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ANALYSIS OF MATHEMATICAL COMMUNICATION SKILLS OF JUNIOR HIGH SCHOOL STUDENTS OF COASTAL KOLAKA

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Abstract

Mathematical Communication Skills (MCS) of Junior High School students in General is still very lacking. Does it happen to students coming from the coast? The purpose of this research is to identify and analyze the Mathematical Communication Skills of junior high school students of Kolaka Regency. The data in this research is the data of test result of students' Mathematical Communication Skills and interview result. The instrument used is a description test. The results of analysis of Mathematical Communication Skills of coastal students in Kolaka regency as a whole is still categorized low and for each of the three indicators are also categorized as low. Three KKM indicators of students, if ranked from the lowest acquisition respectively is the ability indicators Com3, the ability Com1, then Com2.

Keywords: Mathematical Communication Skills, coastal, kolaka

A. Introduction

National Council of Teacher of Matematics (NCTM) (2000) states the five stressed process standards namely, problem solving, reasoning and proof, communication, connections, and representation. This is also supported by the learning objectives stated in the Education Unit Level Curriculum (KTSP), that the expected ability of students are able to: (1) understand the mathematical concepts explaining the interrelationship between concepts and apply the concept or algorithm, flexibly, accurately, efficiently, and right in troubleshooting; (2) using reasoning in patterns and traits, performing Mathematical manipulations in generalizing, compiling evidence, or explaining Mathematical ideas and statements; (3) solve problems that include the ability to understand problems, design mathematical models, solve models and interpret the solutions obtained; (4) communicate ideas with symbols, tables, diagrams, or other media to clarify circumstances or problems; (5) has an attitude of appreciating the usefulness of natural life mathematics, that is having curiosity, attention, and interest in learning Mathematics as well as resilience and confidence in problem solving (MoNE, 2006).

One of the abilities must be developed in the students is the Mathematical Communication Skills (MCS), students are expected to communicate the idea either in the form of symbols, tables, diagrams, or other media to clarify the circumstances or problems around him.

Weigand (1999), communication is an important part of Mathematics education as a means to exchange ideas and tools to clarify understanding. In addition, learning mathematics in the classroom should help students to communicate their ideas. The ability of mathematical communication should be developed as described by Baroody (1993) that there are at least two important reasons why communication in learning mathematics should be developed in students, namely: (1) mathematics is essentially a language; Mathematics is not just a thinking

tool, a tool for finding patterns, solving problems, or making conclusions; math is also an infinite tool of value for communicating ideas clearly, precisely and concisely; (2) mathematics and mathematics learning are, at heart, social activities; as a social activity in learning mathematics interactions between students, such as communication between teachers and students, is essential to develop students' Mathematical potential.

Given the importance of mathematical communication skills for students should be a major concern for teachers. Various research results that have been existing, one of the results of Trends in International Mathematics Science Study (TIMSS) 2011 for grade VIII students placed Indonesia at the rank of 36 out of 48 countries and the results of the 2009 Program for International Student Assessment (PISA) for grade VIII students placed Indonesia at the ranked 52 out of 65 countries. This fact is very alarming for our education in the homeland, it shows that students' mathematics achievement, especially in junior high school is still very low.

Kadir's research (2009) concluded that MCA for junior high school students in the coastal district of Buton is still low both in terms of school ratings and learning models, especially in making mathematical models. These facts show that students' MCA is still a problem and needs to be researched and analyzed in depth on things that are still very weak and must be followed up. This study aims to identify and analyze the mathematical communication skills of junior high school students in Kolaka District.

B. Literature Review

Mathematical Communication Skill

Communication is very important in the middle of social life. In communicating, a person must be able to provide meaning and language that can be understood by the interlocutor, resulting in a good communication and communicative. The meaning of communicative here is that the conversation that occurs between two or more people who interact with each other and understand the contents of the conversation. Hamdani (2009) states that the communication process also builds the meaning and robustness of the idea. When students are challenged to think and reason about mathematics and communicate the results to others verbally or in writing, they learn to become more understanding and more confident.

The role of communication is very important in social life, culture, education and politics. For that, it needs effort and attention to communication. When a person is able to communicate things communicatively, then it is a good capital in behaving, behaving towards others and able to cooperate with others in doing an innovation.

NCTM (2000) explained that communication is an essential part of mathematics and mathematics education. This implies the importance of communication in learning mathematics. Furthermore, this communication is one of the five process standards emphasized in NCTM (2000), namely problem solving, reasoning and proof, communication, connections, and representation. The Ontario Curriculum Grades1-8 (2005) states that communication is the process of expressing mathematical ideas and understanding orally, visually, and in writing, using numbers, symbols, images, graphs, diagrams, and words.

Communication skills are essential in mathematics learning. Syaban (2008) states that students learn math, students actually talk and write about what they do. In addition, students are actively involved in mathematics when students are asked to think through their ideas, talk and listen to other students in ideas, strategies and solutions. While Schoen et al. in Ansari (2003) suggests that mathematical communication is the ability of students in terms of explaining an algorithm and a unique way to solve problems, the ability of students to construct in explaining the presentation of real-world phenomena graphically, words or sentences, equations, tables, and serving physically. While Greenes and Schulman in Ansari (2003) stated that mathematical communication is: (1) expressing mathematical ideas through speech, writing, demonstration, and painting them visually in different types; (2) understand, interpret and evaluate ideas presented in written, spoken or in visual form; (3) construct, interpret, and relate various representations of ideas and relationships.

TIPS4RM (2005) states that "Communication is the process of expressing ideas and mathematical understanding using numbers, pictures, and words, within a variety of audiences including the teacher, a peer, a group, or the class". Stating that communication is the process of pouring ideas and mathematical understanding by using numbers, pictures, and words, to various people including teachers, associates, groups, or classes. While Kadir (2010) states that the mathematical communication of students can be known after the scoring of students' ability in answering mathematical communication problems. Furthermore, the scoring of students 'Mathematical Communication Skills (MCS) is based on the students' effectiveness, accuracy,

and accuracy in using mathematical languages such as models, symbols, signs and / or representations to explain operations, concepts, and processes.

Sulivan and Mousley in Hulukati (2005) argue that CMA is not just an idea but broader, that is part of the students' ability to express, explain, describe, hear, and cooperate. Meanwhile, Asikin (2000) explains that the role of communication in learning mathematics is: (1) with the communication of mathematical ideas can be exploited in various perspectives, help to sharpen students 'thinking and sharpen students' ability in viewing various interrelations Matematic material; (2) communication is a tool to "measure" the growth of understanding and reflect students' mathematical understanding; (3) through communication, students can organize and consolidate their Mathematical thoughts; (4) communication between students in Mathematical learning is essential to: construct their knowledge, develop problem solving and increase reasoning, foster self-esteem, and improve social skills; (5) "writing and talking" can be a very meaningful tool (powerfull) to form an inclusive mathematical community.

According to Baroody (1993) that there are five aspects of mathematical communication, namely representating, listening, reading, discussing, and writing. There are several indicators of mathematical communication according to NCTM (1989) namely (1) the ability to express mathematical ideas orally or written, demonstrate and visualize it; (2) the ability to understand, interpret, and evaluate mathematical ideas either orally, in writing, or in other visual forms; (3) the ability to use terms, mathematical notations and structures to present ideas, describe relationships with situational models.

C. Methodology

The method used in this research is descriptive method. The subjects of the study were VIII Coastal Junior High School of Kolaka District in the even semester of the academic year 2016/2017. The data collection technique in this study using two ways namely test and interview techniques. The research instrument used was a test of Mathematical Communication Skills in the form of a description problem that had been tested for its validity and reliability. There were some statistical tools used for data analysis in this research i.e mean (average), mode, median, variance, and standard deviation.

D. Finding and Discussion

1. Findings

The Mathematical Communication Skills studied consists of three indicators: drawing ability, including the ability to state a situation or mathematical ideas in the form of tables or drawings (Com1); ability to create mathematical expressions, including the ability to state situations, tables or images into language, symbols, ideas, or mathematical models (Com2); and the ability to explain ideas, situations, and mathematical relations in writing and revisit a description or a mathematical paragraph in its own language (Com3). Based on the research data obtained results as follows.

Data from the test result of Mathematical Communication Skills of coastal student of kolaka district can be seen in table 1.

Table 1. Data of Mathematical Communication Skills Test Result

No.	Analysis	Statistic Value
1	N	113
2	Mean	17.05
3	Std. Error of Mean	0.99
4	Median	14.58
5	Mode	6.25
6	Std. Deviation	10.62
7	Variance	112.88
8	Minimum	4.17
9	Maximum	45.83
10	Sum	1927.09

Based on table 1, it can be seen that in general or overall of the three indicators of students' Mathematical Communication Skills of 113 people, the highest score is 45.83 and the lowest is 4.17. While the average value of the total students of 17.04 with median and mode respectively 14.58 and 6.25. Then for the large enough data distribution seen at the variance value of 112.88 with a standard deviation of 10.62.In detail the results of students' Mathematical Communication Skills tests for each value acquisition can be seen in table 2.

Table 2. Breakdown of Test Result Score of Mathematical Communication Skills

No.	Value	Frequency	Percent	Valid Percent	Cumulative Percent
1	4.17	7	6.2	6.2	6.2
2	6.25	22	19.5	19.5	25.7
3	8.33	5	4.4	4.4	30.1
4	10.42	12	10.6	10.6	40.7
5	12.50	8	7.1	7.1	47.8
6	14.58	8	7.1	7.1	54.9
7	16.67	4	3.5	3.5	58.4
8	18.75	4	3.5	3.5	61.9
9	20.83	6	5.3	5.3	67.3
10	22.92	9	8.0	8.0	75.2
11	25.00	2	1.8	1.8	77.0
12	27.08	6	5.3	5.3	82.3
13	29.17	2	1.8	1.8	84.1
14	31.25	7	6.2	6.2	90.3
15	33.33	5	4.4	4.4	94.7
16	37.50	3	2.7	2.7	97.3
17	43.75	1	.9	.9	98.2
18	45.83	2	1.8	1.8	100.0
	Total	113	100.0	100.0	

Based on table 2, it is seen that from 113 test participants the highest score of 45.83 was achieved only by 2 students and the lowest score of 4.27 was 7 students. Then, most students are only able to get a value of 6.25, if 19% or as many as 22 out of 113 students suppress it. For each of the following indicators are presented in full.The result of Mathematical Communication Skills test for Communication Indicator One (Com1) can be seen in table 3 below.

Table 3. Test Results for Indicator Com1

No.	Analysis	Statistic Value
1	N	113
2	Mean	19.62
3	Std. Error of Mean	1.30
4	Median	16.67
5	Mode	16.67
6	Std. Deviation	13.82
7	Variance	190.88
8	Minimum	0.00
9	Maximum	50.00
10	Sum	2216.66

Based on table 3, it can be seen that in the indicator of Mathematical Communication Skills or Communication one (Com1) of 113 students, the highest score is 50.00 and the lowest is very low ie 0.00. While the average value of the total students of 19.616, where the median and mode respectively 16.67 and 16.67. As for the data distribution is quite large seen in the variance value of 190.88 with a standard deviation of 13.82.

Data on the test results of Mathematical Communication Skills for drawing ability, which includes the ability to state a situation or mathematical ideas in the form of a table or picture as an indicator (Com1) on each value obtained from the respondent. Completely presented in table 4 that contains about the many variations of student value in answering the questions that measure the CMA indicator 1.

Table 4. Breakdown of Test Results Score of Indicator of Com1

No	Value	Frequency	Percent	Valid Percent	Cumulative Percent
1	.00	12	10.6	10.6	10.6
2	8.33	27	23.9	23.9	34.5
3	16.67	33	29.2	29.2	63.7
4	25.00	12	10.6	10.6	74.3
5	33.33	15	13.3	13.3	87.6
6	41.67	7	6.2	6.2	93.8
7	50.00	7	6.2	6.2	100.0
	Total	113	100.0	100.0	

Various students' grade score for Com1 is shown in table 4 that of the 113 students who tested, only 2 students achieved the highest score of 50.00 or by 6.2% and the lowest score of 0.00 was 12 students or about 10%. For most students are on the acquisition value of 16.67 as many as 33 students from 113 or 29.2%.The result of Mathematical Communication Skills test for Communication Indicator two (Com2) can be seen in table 5 below.

Table 5. Test Results for MCA Indicator 2

No.	Analysis	Statistic Value
1	N	113
2	Mean	20.43
3	Std. Error of Mean	1.73
4	Median	16.67
5	Mode	0.00
6	Std. Deviation	18.33
7	Variance	336.05
8	Minimum	0.00
9	Maximum	58.33
10	Sum	2308.33

Table 5 shows the test results of Mathematical Communication Skills on Communication indicator two (Com2) that of 113 students, the highest score is 58,33 while the lowest is 0,00. The mean score of the total students was 20.43 and for each median and mode values were 16.67 and 0.00. As for the data distribution is quite large seen at the variance value of 336.05 with a standard deviation of 18.33. The results of Mathematical Communication Skills tests for the ability to create mathematical expressions, including the ability to state situations, tables or images into language, symbols, ideas, or Mathematical models (Com2) on each value acquisition of respondents, are fully presented in table 6 which displays variations in students' value in answering questions for the Com2 indicator.

Table 6. Breakdown of Test Results Score of Indicator Com2

No.	Value	Frequency	Percent	Valid Percent	Cumulative Percent
1	.00	37	32.7	32.7	32.7
2	8.33	10	8.8	8.8	41.6
3	16.67	14	12.4	12.4	54.0
4	25.00	7	6.2	6.2	60.2
5	33.33	21	18.6	18.6	78.8
6	41.67	11	9.7	9.7	88.5
7	50.00	12	10.6	10.6	99.1
8	58.33	1	.9	.9	100.0
	Total	113	100.0	100.0	

Table 6 shows that there are 8 variants of student scores for the Com2 indicator. From the test recorded the highest score of only 58.33 and only 1 student or by 0.9% and the lowest value of 0.00 there are 37 students or about 32.70%. Most students do not answer, i.e there were 37 students from 113 or 32.70%.

The result of Mathematical Communication Skills test for Communication Indicator 3 (Com3) can be seen in table 7 below.

Table 7. Test Results for IndicatorMCA 3

No.	Analysis	Statistic Value
1	N	113
2	Mean	14.09
3	Std. Error of Mean	.99
4	Median	12.50
5	Mode	4.17
6	Std. Deviation	10.48
7	Variance	109.84
8	Minimum	0.00
9	Maximum	41.67
10	Sum	1591.72

Table 7 shows the results of mathematical communication skills test on Communication indicator two (Com3) that of 113 students, the highest score is 44.67, while the lowest is 0,00. The mean score of the entire student is 14.09 and for each median and mode values are 12.50

and 4.17. As for the data distribution is quite large seen in the variance of 109.84 with a standard deviation of 10.48.

Mathematical Communication Skills test results Ability to explain ideas, situations, and mathematical relationships in writing and revisit a description or paragraph Mathematically in the language itself (Com3) on each acquisition value of respondents, is fully presented in table 8 that displays the variation of student value in answer the question for the Com2 indicator.

Table 8. Breakdown of Test Result Score of Com3 Indicator

No.	Value	Frequency	Percent	Valid Percent	Cumulative Percent
1	.00	10	8.8	8.8	8.8
2	4.17	26	23.0	23.0	31.9
3	8.33	15	13.3	13.3	45.1
4	12.50	10	8.8	8.8	54.0
5	16.67	15	13.3	13.3	67.3
6	20.83	13	11.5	11.5	78.8
7	25.00	11	9.7	9.7	88.5
8	29.17	5	4.4	4.4	92.9
9	33.33	4	3.5	3.5	96.5
10	37.50	2	1.8	1.8	98.2
11	41.67	2	1.8	1.8	100.0
	Total	113	100.0	100.0	

Table 8 shows that there are 11 variations of student scores for the Com3 indicator. From the test recorded the highest score of only 41.67 only 2 students or 1.80% and the lowest value of 0.00 there are 10 students or about 8.80%. The greatest frequency of answers is 4.17 at 26 students or 23.00%.

2. Discussion

The results of the research shown in both tables 1 and 2, shows that the students are not able to achieve the minimum score of Minimum Criterion Standard (KKM) of 70. Where, the average value of Mathematical Communication Skills of coastal students of Kolaka Regency on cube and cuboid is 17,054. If based on category in research of Taduengo (2014) explain about KKM category that category of Mathematical Communication Skills in value range between 70-100 high KKM category, between 50-69 medium KKM category, and 0-49 low KKM category. Based on these categories, the average ability of students' mathematical communication at Coastal SMP Kolaka Regency is categorized as low.

The test result on Com1 indicator is drawing ability, covering the ability to declare a situation or mathematical ideas in the form of table or picture, the ability of junior high school students of Kolaka Regency only able to reach the average value of the whole student equal to 19,62, this shows that ability Com1 students are still low category. Based on the students' answer sheet it appears that the students are having difficulty or unable to state a situation or change the shape into a wake drawing or space frame. Most students do not know the framework of a build according to the situation in question. So they just draw as they wish. This is due to the lack of material exposure relating to the problem of context around the students so that students find it difficult to change the form of everyday problems in a solids picture.

The test result on Com2 indicator is the ability to make a mathematical expression, including the ability to express the situation, table or picture into language, symbol, idea, or mathematical model, the ability of junior high school students of Kolaka Regency with an average value of 20.43 and this shows also that Com2 students are still low category. Greened from the student answer sheet it appears that students are having difficulty or are unable to state the situation in mathematical symbols or difficulty in changing the daily situation in the mathematical language. Most students are still confused to make an introduction in mathematical operations as auxiliary variables to facilitate calculation.

The test results on Com3 indicator that is Ability to explain ideas, situation, and mathematical relation in writing and revisit a description or paragraph Mathematically in own language at junior high school student of Kolaka Regency, the average score of student achievement is 14,09 and this is still low category . In line with Rustam and Handayani (2017) research that students are less able or unaccustomed to revisit a description in their own language. This is because that the learning process students are less accustomed to provide non-routine or any matter related to the indicator.

E. Conclusion

This research can be concluded that the Mathematical Communication Skills of coastal students of Kolaka Regency is still low category. From the three MCA indicators of students, if ranked from the lowest indicator of the ability of Com3, the ability Com1, then Com2. Then, Com1 indicator is the ability to draw, including the ability to declare a situation or mathematical ideas in the form of tables or drawings, the ability of junior high school students in Kolaka District is still low category. Indicator Com2 is the ability to make mathematical expressions, including the ability to express situations, tables or images into language, symbols, ideas, or mathematical models, the ability of junior high school students in Kolaka District is still low category. Indicator Com3 namely Ability to explain ideas, situations, and mathematical relations in writing and revisit a description or paragraph Mathematics in the language itself in junior high school students in Kolaka regency is also still low category.

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