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Student's Mathematic Representation ability on Associated Materials in First Middle School

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ABSTRACT

The purpose of this study was to determine the level of mathematical expression ability of Level VII SMP Pembangunan Perbaungan students to solve problems related to typesetting materials through the Realistic Education Method (PMR). Mathematical representational competence is a student's ability to communicate ideas that arise from the student's way of thinking and are used to facilitate problem solving. This study focuses on the ability of visual representations, representations of mathematical equations or expressions, and representations of written or written text in solving problems related to specific materials.

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INTRODUCTION

In science education students' representational abilities must be instilled and cultivated from an early age, especially in mathematics. Student representations are ideas expressed from the student's mindset on a problem that is used to make it easier to solve the problem. The representation includes symbols, equations, words, pictures, tables, graphics, manipulative objects and actions. Representations can help students in terms of describing, explaining or expanding the main ideas on the problems encountered in mathematics lessons. According to Jonel and Knuth (in Syafri, FS 2017) representation is a form or substitute model of a problem situation that is used to find solutions to problems. Such as the representation of objects, pictures, words or mathematical symbols. Deswantari, E., Setyadi, D., & Mampouw , HL (2020) also stated that representation is a person's main foundation in understanding and conveying mathematical ideas. Representation is related to two things, namely process and product.

Mathematical abilities are very diverse. There are five mathematical abilities that must be mastered by students in the mathematics learning process according to NCTM (in Viyani et al., 2022) , namely: (1) problem solving abilities, (2) reasoning and proof abilities, (3) mathematical communication skills (communication), (4) mathematical connection skills (connection), and (5) mathematical representation skills (representation). However, mathematical representation is a very important ability to be developed because it is used as a basis in learning mathematics. This statement is in accordance with the NCTM (in Daneshamooz, S., and Alamolhodaei, H. 2012) which states that representation is a special ability that is indispensable in learning mathematics.

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Hudiono (in Aryanti, D., & Nursangaji, A. 2013) states that "representational abilities can support students in understanding the concepts that exist in learning mathematics; to communicate students' mathematical ideas; or apply mathematics to realistic problems.

Mathematical representation is also included in one of the cognitive abilities that affect students' mathematics learning outcomes. This is consistent with the study by Puspandari et al. (2019), which states that mathematical representation ability directly or indirectly contributes significantly to 9.42% of mathematics academic performance. Thus, mathematical performance or learning outcomes are determined by the ability to represent mathematically. In addition, the ability to express is also closely related to the ability of students to solve the problems they face. With high presentation skills, students will find it very easy to use problem solving to solve the problems they will face in the exam. Jones (in Santia, 2015) proposes that problem solving depends on one's ability to think in different representational systems during problem solving. Therefore, the ability of mathematical expression may be one of the factors that lead to students' poor mathematics achievement.

The Perbaungan Development Private Junior High School is one of the schools that for the last two years has obtained unsatisfactory National Examination scores. In 2016, the Perbaungan Development Junior High School obtained the National Examination score with an average of 32.73 consisting of the lowest score of 17.50 and the highest score of 47.50. The results of these achievements made researchers interested in making this school a place of research. The subjects chosen were grade VII students because the researcher wanted to know the mathematical representation ability of students at the Perbaungan Development Junior High School. The success of students can be influenced, one of which is the success of their learning (Hidayat, 2000, 2022).

Another way to improve students' mathematical expression is through real-world math (PMR) instruction. The course starts with asking questions based on the student's experience and knowledge level, which is one of the hallmarks of PMR. Through the PMR method, students are expected to develop mathematical expression skills as the given material and the provision of everyday mathematical examples enable students to express problems simply and simply. Learning with the PMR method starts with the real thing, so students can engage directly in meaningful lessons (Suherman, E., Irvan, I., & Amri, Z. 2021).

Based on the above description, the overall goal of this study is to describe the ability of mathematical representation to solve problems with fixed materials in the seventh grade of Perbaungan Development junior high school students. At the same time, the specific goal is to describe the ability to use visual representations, mathematical equation or expression representations, and written or written text representations when solving set problems.

RESEARCH METHOD

This study employs a qualitative approach that facilitates obtaining detailed data and information to determine the level of mathematical expression of students in solving set-related problems. The study involved 23 seventh-graders, including 9 boys and 14 girls.

The data collection techniques in this study were observation, testing, and recording. Observations are used to obtain information about how the learning process performed when the material was set up. This test is used to obtain representative data of students as they solve specific problems. After the exam, 19 students from Class 7 were selected as the research subjects, and the other 4 students were absent. Then 4 students were selected as respondents under the KKM. Interviews were conducted to gain a deeper understanding of

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the students' mathematical expression skills based on the written test results. While the documentation is used to obtain a list of student names, written test results, and photos of the research implementation.

The data analysis technique used is based on the analysis technique according to Miles and Huberman which includes: (1) data reduction stage, (2) data presentation stage, (3) conclusion drawing stage. Then the validity of the data is done by increasing persistence, triangulation and peer checking through discussion.

RESULTS AND DISCUSSION

Mathematical literacy is a form of a student's ability to express mathematical ideas to solve problems. The manifestations of students' abilities can be words, words, pictures, mathematical symbols, etc. According to Mudzakir (Karunia, 2016), mathematical representation skills include visual representation, representation of mathematical equations or expressions, and representation of written or written text.

1. Visual Performance Ability

Match the visual representational ability of students' responses to question 3. Metrics allow students to represent or describe responses in the form of a Venn diagram.

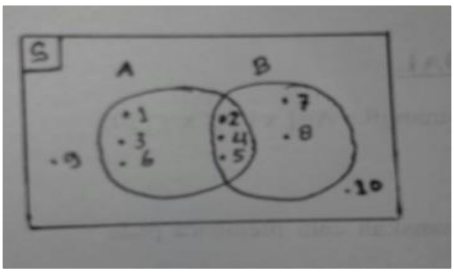

Figure 1. Answers to question number 3

For question 3, only a small fraction can correctly represent the answer in the form of a Venn diagram. Students are still confused about expressing their answers in Venn diagram form. However, there were also some students who answered the question correctly, and I immediately interviewed them to see how the students represented the members of the set in the form of a Venn diagram. According to the results of the interview, the student mentioned that the steps to represent the members of a set in the form of a Venn diagram are as follows: (a) make a rectangle, (b) write the letter S on the upper left side, (c) make two circles, (d)) writes each member of their respective sets and the same members of the two sets are written on the intersection of the circle, while the members that are not included in the members of sets A and B are written on the outside of the circle.

This is one of the students' correct and incorrect answers from question number 3:

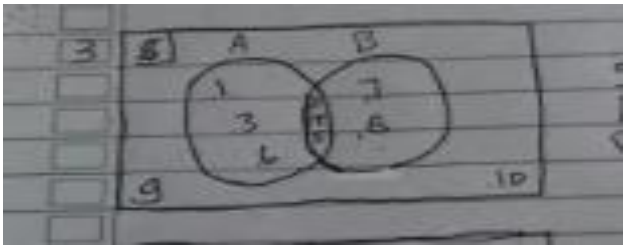

Figure 2. Correct answer

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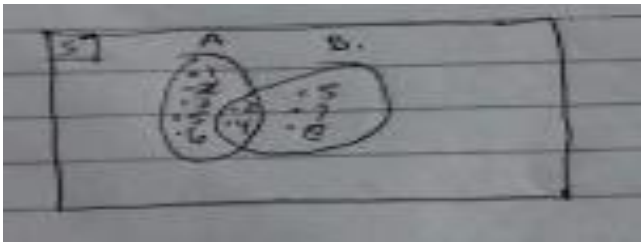

Figure 3. Wrong answer

In question 3, only 6 students got it right and 13 got it wrong. From the interview results, the students who answered the wrong questions found that "all members of group A and group B are included in a circle, indicating that the member is a member of group A and group B". Furthermore, this misunderstanding is caused by students' lack of understanding of the concept of shape and the use of Venn diagrams.

From the results of the test and interview, it can be concluded that the students' visual expression skills are still weak; this can be seen from the results of the students' responses to question 3. Students are unable to visually represent the information in question 3

2. Equation Representation or Mathematical Expression Ability

The ability to represent equations or mathematical expressions can be seen from the results of students' answers to question number 1 with the indicator that students are able to write down the set correctly from other representations given.

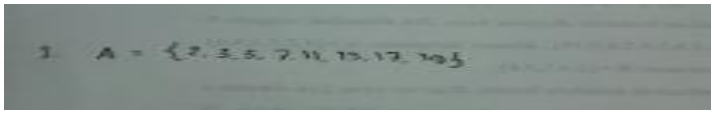

Figure 4. Answer number 1

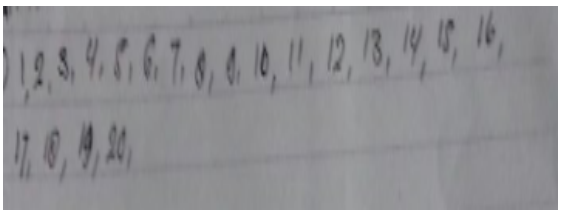

Figure 5. Wrong answer

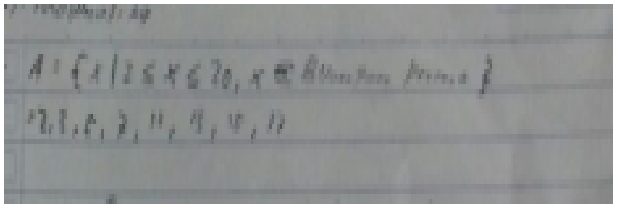

Figure 6. Wrong answer

From the test questions tested on question number 1, none of the students answered correctly. This is because students do not understand about prime numbers. From the results of interviews that researchers got, many students thought that prime numbers were odd numbers; there were also students who said that

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prime numbers start from number one. Thus, I can conclude that the students' ability to represent mathematical equations or expressions is very low.

3. Representation of Words or Written Text

The ability to represent words or written texts can be seen from the results of students' answers in numbers 2a, 2b, and 2c with indicators that students are able to answer in words or written text. Below are the answers from one of the students who answered correctly and one of the students who answered incorrectly on questions number 2a, 2b, and 2c.

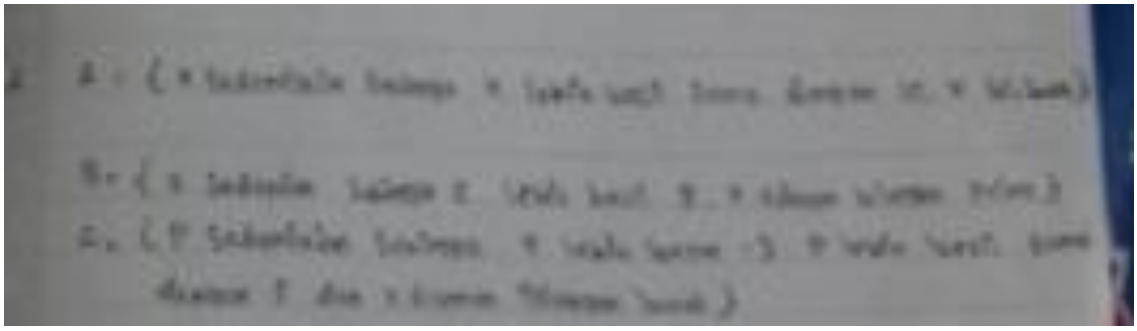

Figure 7. Student's answer is correct

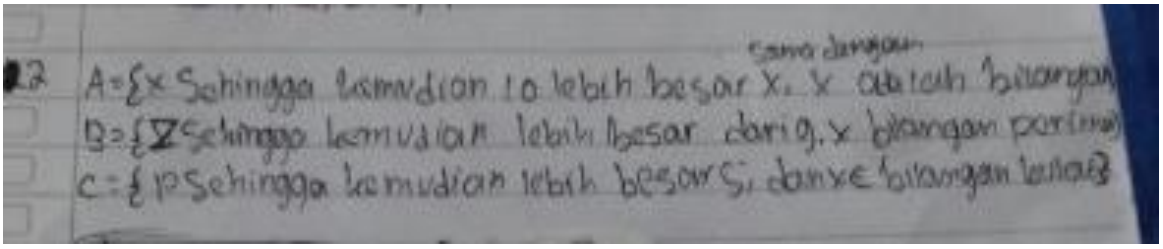

Figure 8. Student's answer is wrong

In question number 2a, a small number of students were able to answer correctly and were able to explain the notation in the question. Based on the results of interviews from students who answered the questions correctly, students could understand how to read the notation on the set. Meanwhile, students who answered the question incorrectly did not understand the notation given on the question. There are some students who read the notation backwards and even some students do not know at all to read the notation on the questions that have been given. From the test results that have been tested, there are 6 students who are able to answer correctly and 13 students who answer incorrectly.

Based on the description above, it can be concluded that their visual representation ability has improved quite a bit from before, but the student's word representation is still very low. In this study, it was found that the level of ability of visual representation, representation of mathematical equations or expressions, and representation of words or written texts is really still very low.

It can be seen in this study that lack of knowledge and understanding of concepts affects students' mathematical expression. This is consistent with Sri, I. and Indriati, HS (2019), this suggests that intelligence has an impact on mathematical representation. Someone who has high intelligence has a mature analogy to

represent a problem. In other words, when someone has good intelligence, he will be able to represent a problem well too. In line with Handayani (2015) which states that in representing a problem, it is certainly related to students' knowledge and understanding of a previously known concept. So when students do not understand a concept, the success of students in representing a problem becomes less precise. Meanwhile, according to Fatqurhohman (2016), representation in mathematics learning can help students build understanding abilities and provide an overview of the extent to which students understand the concept of a mathematical material.

Researchers also see that students' mathematical representations will also determine whether or not the strategies used in solving problems are appropriate. When the representation presented is correct, and then the strategy used to find the answer is also correct. However, when the representation presented is wrong, the strategy and the final answer found also become less precise. This is in accordance with Mustangin (2015) who said that the selection of student representation plays a very important role in making appropriate and accurate mathematical problem solving strategies.

CONCLUSION

Students with good visual performance are those who can answer question 3. Students who are represented by equations or mathematical expressions are students who can answer Question 1. Students who improved their oral or written presentations were those who were able to answer Question 1. But in reality, none of the 19 students answered correctly.

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