
Analysis of Students ' Ability to Understand Mathematical Concepts In Terms of Learning Interests

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Abstract

Understanding the concept is the ability to absorb and understand mathematical ideas and interest in learning are the impulses in students psychically in learning something with full awareness, calmness, and discipline to cause individuals actively and happy to do it. This study aims to analyze the ability of students to understand mathematical concepts in terms of learning interests. The subjects in this study were MIA2 grade students of Christian High School 2 Soe even semester school year 2021/2022 as many as 30 students. The method used in this study is descriptive qualitative data collection techniques using tests, questionnaires, and interviews. The data analysis technique follows the Miles and Huberman model with a validity test of data using the triangulation technique. The results showed that the ability of students to understand mathematical concepts in terms of learning interests varies. Students with a high level of interest in learning by 20% were able to achieve four out of six indicators of the ability to understand mathematical concepts. Students with a moderate level of interest in learning 63% were able to achieve three indicators of understanding mathematical concepts. Students with a low level of interest in learning 17% were able to achieve two indicators of understanding mathematical concepts.

Keywords: Interest In Learning, Understanding of Mathematical Concepts

INTRODUCTION

Mathematics is a basic science that supports the development of Science and technology. Mathematics has many uses in everyday life, it is this that results in mathematics lessons applied at all levels in the educational unit. Mathematics learning is a teaching and learning process built by teachers to develop students 'thinking creativity which can improve students' thinking skills, and can improve the ability to construct new knowledge to improve good mastery of mathematical material (Amir & Risnawati, 2015).

Mathematics lessons are often considered a boring subject, this is because students are less able to understand the concepts of mathematics itself. Learning mathematics in school, starting from the easiest to the most difficult, from the concrete to the abstract, learning mathematics must be gradual, continuous, and continuous (Winata & Friantini, 2020). The purpose of mathematics learning in the 2013 curriculum is to have factual and conceptual abilities in science, this means that students must develop the ability to understand concepts, both in mathematics learning and other learning (Unaenah & Sumantri, 2019). Concept understanding is the ability or aptitude to understand and explain a situation or action of a class or category that has common properties known in mathematics (Ruqoyyah et al., 2020). The ability to understand mathematical concepts is the ability to absorb and understand mathematical ideas. Indicators of the ability to understand mathematical concepts are (1) restating the concepts that have been studied (2) classifying objects based on mathematical concepts, (3) applying concepts algorithmically, (4) providing examples or counter-examples of mathematical concepts, (5) presenting concepts in various representations, (6) linking various mathematical concepts internally and externally (Lestari & Yudhanegara M. R, 2015).

$$\begin{aligned}
 &3^{2x-1} - 3^{x-1} = 4 \\
 &2. 3^{2x-1} - 3^{x-1} = 4 \\
 &3^x - 3 = 6 \\
 &3^x - 2 = 6 \\
 &3 = 6 \\
 &x = \frac{6}{3} \\
 &-x_1, x_2 = 2 \\
 &x_2 = 9 \\
 &-x_1, x_2 = 2 \Rightarrow \text{HP 63}
 \end{aligned}$$

Figure 1. Student Work

Based on the work of Christian High School students 2 Soe in Figure 1 shows the ability to understand mathematical concepts of students is still low. This means that students have not been able to work on problems with the concept of exponential equations where students are mistaken in writing the equation and making the completion step in the exponential equation, students do not understand the nature of exponents, and students do not understand the prerequisite material.

This means that students have not been able to repeat the concepts that have been learned so students have difficulty classifying objects based on existing mathematical concepts and applying concepts algorithmically. The ability to understand mathematics which is a cognitive aspect of students is influenced by many factors both from within and outside the student, one of the factors from within the student that can affect the ability to understand the concept is there is an interest in learning (Winata & Friantini, 2020). The results of observations in Class X of SMA Kristen 2 Soe still found that students did not have the initiative to find out for themselves about the learning materials and they were just waiting for the results from the teacher, while the guidebook had been given to the students. This happens because students do not focus on learning so when working on practice problems they do not find out for themselves and only wait for the results of completion or an explanation from the teacher.

Interest in learning is defined as the state of students who can develop feelings of love and arouse self-motivation in doing activities, which is measured by interest, willingness from within, and participation in the learning process (Hidayat & Widjajanti, 2018). According to Guilford, interest in learning is encouragement-encouragement in students psychologically in learning something with full awareness, calm, and discipline that causes individuals actively and happy to do it. Indicators used to measure students' interest in learning are feelings of pleasure, interest in learning, showing attention while learning, and involvement in learning (Lestari & Yudhanegara M. R, 2015). This study aims to produce a study on the analysis of students' ability to understand mathematical concepts in terms of learning interests.

RESEARCH METHODS

The method used in this study is descriptive qualitative. The subjects of this study were students of Class X MIA2 SMA Kristen 2 Soe even semester year 2021/2022 as many as 30 people. Data collection techniques used mathematical concept comprehension ability tests, study interest questionnaires, and semi-structured interviews. Research data analysis techniques follow the Miles and Huberman model, where qualitative data analysis activities are carried out

interactively and continuously until complete until the data becomes saturated. Activities in data analysis are data reduction, data presentation, and conclusion/verification. with validity test using the triangulation technique (Sugiyono, 2017).

RESULTS AND DISCUSSION

In this study, an in-depth analysis was conducted on research subjects that fall into the categories of the high, moderate, and low learning interests, namely choosing two students from each level of learning interest to be identified more deeply about the ability to understand mathematical concepts in each category of learning interest, the division of which can be seen in Table 1.

Table 1. Student Learning Interest Criteria

Category Grouping	Criteria
$X \geq \bar{X} + SD$	high
$\bar{X} - SD \leq X < \bar{X} + SD$	moderate
$X < \bar{X} - SD$	low

Description :

X: questionnaire value of each student in the class

\bar{X} : average questionnaire score of each student in the class

SD: standard deviation

Learning Interest Questionnaire Results

The results of the questionnaire analysis showed the level of student interest in learning with different students. The categories of students by learning interest are presented in Figure 2.

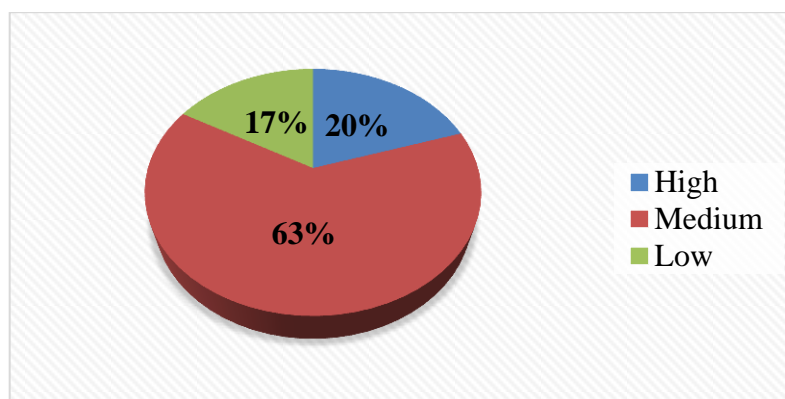


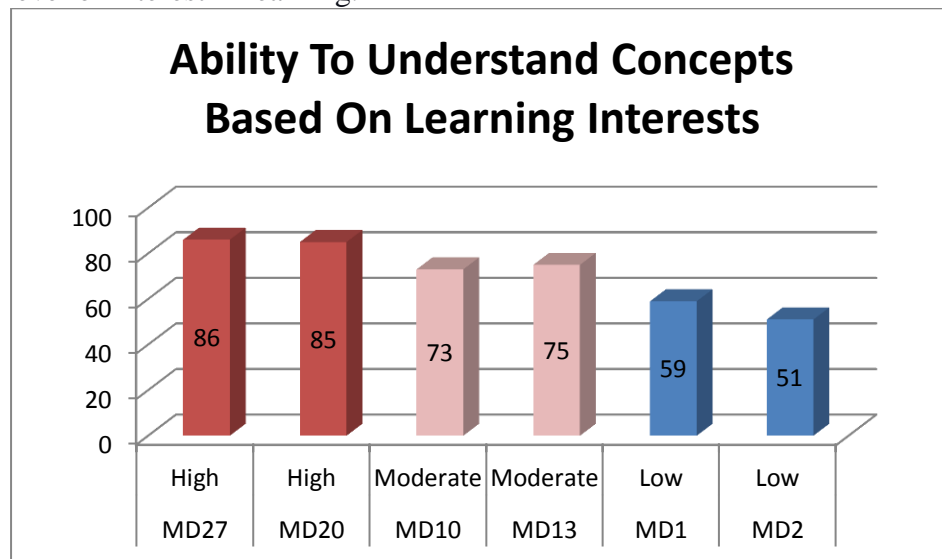
Figure 2. Categories Of Students According To Interest In Learning

Figure 2 shows that out of 30 students who have a high interest in learning as many as 6 students with a percentage of 20%. Interest in learning was as many as 19 students with a percentage of 63%. Low interest in learning as many as 5 students with a percentage of 17%. Most students are in the medium learning interest category. This means that during the learning of mathematics most students have enough impulses in themselves psychically in learning something with full awareness to cause the individual actively and happily to do it.

1. Ability To Understand Mathematical Concepts

Data on students' ability to understand mathematical concepts were obtained from the test results consisting of 6 questions description. The questions were given to 30 students of

Class X MIA2 SMA Kristen 2 Soe. Of the 30 students who worked on the questions, 6 students were selected who had been categorized based on their ability to understand the mathematical concepts of students. Here are the results of students' understanding of mathematical concepts based on their level of interest in learning.



Picture 3. Ability To Understand Concepts Based On Learning Interests

2. High Interest In Learning

Analysis of the work of students who have a high interest in learning by 20% was able to achieve four indicators of the ability to understand mathematical concepts, namely: restating the concepts that have been learned, applying concepts algorithmically, presenting concepts in various representations and associating various mathematical concepts internally or externally. This can be seen in the work of MD27 and MD20 students in Figure 4 and Figure 5.

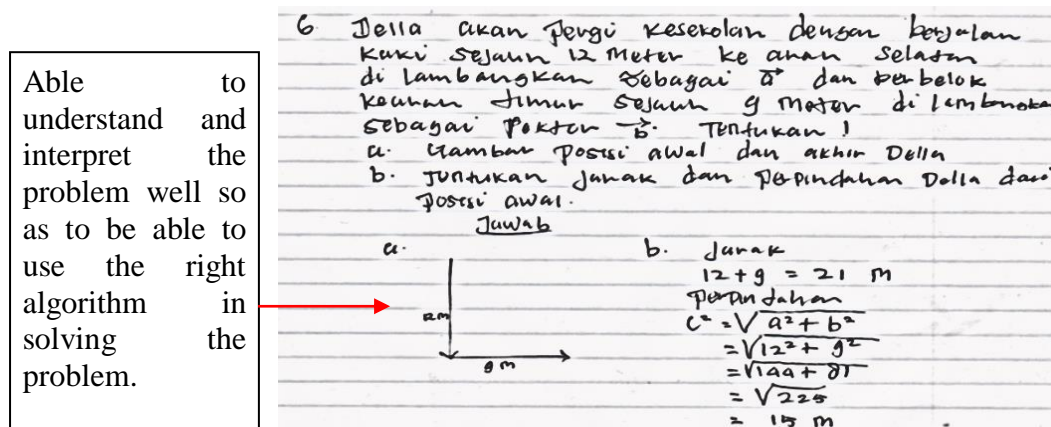


Figure 4. MD27 Work Results from Problem Number 6

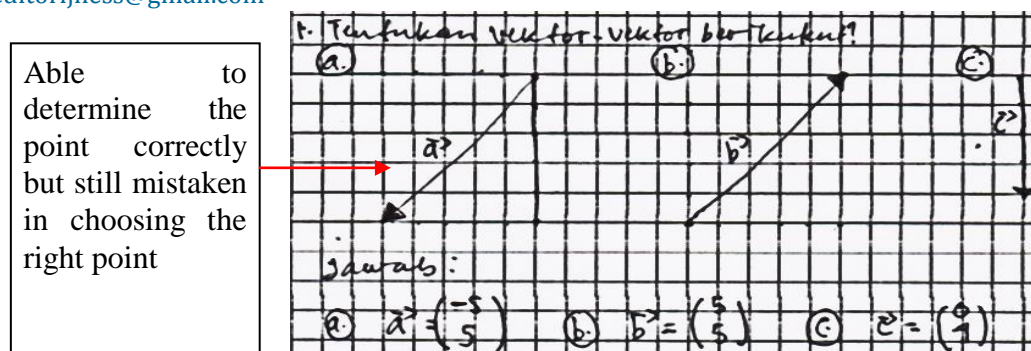


Figure 5. MD20 Work Results from Problem Number 1

Based on Figure 4 and Figure 5, it can be seen that MD27 and MD20 have been able to understand the problem whereas in question number 6 students have been able to relate questions in various representations. However, students are still less thorough and less precise in determining the point of Question Number 1. Then on Problem Number 2 students are less thorough as well so they don't get the maximum score. But on problem number 3, 4, and 5 students can solve them properly, so get the maximum score. The results of interviews with students that problem number 1 and know that students are wrong because students are less thorough and hasty in working on the actual problem students can finish it.

Students with a high interest in learning can understand concepts better but are still less thorough. In this case, students who have a high interest in learning can achieve four indicators of six indicators of understanding mathematical concepts. The high interest in learning students makes students already feel happy and disciplined in solving the problem but still less thorough. This is in accordance with his research (Kartika, 2018), (Komariyah et al., 2018) and (Winata & Friantini, 2020) that students with a high interest in learning have high comprehension abilities as well. (Rais & Ferinaldi, 2019) also stated that interest in learning affects the ability of students to understand concepts.

3. Moderate Interest In Learning

The results of the analysis also showed that 63% of students with a moderate level of interest in learning were able to achieve three indicators of the ability to understand mathematical concepts including: classifying objects based on mathematical concepts, applying concepts algorithmically, presenting concepts in various representations as shown in Figure 6 and Figure 7.

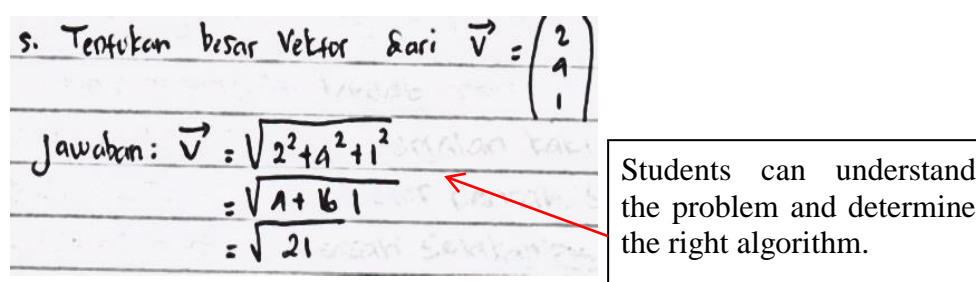


Figure 6. MD10 Work Results Problem Number 5

1. Diketahui: titik-titik A(-2,5) dan B(2,-1). Jarak \vec{A} merupakan
 vektor posisi dari titik A dan \vec{B} merupakan posisi dari titik
 B. Tentukan: $2\vec{A} - \vec{B}$
 Jawab: $2\vec{A} - \vec{B} = \begin{pmatrix} 2 \\ 1 \end{pmatrix} - \begin{pmatrix} 2 \\ 1 \end{pmatrix}$

$$= \sqrt{\frac{2^2 - 2^2}{1^2 - 1^2}}$$

$$= \sqrt{\frac{1-1}{1-1}}$$

$$= \sqrt{1+1}$$

$$= 5+5$$

$$= 10$$

Students are wrong in determining the right algorithm so wrong in solving the problem.

Figure 7. MD13 Work Results Problem Number 4

Figure 6 and Figure 7 shows that MD10 and MD13 have been able to solve the problem by using the right algorithm in question number 5 but still wrong in determining the right algorithm so that in question number 4 students are wrong until the final result. In questions Number 3 and 6 students are able to understand the problem so as to get the maximum score. Then Problem Number 1 and 2 students are able to determine the point and connect the direction of the vector but still less thorough in choosing the right point and connect the direction of the vector appropriately. The results of the interview also showed that from some numbers that students are wrong in doing such as problem number 4 students are wrong in using the algorithm because students do not understand in advance the purpose of the problem. Students immediately rush to answer because students think they have used the right algorithm. Problem number 1 and 2 students are less thorough in answering this because students are very hasty in answering questions.

Students who have an interest in learning are not able to understand the purpose of the problem and the application of the algorithm appropriately and less thorough in working on the problem, so that students are only able to achieve 3 indicators of 6 indicators of the ability to understand mathematical concepts. Students with a moderate interest in learning, tend to feel happy about learning mathematics if the teacher teaches with fun while learning. Low interest in learning students affect cognitive aspects that contribute to solving the problem correctly.

This is by the opinion (Winata & Friantini, 2020), (Pranajaya et al., 2020) and (Sihombing et al., 2021) that the ability to understand mathematics which is a cognitive aspect of students is influenced by many factors both from within and outside the student, one of the factors from within the student is interest in learning. (Rismawati & Hutagaol, 2018) also added that basically, mathematics learning is emphasized mastering concepts so that students have good basic concepts to achieve other abilities such as communication, connection, reasoning, and problem-solving.

4. Low Interest In Learning

The results of the analysis of the ability to understand mathematical concepts of students at low levels of interest in learning that are 17% of students are only able to achieve two indicators of the ability to understand mathematical concepts of students include: restate the concepts that have been learned and classify objects based on mathematical concepts as shown in Figure 7 and Figure 8.

4. Diketahui titik A (-2,5) dan B (2,-1). Jika \vec{a} merupakan vektor posisi dari titik A dan \vec{b} merupakan vektor posisi dari titik B, tentukan : $2\vec{a} - \vec{b}$

Jawab :

$$2\vec{a} - \vec{b} = \begin{pmatrix} 2 \\ 1 \end{pmatrix} - \begin{pmatrix} 2 \\ -1 \end{pmatrix}$$

$$= \begin{pmatrix} 2-2 \\ 1-(-1) \end{pmatrix}$$

$$= \begin{pmatrix} 0 \\ 2 \end{pmatrix}$$

$$= \sqrt{0^2 + 2^2}$$

$$= \sqrt{0+4}$$

$$= \sqrt{4}$$

$$= 2$$

Figure 8. MD1 work result

Students are wrong in determining the right algorithm so wrong in solving the problem.

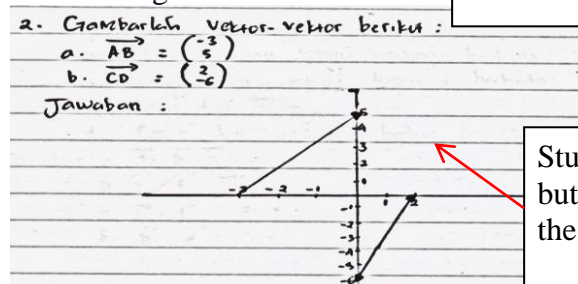


Figure 9. MD2 Work Results Problem Number 2

Students can determine the point but are still mistaken in connecting the exact direction of the vector.

Figure 8 and 9 shows that MD1 and MD2 students have not been able to understand the algorithm in solving the problem correctly it is wrong in the final result on the problem and still wrong in determining the direction of the vector. Numbers 1 and 3 students are capable of determining the point and determining the picture. But in question number 5 and 6 Shiva is still wrong in solving the problem because students are not able to interpret the meaning of the problem. This is to the results of the interview where Shiva has not been able to understand and use the right formula in solving the problem correctly so it is wrong in the final result. This is because the students have not been able to interpret the students' questions only answer what the students think is correct.

Students who have a low interest are still weak in stating, applying other forms of representation, giving, presenting, and relating various concepts in problem-solving. Students with low interest in learning feel unhappy about learning mathematics even though the teacher teaches with fun. Students feel math lessons are difficult lessons. In this case, the student is not active in the learning process of mathematics, does not show attention while studying and the test of understanding the given mathematical concept cannot be solved properly. This is consistent with the Gestalt theory that learning is more successful when it is related to interests, desires, and goals (Nurjan. S, 2016). Slameto argues that students who are interested in learning are students who have a fixed intention to pay attention to and devote to something that is taught flexibly, have a sense of pleasure and interest in something they are interested in, get success and interest in something that is of interest, prefer things that are of interest to other things, expressed through participation in activities and activities (Alifiana et al., 2020).

CONCLUSION

Based on the results of research and discussion can be concluded that the ability of understanding mathematical concepts of students in terms of learning interests varies. Students with a high level of interest in learning by 20% were able to achieve four out of six indicators of the ability to understand mathematical concepts. Students with a moderate level of interest in learning 63% were able to achieve three indicators of understanding mathematical concepts.

Students with a low level of interest in learning 17% were able to achieve two indicators of understanding mathematical concepts.

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