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An Analysis of Elementary School Students' Understanding of Mathematical Concept

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Abstrak

Penelitian ini bertujuan untuk mengetahui pemahaman konsep matematis siswa sekolah dasar pada materi pecahan. Subjek dalam penelitian ini adalah siswa kelas IV pada tiga sekolah dasar di Kecamatan Tanjung Aman Kotabumi Lampung Utara sebanyak 18 siswa. Teknik pengumpulan data yang digunakan berupa wawancara dan tes. Teknik analisis data yang digunakan adalah analisis deskriptif kualitatif. Hasil dari penelitian ini menunjukkan skor rata-rata pemahaman konsep adalah 30,2%. Bersumber dari hasil wawancara dan tes diperoleh bahwa pemahaman konsep matematis siswa pada tiga sekolah dasar tersebut masih rendah.

Kata Kunci: Pemahaman Konsep, Matematika, Sekolah Dasar

Abstract

This study aims to determine the understanding of the mathematical concepts of elementary school students' infraction material. The subjects in this study were fourth-grade students at three elementary schools in Tanjung Aman District, Kotabumi, North Lampung, with 18 students. Data collection techniques were used in the form of interviews and tests. The data analysis technique used is descriptive qualitative analysis. The results of this study indicate that the average score of concept understanding is 30.2%. Based on the results of interviews and tests, it was found that students' understanding of mathematical concepts at the three elementary schools was still low.

Keywords: *Understanding of Concepts, Math, Elementary School*

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INTRODUCTION

Science and Technology is one group of subjects in elementary schools in which there are mathematics lessons. In Permendiknas Number 22 of 2006, it is stated that mathematics must be given to all students so that they can think logistically, analytically, systematically, critically, and creatively and work together. These competencies can allow students to obtain, manage, and utilize information to survive in competitive and ever-changing conditions. Mathematics is a subject that is difficult to reach for elementary school students (Morgan, Farkas, & Maczuga, 2015; Jitendra, Nelson, Pulles, Kiss, & Houseworth, 2016). This is in line with Karsenty & Arcavi's (2003) research, which states that students do not seem to see mathematics policy, but teachers need more significant effort when teaching mathematics (Azmy et al., 2022; Ningrum et al., 2022; Sari et al., 2022). When learning mathematics, students must understand mathematical concepts first so that they can solve problems in problems and apply these concepts to the real world (Sofyan & Putra, 2019). Understanding mathematical concepts is a requirement in mastering different mathematical concepts. This is because mathematics is a subject that is interdependent with others and has a sequence when studied (Hidayat, 2018).

In reality, on the ground, the main problem in learning informal mathematics education is that students' understanding of mathematics is still low (Setiawan et al., 2021; Utomo et al., 2021; Zulela et al., 2022). The reality on the ground shows that mathematics learning is based on memorizing formulas and calculating students' lack of understanding of mathematical concepts (Acesta et al., 2021; Iasha, 2018; Irawan & Iasha, 2021). In addition, mathematics learning activities in elementary schools tend to be teacher-centered. Students only listen to the explanations given by the teacher, practice completing exercises and discuss the exercises classically (Sudrajat et al., 2018).

Based on previous studies, it can be seen that many elementary school students in various regions have low conceptual understanding (Een & Sumantri, 2019; Dharma, Suarjana, & Suartana, 2016; Mukrimatin, Murtono, & Wanabuliandari, 2018). Therefore, this study will also analyze the understanding of mathematical concepts of elementary school students in Tanjung Aman District, North Lampung. This research aims to find out the extent to which students understand mathematical concepts in the material. To analyze the understanding of concepts, students will work on problems based on understanding mathematical concepts. The benefits obtained are also varied, for example being information material about the level of understanding of students' mathematical concepts on the material and the expected results can be used as reference material for further research.

METHOD

Research Design

The research design used is qualitative research with a descriptive method. This design was chosen because it contains characteristics such as allowing to express perceptions, researcher participation from researchers, aligning the original setting, flexibility in research design, realizing inductive analysis with qualitative data. (Maxwell, 2013; Merriam, 2009; Patton, 2002).

Data Collection Techniques and Respondents

This research was conducted in three elementary schools in Tanjung Aman District, Kotabumi, North Lampung. This study uses a purposive sampling technique, which is to determine the subject by selecting the subject according to the predetermined criteria. The criteria in question are students with low, medium, and high PTS mathematics scores, totaling 18 people consisting of 10 male students and 12 female students. Data collection techniques used were interviews and validated mathematical concept understanding tests.

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Research Instruments

The problem of understanding mathematical concepts was modified from Niemi (1996) and the indicators of understanding the mathematical concepts used were adapted from the Ministry of National Education (2006). Table 1 shows the questions and indicators used.

Table 1
The questions and indicators use

No	Questions	Concept Understanding Indicator
1	What is meant by fraction?	Restate a concept.
2	Choose from the images below which has a value equivalent to 1/2!	Classify objects according to certain properties according to the concept.
		Give examples and non-examples of concepts.
3	How do you explain two equivalent fractions?	Develop necessary and sufficient conditions for a concept
4	How do you add two fractions?	Using certain procedures or operations
		Applying the concept

RESULT AND DISCUSSION

The test results in the form of description questions totaling four fractional material questions given to students showed that students' understanding of concepts was low. Many students do not reach the indicators of conceptual understanding. The cause of the low understanding of students' concepts is that students do not have the prerequisite skills. Prerequisite abilities are important in mathematics as stated by Hudjoyo (2003), namely in mathematical concepts if concept A and concept B are the basis of concept C, then concept C cannot be studied before concepts A and B first. Likewise, the concept of D can only be learned if the concept of C has been understood, and so on. The test results can be presented in table 2:

Table 2
Students' Mathematical Concept Understanding Ability

No	Concept Understanding Indicator	Result
1	Restate a concept.	61%
2	Classify objects according to certain properties according to the concept.	33%
3	Give examples and nonexamples of concepts.	33%
4	Develop necessary and sufficient conditions for a concept.	22%
5	Using certain procedures or operations.	16%
6	Apply concepts.	16%

Table 2 shows that students who can restate a concept get quite large results, namely 61%. The first indicator is found in the first question, namely, students are asked to write down what is meant by fractions. As many as 11 out of 18 students can answer the question correctly. Students can state that a fraction is a number that can be expressed in the form a/b.

The second and third indicators are that students can classify objects according to certain properties according to their concepts and can give examples and non-examples of the concept of less large results, namely 33%. The indicator is found in the second question, namely, students are asked to choose an image that has a value equivalent to 1/2. Only 6 out of 18 students were able to choose the pictures correctly. Many students only focus on one form, they have not been able to understand that 1/2 is the same as 2/4.

The fourth indicator is that students can develop the necessary and sufficient conditions for a concept to get a result that is less than 22%. This indicator is found in the third question, where students are asked to explain how two fractions have the same value. Only 4 out of 18 students were able to answer correctly. This proves that students do not quite understand the terms of an equivalent fraction.

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The fifth and sixth indicators are using certain procedures or operations and applying the concept of getting less than 16% results. This indicator is found in the last question, namely how to add two fractions. Only 3 students answered correctly. Students have not been able to use the procedure to complete the addition of fractions, namely equating the denominators first and then adding the numerators, students also have not been able to apply the prerequisite concept, namely finding the LCM in the denominator of a fraction.

The average score of concept understanding obtained from the data is only 30.2%. The score shows how students have not mastered the indicators of understanding mathematical concepts. It can be concluded that the understanding of mathematical concepts of fourth-grade students in three elementary schools in North Lampung is still lacking in fraction material.

It was also found that several problems regarding understanding the concept were found from the results of interviews with students. Many students can only master two indicators of understanding mathematical concepts, namely restating a concept and classifying objects according to certain properties according to the concept, and the rest they have not mastered. The results of the interview showed that students were less able to understand the material given by the teacher coupled with distance learning that was applied to make students more difficult to understand the material and lack of interest in students themselves. Pujiati (2018) states that the difficulties that are often experienced by many students are when solving math problems in the form of stories, digesting language, what the questions ask for, and calculating. From the interview, it was also found that students have not been able to find and describe the requirements needed to solve the problem because students only rely on the formulas they memorize. Students only follow the solution method exemplified by the teacher and will find it difficult if they get questions with different solutions.

Students need to master the understanding of mathematical concepts, in addition to understanding the material also to be able to master further mathematical concepts. This is in line with the opinion of Susanto (2013), namely understanding and mastering a concept or material is a prerequisite to being able to understand and master the next material.

CONCLUSION

Based on the previous explanation, it can be seen that students do not have the prerequisite skills, students are still often confused when working on questions that are different from what the teacher exemplifies, lack of interest in learning mathematics, and test results that show students' low understanding of fractions. Students' abilities are only good at indicators of restating a concept. The conclusion is that students from the three elementary schools have a low conceptual understanding. Conceptual understanding is inherent in broad knowledge systems, Niemi (1996) estimates that it would take at least 1.5 years (assuming optimal instruction) to develop the kinds of "scientific" concepts discussed by Vygotsky. Concept understanding develops over a long period, becomes deeper and more elaborated with increasing knowledge and experience of students.

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