Analysis of Ability to Understand Mathematic Concepts of SMP Students During Online Learning on Set Materials

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Abstract

The purpose of this study was to analyze the ability to understand mathematical concepts of junior high school students during online learning on set material. This type of research uses descriptive qualitative. The subjects of this study were grade VII students with a total of 10 students at SMP Negeri 1 Inuman, Kuantan Singingi Regency in the 2021/2022 academic year. The subject selection technique used is purposive sampling technique because the sample cannot be chosen randomly. The data collection technique used in this study was a written test. The questions given are in the form of 5 description test questions that have been prepared based on indicators of mathematical concept ability. The results obtained from this analysis are the ability to understand students' mathematical concepts when online learning is obtained that the ability of students in the high category is 1 student or 10% of the total number of students tested, categorized as sufficient there are 5 students or 50% of all students tested, and in the low category there are 4 students or 40% of the total students tested.

Keywords: understanding concepts and online learning

INTRODUCTION

The Covid-19 pandemic that has hit the education sector has an impact on the education sector, one of which is learning mathematics. This influence can be seen from the change in the face-to-face learning system to online learning (Arcat, 2020), where the learning process is carried out remotely by utilizing the role of technology and relevant learning media. Distance learning is part of online-based learning (e-learning). Mathematics is a subject that must be studied by students, both students at the elementary to secondary levels (Utami & Cahyono, 2020).

The importance of studying mathematics is also based on the fact that mathematics has an important role in the development of students' potential (Lestari, 2018). This is because there are aspects of thinking and logic in mathematics that can train and develop students' potential, especially cognitive potential, such as high-level abilities that include thinking logically, critically, structured, and creatively (Ulfa, 2019).

Mathematics is also an invaluable tool for communicating ideas clearly, precisely, and concisely. With that, the learning of mathematics should be pursued as well as possible. There are still many students who consider mathematics as a difficult subject, so students easily give up and are not serious in carrying out the learning process (Amalia & Unaenah, 2018).

Online learning certainly affects the quality of student learning, including learning mathematics which since ancient times has been considered a difficult and scary lesson (Astuti, et al, 2002). Social distancing has a significant impact on aspects of life, especially in the world of education. In response to this situation, an online learning policy has been implemented in Indonesia. Online learning is learning that is held through web networks. The benefits of online learning make it easier for students to access material and facilitate interaction with teachers and with other students (Hadisi & Muna, 2015). Online can provide effective learning methods such as feedback, incorporating collaborative independent learning activities.

The ability to understand mathematics is one of the basic abilities that must be possessed by students, so that students are able to construct meaning. Each mathematics learning material contains a number of concepts that must be mastered by students. Concept understanding ability is a student's way of thinking to explain a concept that has been studied using their own discussion. The ability to understand concepts is divided into 2, namely instrumental understanding and rational understanding (Ningsih, 2016). The ability to understand concepts is one of the important goals in learning mathematics. The materials taught to students are not only memorised, but to be understood so that students can understand the concept of the material provided (Novitasari, 2016). Students are said to have the ability to understand mathematical concepts if they can formulate settlement strategies, apply simple calculations, use symbols to present concepts, and change one form to another (Susanto, 2015).

With online learning that seems sudden due to COVID-19, this also causes sub-optimal preparation. This causes students to feel unprepared for their implementation, especially in learning mathematics. Based on the description above, a study is needed to determine the extent to which the mathematics learning process is carried out online in junior high schools (SMP). Therefore, the researcher aims to analyze the ability to understand mathematical concepts of junior high school students during online learning on set material.

METHOD

This type of research uses descriptive qualitative. Bogdan & Taylor in (Moleong, 2010) suggest that qualitative research is a research procedure that produces descriptive data in the form of written or spoken words from people and observable behavior. Qualitative research is based on a natural background holistically, positions humans as research tools, performs inductive data analysis, is more concerned with the process than the results of the research carried out agreed upon by the researcher and the research subject. The subjects of this study were grade VII students with a total of 10 students at SMP Negeri 1 Inuman, Kuantan Singingi Regency in the 2021/2022 academic year. The subject selection technique used is purposive sampling technique because the sample cannot be selected randomly. The data collection technique used in this study was a written test. The questions given are in the form of 5 description test questions that have been prepared based on indicators of mathematical concept ability.

To analyze the data, the researcher refers to what is described stating that qualitative data is analyzed based on three stages, namely data reduction, data presentation, and drawing conclusions (Miles & Huberman, 1992). The analysis is carried out using indicators of understanding mathematical concepts, namely: 1) Ability to restate a concept; 2) The ability to give examples and not examples; 3) Ability to present concepts in various forms of mathematical representation; 4) Ability to use, utilize, and choose certain procedures; 5) Ability to apply concepts/algorithms to problem solving.

RESULT AND DISCUSSION

Result

Based on the results of tests conducted by students at SMP Negeri 1 Inuman, Kuantan Singingi Regency in class VII, it states that the ability to understand mathematical concepts of students in the high category is 1 student or 10% of the total number of students tested, in the sufficient category there are 5 students or 50% of the total students tested, and in the low category there are 4 students or 40% of the total. tested students.

Discussion

To see the students' conceptual understanding ability on each indicator, the following data were obtained:

1. Indicators 1: Ability to restate a concept

$$A = \{2, 4, 6, 8, 10, 12, 14\}$$
$$B = \{2, 4, 8\}$$

Figure 1. Students' Answers to Question Number 1

Based on student answers where students are asked to determine whether set B is part of set A or not and students are asked to explain reasons based on understanding the concepts they have learned. Students answer incorrectly, because students only write down the set without providing information whether set B is part of set A or not. Thus, students cannot understand the concept by restating a concept.

2. Indicators 2: Ability to give examples and not examples

2. Contoh himpunan
A. Sekumpulan hewan berkaki empat
B. Sekumpulan murid pandai
Contoh bukan himpunan
A. Sekumpulan makanan
B. Sekumpulan kendaraan roda 4

Figure 2. Students' Answers to Question Number 2

Based on the students' answers, the students are asked to give 2 examples which are a set and 2 examples which are not a set. Students answer the question incorrectly, because in the student's answer there is an error in grouping a set and which one is not a set. So that students are less precise in giving examples and not examples of a set.

3. Indicator 3: Ability to present concepts in various forms of mathematical representation

$$S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}$$
$$C = \{1, 2, 3, 5, 7, 10, 11, 13, 15\}$$
$$D = \{5, 6, 7, 8, 9\}$$

maka $C \cap D = \{7, 8, 9\}$

Figure 3. Students' Answers to Question Number 3

From the students' answers to question number 3, students are asked to determine the $C \cap D$ and make a Venn diagram and make an arisan. However, basically students are still not precise in determining $C \cap D$ because the student is wrong in stating the members of the set C. Then the students also do not

describe the Venn diagram. Thus, these students are not able to present concepts in various forms of mathematical representation.

4. Indicator 4: Ability to use, utilize, and choose certain procedures

Handwritten student answer for Question Number 4:

$$\begin{aligned}
 &A = \{1, 2, 3, 4, 5\} \\
 &B = \{2, 3, 4, 5\} \\
 &C = \{5, 6, 7, 8\} \\
 &A \cap B \cup C \\
 &= \{1, 2, 3, 4, 5\} \cap \{2, 3, 4, 5\} \cup \{5, 6, 7, 8\} \\
 &= \{1, 2, 3\} \cup \{5, 6, 7, 8\} \\
 &= \{1, 2, 3, 5, 6, 7, 8\}
 \end{aligned}$$

Figure 4. Students' Answers to Question Number 4

Based on students' answers to question number 4, students are asked to determine $(A \cap B) \cup C$. However, this student is less precise in solving the given problem because the student does not follow the procedure of the set concept. So that students cannot use, utilize, and choose certain procedures from the concept of a set.

5. Indicator 5: Ability to apply concepts/algorithms to problem solving

Handwritten student answer for Question Number 5:

5) Misalkan :

A = Gemar Matematika = 15 siswa
 B = Gemar Biologi = 17 siswa
 A dan B = 8 siswa

Venn diagram showing two overlapping circles A and B. Circle A contains 15, circle B contains 17, and the intersection contains 8.

Jumlah Total Siswa adalah ?
 $\Rightarrow 15 + 17 + 8 = 40 \text{ siswa}$

Figure 5. Students' Answers to Question Number 5

From the students' answers to question number 5, students were asked to determine the total number of students from a class. However, this student is less precise in solving the given problem. So that the student's answer is wrong, it can be concluded that the student is not able to apply the concept/algorithm to problem solving in everyday life.

CONCLUSIONS AND SUGGESTIONS

Based on the results of the study, it can be concluded that the students' ability to understand mathematical concepts in the high category is 1 student or 10% of the total number of students tested, in the sufficient category there are 5 students or 50% of the total students tested, and in the low category there are 4 students or 40% of the students. all students tested. In each indicator, students answered more on the second indicator, namely the ability to give examples and not examples. However, there are still students who are less precise in giving examples from a set and examples are not a set. During the online learning process, students experience difficulties in solving the questions given, resulting in the low ability to understand mathematical concepts of class VII students at SMP Negeri 1 Inuman, Kuantan Singingi Regency on set material. Suggestions for further researchers regarding the analysis of the ability to understand mathematical concepts is to be able to analyze all indicators of understanding mathematical concepts. This can strengthen the results of research in analyzing the ability to understand students' mathematical concepts.

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