UJME 11 (2) 2022: 148-155
UNNES JOURNAL OF MATHEMATICS EDUCATION
https://journal.unnes.ac.id/sju/index.php/ujme/
ISSN: 2252-6927 (print); 2460-5840 (online)

Analysis of The Ability to Understand Mathematical Concepts in Terms of Students' Confidence in Blended Learning

Dwi Nuraeni Permatasari[a,*], Hery Sutarto[a]

[a] *Mathematics Department, Universitas Negeri Semarang, Sekaran Campus, Gunungpati, Semarang, 50229, Indonesia*

* *E-mail address: nenidwipermata@students.unnes.ac.id*

ARTICLE INFO

Article history:
Received 5 January 2022
Received in revised form 31 July 2022
Accepted 8 August 2022

Keywords:
Ability To Understand Mathematical Concepts;
Self-Confident;
Blended Learning.

Abstract

The purpose of this study was to determine the effectiveness of the ability to understand mathematical concepts in Blended Learning and to determine the pattern of ability to understand mathematical concepts in terms of students' confidence in Blended Learning. The research method used is experimental research with a sequential explanatory strategy. The population of this study was class VII students of Junior High School 28 Semarang for the academic year 2020/2021, with the research sample being class VII A (experimental class) and class VII C (control class); sampling was done using a simple random sampling technique. Subjects to obtain quantitative data, namely students from the experimental class, were selected by nine students based on the grouping of the results of the self-confidence questionnaire. The data obtained from the calculation of quantitative data, namely the results of the study, show that Blended Learning is effective for improving students' understanding of mathematical concepts. In the analysis of test results and interviews, triangulation was carried out, namely based on the level of student confidence showing the pattern of students' ability to understand mathematical concepts, namely students with high levels of confidence had good mathematical concept skills, those with moderate confidence levels had sufficient mathematical concept understanding abilities, while students with low self-confidence, lack of mastery of the ability to understand mathematical concepts they have. It can be concluded that the higher the students' self-confidence, the more confident they will be in solving problems with their ability to understand mathematical concepts.

1. Introduction

Mathematics is often said to be a lesson that is difficult to understand or difficult to find a way to solve, on the grounds that the questions exemplified by development questions or practice questions are considered different, so that students have difficulty finding ways to solve them. From several studies, it is stated that one of the difficulties arises because understanding concepts or compiling and interpreting new information from the material being studied by students is still lacking. Understanding ability is very important to master material that contains many formulas so that students can understand the concepts in the material as a whole and skillfully use various methods or procedures in it in a flexible, efficient, accurate and precise manner (Dini, Wijaya, & Sugandi, 2018).

Mathematics learning that develops the ability to understand good mathematical concepts is to direct students to the material being taught not only to be memorized, but to direct students to understand, interpret, identify, and be able to explain the concepts of the subject matter being studied. This is so that students are able to solve and solve mathematical problems they face and make it easier for students to develop other mathematical abilities.

One aspect that affects students' ability to understand mathematical concepts is self-confidence. Mulyati & Maya (2018) said that it is most likely that students have difficulty understanding the lesson, one of

To cite this article:
Permatasari, D.N., & Sutarto, H. (2022). Analysis of The Ability to Understand Mathematical Concepts in Terms of Students' Confidence in Blended Learning. *Unnes Journal of Mathematics Education, 11*(2), 148-155. doi: 10.15294/ujme.v11i2.59873

which is the lack of student confidence in their abilities, what happens is that students feel inferior and have not been able to solve the problems given by teacher. Students' self-confidence affects the difficulty of students understanding learning, students will feel inferior and even doubtful as a result students are unable to solve problems. So that it is said that students' self-confidence is very important to the ability to understand the material, especially understanding mathematical concepts. If students have doubts when learning the material they have just learned and feel afraid, they will refuse and hesitate to learn the material.

Several previous studies have shown that students who have high self-confidence can form confidence in themselves about their ability to try and never give up in solving given problems, especially in their ability to understand mathematical concepts. The need for the development of an active, interactive, and innovative learning model that adapts to current conditions and situations. Blended Learning learning model is an alternative learning model that is practical and interactive. With some of these descriptions, the researcher conducted a research on the analysis of ability to understand mathematical concepts which was supported by the students' self-confidence that could be developed through Blended Learning.

2. Methods

The method used by the researchers in this study was an experimental research with mixed methods (mixed methods) with the type of sequential explanatory strategy mixed methods. According to Creswell (2014: 17), this sequential explanatory strategy is a method where researchers first conduct quantitative research, analyze data, and compile the results. This was followed by collecting qualitative data followed by analysis of qualitative data which is built based on quantitative data.

In this study, quantitative data collection and analysis was used to test whether the Blended Learning strategy was effective in improving students' mathematical concept understanding skills. Meanwhile, the collection and analysis of qualitative data which was built from quantitative data was used to find out how the pattern of students' ability to understand mathematical concepts in terms of students' confidence in Blended Learning.

The population in this study were seventh grade students of Junior High School 28 Semarang in the 2020/2021 academic year, with sampling carried out using a simple random sampling technique which selected 2 classes, namely VII A as the experimental class and VII C as the control class. The experimental class was given learning using Blended Learning, while the control class was given learning using conventional learning. The subjects in this study were selected 9 students from the experimental class group based on the grouping of the results of the self-confidence questionnaire.

The variables of this research were the ability to understand mathematical concepts, students' self-confidence, blended learning. The data collection method used is the method of tests, questionnaires, and interviews. This test method is used to obtain quantitative data about students' ability to understand mathematical concepts in the experimental class and control class which will then be used as triangulation material to obtain qualitative data. Student self-confidence questionnaire was used to obtain data on students' confidence in Blended Learning. The interview method in this study was carried out by giving several questions to several students who were selected based on the grouping of the results of a self-confidence questionnaire to determine the students' ability to understand mathematical concepts.

3. Results & Discussions

3.1. Early Data Analysis

Initial data analysis was used as a reference for sample selection by performing normality test, homogeneity test, and two-average similarity test. After testing the normality, homogeneity, and similarity of the two averages in the two classes, the data obtained are normally distributed, have the same variance (homogeneous), and there is no significant difference between the two classes.

3.2. Quantitative Data Analysis

The data referred to in quantitative research are the posttest scores of the experimental class and control class students. Before testing the hypothesis, the data obtained were first tested for normality and homogeneity. After testing for normality and homogeneity in both classes, the results showed that the data

were normally distributed and the data had the same variance (homogeneous), so it could be continued with hypothesis testing.

The achievement of effective learning in this study is the achievement of classical conditions in a class, the average ability to understand mathematical concepts of students in Blended Learning is better than the average ability to understand mathematical concepts of students in ordinary learning, and to analyze the increase in ability to understand mathematical concepts students in the experimental class and in the control class.

Calculation of hypothesis test I is a classical mastery test which aims to determine whether students' ability to understand mathematical concepts in Blended Learning can achieve classical mastery. The classical mastery criteria used are 75% of the results of the students' ability to understand mathematical concepts reaching a value of 75. The hypothesis test of individual learning mastery is carried out using a one-sided average test. While the classical learning completeness test uses the one-party proportion test.

In the calculation of the average test for hypothesis I is the average test (t test) if $t_{count} > t_{table}$ then H_0 is rejected. In testing the average test for hypothesis I in this study using the help of SPSS 22. With the criteria if $sig.(1-tailed) < 0{,}05$ then H_0 is rejected. In this study $\alpha = 0{,}05$ SPSS 22 calculation results sig value. in the One-Sample Test table for the value of $sig.(2-tailed) = 0.033$. These results indicate that $sig.(1-tailed) < 0{,}05$. So, the average ability to understand mathematical concepts of experimental class students is more than the complete limit, which is 75.

In the calculation of the proportion test for hypothesis I is the proportion test (z test) if $Z_{count} > Z_{table}$, then H_0 is rejected. In testing the proportion test for hypothesis I in this study using the help of SPSS 22. With the criteria if $sig.(1-tailed) > 0.05$ then, H_0 is rejected. In this study $\alpha = 0.05$ SPSS 22 calculation results sig value. in the Binomial Test table for the value of $sig.(1-tailed) = 483$. These results indicate that $sig.(1-tailed) > 0.05$. Then H_0 is rejected, meaning that the proportion of students who reach the actual completion limit is more than 75%. So, the ability to understand mathematical concepts in the experimental class has reached classical learning completeness.

Based on the results of the one-sided average test and the one-party proportion test, it was found that the results of the ability to understand mathematical concepts in Blended Learning learning have reached the actual learning mastery of 75. Calculations regarding the one-party average test and the one-party proportion test.

Hypothesis II to determine whether the ability to understand mathematical concepts of experimental class students is better than the ability to understand mathematical concepts of control class students. To test this hypothesis, two tests or two statistics are used, namely the two-mean difference test and the two-proportion difference test.

In the calculation of the Difference Test between Two Averages, if $t_{count} > t_{table}$ then H_0 is rejected. In testing the Two-Mean Difference Test in this study using SPSS 22 assistance. With the criteria if $sig.(1-tailed) < 0.05$ then H_0 is rejected. In this study $\alpha = 0.05$ SPSS 22 calculation results sig value. in the Independent Samples Test table for the value of $sig.(2-tailed) = 0.010$. These results show $sig.(2-tailed) < 0.05$. Then H_0 is rejected, meaning that the average ability to understand mathematical concepts in the experimental class is better than the average ability to understand mathematical concepts in the control class.

In calculating the difference in the two proportions test (z test) the test criteria used are reject H_0 if $Z \geq Z_{0.5-\alpha}$ and accept H_0 for $Z < Z_{0.5-\alpha}$ with α being the significant level. Based on the results of the calculation of the difference in the two proportions for hypothesis II, it is obtained $Z_{count} = 2.895$ and with $\alpha = 5\%$ $Z_{table} = Z_{0.45} = 1.64$ is obtained. Because $Z_{count} = 2.895 > 1.64 = Z_{table}$, then H_0 is rejected, meaning that the proportion of students who complete the experimental class's ability to understand mathematical concepts is better than the students who complete the control class's ability to understand math concepts.

From the two results that have been obtained above, it can be concluded that the ability to understand mathematical concepts of students with Blended Learning is better than the ability to understand mathematical concepts of students with ordinary learning models. Calculations regarding the difference test of two means and the difference test of two proportions for hypothesis II.

Hypothesis III Test The third hypothesis test is a test of increasing the average ability to understand mathematical concepts between the results of the pretest and the results of the posttest. Hypothesis III test

was conducted to analyze the improvement of students' ability to understand mathematical concepts in the experimental class and in the control class. In this improvement test, three test statistics were used, namely the difference test of two paired averages, the normalized gain test (N-Gain) and the two-average difference test of increasing the mathematical concept understanding ability test results.

The difference test of two paired averages in the third hypothesis test aims to determine a significant increase in the results of the ability to understand mathematical concepts between before and after learning with Blended Learning in the experimental class. The criteria used in this test is that H_0 is accepted if it is obtained $-t_{1-\frac{1}{2}\alpha} < t < t_{1-\frac{1}{2}\alpha}$ where $t_{1-\frac{1}{2}\alpha}$ is obtained from the distribution list t with probability $(1-\frac{1}{2}\alpha)$ and $df = (n-1)$. In other cases H_0 is rejected. Based on the results of the tests that have been carried out, it is obtained that $t_{count} = 9.417$ with $\alpha = 5\%$ and $df = 21$ obtained $t_{table} = 2.08$ so that H_0 is rejected and H_1 is accepted. This means that there is a significant increase in the ability to understand mathematical concepts in the experimental class.

The normalized gain test in the third hypothesis test aims to determine the magnitude of the increase that occurs in the ability to understand students' mathematical concepts seen in the results of the pretest and posttest. In the normalized gain test, it can be seen the magnitude of the increase in students' conceptual understanding abilities before and after learning, both the increase for each individual and the increase classically in a class. In the gain test that has been carried out, it is found that the gain index for the experimental class is classically 0.60.

The test of increasing the average ability to understand concepts is carried out to test whether there is a difference between increasing the ability to understand mathematical concepts in the classroom using Blended Learning learning strategies and improving the ability to understand mathematical concepts in the classroom using the ordinary learning model. The criteria used are accept H_0 is accepted if $t < t_{1-\alpha}$ with a significance level of 5% and $df = (n_1 + n_2 - 2)$ with probability $(1-\alpha)$. Based on the results of the calculation of the similarity test of the two average increases for hypothesis III, it is obtained $t_{count} = 13.47$ and with $\alpha = 5\%$, it is obtained $t_{table} = t_{0.95;41} = 2.02$. Because $t_{count} = 13.47 > 2.02 = t_{table}$, then H_0 is rejected, meaning that the average increase in the ability to understand mathematical concepts in the experimental class is better than the average increase in the ability to understand mathematical concepts in the control class.

Based on the three tests that have been carried out, it was found that there was a significant increase in the ability to understand students' mathematical concepts in Blended Learning and the increase was better than the increase that occurred in the classroom with the application of the ordinary learning model. Complete calculations regarding the difference test of two paired averages, normalized gain test, and difference test of two increasing averages.

From some of the results obtained, the application of Blended Learning is considered effective for improving the ability to understand mathematical concepts. This is in line with research by Patmawati, Misdalina, & Fitriasari (2019). Based on the results of the study, it shows that there is a significant positive effect on the ability to understand mathematical concepts of class X students through the Blended Learning model. Supported by research by Nugraha, Astawa, & Ardana (2019). Based on the results of the study, it shows that Blended Learning has a positive effect on understanding concepts and the fluency of students' mathematical procedures. Based on the results of the study Bibi & Jati (2015), it was shown that the application of the Blended Learning model showed an increase in learning motivation and understanding. Based on the results of the study Fatwa & Djuniadi (2016), blended learning was able to improve student learning outcomes.

3.3. Qualitative Data Analysis

The qualitative data analysis will discuss the ability to understand mathematical concepts in terms of students' self-confidence. The level of self-confidence of students in this study refers to the confidence of students in learning mathematics at school. The level of student confidence can be divided into three based on a self-confidence questionnaire. To determine the grouping of students according to Arikunto (2009) in the following table.

Table 1. Confident Grouping Categories

Value Interval (x)	Confidence Criteria
$x > \bar{x} + SD$	High
$\bar{x} - SD \leq x \leq \bar{x} + SD$	Medium
$x < \bar{x} - SD$	Low

From the results of the analysis, it was found that the average value of the student questionnaire was 63 with a standard deviation of 6. Based on the results of the student self-confidence questionnaire in the experimental class, the data obtained in the following table.

Table 2. Percentage of Self-Confidence Questionnaire Results for Students of Class VII A

Group	Number of students	Percentage
High	3	13.64%
Medium	16	72.73%
Low	3	13.64%
Total	**22**	**100%**

The subject of this qualitative data consisted of nine students selected from the experimental class, three students were selected to represent each category. Furthermore, interviews were conducted with nine subjects to obtain qualitative data based on the ability to understand mathematical concepts of each subject. This qualitative data collection was done by using triangulation technique. The triangulation used in this research is to compare the data from the test results for the ability to understand concepts and the results of interviews related to the same topic.

3.3.1. Ability to Understand Mathematical Concepts of High Confident Group Students

The results of the analysis of the ability to understand mathematical concepts in students with high self-confidence categories indicate the ability to understand mathematical concepts of students is good. Judging from the analysis of test results and interview results by students in the high self-confidence group, it shows that students are able to complete almost all indicators of concept understanding ability. The ability to master a material is also seen during interviews, students are able to answer questions with their understanding, although there are some answers that are not in accordance with the concept, but they are confident in conveying their understanding. This is in accordance with the indicators of self-confidence, namely the belief in self-ability. Some students from the high self-confidence group were also active in asking questions related to material that had not been understood. This also shows the confidence indicator, namely optimism. The results obtained are similar to the research of Nurfajriyanti & Pradipta (2021), that the higher students' self-confidence, the more confident students are in solving problems with their ability to understand mathematical concepts. In a study conducted by Eriana, Kartono, & Sugianto (2019), students with high self-confidence had a better concept understanding than moderate and low self-confidence.

3.3.2. The Ability of Understanding Mathematics Concepts of Students in the Medium Confident Group

The results of the analysis of students' ability to understand mathematical concepts in the category of moderate self-confidence showed that students' ability to understand mathematical concepts was sufficient. Judging from the analysis of test results and interview results by students in the moderate confidence group, they showed that they were able to complete only a few indicators of concept understanding ability, some questions were less thorough in completion, and lack of understanding of concepts caused some indicators to have not been achieved. The ability to master a material during an interview, students are able to answer questions, some students doubt the answer because they are not confident in their understanding. Students with confident groups are active in answering the teacher's questions but are reluctant to ask questions if they still do not understand the material.

3.3.3. The Ability of Understanding Mathematical Concepts of Students in the Low Confidence Group

The results of the analysis of the ability to understand mathematical concepts in students with low self-confidence categories show that students' ability to understand mathematical concepts is lacking. Judging from the analysis of test results and interview results by students in the low self-confidence group, it shows that they have not been able to complete the indicators of concept understanding ability. The test results

show that students still experience many conceptual errors but have not dared to ask the teacher or friends who are more capable. Some of the students' answers were written with the right steps but the students were not able to explain the answers. This is because students do not understand the concept. The ability to master a material during an interview shows that students cannot give the right reasons according to the concept. The students of this low self-confidence group tend to be silent and shy to ask or answer the teacher's questions. This is in line with Triyadi as quoted by Sapto, Suyitno, & Susilo (2015), that symptoms of lack of self-confidence in students, one of which is not daring to ask questions and express opinions and being nervous when appearing in class. According to Komara (2016), individuals who have good self-confidence have confidence and always try to develop their potential to the maximum and show the best of themselves as evidenced by an achievement. On the other hand, students who have poor self-confidence are unable to develop their talents, interests, and potentials and are not able to actualize themselves optimally and are passive.

3.4. Patterns of Ability to Understand Mathematical Concepts From Students' Confidence in Blended Learning

According to Jahani & Behzadi (2014), there is a strong relationship between self-confidence and mathematical ability so that the higher a person's self-confidence, the student's mathematical ability will also increase. Someone who has confidence has confidence in overcoming problems. In students' self-confidence, the level of ability to understand concepts is not completely influenced by the self-confidence that exists in each of them, there are many factors that affect the ability of students' self-confidence in the form of internal factors and external factors. Likewise, students' self-confidence is not fully influenced by the intellectual level of students, but there are many factors that influence students, both external and internal factors. According to Ghufron & Risnawita (2017), self-confidence that is too high is not a positive trait. In general, it will make the person less careful. While positive self-confidence is able to lead an individual to achieve maximum results.

From the results of the description of the results of trigulation shows as follows.

a) Students are able to master the concept of the material presented based on indicators of the ability to understand concepts with their abilities. So it can be concluded that the ability to understand mathematical concepts is good.
b) Students' conceptual understanding ability is sufficient in mastering the material presented based on indicators of concept understanding ability.
c) The ability to understand mathematical concepts of students is lacking in mastering the concepts of the material presented based on indicators of ability to understand concepts.

This data analysis is supported by the average value of student learning outcomes based on the grouping of students' self-confidence questionnaires obtained as follows:

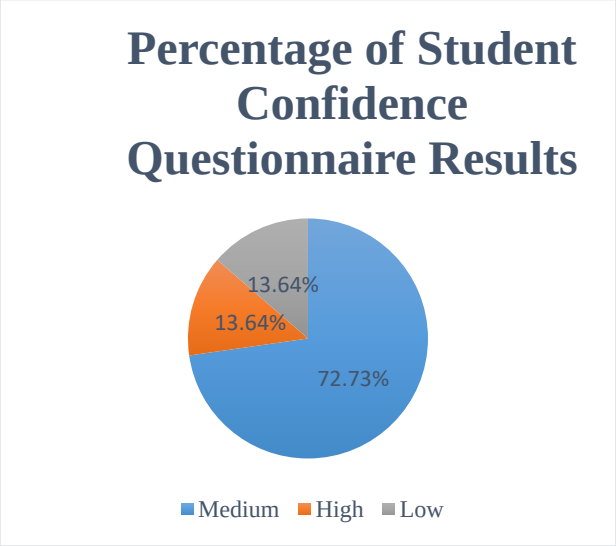


Figure 1. Diagram of the Percentage of Students' Confidence Questionnaire Results

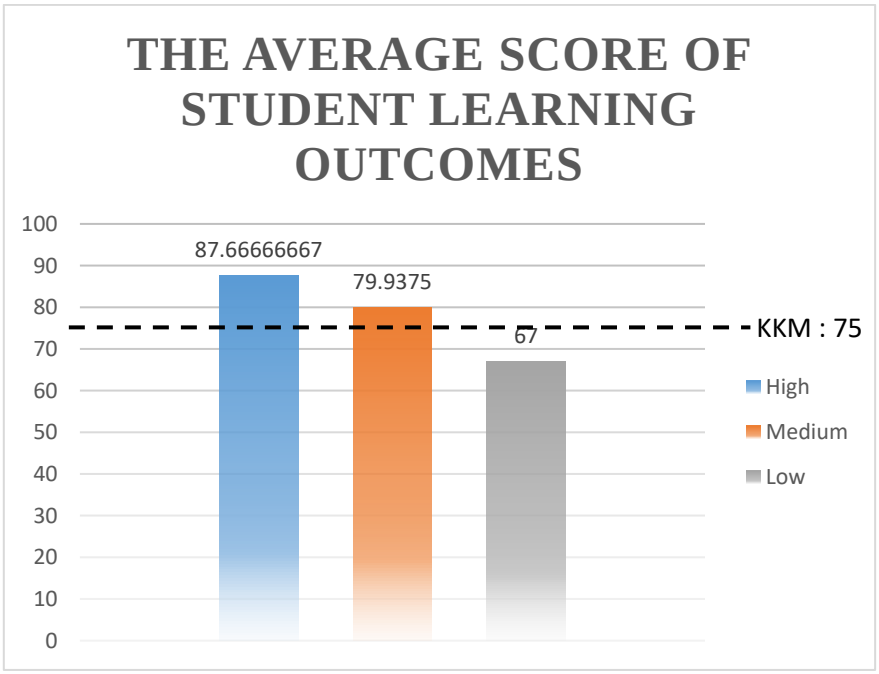
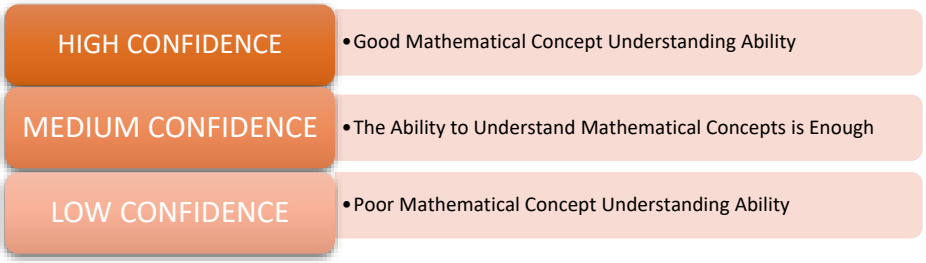


Figure 2. Graph of the average value of student learning outcomes based on the level of self-confidence

From the average value of student learning outcomes based on the grouping of students' self-confidence, it is known that students with high levels of self-confidence obtained an average value far above the minimum criteria of mastery learning (KKM) value, students with moderate levels of confidence obtained an average score above the KKM less, while on students with low self-confidence, the average value is below the KKM value. This is in line with the results of research by Hasbullah (2014) that the average mathematics learning outcomes of students with high student self-confidence are higher than students with low self-confidence.

Based on the data analysis of the concept understanding ability test, self-confidence questionnaire, and interviews, a pattern of students' ability to understand mathematical concepts was obtained based on students' self-confidence as follows.



4. Conclusion

Based on the results of the research and discussion that have been presented, it is concluded that Blended Learning is effective on the ability to understand mathematical concepts. It was found that the pattern of ability to understand mathematical concepts in terms of students' self-confidence in Blended Learning is as follows: (a) In the category of students with high self-confidence, they have good mathematical concept understanding abilities. (b) In the category of students with moderate self-confidence, the ability to understand mathematical concepts is quite good. (c) In the category of students with low self-confidence, they have poor understanding of mathematical concepts.

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