ANALYSIS OF STUDENTS' ABILITY TO UNDERSTAND THE MATHEMATICS CONCEPT IN THE APPLICATION OF MATLAB ASSISTED DISCOVERY LEARNING MODEL

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Abstract
This study aims to describe: (1) The level of students' ability to understand mathematical concepts in the application of the Matlab-assisted Discovery Learning model; (2) The difficulty of students' understanding of mathematical concepts. in the application of the Matlab-assisted Discovery Learning model. This research is a qualitative research with a descriptive approach. Based on the research data, it was found that: (1) The level of ability to understand mathematical concepts of students in the application of the Matlab-assisted Discovery Learning model with good abilities had the highest percentage of 57% followed by excellent abilities students with a percentage of 24%, students with moderately capable with a percentage of 14 % and students with less ability with a percentage of 5%; (2) The difficulty in understanding students' mathematical concepts in the application of the Matlab-assisted Discovery Learning model is the difficulty of facts because it does not able to interpret the results obtained, unable to change the problem in a simpler model.

Keywords: Concept Understanding, Discovery Learning, Matlab

INTRODUCTION

Education is an activity that plays an important role as well as one of the determinants and assessors of the success or failure of a person in his life. Education is not an activity that is only carried out in schools, but the family is the place where education begins and is carried out. Muhardi (Toyib, 2019: 65) in his research states that to support improving the quality of a country, it is necessary to improve the quality of its human resources through improving the quality of education. Therefore, an effort that can be made to produce good, quality and reliable human resources through education is through the learning process, one of which is learning mathematics (Destiniar, 2019: 116).

Mathematics is an abstract science so that solving mathematical problems requires good mathematical skills, one of which is understanding concepts. As in the Education Unit Level Curriculum which explains that one of the goals of mathematics subjects is to understand concepts or algorithms in a flexible, accurate, efficient and problem-solving manner (Trianingsih, 2019: 2). Understanding and mastery of concepts is the basis that students must have in learning mathematics. If someone already has the ability to understand mathematical concepts, then he is able to solve mathematical problems. Conversely, if someone can solve mathematical problems, then that person has the ability to understand mathematical concepts well.

The low ability to understand students' mathematical concepts is because students only memorize formulas without understanding the concepts and students are less able to restate

concepts and classify certain objects according to their concepts correctly. Russeffendi argues that not a few students who after studying mathematics are able to understand even simple concepts well, many concepts are understood incorrectly so that mathematics is considered a difficult, complicated and difficult science (Setiawan, 2017: 1029). In Ghozali's research (2018: 321) it was found that the low understanding of concepts was due to students having difficulty in restating the concepts they had learned and in determining the steps used in solving problems.

Observations made by researchers on March 10, 2020 showed that the ability to understand mathematical concepts of class XI students at SMAS Methodist Kutalimbaru was low at 26,7%. The diagnostic test for understanding mathematical concepts given contains 3 indicators of understanding mathematical concepts: 1) restating a concept; 2) Provide examples and non-examples of a concept; 3) Applying concepts or algorithms in problem solving. The following is the process of answering a diagnostic test for the ability to understand mathematical concepts of class XI students of SMA Methodist 1 Kutalimbaru on the material of algebraic functions.
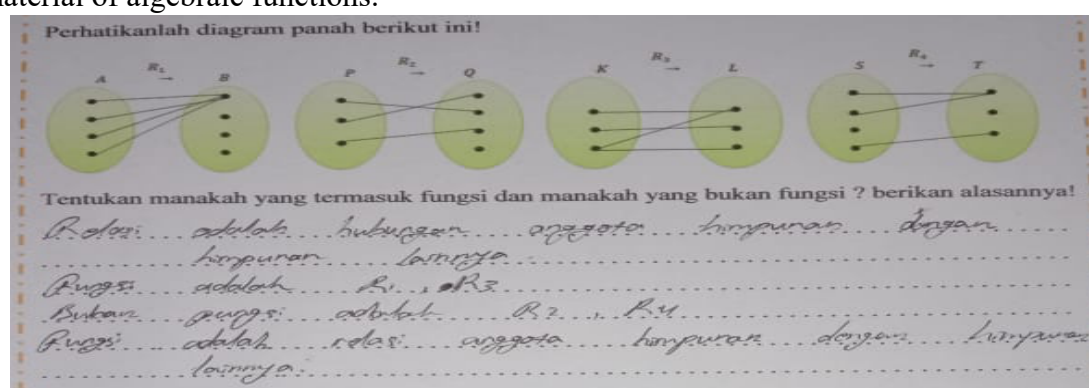

Figure 1. Restate the Concepts of Relations and Functions

Ghozali (2018: 321) explains that in learning mathematics, teachers who tend to use conventional learning will make students understand but only when the teacher explains and provides examples of questions and their solutions. However, when faced with a problem that is different from the example, students find it difficult to determine the steps to solve it. If in learning activities students only hear the subject matter delivered by the teacher, students will have difficulty understanding and interpreting the mathematical ideas they have Setiawan (2017: 1029). Therefore, a learning model is needed that can guide students to actively find and investigate so that students are able to construct mathematical concepts, express ideas, classify objects, use, utilize and choose procedures and apply concepts in solving problems. One learning model that is able to guide students to actively find and investigate is the Discovery Learning model.

Learning media in the form of computers which are advanced technology which is now equipped with software programs can help students become more responsible for their learning. Software in teaching and learning mathematics is increasingly important, especially in the subject of calculus. Schofield (Annajmi, 2016: 4) asserts that the use of technology in learning has a positive influence on student motivation and achievement. Indirectly the use of computers in learning can make the learning process individually (individual learning) by fostering student learning independence. Thus, students will experience a process that is much more meaningful than conventional learning (Rusman, 2015: 127). As NCTM suggests that the use of technology in the mathematics learning process can help students explore and identify mathematical concepts (Lestari, 2018: 2).

This encourages researchers to conduct research by utilizing computer software in learning mathematics, namely Matlab software. As according to Eng R. H Sianipar Matlab is

one of the computer computing devices used in the fields of science and engineering (Apriansyah, 2018: 13). Matlab is a programming language that comes with functions and characteristics that are different from other programming languages such as Delphi, Basic and C++. Matlab is also referred to as software with a high-level programming language that is devoted to technical computing needs, visualization programming and can be used to solve problems involving mathematical operations, matrix elements, optimization, approximations and others (Laksono, 2016: 5).

Based on the description of the problems in the background, the researcher intends to carry out research, namely "Analysis of Students' Mathematical Concept Understanding Ability with Application of Matlab Assisted Discovery Learning Model".

METHOD

The type of research used is descriptive qualitative research, this research involves class XI IPA-2 SMA Methodist 1 Kutalimbaru which is treated with the application of the Matlab-assisted Discovery Learning model in the even semester of the 2020/2021 school year, totaling 25 people. Kutalimbaru is a research that aims to describe in depth, systematically, factually and accurately the ability to understand students' mathematical concepts in the application of the Matlab-assisted Discovery Learning model and the difficulties experienced by students. As according to Hariwijaya (2007: 85) that qualitative research is research that explains how a phenomenon is studied in depth through data collection. If the data collected is deep enough to explain the phenomenon under study, there is no need to look for other sampling.

Data collection technique

This data collection process includes the process of entering the research location. The data collection methods needed in this study were a test of students' ability to understand mathematical concepts, interviews with students, observations or observations by observers, and documentation in the form of voice recordings and video recordings.

Research Mechanism and Design

The mechanism that will be used in this research includes three stages, that is: (1) The stage of preparing learning tools and research instruments; (2) the validation stage of learning tools and research instruments; (3) The stage of conducting research and data analysis. Each stage is designed so that valid and reliable data is obtained in accordance with the research objectives.

Research design

The research design is described as follows:
1) Field observation
2) Prepare research proposals
3) Validation of learning tools and research instruments.
4) Implementation of learning with the Matlab-assisted Discovery Learning model.
5) Implementation of students' mathematical concept understanding ability tests.
6) Conducting interviews as well as data triangulation.
7) Data analysis and research findings.
8) Writing research reports.

Data analysis

The data analysis used refers to the data analysis model of Milles and Huberman (Sugiyono, 2012: 236) that the activities in qualitative data analysis are carried out

interactively and take place continuously until complete. The data analysis of the Milles and Huberman model consists of three activities, namely data reduction, data display, and conclusion drawing.

RESULT AND DISCUSSION

1) The level of students' understanding of mathematical concepts in the application of the Matlab-assisted Discovery Learning Model

The level of students' ability to understand mathematical concepts in the application of the Matlab-assisted Discovery Learning model is grouped into 4 categories, namely less, sufficient, good and very good, which are presented in the following table:

Table 1. Ability Level of Understanding Mathematical Concepts

No	Level		Ability Level	The number of students	Percentage
	Number	**Alphabet**			
1		D	Not enough	1	5%
2		C	Enough	3	14%
3		B	Good	12	57%
4		A	Very good	5	24%
				21	100%

Description: Ability to Understand Mathematical Concepts (AUMC)

(Modification, Permendikbud No. 104; 2014)

The level of students' ability to understand mathematical concepts is divided into 4 (four) levels, namely less, sufficient, good and very good. Based on the data on the results of the ability to understand mathematical concepts obtained, the number of students for the level of ability to understand mathematical concepts is less than 1 person with a percentage of 5%, enough criteria is 3 people with a percentage of 14%, good criteria are 12 people with a percentage of 57%, and very good criteria as many as 5 people with a percentage of 24%. The weight of the average value of the ability to understand mathematical concepts obtained by the students of class XI IPA-2 SMA Methodist 1 Kutalimbaru is 2,83.

The diagram of the level of students' ability to understand mathematical concepts is presented in Figure 1. below:
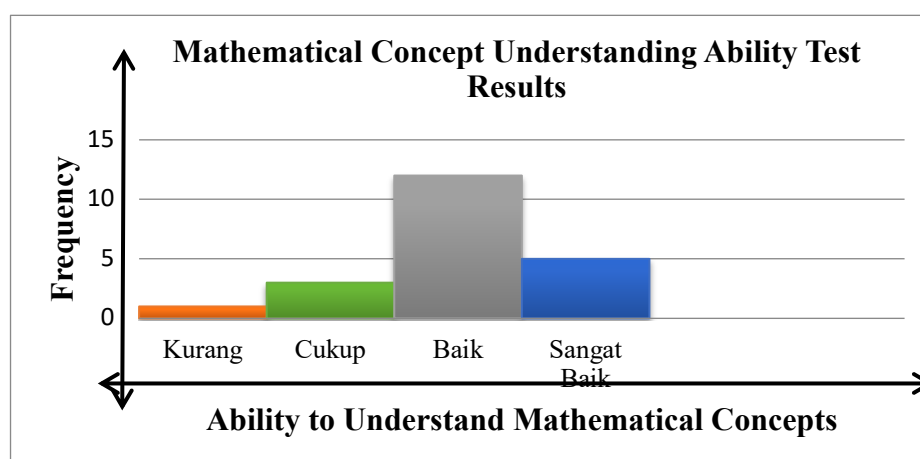
Figure 2. Students' Mathematical Concept Understanding Ability Level

2) **Difficulty in Understanding Students' Mathematical Concepts in the application of the Matlab-assisted Discovery Learning Model**

Difficulty in understanding students' mathematical concepts in the application of the continuous Matlab-assisted Discovery Learning model with mathematical objects, namely facts, concepts, operations and principles. These difficulties are not only experienced by groups of students who are able to understand mathematical concepts 'less' or 'enough', groups of students who are able to understand mathematical concepts very well can also experience difficulties.

The difficulty of understanding mathematical concepts was analyzed at each level of ability to understand mathematical concepts. These difficulties are presented in the form of a narrative from triangulation of data on the answer process and interview results. The category of difficulty in understanding mathematical concepts in the application of the continuous Matlab-assisted Discovery Learning model with mathematical objects including facts, concepts, operations and principles at each level of ability to understand mathematical concepts.

Difficulties in understanding mathematical concepts in the application of the Matlab-assisted Discovery Learning model experienced by students with a low level of ability to understand mathematical concepts include difficulty in facts because they are unable to interpret the results obtained, are unable to write limit definitions intuitively, are unable to simplify and determine the roots of functions in the form of a quadratic equation; concept difficulties because students are not able to write examples of functions that have limit values; operational difficulties because students use incorrect operations in determining function values; and difficulty in principle because students are not able to link between concepts/formulas (theorems and exponents) in problem solving.

Difficulties in understanding mathematical concepts in the application of the Matlab-assisted Discovery Learning model experienced by students with a sufficient level of ability to understand mathematical concepts include difficulty in facts because students are unable to interpret the results obtained, and determine the roots of functions in the form of equations unable to change problems in the form of mathematical models simpler ones; conceptual difficulties because students are not able to write down the definition of the limit of a function in the correct form of language according to the conditions; and difficulty in principle because students are not able to link between concepts/formulas (theorems and exponents) in problem solving.

Difficulties in understanding mathematical concepts in the application of the Matlab-assisted Discovery Learning model experienced by students with a good level of ability to understand

mathematical concepts include difficulty in facts because students are not able to interpret the results obtained, are unable to write limit definitions intuitively; conceptual difficulties because students are not able to write the definition of the limit of a function in the correct form of language according to the conditions; and difficulty in principle because students are not able to link between concepts/formulas (theorems and exponents) in problem solving. Difficulties in understanding mathematical concepts in the application of the Matlab-assisted Discovery Learning model experienced by students with a very good level of ability to understand mathematical concepts include difficulty in facts because students are unable to understand mathematical meanings/symbols; and difficulty in principle because students associate incorrect concepts/formulas (theorems and exponents) in problem solving.

Many things cause difficulties in learning mathematics, including spatial relationship disorders, abnormalities in visual perception, Visual-Motor associations, Perseverance, difficulty regarding and understanding symbols, impaired body appreciation, difficulties in language and reading and a lower IQ performance score than verbal IQ. . In addition, difficulties in understanding concepts can also occur because students have not fully and thoroughly understood definitions, theorems and prerequisite material in solving function limits so that in solving them students have difficulty and result in many mistakes made by students in solving test questions. This is in line with Suci's research (2020) that the lack of accuracy and completeness of students in learning limit material encourages students to make many mistakes in solving problems related to limits.

Based on the description above, it can be concluded that the difficulties in understanding mathematical concepts in the application of the Matlab-assisted Discovery Learning model include the difficulty of facts because they are unable to interpret the results obtained, unable to change the problem in a simpler model; conceptual difficulties due to not being able to explain through writing a precise definition; and difficulty in principle due to not being able to relate between concepts (limit theorem and exponential nature) in problem solving.

CONCLUSION
1. The level of ability to understand mathematical concepts of students with good abilities has the highest number, namely 12 students with a percentage of 57% followed by the level of ability to understand mathematical concepts of students with very good abilities as many as 5 students with a percentage of 24%, the level of ability to understand mathematical concepts moderately capable students are 3 students with a percentage of 14% and the level of ability to understand mathematical concepts of less capable students is 1 student with a percentage of 5%.
2. Difficulty in understanding mathematical concepts in the application of the Matlab-assisted Discovery Learning model including difficulty in facts because they are unable to interpret the results obtained, unable to change the problem in a simpler model; conceptual difficulties due to not being able to explain through writing a precise definition; and difficulty in principle due to not being able to relate between concepts (limit theorem and exponential nature) in problem solving.

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