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The Influence of Self-Efficacy on Students' Mathematical Disposition

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a b s t r a c t

This study aims to 1) determine student self-efficacy; 2) Knowing the mathematical disposition of students; and 3) Knowing the effect of self-efficacy on students' mathematical dispositions. The research method uses quantitative methods with a one-shot case study research design. The study population was all students of the Mathematics Tadris Department of IAIN Syekh Nurjati Cirebon in the even semester of the 2020/2021 academic year with the sample being all fourth semester students of the Mathematics Tadris Department of IAIN Sheikh Nurjati Cirebon, namely four classes totaling 151 students. The data collection technique used a questionnaire to determine the students' self-efficacy and mathematical disposition. The results showed that 1) the average student self-efficacy was 72.86, included in the strong category; 2) The average student's mathematical disposition is 74.42, which is included in the strong category; and 3) Self-efficacy has a significant effect on students' mathematical disposition. Self-efficacy has an effect of 68% on students' mathematical dispositions.

K e y w o r d s :

INTRODUCTION

Mathematics is one of the subjects taught to students in schools starting from the most basic level in elementary school to a high level, namely in college. Mathematics is a lesson that has its own characteristics, namely lessons that focus on calculating numbers and formulas, so that ultimately creates the impression that mathematics is a lesson that only develops cognitive abilities, but actually learning mathematics does not only focus on the ability of the mathematical cognitive domain. , but also in the affective and psychomotor domains. One of the important aspects of the affective domain is the students' mathematical position.

Mathematical disposition is an interest and appreciation for mathematics, namely the tendency to think and act positively, including self-confidence, curiosity, perseverance, enthusiasm in learning, persistent in facing problems, flexible, willing to share with others, reflective in mathematical activities (doing math) Wardani (2008: 15).

Mathematical disposition must also be the focus of attention of mathematics teachers, so that the objectives of learning mathematics can be achieved optimally, both from the cognitive aspect, as well as the affective aspect. To optimally improve students' mathematical dispositions, it is necessary to look for any factors or things that might affect the development or increase of students' mathematical dispositions. One thing that can be researched is self-efficacy. Mathematical disposition has a relationship with self-efficacy because it is equally related to self-confidence. Bandura (1997) states that self-efficacy is an individual's belief in his ability to achieve results in accordance with the expected goals. Individuals with high self-efficacy will perceive themselves as highly competent. He will feel challenged if faced with tasks with a high degree of difficulty and risk. Conversely, people with low self-efficacy will consider themselves incompetent and perceive failure as a result of their inability (Bandura, 1997). In line with the results of research conducted by Utami, W.T., et al (2021) which showed that there was a strong positive relationship between mathematical disposition and student self-efficacy.

Based on this description, the researchers conducted this research with the aim of: 1) Knowing the students' self-efficacy; 2) Knowing the mathematical disposition of students; and 3) Knowing the effect of self-efficacy on students' mathematical dispositions.

LITERATURE REVIEW

Self-efficacy is a concept formulated by Bandura. Self-efficacy is an individual's belief in his ability to achieve results in accordance with the expected goals (Bandura, 1997). Self-efficacy is divided into 3 dimensions, namely: 1) Level or magnitude dimension (Refers to the level of task difficulty that individuals believe will be able to overcome it), 2) Generality Dimension (Refers to the variety of situations in which self-efficacy assessments are applied), and 3.) Strength Dimension (Refers to the strength of a person's self-efficacy when dealing with the demands of a task or a problem (Bandura, 1997).

Bandura and Adams (1977) suggested that there are 4 factors that influence self-efficacy, namely: 1) Experience of success in the form of success and failure. The experience of success will increase the individual's self-efficacy, while the experience of failure will decrease it; 2) The experience of others (vicarious experience). Observation of the success of others with comparable abilities in doing a task will increase the individual's self-

efficacy in doing the same task. Vice versa, observing the failure of others will reduce the individual's assessment of his abilities and the individual will reduce the effort made; 3) Verbal persuasion. In verbal persuasion, individuals are directed with suggestions, advice, and guidance so that they can increase their beliefs about their abilities that can help achieve the desired goals. Individuals who are convinced verbally tend to try harder to achieve a success; and 4) physiological condition (physiological state). Individuals will base information about their physiological condition to assess their abilities. Physical tension in stressful situations is seen by individuals as a sign of incompetence because it can weaken the individual's work performance.

Self-efficacy indicators according to Brown, et al (1986) are: 1) Convinced that they can complete certain tasks, 2) Confidence that they can motivate themselves to take the necessary actions in completing tasks, 3) Confidence that they are able to try hard, be persistent, and persevere. , 4) Believe that you are able to withstand obstacles and difficulties, and 5) Believe that you can complete tasks that have a wide or narrow (specific) range. Self-efficacy can be said to be a matter of subjective perception of each individual, because it is related to belief and emotional control to achieve success in facing obstacles (Nugroho & Riyanto, 2019).

Katz (2009) states that disposition is a conscious, regular, and voluntary tendency to behave in a certain way that leads to the achievement of certain goals. Mathematical disposition relates to how students perceive and solve problems; whether confident, diligent, interested, and flexible thinking.

Mathematical disposition is a strong desire, awareness, and dedication in students to learn mathematics and carry out various mathematical activities (Sumarmo, 2003). Meanwhile, according to Maxwell (2001) disposition consists of: 1) inclination (tendency), namely how students' attitudes towards tasks; 2) sensitivity, namely how students are ready to face assignments; 3) ability, namely how students focus on completing the task completely; and 4) enjoyment, namely how students behave in completing assignments. In line with Maxwell, NCTM (1989) states that mathematical disposition is a connection and appreciation of mathematics, namely a tendency to think and act in a positive way.

Polking (1998) states that mathematical dispositions are 1) self-confidence in using mathematics, solving problems, giving reasons, communicating ideas, 2) flexibility in investigating mathematical ideas and trying to find alternative methods in solving problems, 3) persevering in doing math tasks, 4) interest, curiosity (curiousity), and inventiveness in carrying out mathematical tasks.

Based on the descriptions of several experts regarding mathematical disposition, it can be concluded that mathematical disposition is a positive attitude of students towards mathematics which can be seen from self-confidence, interest, tendency, persistence, and persistence in completing mathematical tasks.

Indicators to measure mathematical disposition according to NCTM (1989) are: 1) Confidence in solving mathematical problems, communicating ideas, and giving reasons; 2) Flexibility in exploring mathematical ideas and trying various alternative methods to solve problems; 3) Strong determination to complete math tasks; 4) Interest, curiosity, and ability to find in doing mathematics; 5) Tendency to monitor and reflect on one's own thinking process and performance; 6) Assess the application of mathematics in other fields

and in everyday life, and 7) Appreciation (appreciation) the role of mathematics in culture and its value, both mathematics as a tool, and mathematics as a language.

RESEARCH METHODE

Population and Sampling

The research population was all students of the Mathematics Tadris Department of IAIN Sheikh Nurjati Cirebon in the even semester of the 2020/2021 academic year with the sample being all fourth semester students of the Mathematics Tadris Department of IAIN Sheikh Nurjati Cirebon in the odd semester of the 2020/2021 academic year, namely four classes (class A, B, C and D) totaling 151 students.

Research Desain

This research method uses quantitative methods with regression correlation method to see the effect of self-efficacy on students' mathematical dispositions. The processed data is in the form of values or numbers that can be calculated and the analysis process uses statistics.

The research design used is a one-shot case study. In brief, the research design is as follows:

$$X \rightarrow Y$$

note :

X : *self-efficacy*

$\rightarrow$: Influence

Y : mathematical dispotition

Data Processing Flow

The data was obtained by distributing 2 types of questionnaires to the research sample. The first questionnaire was to determine the students' self-efficacy and the second was to determine the students' mathematical disposition. Each questionnaire consists of 25 statement items with five answer options, namely: strongly agree (SS), agree (S), uncertain (R), disagree (TS), strongly disagree (STS).

Before using the questionnaire instrument, the research was tested first to determine its validity and reliability. The test of this questionnaire instrument was carried out on fourth semester students majoring in Mathematics at IAIN Syekh Nurjati Cirebon in the even semester of the 2020/2021 academic year in addition to the research sample, namely class E semester IV as many as 32 students. Class E was chosen because class E had homogeneous student characteristics and abilities with the characteristics and abilities of the research sample. Furthermore, after the questionnaire instrument is valid and reliable, the questionnaire is given to the research sample to obtain research data.

The data obtained from the research results are processed through the following stages:

1. Conduct a normality test to find out whether the data comes from a population that is normally distributed or not.

2. Testing the homogeneity of the data variance to find out whether the data is homogeneous or not.
3. Testing a simple linear regression equation to determine the effect of the independent variable (X) on the dependent variable (Y).
4. Test linearity to find out whether the regression equation is linear or not.
5. Testing the regression coefficient to prove the research hypothesis and determine whether the direction of the relationship between the independent variable and the dependent variable is positive or negative.
6. Testing the coefficient of determination or goodness of the model to determine the contribution of the independent variable to the dependent variable.

RESULTS AND DISCUSSION

Data Description

Student self-efficacy data was obtained from the provision of a questionnaire containing 25 statements in the research sample, namely 151 students. From the results of the questionnaire obtained statistical description data as follows:

Table 1
Description of Self-efficacy Results Statistics

Statistics	*Self-efficacy*
N	151
Min	52
Max	95
Sum	11.002
Mean	72,86
Std.deviation	12,46
Varians	120,09

Based on Table 1, the average score of student self-efficacy is 72.86. The average score of 72.86 can be categorized as strong student self-efficacy because it is in the 61% -80% range. Meanwhile, the details of the percentage of each student's self-efficacy indicator can be seen in the following table:

Table 2
Recapitulation of Student Self-efficacy Indicators

Indicator	Percentgse	Criteria
Confidence that you can complete certain tasks	74%	Kuat
Confidence can motivate yourself to take the necessary actions in completing tasks	69%	Kuat
Believe that you are capable of trying hard, persistent, and diligent	76%	Strong
Believe that you are able to withstand obstacles and difficulties	70%	Strong
Confidence to be able to complete tasks that have a wide or narrow range	75%	Strong
Average	73%	Strong

From the table above, it can be seen that all indicators of student self-efficacy are in the range of 61% -80%, which means that all indicators of student self-efficacy are strong criteria.

Furthermore, to determine the students' mathematical disposition, a questionnaire containing 25 statements was given to 151 research sample students. The description of the students' mathematical disposition data is obtained as follows:

Table 3
Description of Student Mathematical Disposition Results Statistics

Statistics	Disposisi Matematis
N	151
Min	58
Max	92
Sum	11.238
Mean	74,42
Std.deviation	15,37
Varians	208,11

Based on Table 3, the average score of students' mathematical disposition is 74.42. The average score of 74.42 is included in the strong category because it is in the 61% -80% range. As for the details of the percentage of each student's mathematical disposition indicator can be seen in the following table:

Table 4
Recapitulation of Student Mathematical Disposition Result Indicators

Indicator	Percentage	Criteria
Confidence	78%	Strong
Flexibility	72%	Strong
Strong determination	68%	Strong
Interest, curiosity	78%	Strong
Reflection	72%	Strong
Rate math apps	80%	Strong
appreciation	73%	Strong
Average	74%	Strong

From the table above, it can be seen that all indicators of student's mathematical disposition are in the range of 61% -80%, which means that all indicators of student's mathematical disposition are strong criteria.

Data Analysis

Previously, the research hypothesis was tested, and the prerequisite tests were conducted, namely normality test and homogeneity test.

The normality test was conducted to determine whether the data came from a population that was normally distributed or not. The statistical test that will be used is the Kolmogrov-Smirnov test by taking a significant level (α) of 0.05 with the following statistical hypothesis:

H0 : Data comes from a normally distributed population

H1: Data comes from a population that is not normally distributed

The test criteria are: H0 is accepted if the significant value is 0.05 and H0 is rejected if the significant value is <0.05.

Table 5

Uji Normalitas

Group	Self-efficacy	Disposisi Matematis
N	151	151
Kolmogorov-Smirnov Z	0,200	0,200
Shapiro-Wilk	0,087	0,162
Conclusion	Normal	Normal

From the table above, data on self-efficacy and mathematical disposition of students come from a population that is normally distributed at a significance level of = 0.05.

Furthermore, because the data came from a normally distributed population, a homogeneity test was conducted to determine whether the variance of the data was homogeneous or not. The statistical test that will be used is Levene's test by taking a significant level (α) of 0.05. with the following statistical hypothesis:

H_0 : Both data have homogeneous variance
H_1 : Both data have non-homogeneous variance

The test criteria are: H0 is accepted if the significant value is 0.05 and H0 is rejected if the significant value is <0.05.

Table 6

Homogeneity Test s

Levene Statistic	df1	df2	Sig.	Conclusion
2,61	5	146	0,103	Homogen

Based on the table above, it can be seen that the homogeneity test results have a significance value of 0.103 > 0.05, so H0 is accepted. So it can be concluded that the students' self-efficacy and mathematical disposition data are homogeneous.
Based on the calculation results obtained the following data:

Table 7

Linear Regression Test

Regresion		Unstandardized Coefficients		T	Sig.
		B	Std. Error		
1	Constant	2,73	13,57	0,35	0,14
	Self-efficacy	1,42	0,124	5,26	0,00

Based on the table above, the regression equation is: Y = 2.73 + 1.42 X.

Hypothesis testing is carried out to determine whether there is an influence of self-efficacy on students' mathematical dispositions, then hypothesis testing is carried out with the following hypotheses.

H_0 : self-efficacy has no significant effect on students' mathematical disposition

H_1 : self-efficacy has a significant effect on students' mathematical disposition

The test criteria are:

H0 is accepted if the significant value is 0.05

H0 is rejected if the significant value is <0.05.

From the calculation results obtained in Table 5, it is known that the significance value (Sig) is 0.00 < 0.05, so the null hypothesis is rejected. So it can be concluded that self-efficacy has a significant effect on students' mathematical dispositions

Furthermore, linearity test was performed. This test is used to determine whether the relationship between the two research variables is linear. The data obtained is a significant value on linearity of 0.00. Because the significance value is less than 0.05, the relationship is linear.

Based on the regression equation, the regression coefficient is 1.42. It states that each addition of self-efficacy will affect the mathematical disposition of students by 1.42. The positive coefficient means that there is a positive relationship between self-efficacy and students' mathematical disposition or the higher the self-efficacy, the better the mathematical disposition.

The goodness of the model or the coefficient of determination test is used to find out how big the percentage of the influence of self-efficacy on students' mathematical dispositions.

Table 8
Coefficient of Determination Test

Model	R	R square	Adjusted R square	Std. Error of the Estimate
1	0,76	0,68	0,82	0,78

From the table above, it can be seen that the coefficient of determination (R Square) is 0.48. This means that 68% of students' mathematical disposition variables (Y) are influenced by variable X, namely self-efficacy or in other words, the effect of self-efficacy on students' mathematical dispositions is 68%.

CONCLUSION AND IMPLICATION

Conclusion

Based on the results of research and discussion on the effect of self-efficacy on students' mathematical dispositions, it can be concluded that:

1. The average student self-efficacy is 72.86, which is included in the strong category.
2. The average student's mathematical disposition is 74.42, which is included in the strong category.
3. Self-efficacy has a significant effect on students' mathematical disposition. Self-efficacy has an effect of 68% on students' mathematical dispositions.

Implication
The implications obtained from this research are as follows:
1. Self-efficacy can improve students' mathematical disposition skills.
2. Improving student self-efficacy as an option in an effort to improve students' mathematical disposition.

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