

The Effect of Mathematical Anxiety on the Understanding of Mathematical Concepts in Class XI Students of SMAN 5 Sinjai

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Abstract

This research aims to determine the influence of mathematical anxiety on the understanding of mathematical concepts. The method used an investigation and sampling method with a simple random sampling technique, the sample of which was 90 students. Analysis in the context of testing research hypotheses using linear regression analysis tests, with the results of hypothesis tests producing the influence of mathematical anxiety on the understanding of mathematical concepts.

Keywords: Anxiety, mathematics, understanding of mathematical concepts

1. Introduction

Education is a process of changing a person's behaviour and ability towards the direction of progress and improvement. Education can change a person's mindset to always innovate and improve in all aspects of life towards the direction of improving self-quality. As in mathematics education, students are expected to have improved mathematical abilities after they go through the learning process.

The assumption that mathematics is a very difficult and frightening lesson is still felt by students. The fear of learning mathematics will cause anxiety for students, resulting in anxiety for students. This anxiety is called math anxiety (Math Anxiety)(Setiawan et al., 2021).Anxiety, tension and fear according to most people are natural things in learning, because everyone feels these things when learning. However, according to the expert's view, it turns out that psychologically this can interfere with one's performance in learning.

Anxiety is a form of a person's emotions that can cause a feeling of stress, worry or anxiety in them in different situations. We can feel anxious about anything at any time. Big problems or small problems, good things or bad things if we believe they will happen, they will actually happen(Dwirahayu, 2018). Maths anxiety is defined as a feeling of anxiety that one cannot do something efficiently in situations involving the use of mathematics(Furner & Marinas, 2016)

The relationship between anxiety and ability and achievement can be explained by the logic that when someone has anxiety, anxiety arises in tests and results that are not optimal. Anxiety is considered as one of the inhibiting factors in learning that can interfere with the performance of a person's cognitive functions, such as in concentrating, remembering, forming concepts and solving problems.(Ashcraft & Kirk, 2001).

Anxiety is a form of individual emotion related to a feeling of being threatened by something, usually with an object of threat that is not very clear. Anxiety with a reasonable intensity can be considered to have a positive value as motivation, but if the intensity is very strong and negative, it will actually cause harm and can interfere with the physical and psychological state of the individual concerned. Mathematics anxiety is not only experienced in academics, but also affects in real life.

The purpose of mathematics education is for students to understand mathematical concepts, explain the interrelationships between concepts and apply concepts or algorithms in a flexible, accurate, efficient and precise way in solving problems. Math Anxiety is very influential on the results of learning mathematics and student achievement in low mathematics(Handayani, 2016). To achieve good mathematics learning outcomes, mathematical abilities are

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needed including the ability to understand mathematical concepts, mathematical reasoning abilities, mathematical communication skills, mathematical connection abilities, problem solving abilities, and students' mathematical representation abilities. Among these mathematical abilities, the most basic ability that must be mastered by students first is the ability to understand mathematical concepts, because the ability to understand mathematical concepts is the most basic ability that must be mastered by students,

One of the factors that causes mathematics to be difficult for students is the abstractness of mathematics, so that students find it difficult to imagine what they are learning. Difficulties in learning mathematics are caused because most of them just memorize the formula instead of understanding the concept. Therefore, in order for students to understand the subject matter of mathematics, students need to emphasize understanding the concepts and mathematical reasoning of the material being studied.(Munasiah, 2016). Understanding concepts is the basis of understanding principles and theories, so that in order to understand principles and theories students must first understand the concepts that make up these principles and theories.

Understanding of mathematical concepts is needed by students to succeed in learning mathematics, this is in line with(Fatqurhohman, 2016), one of the keys to success in learning mathematics is mastery of concepts. It is necessary for students to master mathematical concepts because mathematical concepts have links between one concept and another. If students have not mastered the basic concepts in understanding mathematics, the expected learning objectives will not be achieved and students will have difficulty solving mathematical problems. Understanding the concepts contained in mathematics is necessary to understand mathematics, the basic concepts in mathematics must be completely mastered from the beginning before learning mathematics further, by understanding the concepts in advance students will be easier to receive new material.

2. Research Method

This research is a survey research using the correlation-regression method to see the effect of mathematical anxiety levels (Mathematics Anxiety) with an understanding of mathematical concepts. The sampling technique used is simple random sampling. The number of members of the sample are 90 students.

Measuring Mathematical Anxiety by distributing questionnaires (divided into indicators of Physiological Responses, Behavioral Responses, Cognitive Responses and Affective Responses) with a total of 36 item statements and using a Likert scale of 1-5. Understanding of Mathematical Concepts (divided into indicators describing counting rules, permutations, and combinations as well as calculating the probability of an event) with a total of 10 essay questions.

3. Data analysis

Research analysis techniques in the context of hypothesis testing using linear regression analysis tests. Before hypothesis testing is carried out, an analysis requirement test is first carried out which includes normality test, linearity test, and heteroskedasticity test.

4. Results and Discussion

A simple linear regression statistical test was carried out to determine the effect of students' mathematical anxiety on their ability to understand mathematics. The data used is the post-test scores of mathematical understanding abilities and math anxiety scores after learning is done on students. Before the linear regression statistical test is carried out, it is necessary to test the classical linear assumption.

4.1. Classical Linear Assumptions Test

1) Normality test

Based on the previous analysis, it is known that the posttest score data on students' ability to understand mathematical concepts and math anxiety are normally distributed. The result show on Table 1.

2) Linearity Test

The results of the linearity test with a significance level of $\alpha = 0,05$ and the results are presented in the table 2.

Table 1. Normality Test Results

	One-Sample KS			Conclusion
	Stats	Df	Sig.	
Concept Understanding	0.642	90	0.657	Normal Distributed Data
Math Anxiety	0.763	90	0.348	Normal Distributed Data

Table 2. Normality Test Results

	Concept Understanding	
	F	Sig.
Math Anxiety	1.210	0.442

4.2. Regression Test

The calculation of linear regression analysis between mathematical anxiety towards the ability to understand mathematical concepts produces a mathematical model of linear regression as follows:

$$Y = 31.336 - 0.458X$$

The value of 31,336 is a constant value which indicates that if there is no math anxiety then the mathematical understanding will reach 31,336. The regression coefficient X of -0.458 states that every time there is an addition of one value for math anxiety it will reduce the ability to understand mathematics by 0.458.

The significance of the regression equation obtained can be tested using the F test. However, because only one independent variable is used, namely math anxiety, the t test can also be used to test the significance. The hypothesis being tested is: H_0 : Mathematics anxiety has no significant effect on the ability to understand mathematical concepts. H_1 : Math anxiety has a significant effect on the ability to understand mathematical concepts. The results of the calculation of the t test and F test at a significance level of $\alpha = 0.05$ can be seen in the table 3.

Table 3. Results of the t test and F test

Statistic test	Count Value	Sig.	Information
t test	-5.783	0.000	H_0 is rejected
F test	86.233	0.000	

The results of the t statistical test in table 3 state that the significance value of the two tests is 0.000. Because the value of Sig. $< \alpha$ then H_0 is rejected, this shows that mathematics anxiety has a significant effect on the ability to understand students' mathematical concepts.

5. Discussion

The results of calculations in the hypothesis give significant results, this proves that there is an effect of math anxiety on understanding mathematical concepts, this is in line with the results of the study (Djafar, 2018), student anxiety has a positive effect both directly and indirectly on mathematics learning outcomes. In this study it can be seen that anxiety can increase understanding of concepts by 0.458, although it can be said that the effect of anxiety on increasing understanding of mathematical concepts is relatively low, but this gives positive results mathematics. As in (Wicaksono & Saufi, 2013), if students do not understand a subject matter they will be anxious and will not hesitate to try harder to understand, but excessive anxiety also has a bad impact on them because it can reduce the effectiveness of the efforts they are doing.

Learning mathematics is expected to be able to provide an integrated, comprehensive and holistic student understanding of the material that has been presented. The understanding in question is not only to meet the demands of learning mathematics substantively, but can provide significant benefits to students. Seeing this how important student control is needed to control his anxiety in order to get positive results. By mastering the understanding of the concept, students are expected to be able to develop the knowledge they have acquired. According to (Wicaksono & Saufi, 2013) states that anxiety is one of the reasons why good interpersonal relationships are important in understanding mathematics. This is because anxiety can increase, is subjective in each individual, and affects whether or not understanding is difficult.

6. Conclusion

Mathematics anxiety has a significant effect on the ability to understand students' mathematical concepts. This is evidenced by the results of the t and F statistical tests, stating that the significance value of the two tests is 0.000. Because the value of $\text{Sig.} < \alpha$ then H_0 is rejected, with a linear regression mathematical model as follows: $Y = 31.336 - 0.458X$. The value of 31.336 is a constant value which indicates that if there is no math anxiety then the mathematical understanding will reach 31.336. The regression coefficient X of -0.458 states that every time there is an addition of one value for math anxiety it will reduce the ability to understand mathematical concepts by 0.458.

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