ANALYSIS OF MATHEMATICAL COMMUNICATION ABILITY THIRD GRADE ELEMENTARY SCHOOL STUDENT ON THE MATERIAL TO KNOW THE CONCEPT OF FRACTIONS

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Abstract

This research is based on the results of preliminary field studies on students' mathematical communication abilities on fractions concept that have not been considered to be developed. The ability of communication is an ability to convey various mathematical concepts of ideas, symbols, formulas both orally and in writing in order to be understood by others. This mathematical communication is one of the demands contained in the mathematics learning curriculum in elementary school third grade. Therefore, it needs to be analyzed how third grade students ability of mathematical communication on material knowing the fractions concept. Method used in this study is descriptive qualitative method To provide an overview of students' mathematical communication skills and make conclusions about the underway phenomenon or conditions. Data collection techniques such as observation, interview and documentation study. Data analysis technique is content analysis with research focus on the whole contents of communication either expressed or implied. The results showed that the communication ability of third grade students of elementary school on the material knowing the concept of fractions is still lacking. This is indicated by the five indicators studied, only three indicators appear. The most common indicator is showing the fractions by draw the fraction into picture and reading the fractional numbers that show on picture. While the indicator that does'nt appear is explaining fractions using real objects, declaring the concept of fractions in everyday events in mathematical ideas, and revealing the concept of fractions using their own language orally and in writing.

Keywords: Ability of mathematical communication, fractional concepts.

INTRODUCTION

Mathematics is identical with numbers and signs of count operations which are symbols of a mathematical language. Hendriana and Soemarmo (2014), said that: "Mathematics as a language that has some similarities with other languages. among other things, they have certain rules and terms ". This mathematical language needs to be communicated to be understood by everyone. This is in accordance with one of the objectives of mathematics learning in the 2006 curriculum that is to communicate ideas with symbols, tables, diagrams, or other media to clarify the situation or problem.

According to Racmayani Dwi (2014), through communication students have the ability to apply and express an understanding of the concepts and processes of mathematics that they learn. According to Hendriana and Soemarmo (2014), "The ability of communication in accordance with the essence of mathematics as an efficient symbol language, solid meaning, has a beautiful nature of order and qualitative analytical skills and is universal so that can be understood by everyone anytime and anywhere."

In addition to being listed in the objectives of mathematics learning in the curriculum KTSP 2006, communication skills are also in accordance with 21st-century learning. Students are required to have 4C, namely communication, collaboration, critical thinking and creative thinking. Although the ability of mathematical communication is very important, in fact, the quality of mathematical communication skills in Indonesia is still not good. This is indicated by the results of the PISA (Progam For International Student Assesment) study in 2015, that Indonesia is ranked 69 out of 76 countries. While the results of TIMSS (Trends in International Mathematics and Science Study) Indonesia is ranked at 36 from 49 countries. (Sarnapi, Pikiran Rakyat edition 18 June 2016).

Another opinion says that according to Lim and Pugalee (in Fitriani, 2013) stating that,

> *"Of the four categories of skills that are evaluated (knowledge, application, thinking/ inquiry/problem solving, communication), the lowest student achievement is in communication skills."*

Based on the results of his research note that the ability of mathematical communication only reached 13%. Achievement of basic skills and learning outcomes is less satisfactory, one of the causes is the emphasis of the curriculum in approaches and processes of mathematics are less than optimal. In the TIMSS report, Indonesia still has lower ratings than any other country in its emphasis on mathematical approaches and processes particularly on aspects of mathematical communication skills. This opinion shows that Indonesia's attention to students' mathematical communication ability is lacking.

However, mathematics remains to be learned and the ability to communicate must be demonstrated by the students. In the curriculum, students are expected to explain, describe, show, declare and read the concept of fractions correctly. However, the observation result of some students' work showed that the understanding of fraction concept still has not been mastered by the students. This is evidenced by there are still some students who have not been able to write, show and describe the form of fractions.

Based on the above description, the researcher is still interested to find out more through the analysis of mathematical communication ability of elementary school students in materials about the concept of fractions.

RESEARCH METHOD

The method used is the method of qualitative analysis with the descriptive study to examine the condition of natural objects. The researcher is a key instrument during analyzing the mathematical communication ability of elementary school students of class III in the material knows the concept of fractions. Researchers provide information and explain how the students' mathematical communication skills and make conclusions about the phenomenon or conditions that are underway.

The stages of his research (Creswell, 2010) are as follows:

1. Identification of Problems
   Conducted a preliminary study at the elementary school, then conducted a literature study.
2. Literature Review
   Collecting literature as much as possible related to the mathematical communication in the material to know the concept of fractions.
3. Specifying Research Objectives
   Formulate the objectives to be achieved in this research is to determine the mathematical communication ability of elementary school students of third class on the material to know the concept of fractions.
4. Data Collection
   Collecting data with various data collection techniques such as using observation, interview, and documentation study. Observation of the process of learning the concept of fractions. Interviews were conducted to obtain information on incomplete data and wanted to find out more. Interviews were conducted on teachers and students who were subjected to the study. study documentation to obtain data in the form of records of events that have been passed, either writing, drawing or works.
5. Data Analysis and interpretation
   Researchers conducted data analysis by classifying and organizing data into small units. This process of analysis is done since researchers began to plunge the space for data retrieval until the data collection process is complete.
6. Report and Evaluation of Research Results
   In the last stage, researchers write the results of research presented in a way descriptive. All observed data are clearly described in order to be understood by the reader.

The place of research is in SDN 2 Kadipaten in third-grade students which has 15 students. The study was conducted at the time of learning mathematics about the concept of fractions.

Data collection techniques used are as follows:

1. Observation
   Observing students' mathematical communication abilities during the learning process about recognizing the concept of fractions in III grade SDN 2 Kadipaten.
2. Interview
   Obtain information from research subjects to complete and clarify data on observations that have not been considered to be fulfilling. Researchers conducted interviews with students, teachers and others who supported in data collection.
3. Study documentation
   To support data collection techniques such as observation and interviews. As concrete evidence of trustworthiness of observations and interviews. In this case, documenting learning activities in the form of photographs and videos as well as students' work results in daily tests, exercise questions, and public relations about the fractional concept material.

Next is to analyze the data by categorizing and describing it then concluded so that it can be understood by myself and others. The data analysis

used by researchers more specifically using content analysis with stages according to Klaus (2004) as follows:

1. *Unitizing*
   Overall data retrieval includes text, images, sounds, and data.
2. *Sampling*
   Group data into units that have the same theme/ character.
3. *Recording/coding*
   Doing repetition of supporting data so that the data obtained remain regular and unchanged.
4. *Reducing data or simplifying data*
   The data is simplified into shorter, denser, and clearer data.
5. *Abductively inferring*
   Look for the meaning of data of existing units by selecting, analyzing, and explaining data as detailed as possible based on existing theory.
6. *Naratting*
   Provide the information the results of the data analysis is done in the form of a narrative.

RESULT AND DISCUSSION

The ability of mathematical communication of third grade students of Kadipaten Primary School on the subject of the concept of fractional number shows 3 indicators from 5 indicators studied. Here is Table 1 ability of mathematical communication of third grade students on fractional concept material.

Table 1. Ability of Mathematical Communication of Third Grade Students on Fractional Concept Material

No	Students name	Indicators													
		1		2			3				4			5	
		a	b	a	b	c	d	e	a	b	a	b	c	a	b
1	A	√	√	√	√		√	√			√	√	√		√
2	B						√					√	√		
3	C	√	√	√	√		√		√		√	√	√		
4	D	√	√		√		√		√		√	√	√		
5	E	√	√	√	√		√				√	√			
6	F	√	√	√			√				√	√			
7	G	√	√	√			√		√		√	√	√		
8	H	√	√	√			√				√	√			
9	I	√	√	√	√		√	√			√	√	√		√
10	J	√	√	√	√		√				√	√	√		
11	K	√	√	√	√		√	√			√	√	√		√
12	L	√	√	√			√				√	√	√		
13	M	√	√	√	√		√	√	√		√	√	√		√
14	N	√	√	√	√		√				√	√	√		
15	O	√	√	√	√		√				√	√			
Total		14	14	13	10	0	15	4	4	0	14	15	11	0	4

Argued that

Student's mathematical communication ability on fractional material about:

1. Depicts or represents the concept of fractions in the form of ideas and mathematical symbols or demonstrated with the ability to write fractions into:
   a. Mathematical symbols of 93.33%; and;
   b. Form of the mathematical ideas of 93.33%.
2. Explain the ideas, situations and relations of the concept of fractions, orally and in writing using real objects, drawings and others indicated in the ability:
   a. Describing fractions to drawings/ illustrations is 86.67%.
   b. Shows fractions by using real objects is 66.67%.
   c. Explain fractional numbers using real objects is 0%.
   d. Shows the fractional numbers into the figure is 100%.
   e. Explain the concept of fractions verbally is 26.67%
3. State the concept of fractions in everyday events in language or mathematical symbols to construct mathematical models indicated in the ability:
   a. Stating the concept of fractions on everyday events in mathematical symbols is 26.67%.
   b. Stating the concept of fractions in

everyday events in mathematical ideas is 0%..

4. Reading fractions with an understanding of a mathematical presentation indicated in the ability:
   a. Read the symbol of the fraction number is 93.33%.
   b. Read fractions in the form of images is 100%.
   c. Reading mathematical ideas of the concept of fractions of 73.33% c. Reading the mathematical ideas of the concept of fractions is 73.33%.
5. Reveals the concept of fractions using own language indicated in the ability:
   a. Reveals the concept of fractions using their own language in writing is 0%.
   b. Revealed the concept of fractions using their own language orally is 26.67%.

The research result is described as follows:

The result of data analysis taken through observation, interview, and documentation study stated some findings. In the first indicator point one, there are 14 (93.33%) students who reach the indicator of writing the fractional numbers into mathematical symbols. Student answers are shown in figure 1.

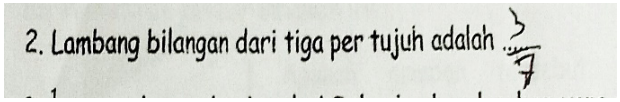

Figure 1. The result of correct answer indicator 1a

Most of the students correctly answered the question. Only one student answered wrong which is a student with special needs.

In the first indicator point two, there are 14 (93,33%) students who reach the indicator of writing the concept of fractionation into the form of mathematical ideas. Student answers are shown in figure 2.

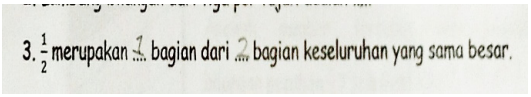

Figure 2. The result of correct answer indicator 1b

One student who answers wrong is a student with special needs. Thus it can be said that the student has reached the indicator depicting or representing the concept of fractions in the form of ideas and / or mathematical symbols. At the time of interviewing, they can answer well related to writing the concept of fractions.

In the second indicator point one, there are 13 (86.67%) students who have been able to declare fractions into the figure. One student who has not achieved the ability to describe fractions is a student with special needs. Results of student answers are shown in Figure 3.

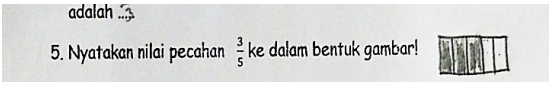

Figure 3. The result of the correct answer indicator 2a

In the second indicator of point two, there are 10 students (66.67%) who have reached the indicator. they are quite difficult in answering questions or questions showing fractions using real objects. This can be due to less contextual learning and more use of images or illustrations. However, students can still answer the questions correctly. The result of the student's correct answer is shown in figure 4. While the result of student's wrong answer is shown in figure 5.

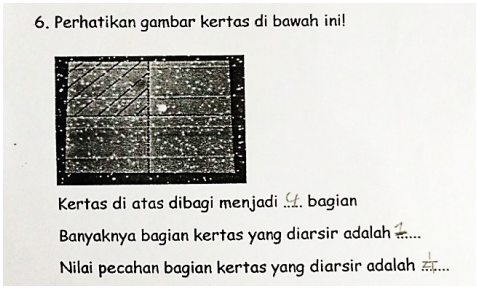

Figure 4. The result of correct answer indicator 2b

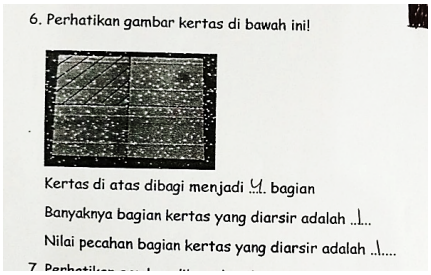

Figure 5. Result of wrong answer indicator 2b

From the picture, it can be concluded that students who answered incorrectly have not understood the meaning of fraction value. Proven on the first answer and both are true, while in writing the fraction value is wrong. This can be due to less emphasizing lessons on mathematical terms so that students do not understand the meaning of the term.

In the second indicator of point three, no student has achieved the indicator. Students have difficulty explaining fractions using real objects. Data on the achievement of this indicator was collected through interviews. When asked, all students cannot

explain or execute the order. They answer "do not know", "how?", And confusion. This problem is similar to the problem in the second indicator of two points that associate the concept of mathematics with real objects. It turns out students are confused if they have to associate the concept of mathematics with real objects. This is related to the learning experience of students who have not been contextual and rely solely on pictures and illustrations.

In the second indicator of point four, all students can reach the indicator. Students can answer correctly regarding showing fractions based on the image. The student's true answer is shown in Figure 6.

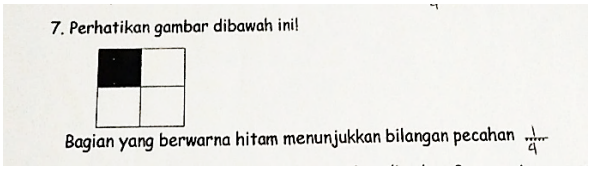

Figure 6. The result of answer is correct indicator 2d

In addition to answering questions, students are also interviewed to explain the meaning of the picture. Only 8 students answered well but not quite right. Students understand that from the picture there is a shaded plot which is 1 part of 4 plot. But none of the students mentioned "equal". Though it is a basic concept of fractions. Other students can not verbally explain their reasons, though they understand and can answer the question.

In the second indicator point five, there are 4 students (26.67%) who have reached the indicator. most students have difficulty in communicating the explanation of the concept of fractional numbers orally. Students are asked the question "explain what is a fraction?". Only 4 students can express their opinions and explain by using the images they make themselves. Globally students understand the concept of fractions, but can not re-explain the concept of fractions properly and correctly. But they can answer and communicate. While the other 11 students just silent and can not explain anything. This can result from communication skills or speaking of poorly trained students. Most learning is only done in a unified way and with enough questions, so that even if students can answer questions, students can not restate what they understand.

In the third indicator of the first point, there are only 4 students (26.67%) who have reached the indicator. Most students find it difficult to express the concept of fractions in everyday events in mathematical symbols. Results of student answers are shown in figure 7.

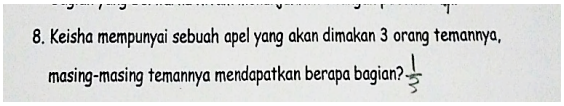

Figure 7. The result of the correct answer indicator 3a

Most students have not been able to answer the question correctly. Some answered "1 part", "half", and "1/4". This shows that many students are still confused in interpreting the story.

In the third indicator point two, all students have not reached the indicator. all students are confused in interpreting the story. The answers of some students are shown in figure 8.

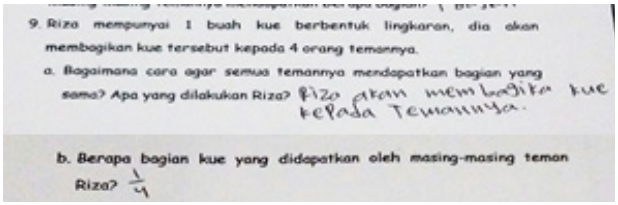

Figure 8. The result of correct answer indicator 3b

From the picture, students can answer the question but not quite right. On the first point question, students do not explain how to divide the cake to be equal. Most students respond generally in terms of "sharing the cake", and "splitting the cake". But most students can answer the second point. This shows that students still do not understand the types of story-shaped questions. Students are confused how to answer the question.

The results of data collected through interviews with the question "whether fractions exist in everyday life?". All students answered "yes". But when asked for an example, students do not know and confused. This can be caused by less learning to associate the concept of mathematics with the students daily life.

In the fourth indicator point one, there are 14 students (93.33%) who have reached the indicator read the symbol of the fraction. Only one student who can not answer the problem that is students with special needs. Student answers are shown in figure 9.

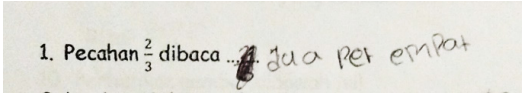

Figure 9. Result of wrong answer indicator 4a

Based on the picture, we can analyze that the student is answering the question with less baseless. When interviewed, the student can only nod and shake his head.

In the fourth indicator of point two, all students have reached the indicator of reading fractions in the form of images. It is as easy to answer by all students as it is supported by the learning experience gained. The student's answer is shown in Figure 10.

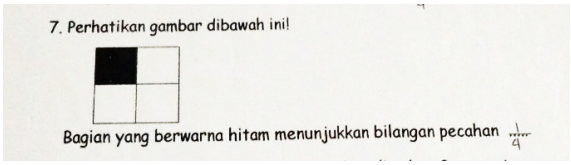

Figure 10. The result of the correct answer indicator 4b

In the fourth indicator point three, there are 11 students (73.33%) who have reached the indicator. Some students still have difficulty in reading mathematical ideas of fractional concepts. This is because students are still difficulty in taking meaning or understand the story-shaped though simple. The student's wrong answer is shown in Figure 11.

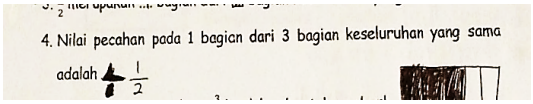

Figure 11. Result of wrong answer indicator 4c

In the fifth indicator point one, all students have not reached the indicator well. This happens because students are fooled by the image statements provided. This proves that the students have not really understood the basic concept of fractions. Most of the students responded with less communicative and unclear language. The answers of the students who are considered the most clever are shown in Figure 12. Whereas the answers of the students with spesial need are shown in Figure 13.

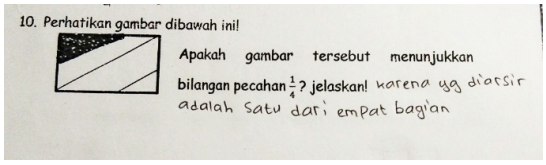

Figure 12. Results of student answers most clever indicator 5a

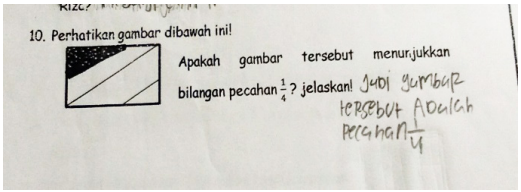

Figure 13. Results of answers of students with special needs indicator 5a

From the two images we can analyze that the student answers the question with the answer that concludes the value of fraction 1/4. Though the picture is not a fraction because it does not divide its share with the same.

In the fifth indicator of point two, there are only 4 students (26.67%) who are considered to have reached the indicator. Data were collected through interview activities. Most students find it difficult to express their ideas or understanding. They just answer "can not". The four students who can answer seem to have difficulty in speaking. As has been discussed earlier that the ability of students in speech is very less. Students can not explain or express their understanding properly.

CONCLUSION AND SUGGESTION

The ability of mathematical communication of third grade elementary school students on materials to know the concept of fractions in SDN 2 Kadipaten Tasikmalaya has reached communication ability in reading fractions with an understanding of a mathematical presentation, depicting the concept of fractions with objects, illustrations and symbols, and explains the concept of fractions with objects, illustrations and symbols. There are two indicators that students have not achieved, there are the ability of students in State the concept of fractions in everyday events in language or mathematical symbols to construct mathematical models and reveals the concept of fractions using own language.

Based on the research results can be seen that not all mathematical communication indicators are owned by all students. It requires teachers to put more effort in developing students' mathematical communication ability optimally. Students should be trained using various media ranging from concrete, semi-concrete, semi-abstract and abstract, so students will not have difficulty in conveying ideas or thoughts. Students also need to be trained in revealing what they know to use their own language either through discussion or questioning.

Based on the conclusions of the research results, some suggestions or recommendations that need to be considered are teachers and college students who will become teachers to better understand the indicators of mathematical communication skills and know how to develop it. For the next researcher, it is suggested to be able to implement the learning that develops students' mathematical communication ability in elementary school.

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