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Effect of Mathematics Anxiety and Student Learning Styles on Ability to Solve Mathematics Problems of Class XI Madrasah Aliyah Negeri (MAN)

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Abstract. The ability to solve mathematics problems is an ability needed in the learning process. Mathematic anxiety and student learning styles are among the factors that influence the success of mathematics problem-solving ability. By paying attention to mathematics anxiety and learning styles possessed by students, it is expected that the ability to solve mathematics problems will increase. This research is a field research type with an Ex Post Facto method and multiple linear regression statistical data analysis techniques. Data was collected through mathematics anxiety questionnaires, student learning style questionnaires, and mathematics problem-solving skills of students at Madrasah Aliyah level. The results show that (1) there is no significant effect of mathematics anxiety on the ability to solve mathematics problems with the t_{count} is 1.537 and the significance level is $0.126 \geq 0.05$. (2) there is a positive and significant effect of learning styles on the ability to solve mathematics problems with the value of t_{count} is 2.457 and a significance level of $0.015 < 0.05$.

Keywords. *problem solving, mathematics anxiety, learning style*

INTRODUCTION

Mathematics is one of the subjects taught at every level of education from basic education to college. This subject has a very important role both in school and in daily life. Students' assumption that mathematics is a frightening subject causes anxiety when learning mathematics. The fear of mathematics is resulted from the demand that students must give the correct answer to a mathematics problem since the wrong answer means failure. This assumption triggers a sense of fear among students. The fear of mathematics can be interpreted as mathematics anxiety. This problem needs serious attention as the inability of students to adapt to the lesson causes students difficulties and phobias towards mathematics which ultimately disrupts student learning (Luttenberger, Wimmer, Paechter, 2018).

Learning is a necessity for every human being to fulfill his life. According to Piaget, quoted from the Islamic Perspective on Learning Strategies, learning is a process of interaction of students with an environment that is always changing and carried out continuously. While Pashler, McDaniel, Rohrer, Bjork (2009) explained that in learning, every individual has a tendency to one way or style. This tendency is then called the learning style. Getting to know learning styles is the key to improving performance at work, achievement at school, and in daily communication. According to Kyprianidou, Demetriadis, Tsiatsos, and Pombortsis (2012), learning style is a consistent way carried out by someone in capturing stimulus or information, how to remember or think, and how to solve problems. Student learning styles vary, among others are visual learning style, auditory, and kinesthetic. From the research conducted, student learning styles in Madrasah Aliyah Negeri 2 (MAN) 2 Cilacap were considered evenly, both visually, auditory and kinesthetic. Through mathematics, the ability of patterns (learning styles), logical, analytical, critical, creative, and systematic thinking can be developed. As for some of the goals of studying mathematics in schools, namely to develop various abilities possessed by students, the National Council of Teachers of Mathematics (NCTM) in 2000 set five standards of mathematical abilities that must be possessed by students: problem-solving, reasoning, communication, connection, and representation abilities. According to NCTM, of several goals of learning mathematics, there is an interesting goal, namely problem-solving ability. The ability to solve problems becomes interesting because problem-solving is an important goal in learning mathematics and even the process of solving mathematics problems is at the heart of mathematics, thus the ability to solve mathematics problems is very important for students to possess. Therefore the teacher is expected to be able to guide students to improve their problem-solving abilities.

Based on the results of interviews with Madrasah Aliyah Negeri teachers, most students feel afraid of mathematics. This causes students are not interested in mathematics. Mathematics has always been labeled negative among students, namely subjects that are difficult, frightening, and boring. As a result, students do not pay attention to their learning styles which resulted in students' low ability in learning mathematics.

Therefore researchers are interested in conducting research with the formulation of the problem as follows: Does mathematics anxiety significantly influence the ability of mathematics problem-solving in class XI Madrasah Aliyah Negeri (MAN) 2 Cilacap? Does the student's learning style significantly influence the ability to solve math problems in class XI Madrasah Aliyah Negeri (MAN) 2 Cilacap?

METHOD

This type of research is field research, which is directly conducted in the field or on respondents. The research method is a scientific way to obtain data with specific purposes and uses.51 In this study, the author used the Ex Post Facto research method. According to Kerlinger (1973) causal-comparative research, usually called Ex Post Facto research, is a systematic empirical investigation in which scientists do not control the independent variables directly because the existence of these variables has occurred, or because these variables basically cannot be manipulated (Emzir, 2009). The population was 423 students of class XI of MAN 2 Cilacap. Using the Slovin formula, a sample of 206 students spread across 12 classes at MAN 2 Cilacap was obtained. This study used tests to determine the ability of mathematics problem-solving with indicators including identifying known elements, compiling mathematical models, implementing strategies to solve various problems, explaining results according to original problems, and being able to use mathematics meaningfully. The questionnaire was used to identify mathematics anxiety and student learning styles. Indicators of mathematics anxiety used were self-confidence, self ability, fear of failure, anxiety, and somatic effects. Indicators of learning styles included understanding with visualization, learning by listening and learning by involving physical activity.

RESULTS AND DISCUSSION

As prerequisite tests for analysis, researchers used the normality, linearity, multicollinearity, heteroscedasticity, and regression significance tests. The objective of conducting those tests is to ensure that the data distribution is normally distributed. In addition, it is to ensure that the regression equation is linear and significant. Researchers need respondents' answers to questionnaires and test questions before the researcher conducts an analysis of prerequisite tests. The total number of items from the questionnaire was 18 items of mathematics anxiety questionnaires, 18 items of learning style questionnaires, and 5 test questions that had previously been tested for their validity and reliability. Questionnaires and questions were given to 206 students of the XI Madrasah Aliyah Negeri (MAN) 2 Cilacap class. Questionnaire entries in appendix 3.
Analysis of the hypothesis as follows:

The Effect of Mathematical Anxiety (X1) on Mathematical Problem Solving Ability (Y) (Hypothesis 1).
Based on table 1 Partial Linear Regression (t_{test}) has a t_{count} of 1.521 with sig. 0.130. To determine whether a hypothesis is accepted or rejected is by looking at the value of t and the level of sig. The requirement is if $t_{count} > t_{table}$ or the level of sig. <0.05, then H_0 is rejected and Ha is accepted.

Table 1 Partial Linear Regression.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	20.643	17.281		1.195	.234
Learning Style	.851	.350	.170	2.430	.016
Mathematics Anxiety	.310	.204	.106	1.521	.130

Prior to comparing the value of t_{count} with t_{table}, t_{table} should be first observed. t_{table} was 0.05 / 2 = 0.025 (2-tailed test) and df = n-k-1 = 210-2-1 = 207, where n is the number of respondents. Then t_{table} of 1.97 was obtained for the error level of 5%. Based on table 1 Partial Linear Regression (t test), above, t_{count} (1.521) $<t_{table}$ (5% = 1.97) and significant value 0.130> 0.05, so it can be concluded that H_0 is accepted and Ha is rejected, meaning that there is no significant effect of mathematics anxiety on the ability to solve mathematics problems.

Mathematics anxiety has no effect on the ability to solve mathematics problems; if anxiety increases then the ability to solve mathematics will be the same. Someones level of anxiety does not affect the process of problem-solving. This means that the level of ability to solve mathematics problems is not influenced by students' mathematics anxiety. This is different from the findings of the research results of Kurniawati and Siswono (2014) which showed that there was a significant influence of mathematics anxiety on the ability to solve mathematics and the results of Novikasari's research (2016) which showed a weak relationship between mathematics anxiety and mathematics learning achievement. Both studies show a negative relationship, if anxiety increases, the ability to solve mathematics or mathematics learning achievement decreases. Someone with high anxiety tends to be not optimal in the problem-solving process which then reduces the value of problem-solving abilities. These findings are also supported by the findings of Ramirez, Chang, Maloney, Levine, Beilock (2016) that the magnitude of one's mathematical anxiety in solving

mathematics problems will support one's mathematical success. Therefore, feelings of anxiety cause a person to solve mathematics problems maximally.

The Effect of Learning Style (X2) on Mathematical Problem Solving Ability (Y) (Hypothesis 2).

Based on table 1 Partial Linear Regression (t_{test}) has a t_{count} of 2.430 with sig. 0.016. To determine whether a hypothesis is accepted or rejected by looking at the value of t and the level of sig. the requirement is if tcount> t_{table} or the level of sig. <0.05, then H0 is rejected and Ha is accepted.

Prioi to comparing the value of t_{count} with ttable, t_{table} was first observed. t_{table} was 0.05 / 2 = 0.025 (2-tailed test) and df = n-k-1 = 210-2-1 = 207, where n is the number of respondents. Then from the t_{table} 1.97was obtained for the error level of 5%. Based on table 1 Partial Linear Regression (t_{test}) above, t_{count} (2,430)> t_{table} (5% = 1.97) and significant value 0.016 <0.05. Hypothesis test results show that there is a significant influence between learning style on mathematics solving ability with a value of t_{count} of 2,430 and t_{table} of or t_{count}> t_{table} of 1.97 then H_0 is rejected and Ha is accepted. Between learning styles and the ability to solve mathematics have a positive relationship; if the learning style increases, the ability to solve mathematics will increase as well. Someone with a good learning style will do the problem-solving process optimally so that the ability of problem-solving will rise. This is supported by Waskitoningtyas research (2017) which shows the influence of learning styles on problem-solving skills; the higher or lower the level of learning styles on the learning process will affect the ability of students to solve problems.

CONCLUSION

Based on research conducted in class XI MAN 2 Cilacap, there was no significant effect between mathematics anxiety on the ability to solve mathematics problems. In addition, the results shown that there was a positive and significant influence of learning styles on students' mathematics problem-solving abilities. It is because students get more guidance from teachers in solving problems at school so they do not feel anxious about the mathematics problems given. However, the solution to this problem is more affected by student learning habits.

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