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Analysis of Mathematic Communication Skill on Set Operations Reviewed from Mathematics Skill

Anggraini Anggraini[1*], Baharuddin Baharuddin[1], Pathuddin Pathuddin[1], Novita Haerani[1], Gandung Sugita[1], I Nyoman Murdiana[1]

[1]*Faculty of Teacher Training and Education Tadulako University Palu, Indonesia*
**Corresponding author. Email :anggiplw67@gmail.com*

ABSTRACT

Mathematical communication skills of SMP Negeri 3 Tolitoli students on set operations material in terms of mathematical ability. This type of research is qualitative research. The subjects of this study were selected based on their mathematical abilities. The subject was given a written test with set operations material and then interviewed. This study uses a triangulation method, namely by comparing the results of written tests and interviews. The results of this study are (1) Subjects with high mathematical abilities achieve three indicators of mathematical communication skills in set operations, namely being able to express mathematical ideas through oral and written; able to interpret and evaluate mathematical ideas both orally and in writing; and able to use terms, mathematical symbols to model mathematical situations or problems. (2) Subjects with moderate mathematical ability achieved two indicators of mathematical communication skills on set operations, namely being able to express mathematical ideas only through writing, and being able to interpret and evaluate mathematical ideas orally and in writing. (3) Subjects with low mathematical ability achieved one indicator of mathematical communication skills on set operations, namely expressing mathematical ideas in writing.

Keywords : *Mathematic Communication Skill, Operations Reviewed*

1. INTRODUCTION

In the process of learning mathematics in addition to solving problems students are also required to communicate by re-explaining the mathematical ideas. This is in line with what was stated by Arifin that in learning mathematics a student who already has the ability to understand mathematics is also required to be able to communicate it, so that understanding can be understood by others [1]. Communication is a process enabling us to understand others dan enabling others to understand us [2]. By communicating mathematical ideas to others, a student can improve their mathematical understanding. Further explained by NCTM, that there are five basic mathematical abilities that are standard, namely problem solving, reasoning and proof, communication, connection, and representation. This shows that mathematical communication skills play an important role in learning mathematics [3]. Mathematical communication skills are needed in understanding and solving mathematical problems. Furthermore, Maya explains that mathematical communication skills are basic abilities that students must have in learning mathematics [4].

Based on the results of interviews conducted by researchers with one of the mathematics teachers at SMP Negeri 3 Tolitoli, in the set material there are still many students who are not able to use notations on set operations such as combination, intersection, difference, and complement. If students are given questions that contain more than one set operation, then many students make mistakes in using the notation. In line with this problem, Yenni stated that students' communication skills are still far from expectations. Most students are still oriented to be able to work on problems without the need to interpret them [5]. The teacher further explained that students' abilities vary depending on their mathematical abilities.

Greenes and Schulman which states that mathematical communication is: 1) a central force for students in formulating mathematical concepts and strategies; 2) success capital for students towards approaches and solutions in mathematical exploration and investigation; 3) a forum for students to communicate with their friends to obtain information, share thoughts and discoveries, brainstorm, assess and sharpen ideas to convince others [6]. Mathematical communication ability is an ability where students convey something they know through dialogue or interconnected events that occur in the classroom environment, where there is a transfer of delivery of messages containing the mathematical material that students are studying, for example in the form of concepts, formulas, or strategies for solving a problem, how to The transfer of the message can be done verbally or in writing [7]. Meanwhile, according to NCTM

communication is an essential part of mathematics and mathematics education.

The inability to understand basic mathematics concepts may hinder the understanding of other concepts or subjects [8]. In general, mathematical ability is the ability that students have in mathematics [9]. Life-skills-training positively effects on problem-solving, effective communication [10]. According to Hudojo, mathematical ability is the ability of knowledge about the structure and its relationships, symbols are very necessary, because symbols are important to help manipulate rules with the operations applied [12]. When studying, each student has different abilities. The difference in ability has an impact on students' differences in understanding a mathematical concept and solving mathematical problems [13]. Based on the description above, mathematical ability is the ability of students to solve mathematical problems and affect learning outcomes which are divided into three levels, namely high, medium, and low. This study aims to obtain a description of the mathematical communication skills of students of SMP Negeri 3 Tolitoli on set operations material in terms of mathematical ability.

2. METHODS

This study uses a qualitative approach. The subjects in this study were 3 students of class VIIA with one student with high math ability, one student with medium math ability, and one student with low math ability. The level of ability is seen from the midterm test scores and grouped based on Arikunto's theory, namely by using mathematical ability category or value (AC), average value ($\bar{x}$) and standard deviation (SD) of students' midterm tests [14]. The criteria are as follows:

$AC > \bar{x} + SD$: high math ability category

$\bar{x} - SD \leqslant AC \leqslant \bar{x} + SD$: medium math ability category

$AC < \bar{x} - SD$: low math ability category

Data collection techniques in the study used set operation tests and interviews. Testing the credibility of the data using a triangulation method by comparing the results of written tests and interviews, and data analysis refers to the analysis according to Miles and Huberman namely data reduction, data presentation, and drawing conclusions [15].

3. RESEARCH RESULT

Based on the calculation results, the average ($\bar{x}$) is 51.4 and the standard deviation (SD) is 17.4. Furthermore, obtained $AC > 68.8$ for high mathematical ability, $34 \leq AC \leq 68{,}8$ for moderate mathematical ability, and $AC < 34$ for low mathematical ability.

TABLE 1. STUDENT'S MATHEMATICAL ABILITY LEVEL

No.	Ability Category	Total Students
1.	High Mathematical Ability	5
2.	Medium Mathematical Ability	20
3.	Low Mathematical Ability	7

Based on Table 1, it is found that there are 5 students with high math ability, 20 students with moderate math ability, and 7 students with low math ability. From each level of mathematical ability, one student will be selected to be the subject of research. The selected research subjects are presented in Table 2.

Table 2. Reaserch Subject

No.	Ability Category	Subject Code
1.	High Mathematical Ability	NJ
2.	Medium Mathematical Ability	FL
3.	Low Mathematical Ability	MA

The selection is based on the highest score for the subject with high mathematical ability, then there is more than one student who gets the highest score, the researcher asks for consideration from the teacher to get students who are willing and communicative. The same way is done to select subjects with medium and low ability.

After selecting the research subjects, data was collected by providing research instruments that had been validated to each subject to obtain data on students' mathematical communication skills.

After collecting data, the results of the research will be presented. The data are data from subjects with high, medium, and low mathematical abilities. The presentation is described according to the indicators of mathematical communication skills, namely the ability to express mathematical ideas through oral and written, the ability to interpret mathematical ideas both orally and in writing, the ability to use terms, mathematical symbols to model mathematical problems.

Based on the discussion, it can be concluded that the mathematical communication skills of students with high mathematical abilities are good. Students with high mathematical communication skills can achieve all indicators of mathematical communication skills. Students with moderate mathematical ability can achieve two indicators of mathematical communication skills and have not achieved indicators of using mathematical terms, mathematical symbols to model mathematical situations or problems. Students with low mathematical abilities have low mathematical communication skills as well. Students with low mathematical abilities are only able to achieve indicators of expressing mathematical ideas verbally, but not yet perfect. While the other two indicators are not able

to be achieved by students with low mathematical abilities.

4. CONCLUSION

The higher the students's mathematical ability, the higher their communication skills. Subjects with high mathematical abilities achieve three indicators of mathematical communication skills in set operations, subjects with moderate mathematical ability achieved two indicators of mathematical communication skills on set operations, subjects with low mathematical ability achieved one indicator of mathematical communication skills on set operations. Students are expected to be more active in doing practice questions, especially those related to mathematical communication skills, considering the importance of the role of mathematical communication skills in learning mathematics. Teachers are expected to pay more attention to materials related to mathematical communication during learning so that mathematical communication skills can be developed. In future research, it is hoped that researchers will conduct research on students' mathematical communication skills with their friends in class.

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