The Effect Self-Confident on Mathematical Creativity

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Abstract. One of the important things to note in supporting the success of learning is self-confidence and creativity. The purpose of this study was to determine the effect of self-confidence on mathematical creativity. This type of research is quantitative research. Through the use of random sampling techniques, the sample for this study was 65 semester 1 student in the mathematics education study program at the Islamic University of Malang. The data collected in this study is the result of a questionnaire about students' self-confidence and mathematical creativity. The questionnaire used in this study has met the validity and reliability. Questionnaire results were analyzed by correlation test and linear regression test. Correlation and linear regression tests were carried out with the help of SPSS. The results of the research show that there is a correlation between self-confidence and mathematical creativity. The results also show that self-confidence has a positive effect on mathematical creativity by 32.5%. This influence is due to four things, namely self-confidence in solving math problems (even though it is difficult), confidence in expressing opinions during discussions, confidence when appearing in front of the class, and confidence when answering questions from the teacher. Thus, it is important to train students to be more confident in solving math problems, so that this will increase their creativity in solving math problems.

Keyword: Self-Confident, Mathematical Creativity, Mathematical Disposition, Thinking Disposition.

INTRODUCTION

One important attitude to pay attention to in learning mathematics is an attitude of self-confidence. All students have confidence in their ability to do math problems at an age that depends on problem-solving, technology, science, and mathematics (1). This is because in the end all decisions that will be made by students are determined based on their self-confidence. The results also show that there is a positive relationship between a confident approach, an optimistic approach, and seeking support. Therefore this self-confidence is a significant predictor of achievement at school (2). Coffey and Gibbs said that the teacher's self-confidence can improve the quality of the learning and evaluation they carry out (3). In addition, research results show that an environment of trust and security is developed to optimize learning in the classroom (4). Thus the importance of self-confidence in learning mathematics, namely: to increase the ability to make the right decisions when learning or solving math problems and to optimize the success of learning in class.

This self-confidence is not knowledge, but a behavior that shows confidence in the knowledge and abilities they have. Therefore this self-confidence is simply called awareness of the knowledge they have (5). In addition, this definition of self-confidence is adapted to the context used. For example, in the industrial context, self-confidence is defined as a belief in innovations that are made to be the best. In the context of trial, confidence is considered as a belief in the credibility of an expert, the credibility of judges and lawyers. In the context of academics, self-confidence is defined as confidence in choosing content, references, activity in order to realize more profitable ideals and hopes. The definition of self-confidence in this study is using the context of learning mathematics, where the definition of trust in this study is belief in knowledge and abilities in learning mathematics and solving mathematical problems.

Even though self-confidence is important in learning mathematics, students' self-confidence is also less noticed by lecturers in learning mathematics. This can be seen when students are asked to work on the blackboard, they tend to be embarrassed and experience anxiety. The results of the study also showed that only two junior high school students succeeded in revising the way they used generalizations supported by their self-confidence (6). The results of other

studies show that people who have low self-esteem cannot ensure their answers are correct, even though they know the answers (5). So it can be concluded that the self-confidence of students and students is less of a concern by the teacher, this causes students who lack self-confidence will tend to decrease their achievements. This is because they easily give up on solving problems, experience anxiety, and cannot ensure that their answers are correct. Therefore, the problem of self-confidence is important to solve.

Various studies in the context of overcoming self-confidence include research on the development of tests to measure self-confidence, where the results of the research show that the measurement of ability and self-confidence can be carried out using multiple-choice test questions (5). Other research shows that inquiry-based learning affects attitudes and self-confidence, especially more confidence when reading, understanding, and critically evaluating reports provided (7). Other research shows that three-dimensional-based learning can increase students' self-confidence and produce positive students (8). Other research focuses on knowing student self-confidence based on gender, age, and type of school, where the research results show that student self-confidence scores do not vary according to gender, age, and the type of high school where they graduate (9). Other research shows that the content and design of online learning modules can reactivate existing knowledge, encourage self-awareness and reflection, and build student confidence (10). Other research compares performance with prospective teacher self-confidence, where the results show that self-confidence exceeds performance (11). Other research has tested the correlation and impact of curiosity on self-confidence which shows that curiosity has a positive effect on self-confidence (12). None of these studies have tested the link between self-confidence and mathematical creativity.

Thus this study aims to examine the relationship and influence of self-confidence on students' mathematical creativity. This self-confidence and mathematical creativity are important abilities needed by someone in understanding mathematics (13). In addition, mathematical creativity is considered the key to success in the 21st century. The definition of mathematical creativity in this study follows the definition of previous research, namely Creativity in this study is defined as an effort to find new alternative solutions in solving mathematical problems (14). Therefore the indicators of mathematical creative thinking in this study are adopted from previous studies (14) which can be seen in Table 1. Thus the aims of this study are to find out: 1) The correlation between the self-confidence variable and the mathematical creativity variables. 2) The effect of self-confidence variable on mathematical creativity. The research results are useful in learning, that to develop mathematical creativity it is also necessary to develop positive self-confidence, both internal and external self-confidence. Thus learning mathematics becomes more successful.

METHOD

This type of research is quantitative research. This research was carried out in the 2021/2022 school year. The sample of this research consisted of 65 students of the mathematics education study program in semester 1 at the Islamic University of Malang. The sample selection technique in this study was carried out using a random sampling technique. This is because there are no specific criteria for determining the research sample. The predictor variable in this study is self-confidence (X), while the dependent variable in this study is mathematical creativity (Y). Measurement of these two variables in this research using a Likert Scale. Where the likert scale is used to measure a person's attitude or response. Indicators of the predictor variable and the dependent variable can be seen in Table 1.

TABLE 1. Indicators of Predictor and Dependent Variable

Variable	Indicators
Predictor variable: self-confidence (X)	Confident that he can solve math problems
	Confidence when working on problems in front of the class
	Confident in the results of his work
	Confidence in solving difficult problems
	Confident in refuting the opinions of his friends who are not quite right.
	Confident in expressing opinions during group discussions
	Confident in expressing opinions during class discussions
	Confident in answering questions from the teacher
Dependent Variable: mathematical creativity (Y)	Happy to find solutions to problems from various sources
	Have the opinion that there is not just one solution
	Try to solve the problem in another way
	Enjoy solving problems in different ways

Source: Setiawan et al. (12); Setiawan and Surahmat (14).

The research instrument was a questionnaire to find out students' self-confident and mathematical creativity. This questionnaire consists of 8 statements about self-confidence and 4 statements about mathematical creativity developed from the indicators in Table 1. Each statement uses the options strongly agree (SA), agree (A), disagree (D), and strongly disagree (SD). Each of these options is given a score of 4, 3, 2, and 1 for positive statements, while negative statements are given a score of 1, 2, 3, and 4. By filling out the instrument in the form of this questionnaire, quantitative data from respondents are obtained in the form of a score for self-confidence and mathematical creative scores. This questionnaire was adopted from previous studies (14,15) which showed that the instrument was valid and reliable, so it could be used for data collection.

Quantitative data analysis in this study was carried out in two stages. The first stage is to change the score obtained by the respondents into a value of self-confidence and a creative mathematical value by dividing the score obtained by the maximum score multiplied by 100. In this way, the value of students' self-confidence and mathematical creative value is obtained. The second step is to analyze the correlation and regression between the two variables. Correlation analysis used Pearson's product-moment correlation, while regression analysis used linear regression with the help of SPSS. The significance level of the correlation and regression test results in this study was 5%. Therefore, the criterion for the test results is that Ha is accepted if the value of Sig. < 0.05. Thus there is a correlation and there is a significant effect of self-confidence on students' mathematical creativity.

RESULT AND DISCUSSION

Based on the stages of this research. The first stage is to test the correlation. The results of testing the correlation between self-confidence and mathematical creativity in this study with the help of SPSS can be seen in Table 2. From the test results, it was found that the value of Sig. (2-tailed) shows 0.000 <0.05 which means that it can be concluded that there is a correlation between self-confidence and students' mathematical creativity.

TABLE 2. Correlation Test Results

		Creativity	Self-Confident
Creativity	Pearson Correlation	1	.570**
	Sig. (2-tailed)		.000
	N	65	65

**. Correlation is significant at the 0.01 level (2-tailed).

The second research phase is linear regression testing. The results of linear regression testing with the help of SPSS in this study can be seen in Table 3 and Table 4.

TABLE 3. Model Summary of Regression Test Results

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.570a	.325	.314	7.347

a. Predictors: (Constant), Creativity

TABLE 4. Coefficients ^{a} Value of Regression Test

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	28.241	7.423		3.805	.000
	Creativity	.501	.091	.570	5.504	.000

a. Dependent Variable: Self-Confident

From Table 3 it can be seen that the magnitude of the influence of self-confidence on mathematical creativity can be seen from the R Square value, which is equal to 0.325. This value means that the effect of self-confidence on mathematical creativity is 32.5% and the other is 67.5% influenced by other factors not identified in this study. From table 4 it can be seen that the value of Sig. of creativity of 0.000 <0.05. This means that it can be concluded that H0 is rejected and Ha is accepted, that is, there is a significant effect of self-confidence on mathematical creativity. From

Table 4 it can also be seen that the constant value of the Unstandardized Coefficients is 28,241. This means that if there is no self-confidence value, then the value of mathematical creativity is 28,241. Meanwhile, the regression coefficient is 0.501 which means that for every 1% increase in self-confidence, mathematical creativity will increase by 0.501. It can also be said that self-confidence has a positive effect on mathematical creativity. Thus the regression equation is

$$Y = 28.241 + 0.501X$$

. For example someone who has a value for low self-esteem (eg 50), then the value of creativity is $Y = 28.241 + 0.501(50) = 53.241$. Whereas someone who has a high self-confidence score (eg 95), then the creativity value is $Y = 28.241 + 0.501(95) = 75.836$. It can be said that the higher a person's self-confidence, the higher the value of his creativity.

The results of this study contribute to developing a theory about self-confidence in the context of learning mathematics. The results of previous studies showed that curiosity affected students' self-confidence by 19.6% (12). This curiosity affects mathematical creativity by 43% (14). The results of previous research indicate that both mathematical self-confidence and creativity can be developed through science wastepreneurship learning and challenge based learning (13,16). The results of this study expand on the results of previous research by showing that self-confidence is correlated with mathematical creativity and this self-confidence has a significantly positive effect of 35.5%. In theory this effect is due to students who have self-confidence tend to be able to overcome anxiety and stress (17). In theory, this self-confidence can also optimize learning in class (1,4,7). Thus this self-confidence can be said to also affect students' mathematical abilities, one of which is mathematical creativity. Empirically it was found that the effect of self-confidence on mathematical creativity is due to four factors, namely 1) confidence in solving math problems even though it is difficult, 2) confidence in expressing opinions during discussions, 3) confidence when appearing in front of the class, and 4) confident when answering questions from the teacher. Each of these factors is explained as follows.

The first factor is confidence in solving difficult math problems. Problems that are difficult make students desperate in working on these questions. The results of the study show that students tend to get discouraged when they solve difficult questions or even tend to do the questions incorrectly (18). The results of other studies show that when students are not desperate or persistent in solving difficult questions, they will try to find the right answer and will eventually find the right answer (6). The results of other studies also show that one of the components of an independent learning disposition that supports success is persistence in learning (19). The results of this study have shown that self-confidence in solving difficult questions makes students more creative, because they will be encouraged to find the right answer.

The second factor is confidence when expressing opinions during discussions. When doing group learning, it can be seen that students who lack confidence tend to be silent and do not give their opinion. In contrast, students who are confident will tend to dare to give their opinion. The results of previous research indicate that one of the mathematical dispositions that influence basic mathematical abilities is self-confidence, namely self-confidence in communicating ideas or reasoning (20). The results of this study expand the results of previous studies by showing that when a person has confidence in expressing his opinion, this has an impact on the development of his mathematical creative abilities. This is because someone will try to find ideas or ideas to be communicated.

The third factor is confidence when appearing in front of other people. This is especially when students appear in front of the class to present their work. The observation results show that confident students tend to be able to explain well, while students who lack confidence are less able to explain their work to their friends. Appearing in front of others is a skill, therefore teachers must train students to have the courage to communicate in front of others through presentation strategies. The results of previous research indicate that one of the things that causes an effective learning model to increase learning outcomes is group learning, where mutual communication occurs between students (21).

The fourth factor is confidence when answering questions from the teacher. The teacher must build students' self-confidence by getting used to asking questions whose purpose is as feedback on students' understanding. Aside from being feedback, questions can also function to provide reinforcement or warning of student learning outcomes. The results of previous research indicate that one of the theories that underlie a person to learn is the interaction between a teacher and students (20,22–24). Thus, it is important to train students to be more confident in answering teacher questions, so that this will increase their creativity in solving math problems. This is because students will try to find answers that they understand.

CONCLUSION

From the results of the study, it can be concluded that self-confidence correlation with mathematical creativity and self-confidence has a positive effect on students' mathematical creativity by 32.5%. Four important things cause self-confidence to influence students' mathematical creativity. The first is confidence in solving math problems (even though it is difficult), the second is confidence in expressing opinions during discussions, the third is confidence when appearing in front of the class, and the fourth is confidence when answering questions from the teacher or other people. Thus, the recommendation for educators is to carry out learning by increasing student self-confidence which results in increased student mathematical creativity. The recommendation for further research is to conduct in-depth qualitative research on the analysis of students' mathematical creative thinking in terms of the level of student self-confidence.

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