Analysis Of Junior High School Students' Mathematics Literacy On Statistics Material Using The Discovery Learning Model

Tohonan Kristina Butarbutar [1], Wardono[2], Schosatika Mariani[3], Masrukan[4], Bambang Eko Susilo[5]

[1,2,3,4,5,6]Department of Mathematics Education, Faculty of Mathematics and Natural Sciense, Semarang-Indonesia

email correspondence: tohonanbutarbutar311285@students.unnes.ac.id

ABSTRAK

Basic statistical concepts are an important aspect of mathematical literacy because these concepts provide the basis for understanding and solving various types of problems that involve calculating and arranging objects or data in various situations. In reality, students' mathematics literacy at SMP Negeri 2 Porsea is still low. This is caused by various factors, including less effective learning methods and a lack of learning resources appropriate to students' level of difficulty. To prove this, an analysis of the mathematics literacy of students at SMP Negeri 2 was carried out. This research is a descriptive study with a qualitative approach. Sampling or data sources in this research were carried out purposively and the sample size was determined snowballing, the collection technique was triangulation (combination), data analysis was qualitative and the research results emphasized the meaning of generalization. The research results show that students have quite good mathematics skills in several aspects, such as problem solving, use of mathematical tools, and communication skills. However, there is still room for improvement in terms of representation of basic statistical concepts, understanding of using symbols, reasoning abilities, and implementation of mathematics in everyday life.

Keywords: Mathematical Literacy, Statistics

INTRODUCTION

According to Madyaratri et al (2019) mathematical literacy is a person's ability to formulate, apply and interpret mathematics in various contexts. Including the ability to reason mathematically and use concepts, procedures and facts to describe, explain or estimate a phenomenon. There are seven components of ability contained in mathematical literacy, namely (1) communication, (2) mathematization, (3) restating, (4) reasoning and giving reasons, (5) using problem solving strategies, (6) using symbols, formal language and engineering, (7) using mathematical tools. Mathematical literacy is an important skill in students' daily lives. This helps students to become more competent in problem solving, decision making, and understanding the world around them which often involves mathematical concepts, one of which is the concept of statistics.

Statistics is a collection of methods and rules relating to data collection, processing (analysis) and drawing conclusions from data in the form of numbers using certain assumptions. Statistics are very important in everyday life. This can be seen when someone uses statistical tools to predict something (Sangila & Jufri, 2018). Statistics is a science which is a branch of applied mathematics that discusses scientific methods for collecting, organizing, inferring, presenting, analyzing data, and drawing valid conclusions so that the decisions obtained can be accepted (Firmansyah, 2017). In Indonesia, statistics is a mathematics subject in both middle and high school (Hafiyusholeh, 2015).

Students' mathematics achievement at junior high school level is still often low. This can be caused by various factors, including less effective learning methods and a lack of learning resources appropriate to the student's level of difficulty. Mathematics learning at junior high school level is often faced with complex challenges, especially in teaching abstract material such as statistics.

Students often have difficulty understanding basic statistical concepts, which is an important aspect of mathematical literacy.

In line with Nurwahid & Ashar (2022), the results of their research show that low mathematical literacy is caused by several factors, including the learning process is still teacher-centered, the lack of students practicing problem literacy, students having difficulty creating mathematical models from real world problems. According to Murtafiah et al (2021), the results of their research show that there are differences in the decision-making process carried out by students with correct and incorrect problem solving, namely: (1) building ideas, having three vs two solution ideas, formulating and implementing correctly vs. formulate correctly and apply incorrectly; (2) clarify ideas, give reasons for each idea vs. wrong reasons due to calculation errors, interpreting correctly vs. misinterpret; and (3) assessing the reasonableness of an idea, providing a logical reason with one option vs. a logical reason with one option but less certainty. Based on the findings he obtained, he concluded that the creativity of prospective teacher students in developing ideas was still low and their reasoning in expressing and selecting ideas was still weak, causing immature decision making.

The Discovery Learning model in this research provides opportunities for students to be able to play an active role in activities to find their own ideas and derive their own concepts so that students better understand the concepts they have acquired and develop their problem solving abilities. According to Cahyo (2013: 100), the Discovery Learning learning model is a learning method that regulates all teaching so that students gain new knowledge through self-discovered discovery methods. According to Hosnan (2014: 287-288) the Discovery Learning model can help students to improve and improve their skills in solving problems. Kurniasih & Sani (2014: 66-67) also stated that the Discovery Learning model can create a feeling of joy in students, because of the growing sense of investigation and success, students will understand basic concepts and ideas better, encourage students to think and work on their own initiative, Students learn by utilizing various types of learning resources. Meanwhile, the Ministry of Education and Culture (2013) in applying the Discovery Learning model in the classroom, there are procedures that must be implemented in general teaching and learning activities, namely, (1) Stimulation, (2) Problem Statement, (3) Data Collection, (4) Data Processing, (5) Verification, (6) Generalitation. This syntax is a problem-based learning stage that is close to students' minds.

Based on these problems, it is necessary to carry out a deeper investigation regarding the mathematical literacy of students at SMP Negeri 2 Porsea regarding statistics using the Discovery Learning model.

RESEARCH METHODS

This research is a descriptive study with a qualitative approach. Bogdan & Steven (1975) define qualitative research as a research procedure that produces descriptive data in the form of written or spoken words from people and behavior observed from phenomena that occur. Sampling or data sources in this research were carried out purposively and the sample size was determined snowballing, the collection technique was triangulation (combination), data analysis was qualitative and the research results emphasized the meaning of generalization. The results of this research only describe or construct the results of filling out the questionnaire for the mathematical literacy skills of students at SMP Negeri 2 Porsea.

Data analysis was carried out based on the achievement of indicators of mathematical literacy ability to see the level of mathematical literacy that students had achieved. The indicators measured in this research are (1) communication , (2) mathematization , (3) representation , (4) reasoning (5) strategies to solve problems, (6) use operations and symbol language, formal language and technical language, as well as (7) the ability to use mathematical tools. The criteria for seven indicators of mathematical literacy can be seen in Table 1.

Table1. Indicators of Mathematics Literacy

No	Indicator of Mathematical Literacy	Mathematical Literacy Indicator Criteria
1	Communication	a. Students are able to write down what they know in the questions given. b. Students are able to write down what is asked in the questions given.
2	Mathematization	Students are able to write mathematical models according to what is known.
3	Representation	a. Students choose a form of representation to solve the problem. b. Students interpret, translate the form of representation that has been made. c. Students are able to use the form of representation that has been created.
4	Reasoning	a. Students make conclusions from the results obtained. b. Students provide reasons or evidence for the conclusions from the results obtained.
5	Strategies to solve problems	a. Students choose the strategy used to solve the problem. b. Students develop strategies and steps to solve the problem.
6	Use operations and symbol language,	a. Students are able to use mathematical calculation operations (addition, subtraction, multiplication and division) correctly. b. Students are able to use mathematical language that is appropriate to the problem.
7	The ability to use mathematical tools	Students are able to use mathematical tools and apply them to problems.

Data was also collected using student interviews. The interviews confirmed the level of basic mathematics education achieved by the students. The triangulation used in this research is technical triangulation based on the results of tests and interviews conducted in this research.

RESULTS AND DISCUSSION
Result
esults of analysis of mathematical literacy of students at SMP Negeri 2 Porsea. demonstrate varying levels of understanding and ability in various aspects of mathematics. For more details, see Figure 1.1.
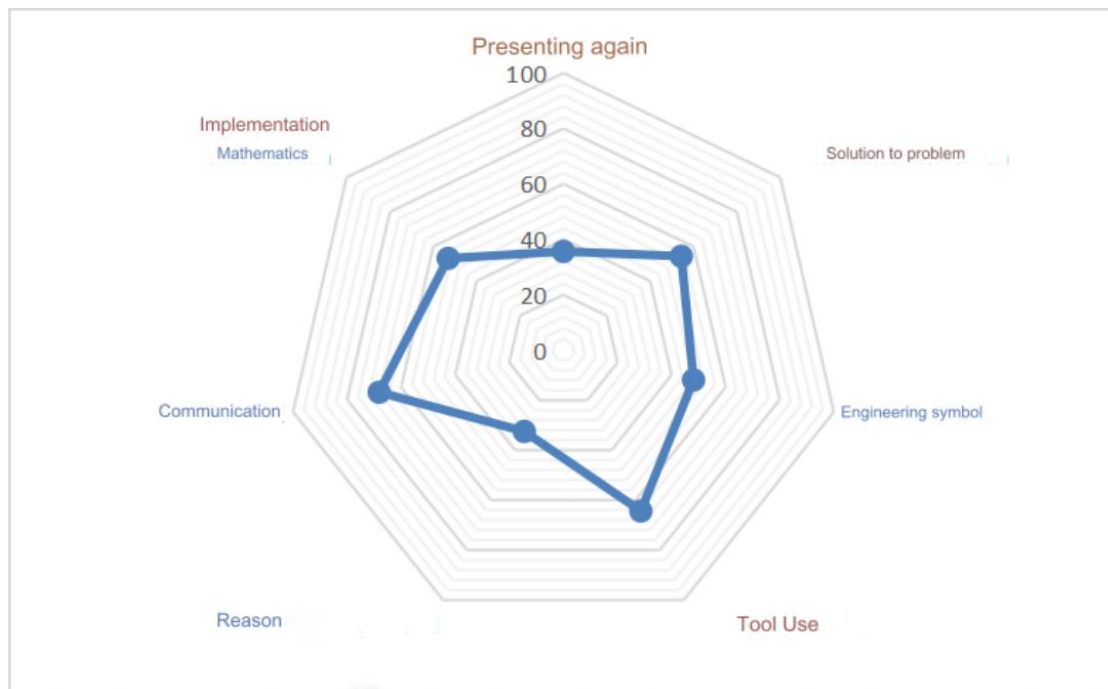
Figure 1.1 Student Mathematical Literacy

Based on Figure 1.1, it shows that students' ability to re-present mathematical objects and situations has a score of 36 with poor criteria. This shows that students' ability to explain or re-describe a mathematical concept or certain mathematical situations is still low and needs to be improved. They have difficulty understanding and applying the concept of composite average. Meanwhile, according to Edo et al (2022), their research shows the ability to understand mathematical concepts in terms of learning style, namely (a) students with a visual learning style are able to carry out all indicators well and have an average of 70.23% at high criteria; (b) students with an auditory learning style got an average of 63.09 which was in the medium criteria for the three indicators of concept understanding (c) Students with a kinesthetic learning style had an average score of 65.27 for the three indicators of concept understanding. (2) Factors that influence the ability to understand mathematical concepts in terms of learning style include lack of accuracy in writing fractions, errors in shading and confusion in writing fractions.

The problem solving carried out by students in statistics material had a score of 54 with sufficient criteria (Fig. 1.1). This shows that students have sufficient abilities in solving problems, such as the ability to identify mathematical problems, formulate problem solving strategies, and find the right solution. Even though they don't reach a good level, they are able to handle most of the given problems well. Meanwhile, Yunaeti et al 2021) argue that the mathematical problem solving abilities of trigonometry comparison material of students with visual, auditory and kinesthetic learning styles have the ability to convey verbal arguments, identify facts, carry out calculations in solving problems, compare answers obtained with other calculations, and choose the right strategy after trying other strategies.

Students' ability to use mathematical engineering symbols has a score of 48 with sufficient criteria (Fig. 1.1). This shows that students' level of understanding of mathematical symbols is considered sufficient, such as using average symbols, often symbolized by the sign "," is the average of two or more separate groups, and is determined by calculating the average of each group and then combining the results. As for students' difficulties in using symbols, according to Fajri & Iwan

(2018) that students often make mistakes in interpreting language, the causes of errors are in the form of students misinterpreting symbols into mathematical language,

The use of mathematical tools in statistics material has a score of 64 with good criteria (Fig. 1.1). This shows that students have good abilities in using mathematical tools, such as the ability to use mathematical tools, such as calculators, computers, graphs, or tables, to assist in solving mathematical problems. As is the case with research conducted by Yaqin & Maulana (2022) that the use of a mathematical logarithm ladder can provide students with understanding in finding logarithm values which usually seem difficult and to make it easier for teachers to explain concretely about logarithm material. The benefit of the mathematical logarithm ladder tool is to make it easier for students to understand the concept of logarithms and not have difficulty with the exponents contained in the logarithm material.

The student's ability to reason and provide explanations has a score of 33 with poor criteria (Fig. 1.1). This shows that students' reasoning abilities are still low in basic mathematical concepts. There are several factors that can cause students' low reasoning abilities in mathematics. Some of them include: 1) Lack of understanding of basic concepts: often, students face difficulties in mathematics because they do not have a strong understanding of basic concepts. This can be caused by ineffective teaching methods or a lack of support in understanding more complex mathematical concepts due to a weak foundation. 2) Lack of practice: math skills require regular practice. Students who do not practice enough in solving math problems may experience difficulty in developing their reasoning abilities. It is important to remember that reasoning skills in mathematics can be improved with the right effort, good support, and an effective learning approach. Students need to be given opportunities to overcome their difficulties and strengthen their mathematical foundations. In line with Wahyuni et al (2022), subjects with high mathematical abilities are able to complete the four indicators of the analogical reasoning stages well, namely encoding, inferring, mapping and applying.

Mathematical communication ability has a score of 68 with good criteria (Fig. 1.1). This shows that students have good mathematical communication skills, such as the ability to communicate ideas, results and solve mathematical problems clearly and effectively through writing or orally. They are able to explain mathematical problem solving clearly and can communicate effectively in a mathematical context. Meanwhile, the research results of Riswandha & Sumardi (2020) show that mathematical communication skills, students' perceptions of mathematics subjects, and students' learning independence have a significant effect on mathematics learning achievement both partially and simultaneously. Mathematical communication ability is the factor that makes the most dominant contribution among the factors of mathematical communication ability, student perceptions of mathematics subjects, and student learning independence towards mathematics learning achievement.

The implementation of mathematics in students' daily lives has a score of 53 with sufficient criteria (Fig. 1.1). This shows that students have sufficient ability to implement mathematics in everyday life, such as financial planning, measurement, or solving everyday problems. Even though they can relate mathematics to real situations, there is still room for improvement. In line with Wulandari et al (2020) that students' application of daily mathematics learning is very useful. However, students' understanding of mathematics learning which is very necessary in everyday life is still very minimal.

Discussion

The increase in students' mathematical literacy is caused by several factors. One of them is different learning steps. Problem-based teaching is an effective approach to teaching higher order thinking processes. This learning helps students to process ready-made information in their minds and construct their own knowledge about the social world and their surroundings. This learning is suitable for developing basic and complex knowledge. Discovery Learning has student-centered characteristics, designed based on real problems that encourage students to build a rich understanding of contextual mathematical concepts through a series of constructive questions. The Discovery Learning learning model is a student-centered learning process, while before the implementation of Discovery Learning educators still used a learning process that was only teacher-centered.

CONCLUSIONS

The general conclusion is that students have quite good mathematical skills in several aspects, such as problem solving, use of mathematical tools, and communication skills using a discovery learning model which has student-centered characteristics, designed based on real problems that encourage students to build a rich understanding of concepts. contextual mathematics through a series of constructive questions. However, there is still room for improvement in terms of the representation of basic statistical concepts in calculating combined averages, understanding in using symbols, reasoning abilities, and the implementation of mathematics in everyday life. Efforts are needed to implement digital technology integrated into LKPD to increase understanding and skills in aspects that are lacking in mathematical literacy.

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