Analysis of The Conceptual Understanding of Elementary School Students on The Concept of Fractions through Distance Teaching Materials using WhatsApp Group

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Abstract: Learning carried out from a distance hurts student in remote areas, especially in Panguragan, Cirebon District. This study aims to 1) analyzing conceptual understanding through interviews, and 2) analyzing conceptual understanding through test results. The research location is one of the elementary schools in Panguragan, Cirebon District. The subjects in this study were students in grade 5 with a total of 24 students. Data collection techniques used in this study were through interviews and test results. The results of data collection were analyzed using descriptive quantitative data analysis techniques. From the results of interviews and test results, it was found that the student's conceptual understanding was still low. The average score obtained on conceptual understanding is only 28.50%. These results indicate that grade 5 students have a low mathematics conceptual understanding ability on fractions concept. This shows the need to improve the quality of learning through more creative and innovative distance teaching materials to improve student's conceptual understanding.

Keywords: Conceptual Understanding, Fractions, Distance Teaching Materials Using WhatsApp Group.

INTRODUCTION

Academically, mathematics is a subject that is taught starting from primary education, secondary education, to higher education. At the primary education level, in this case, is Elementary School (SD), the mathematical conceptual understanding is the basis for understanding mathematical concepts at the next level of education. This shows the importance of mathematical conceptual understanding in education. So that students can apply the concept appropriately and efficiently in mathematics learning activities, students must have the conceptual understanding ability (Mawaddah, 2016). This means that students must develop the ability to understand concepts, both in mathematics and another subject.

Conceptual understanding is the ability to understand concepts, operations, and relations in mathematics (Kilpatrick, et al., in Afrilianto, 2012). Student's knowledge and conceptual understanding can be measured in four ways, namely: (1) defining the concept; (2) identify the characteristics of the concept; (3) connecting the concept with other concepts; (4) identify examples of concepts that have not been found before. So, it can be concluded that when students have conceptual understanding, it means that the students understand the idea or the abstract from a concept that is being studied (Eggen and Kauchak, 2012). Another opinion states that conceptual understanding is the student's ability to: (1) explain the concept, meaning that the student can re-express what has been communicated to him; (2) using the concept in different situations (Duffin & Simpson, 2000).

Indicators of concept understanding include students being able to: re-explain a concept; classify objects according to certain properties per the concept; provide examples and not examples of a concept; presents concepts in various forms of mathematical representation; develop necessary or sufficient conditions of a concept; use, utilize and select certain procedures or operations; and apply

concepts or algorithms in problem-solving (Wardhani, 2008).

Fractions are defined as part of something whole (Heruman, 2017). A fraction is a number that, if illustrated in a picture, is the part that is usually marked with shading. The shaded part is called the numerator, while the whole part is called the denominator.

Another definition says that a fraction is a number that can be denoted by $\frac{a}{b}$, a is called the numerator, and b is called the denominator, where a and b are integers and b≠0. $\frac{a}{b}$ the shape can also be interpreted as a: b (a divided by b) (Karso, 2013). From this definition, it can be seen that a fraction is a number that represents the ratio between a portion of an object and the whole object, if an object is divided into several equal parts then the comparison of each part with the whole object is the basic symbol of a fraction. To add or subtract the fractions that are not the same, then first equate the denominators by looking for the LCM (KPK) of the denominators of the original fractions, then add or subtract these new numerators. (Wahyudin, 2018)

Students are said to have the mathematical conceptual understanding ability if the students can meet predetermined indicators, then implemented in questions that must be answered by students to measure the abilities they already have. Based on the results of observations, it was found that 17 out of 24 students answered the conceptual understanding questions about fractions material incorrectly. This happens because of student's lack of understanding of mathematical concepts, students do not have the prerequisite concepts for working on fractions material. The prerequisite concepts include the conceptual understanding of addition, subtraction, multiplication, division, and the concept of the Greatest Common Factor and the Least Common Multiple.

All students need to be given mathematics subjects to have the ability to think logically, analytically, systematically, critically, and creatively and be able to work together (Permendiknas Nomor 22, 2006). These abilities are needed by students in a dynamic and competitive life. During the current Covid 19 pandemic, learning in elementary schools is not done face-to-face, but through distance teaching materials using a WhatsApp Group (WAG) which is guided by a teacher. Mathematics learning that is carried out through distance teaching materials using a monotonous and less creative WAG creates obstacles for students in understanding mathematical concepts so that student's conceptual understanding is lacking. This can be seen from the difficulties experienced by students in solving different questions from the example questions given earlier. Teacher innovation and creativity are needed in preparing for learning, so that distance learning is more meaningful. Innovations in selecting and using approaches, strategies, and learning models can be carried out by teachers by changing teacher habits from using conventional learning to learning using innovative learning models (Sujana, & Sopandi, 2018). The creative thinking ability of students who learn through learning using a contextual approach is better than students who learn through conventional learning (Amaliyah, et al., 2020).

METHOD

The research method used in this study is quantitative research methods using a descriptive approach. The subjects in this study were students in grade 5 with a total number of 24 students. Data collection techniques used in this study were through interviews and tests. Interviews and tests were conducted to determine the level of student's conceptual understanding through distance teaching materials using WAG.

The results of data acquisition were analyzed using descriptive quantitative data analysis techniques. The data analysis technique is carried out at each problem solving which is then analyzed according to 7 indicators of concept understanding, that is: (1) Students can re-explain the concept;

(2) Students can classify objects according to certain properties by the concept; (3) Students can provide examples and not examples of a concept; (4) Students can present the concepts in various forms of mathematical representation: (5) Students can develop necessary or sufficient conditions of a concept; (6) Students can use, utilize and select certain procedures or operations; and (7) Students can apply concepts or algorithms in problem-solving.

The scoring criteria for mathematical conceptual understanding ability can be seen in the table as follows:

Table 1. Rubric Assessment for Mathematical Conceptual Understanding Ability

Conceptual Understanding Indicators	Information	Score
Re-explain the concept	Answer is blank	0
	Unable to re-explain the concept	1
	Can re-explain the concept but there are still many mistakes	2
	Can re-explain the concept but a little less precise	3
	Be able to re-explain the concept precisely	4
Classify an object according to certain properties by the concept	Answer is blank	0
	Unable to classify objects according to the concept	1
	Can name properties according to the concept but there are still many mistakes	2
	Can mention the properties according to the concept but incomplete	3
	Can name the properties according to the concept completely	4
Provide an example and not an example of a concept	Answer is blank	0
	Cannot set an example and not an example	1
	Can provide examples and not examples but there are still many mistakes	2
	Can provide examples and not examples but not quite right	3
	Can provide examples and not examples correctly	4
Presenting concepts in various forms of mathematical representation	Answer is blank	0
	Cannot present a concept in the form of a mathematical representation	1
	Can present a concept in the form of a mathematical representation but it is not accurate	2
	Can present a concept in the form of a mathematical representation but it is still not accurate	3
	Can present a concept in the form of a mathematical representation appropriately	4
Developing a necessary or sufficient condition of a concept	Answer is blank	0
	Cannot use and choose the procedure or operation used	1
	Can use and choose the procedure or operations to use but is not right	2
	Can use and select procedures or operations to use	3

	but still a little less precise	
	Can use and choose the procedure or operation that is used appropriately	4
Using, utilizing, and selecting specific procedures or operations	Answer is blank	0
	Cannot use, utilize, and select procedures or operations	1
	Can use, utilize, and select procedures or operations but there are still many mistakes	2
	Can use, utilize, and select procedures or operations but not quite right	3
	Be able to use, utilize, and select procedures or operations appropriately	4
Apply concepts or algorithms in problem-solving	Answer is blank	0
	Cannot apply the formula according to the procedure in solving problem-solving problems	1
	Can apply the formula according to the procedure in solving problem-solving problems but there are still many errors	2
	Can apply the formula according to the procedure in solving the problem but a little bit incorrect	3
	Can apply the formula according to the procedure in solving problem-solving problems correctly	4

As for the assessment of student's mathematical conceptual understanding ability, that is: the score obtained is divided by the maximum score multiplied by 100, where the maximum score of student's abilities to understand mathematical concepts is 28, thus:

$$\text{Score} = \frac{Score\ obtained}{28} \times 100$$

The score of the student's conceptual understanding ability is interpreted based on the table as follows.

Table 2. Interpretation of Student Conceptual Understanding Ability

Score	Criteria
85,0 - 100,0	Very Good
70,0 - 84,9	Good
55,0 - 69,0	Fair
40,0 - 54,9	Poor
00,0 - 39,9	Very Poor

RESULTS AND DISCUSSION

The data in this study were obtained through structured interviews conducted with students and teachers, and assessing the results of tests conducted on students. Each question in the interview activity contains an overview or indicator of a student's conceptual understanding of fraction material and tests to describe the student's conceptual understanding of fraction material.

Interview result

Based on the results of interviews with teachers, students were still unable to develop the requirements needed to solve the questions, this was because students were still focused on memorization and equations. Students only work on the questions in a way exemplified by the teacher and will have difficulty when finding different questions. The results of the interview indicated that students still lack conceptual understanding. The conceptual understanding ability needs to be possessed

by students to understand the material that will be taught next. The ability to understand material or concepts is a prerequisite for mastering the next material (Susanto, 2013, p. 209).

Based on the results of interviews with students, it was found that there were problems regarding the ability to understand concepts. Many students do not master the indicators of conceptual understanding. The results of the interview showed that the students did not master the conceptual understanding of the material being studied.

Mathematical Conceptual Understanding Test Results

The analysis of student's mathematical conceptual understanding abilities was obtained based on the results of tests carried out through questions of mathematics conceptual understanding with the concept of fractions. The test results given through essay questions, totaling 5 questions on fraction material, show that student's mathematical conceptual understanding is still low. This is due to the prerequisite abilities that students do not have. Concept a and concept b must first be understood before understanding concept c if concept a and concept b underlie concept c, (Hudojo, 2003). The results of the tests on the overall ability of student's mathematical conceptual understanding can be seen in the table as follows:

Table 3. Conceptual Understanding Test Results

Conceptual Understanding Indicators	Result
Be able to re-explain the concept	37%
Be able to classify an object according to certain properties by the concept	35%
Be able to provide examples and not examples of a concept	33%
Able to present concepts in various forms of mathematical representations	29%
Able to develop necessary or sufficient conditions of a concept	27%
Able to use, utilize and select certain procedures or operations	25%
Be able to apply concepts or algorithms in problem-solving	30%

From Table 3 above, it can be seen that the results of the conceptual understanding test are: the percentage of students able to re-explain the concept is 37% with a poor category, the percentage of students able to classify objects according to their properties is 35% with a poor category, the percentage of students able to provide examples and not examples is 33% with a poor category, the percentage of students able to present the concepts in various mathematical representations is 29% with a poor category, the percentage of students able to develop necessary or sufficient conditions for a concept is 27% with a poor category, the percentage of students able to use, utilize and choose certain procedures is 25 % in the poor category, the percentage of students able to apply concepts or algorithms in problem-solving is 30% with a poor category. The average score obtained on conceptual understanding is only 28.50%. These results indicate that students have not mastered the indicators of mathematical conceptual understanding, so it can be concluded that students in grade 5 elementary school for the 2020/2021 academic year in Panguragan, Cirebon District, have the conceptual understanding that is still lacking in fraction material.

CONCLUSION

Based on the analysis results that have been described, the following conclusions are obtained: The ability to understand math concepts in grade 5 elementary school students for the 2020/2021 academic year in Panguragan, Cirebon District in learning mathematics through distance teaching materials using WAG is in the poor category. This shows the need to improve the quality of learning through more creative and innovative distance teaching materials to

improve student's conceptual understanding.

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