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Description of Understanding Ability in Mathematics Concepts of Fraction in Second Grade Junior High School

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Abstract

This study aims to determine the abilities to understand students' mathematical concepts in fractional. This research is descriptive research with a qualitative approach. The subjects were selected based on data on students' concept comprehension ability and recommendations from mathematics teachers with one high-ability student, one medium-ability student, and one low-ability student. The instruments used in this study were a concept understanding test and interview guidelines. The results showed that students who had high abilities met the four indicators of understanding concepts in fractional, namely being able to interpret images and state in the form of fractions (interpreting), able to give examples in the form of images (exemplifying), able to classify types of fractions (classifying) and able to compare fractions. Students who have moderate abilities fulfill four indicators of understanding mathematical concepts in fractional material, namely being able to interpret images and state in the form of fractions (interpreting), able to give examples of fractions in the form of images (exemplifying), able to classify the types of fractions (classifying) and able to compare fraction (comparing). Meanwhile, students with low abilities only fulfill two indicators of understanding mathematical concepts in fractional material, namely being able to interpret images and express in fractions (interpreting) and giving examples of fractions in the form of images (exemplifying).

Keywords: Understanding ability; Mathematical Concept; Fractions.

INTRODUCTION

Mathematics is a science that is organized systematically in a logical sequence of sequences (Rismawati & Hutagaol, 2018). An important idea in Mathematics education is to create a teaching and learning environment that allows students to learn with understanding (Gulkilik, Moyer-Packenham, Ugurlu, & Yuruk, 2020). According to Resta (Yufentya, Roza, & Maimunah, 2019), mathematics with regard to ideas, logical thought processes, deductive thinking patterns, and various concepts are arranged systematically. In mathematics learning, students' ability to understand mathematical concepts is strongly emphasized (Yanti, Nindiasari, & Ihsanuddin, 2020). Understanding concepts is very important for students to have so that the student's learning process is not just memorizing formulas and giving practice questions, if students only memorize concepts but are not able to relate concepts to other concepts, the learning process and results will not be meaningful (Yufentya et al., 2019). Therefore, an update in the learning design is needed so that students easily understand the mathematical concepts being studied (Fajar, Kodirun, Suhar, & Arapu, 2019).

Understanding is essential for overall mathematics learning (Torbeyns, Schneider, Xin, & Siegler, 2015). Understanding is defined as the absorption of meaning from a material being studied (A'zima, Roza, & Maimunah, 2019). According to Susanto (Kartika, 2018), understanding is a process that consists of the ability to explain and interpret something, is able to provide a broader and more adequate picture, example, and explanation, and is able to provide a more creative description and explanation, while a concept is something that is depicted in the mind, a thought, an idea, or an understanding. So that students are said to have the ability to understand mathematical concepts and can give an example

and not an example of the concept (Fadzillah, 2016) they can formulate solving strategies, apply simple calculations, use symbols to present concepts, and change other forms such as fractions in mathematics (Kartika, 2018). Therefore, understanding mathematical concepts involves introducing when an idea can be applied and how it can be seen in various representations (van Garderen, Lannin, & Kamuru, 2020).

In line with this opinion, students are said to understand mathematics learning concepts if they can meet the indicators of understanding concepts. The indicator of understanding mathematical concepts is being able to interpret (*interpreting*), able to give an example (*exemplifying*), able to classify (*classifying*), able to mention an overview (*summarizing*), able to compare (*comparing*), and able to explain (*explaining*).

One of the learning materials that junior high school students must master is fractions. The concept of fractions in everyday life must have been applied consciously and unconsciously. In reality, the concept of fractions in education still does not show satisfactory results. Many students do not develop an understanding of fractions, one of which is fractional multiplication (Simon, Kara, Norton, & Placa, 2018). Understanding fractions is essential for mathematics learning, it requires not only a deeper understanding of numbers than is usually obtained through experience with integers but is also predictive for students' mathematical achievement years later (Torbeyns et al., 2015).

Based on the results of research observations and interviews with mathematics teachers at one of the secondary schools in the Gowa district, in learning fractional material, there are still many students who do not know the types of fractions, and it is difficult to complete fractional operations, especially addition and subtraction of fractions if the denominators are different. As a result of this, in the daily assessment results, only nine students obtained good results. This is because students do not understand the concept of fractional material, as a result, if given various questions, students will have difficulty solving them. Conceptual knowledge of fractions, then, must consist of general principles about fractions and knowledge of which principles underlie procedures for comparing or operating on them (Geller, Son, & Stigler, 2017).

Some previous research that has been done a lot to know the ability to understand students' concepts, as well as the research carried out by W. Eggy Yufentya, Yenita Roza, dan Maimunah (2017) it is obtained that highly capable students have a good understanding of concepts because they have reached more than 50% for each indicator. Meanwhile, students with medium and low abilities have a poor understanding of the concept because the results obtained are less than 50% for each indicator. Then the research conducted by Ayu Putri Fajar (2019), students who have high abilities can complete six questions which means that the student has mastered six indicators of concept understanding; students who have moderate abilities can solve six questions which means that the student has mastered six indicators of understanding concepts, while students who have the low ability can solve four questions which means that the student has mastered four indicators understanding of concepts. However, no studies have tried to describe students' conceptual comprehension abilities in fractional material. The difference between this study and the previous research is that it focuses on describing the concept of understanding the ability of grade VIII junior high school students on fractional material for each indicator so that it can be known which indicators students have not mastered students.

METHOD

This research uses a descriptive type of research with a qualitative approach. The purpose of the study is to describe of understanding the abilities in mathematics concepts of fractions in the second grade junior high school. The selection of subjects in this study was obtained from the value of the report card as an initial ability. The initial ability data is used to group students into three, namely students with high, medium, and low abilities.

Then three students were obtained as subjects, namely one student with high understanding, one with moderate understanding, and one with low understanding with consideration of learning outcomes and recommendations from subject teachers. The instruments used in this study were tests of ability to understand mathematical concepts and interviews. In this study, the triangulation method was used by comparing the data from the document examination results with the data from the interview results.

RESULT AND DISCUSSION

Result

Data collection activities were carried out on grade VIII.3 students of SMP Negeri 2 Sungguminasa by choosing subjects representing each category of high, medium, and low abilities. After the subjects are selected, the three subjects are given a concept understanding test. The concept comprehension test questions contain questions based on indicators of understanding mathematical concepts.

Then proceed to the next stage, namely interviews with the three subjects to obtain deeper information about students' understanding of concepts according to the answers written by students in the concept understanding test. Based on the data from the results of test answers and interviews, the indicators of understanding mathematical concepts in fractional material mastered by the three subjects are indicator one (able to interpret images and express in the form of fractions (interpreting) and the second indicator (able to give examples of fractions in the form of images (exemplifying).

Discussion

1. Ability to Understand Mathematical Concepts of High Category Subjects (HCS)
   Based on the results of tests and interviews, High Category Subjects (HCS) are able to master four indicators of concept understanding, namely: being able to interpret images and express in the form of fractions (interpreting), able to give examples of fractions in the form of images (exemplifying), able to classify the types of fractions (classifying), able to compare fractions (comparing). Meanwhile, the indicators that have not been met are able to mention the characteristics and types of fractions (summarizing) in the answers to the HCS subject concept understanding test, only writing down the types of fractions and examples without explaining the types of fractions, then during the interview HCS was unable to explain what pure and impure fractions look like. Furthermore, for indicators, they are able to express the meaning of fractions (inferring) in test answers and HCS interviews, only writing "fractions, which are numbers consisting of numerators and denominators." and for indicators to be able to reconstruct or re-explain the cause and effect (explaining) of the HCS only write down the reasons as stated in the notion of fractions.

2. Ability to Understand Mathematical Concepts of Medium Category Subjects (MCS)
   Based on the results of tests and interviews, Subjects of the Medium category are able to master four indicators of understanding concepts, namely being able to interpret images and express in the form of fractions (interpreting), being able to give examples of fractions in the form of images (exemplifying), being able to classified types of fractions (classifying), being able to compare fractions (comparing). While the indicators of understanding the concept that is still not met are able to mention the characteristics and types of fractions (summarizing), MCS in tests and interviews are not able to explain the types of fractions, only writing down examples of the types of fractions. Then the indicator can state the meaning of fractions (inferring) by only writing, "fractions are numbers consisting of numerators and denominators." The subject does not write down completely. The meaning of fractions can reconstruct or re-explain (explaining); credits on tests and interviews suggest that $\frac{1}{12}$ is a fraction because it has a numerator and denominator.

3. Ability to Understand Mathematical Concepts of Low Category Subjects (LCS)

Based on the test results and interviews of Low Category Subjects (LCS), mastering only two indicators, namely being able to interpret images and expressing in the form of fractions (interpreting), being able to give examples of fractions in the form of images (exemplifying). While the indicator of understanding the concept that is still unmet is able to classify the types of fractions (classifying), LCS on the test is only able to classify ordinary types of fractions. LCS can't classify other fractions because it does not know the types of fractions. Then for questions containing indicators that mention the characteristics and types of fractions (summarizing), LCS does not write down the answer. Then the indicator can state the meaning of fractions (inferring) LCS suggests that fractions are numbers with numerators and denominators. Then the indicator is able to state the meaning of fractions (inferring) LCS suggests that fractions are numbers that have numerators and denominators. Then the question containing the indicator can reconstruct or re-explain in its answer LCS stated that $\frac{1}{12}$ fractions without explaining why LCS states the number is a fraction.

The limitations in this study were when the concept understanding test was given by visiting the homes of students who were subjects due to the Covid-19 pandemic; students did not carry out learning at school.

CONCLUSION AND SUGGESTION

Conclusion

This study aims to determine the understanding of students' mathematical concepts in fraction material. In its implementation, a concept understanding test is given, followed by an interview stage to find out more about the students' conceptual understanding level. The indicators of understanding concepts mastered by the three subjects are the first indicator, being able to interpret images and express them in the form of fractions (interpreting). The second indicator is being able to give examples of fractions in the form of images (exemplifying). However, because this research was carried out during the Covid-19 pandemic, students did not carry out learning at school. As a result, researchers had difficulty administering concept understanding tests for the three subjects.

Suggestion

The suggestions for teachers are to pay attention to how students understand the concepts being taught and familiarize students with working on math problems related to applying the concepts taught as exercises to improve students' abilities in solving various mathematical problems. For further research, it should be developed further as an effort to improve the quality and quality of education.

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