Analyze the Mathematical Communication Ability of Junior High School in Rectangular Materials

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Abstract. This aims to analyze the mathematical communication ability of junior high school in rectangular materials. Sample of research is 5 students of class VII which is taken random in one of junior high school in Bekasi. The type of research used is descriptive qualitatif research. The instrument used is a test of mathematical communication skills in the form 5 items essay question. The test result that have been done on some mathematical communication skills is still show below average result. So, it can be concluded that the level of student’s mathematical communication ability is still relatively low. As for the student’s difficulties in solved the problem of mathematical communication ability for indicators of making conjectures, compiling arguments, formulating definitions and generalizations, and indicators re-describe a paragraph of mathematical problem in their own language.

Keywords: Analyze, Mathematical Communication Ability, Rectangular Materials

1. Introduction
Mathematics is an universal science that underlies progress of modern technology, has an important role in various discipline and shows the power of human thought. Mathematics needs to be given to all students start from elementary school to equip students with the ability to think logically, analytical, systematic, critical and creative as well as the ability to cooperate (BNSP, 2006). The statement gives the meaning that the importance of mathematics is mathematics learning included in all levels of education in Indonesia from elementary school to college.
Based Permendiknas statement that communication skills is one of the competencies that must be developed in mathematics learning. Through mathematical communication, students can express mathematical ideas both verbally and in writing during the mathematics learning process. Baroody (1993) stated that at least there are two important reasons why communication in mathematics learning needs to be developed at school. The first reason is that mathematics is not only a thinking, shape finding, problem solving, and decision taking tools, but mathematics is also a tool to communicate various ideas clearly, appropriately, and briefly. Second reason is that mathematics is some kind of social activity in learning.

NCTM (2000) states that communication in good mathematics learning must support students to: 1) Organize and support mathematical ways of thinking, encourage learning new concepts by thinking objects, using diagrams, writing and using mathematical symbols, 2) Communicate mathematical conversations logically and clearly so that they are easily understood, 3) Analyze and Measure mathematics and strategies used by others, and 4) Use the language of mathematics to launch mathematical ideas correctly.

There are several indicators of mathematical communication ability such as: a) expressing ideas or opinions, situations and mathematic relations both orally and in writing, and describing them visually in the form of real objects, images, graphs, and algebraic expressions; b) represents real objects, images, and diagrams in the form of mathematic ideas and / or mathematic symbols; c) declare or create mathematical models of daily events or other mathematic problems in the language of mathematical symbols, terms, and structures; d) construct conjectures, arguments, formulate definitions and generalizations; e) reexpress a mathematical description or paragraph in her/his own language (sumber Sumarno). As in this research used some indicators of mathematical communication as follow: 1) state a situation, diagram, or real object in the form of a mathematical model, 2) state a daily problems into mathematical languages and symbols, 3) express a mathematical idea in the form of an image, 4) making conjectures, compiling arguments, formulating definitions and generalizations, and 5) re-describe a paragraph of mathematical problem in their own language.

2. Method
The type of this research is descriptive. The purpose of the research is to identify which aspects of the communication skills in rectangular materials. The subjects of the research were five students of 7th grade in one of junior high school in Bengkulu. The instrument used is a test of mathematical communication ability in the form 5 items essay question. Data processing techniques to score students' mathematical communication skills according to Sumarmo (2016: 2)
Table 1. Guidelines Scoring Mathematical Communication Ability

<table>
<thead>
<tr>
<th>Score</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Complete response and clear, no doubt, a complete diagram, efficient communication, logical dish, accompanied by examples.</td>
</tr>
<tr>
<td>3</td>
<td>The response is correct, complete and clear, complete diagram, efficient communication, and complete presentation but not accompanied by examples.</td>
</tr>
<tr>
<td>2</td>
<td>Response is correct, complete and clear, complete diagram, communication and presentation are incomplete and not accompanied by examples</td>
</tr>
<tr>
<td>1</td>
<td>The response is correct but not complete / clear, the diagram, communication and presentation are incomplete, not accompanied by no examples.</td>
</tr>
<tr>
<td>0</td>
<td>Response, inefficient communication, misinterpretation (no answer / blank student answer sheet)</td>
</tr>
</tbody>
</table>

Table 2. Categories of Achievement of Mathematical Communication Skills

<table>
<thead>
<tr>
<th>Score Test</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>X ≥ 66%</td>
<td>High</td>
</tr>
<tr>
<td>33% ≤ X &lt; 66%</td>
<td>Medium</td>
</tr>
<tr>
<td>X &lt; 33%</td>
<td>Low</td>
</tr>
</tbody>
</table>

Adaptation from Wijayanto (2018)
3. Results And Discussion

Table 3 below represents the frequency distribution of scores achievement of mathematical communication ability.

<table>
<thead>
<tr>
<th>Student Code</th>
<th>Question Number 1</th>
<th>Question Number 2</th>
<th>Question Number 3</th>
<th>Question Number 4</th>
<th>Question Number 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS01</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>SS02</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SS03</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>SS04</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>SS05</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Based on the results, we can see that question number 1 has percentage of 70% with high criteria for indicator state a situation, diagram, or real object in the form of a mathematical model. Question number 2 has percentage of 50% with medium criteria for indicator state a daily problems into mathematical languages and symbols. Item 3 has percentage of 65% with medium criteria for indicator express a mathematical idea in the form of an image. Item 4 has percentage of 25% with low criteria for indicator making conjectures, compiling arguments, formulating definitions and generalizations, and the last item has percentage of 15% where the criteria are low for indicator re-describe a paragraph of mathematical problem in their own language.

The following is a display of questions and answers to students who have experienced errors. Question number 1. A rhombus has a diagonal of each 8 cm and 6 cm. Calculate the area and circumference!
Figure 1. The answer is correct, but the students do not understand the meaning of 5 cm and the formula of the circumference is less true.

From figure 1 we can see that the answer is correct but student can't understand CD. Student should be make a rhombus first for understand what the CD is. On the circumference, student should be formula too before write the answer.

Question number 2. Rasya wants to make a kite with diagonals of 50 cm and 40 cm. If Rasya has square oil paper with an area of 9000 cm². How many kites can be made from the paper? How much money does Rasya get if the kite is sold for Rp. 5,000.00 per piece?

Figure 2. Students only miscalculate

From figure 2 we can see that the answer wrong, but student have understood the question and use the formula correctly. On this answer students was careless.
Question number 3. Draw a kite and its size. Calculate the area and circumference!

![Figure 3. Students misconcept](image)

From figure 3, we can see, students use the formula correctly but must be careful because student write the side length of the kite is different in each side. Even though kite has two pairs of opposite sides of the same length.

Question number 4. Consider the following picture!

![Diagram of Mr. Teuku's house yard](image)

Mr. Teuku's house yard is in a right-angled trapezium. The yard will be made by swimming pool in the form of a rectangle. The shaded part is the part of the yard that will be used as a park. Write down the steps to find out the size of Mr. Teuku's house yard that will be made!
Figure 4. Students use the wrong formula

From figure 4, we can see that students use the wrong formula for area’s trapezium. The true formula is............................Students do not understand trapezium.

Question number 5. Mama Risa is a batik entrepreneur who wants to expand her business by buying land in the Bantul area. He found land (eg PQRS) with a size, the distance of point P to point Q is 30m, distance Q to R is not known, distance of point R to point S is 15m, and distance S to point P is 10m. Elbows at the corner of P and S. The price of land to be purchased is Rp. 500,000.00/m². If mama Risa has money of IDR 150,000,000.00.

a. Sketch a picture of the situation and explain Flat is formed?
b. Complete it into a mathematical model to find out whether Mama Risa’s money is enough to buy the land?

Figure 5. Student do not understand the question.
From figure 5 students only make a right-angled trapezium and the area’s formula is wrong. On the question this, student do not understand the question, so that students can’t answer the question.

4. Conclusion
As conclusion, it was found that students’ mathematical communication ability are still relatively low. This can be seen from the questions tested, there are two questions of the two indicators of mathematical communication ability whose percentages are below 33%. As for the student’s difficulties in solved the problem of mathematical communication ability for indicators of making conjectures, compiling arguments, formulating definitions and generalizations, and indicators re-describe a paragraph of mathematical problem in their own language.

5. References