

Pengaruh Self Efficacy dan Kecemasan Matematis terhadap Hasil Belajar Mahasiswa Mata Kuliah Statistika Ekonomi

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Abstrak

Artikel ini bertujuan untuk menjelaskan pengaruh self efficacy dan kecemasan matematis terhadap hasil belajar mahasiswa pada mata kuliah statistika ekonomi. Responden penelitian sebanyak 50 orang mahasiswa Prodi Ekonomi dan Perbankan Syariah STES Manna Wa Salwa yang telah mengambil matakuliah Statistika Ekonomi. Instrument yang digunakan dalam penelitian ini adalah tes dan non tes. Tes digunakan untuk mengukur hasil belajar statistika ekonomi mahasiswa. Sedangkan non tes berupa angket *self-efficacy* dan angket kecemasan matematis sebanyak 20 butir pernyataan. Pengumpulan data berupa tes dan angket dilakukan setelah pertemuan terakhir perkuliahan statistika ekonomi. Analisis data menggunakan uji regresi linier berganda. Hasil penelitian menemukan adanya pengaruh yang signifikan antara *self-efficacy* terhadap hasil belajar mahasiswa, tidak terdapat pengaruh yang signifikan antara kecemasan matematika terhadap hasil belajar mahasiswa, dan terdapat pengaruh signifikan antara *self-efficacy* dan kecemasan matematika secara bersama-sama terhadap prestasi belajar mahasiswa sebesar 22,7%. Berdasarkan hasil penelitian, kami menyimpulkan bahwa *self-efficacy* memiliki hubungan dengan kecemasan matematis, selain itu ditemukan bahwa mahasiswa dengan kecemasan matematis yang tinggi memiliki hasil belajar statistika ekonomi yang tinggi pula.

Kata kunci: hasil belajar, kecemasan matematis, *self-efficacy*

The Influence of Self-Efficacy and Mathematical Anxiety on Student Learning Outcomes in Economic Statistics Courses

Abstract

This article aims to explain the effect of self-efficacy and mathematical anxiety on student learning outcomes in economic statistics courses. The research respondents were 50 students of the Economics and Sharia Banking Study Program of STES Manna Wa Salwa who had taken the Economic Statistics course. The instruments used in this study were tests and non-tests. Tests are used to measure student economic statistics learning outcomes. While non-tests in the form of self-efficacy questionnaires and mathematical anxiety questionnaires have as many as 20 statement items. Data collection in the form of tests and questionnaires was carried out after the last meeting of the economic statistics lecture. Data analysis using multiple linear regression tests. The results found a significant influence between self-efficacy on student learning outcomes, there is no significant influence between math anxiety on student learning outcomes, and there is a significant influence between self-efficacy and math anxiety together on student learning achievement by 22.7%. Based on the results of the study, we conclude that self-efficacy has a relationship with mathematical anxiety, besides that it is found that students with high mathematical anxiety have high learning outcomes in economic statistics.

Keywords: learning outcomes; mathematical anxiety; self-efficacy

INTRODUCTION

One of the fields of study taught at educational levels from elementary school to university in mathematics (Ramadhani & Siregar, 2021). Unfortunately, there are still many students who don't like mathematics lessons. Mathematics is still seen as a difficult and unpleasant subject so many people avoid it (Prifti, 2022) Studying mathematics will help students become more logical, analytical, critical, creative, and team-oriented thinkers (Fathani, 2019).

One of the branches of mathematics is statistics (Yulianti et al., 2022). Economic statistics is a mandatory subject for students at the Manna Wa Salwa College of Sharia Economics. Material in economic statistics relates to the application of statistics in research in the field of economics. Economic statistics courses are full of calculations because they apply mathematical formulas or theories to economic problems. So students must understand mathematics to have the ability to solve problems in the economy

Initial observations showed that several students were not confident when attending lectures. Students' lack of self-confidence when facing economic statistics lectures creates situations and conditions that make students less enthusiastic about studying. This is proven by the ability to solve the questions given during exercises and assignments, many students ask for answers from their friends. This fact is supported by findings from Dzulfikar (2022) that students with mathematical anxiety tend to ask for help, even though they face difficulties in learning statistics. Apart from showing students' inability to solve Economic Statistics problems, it also indicates a sense of distrust in their abilities. When faced with matters related to calculations, students who lack confidence in their abilities will have difficulty solving mathematical problems. The implication is the avoidance of active involvement in the learning process and problem-solving solving which leads to less-than-optimal students' problem-solving abilities in statistics (Dzulfikar, 2022).

If they cannot answer questions, students will feel afraid and embarrassed because they will be made fun of by peers and teachers (Mukti et al., 2022). Students have difficulty focusing when studying mathematics material because they feel anxious. Students cannot participate in the learning process effectively when they have difficulty focusing and experience math anxiety. This is because mathematics anxiety is always related to students' poor emotional condition when working on mathematics problems which can indirectly affect their mathematics learning achievement (Nurhidayat & Djidu, 2022). So mathematical anxiety becomes a serious obstacle and must be able to be resolved by teachers (Gresham & Burleigh, 2019).

The affective aspect that often arises, especially when students are faced with lectures that they consider difficult, such as economic statistics, is mathematical anxiety. Mathematics anxiety is a negative reaction to mathematics that can be triggered by solving mathematical problems (Suren & Ali Kandemir, 2020). Mathematics anxiety is based on physical and emotional feelings (Lu et al., 2021). Anxiety is included in the realm of attitudes in mathematics which must be developed well (Putri et al., 2020). This is because mathematics anxiety can hurt learning achievement and future job prospects (Putri et al., 2020). Research results from Astuti & Munasiah (2022) show that there is a negative influence between student anxiety and student learning outcomes. To achieve good learning outcomes, students must reduce their feelings of anxiety (Tanzila & Nasution, 2022).

Apart from mathematical anxiety, the affective aspect inherent in every student is self-efficacy. Self-efficacy is needed in every lesson, including Economic Statistics. This is because self-efficacy makes students construct initial knowledge to solve the mathematical problems given (Sowanto et al., 2019). Self-efficacy is our belief in our ability to do something (Indirwan et al., 2021; Parmer, 2022; Prifti, 2022). Student potential can be used optimally if they have self-efficacy. Research results from Callaman & Itaas (2020a) dan (Indirwan et al., 2021) suggest that there is a significant role of self-efficacy in mathematics learning outcomes. Self-confidence or self-efficacy has many impacts in the world of education, for example, influencing how a person chooses to complete a task, their persistence when facing difficulties, and how much effort they put into completing tasks in learning (Ahn & Bong, 2019).

Affective aspects can influence a person's achievement of learning outcomes (Anisa et al., 2020; Wulandari et al., 2021). Learning outcomes themselves are defined as abilities obtained by individuals after the learning process, which can result in improvements in student behavior, knowledge,

understanding, attitudes, and skills (Hadiprayogo, 2023). Student learning outcomes can be a benchmark for evaluating the effectiveness of the lecture process. Learning outcomes can show how well students, teachers, the teaching and learning process, and educational institutions as a whole are achieving the educational goals that have been set (Adriani & Nurjihan, 2020). There are still many students who show a lack of self-confidence and are afraid of not getting good grades in completing mathematics exams. Due to low self-confidence, poor conceptual understanding, poor attitudes towards mathematics, and apathy, students with low mathematics abilities always show signs of mathematics anxiety (Rismayana et al., 2021). Based on several research results, there is a lot of discussion about how self-efficacy and mathematical anxiety can influence a student's learning outcomes, and very few research results discuss how self-efficacy and mathematical anxiety influence the learning outcomes of college students. This is urgent because statistics courses in particular are needed by students in the future so that they can be used in many of the students' research plans or theses. Therefore, researchers are interested in seeing whether self-efficacy and mathematical anxiety affect student learning outcomes. This is also a strong reason that this research already has novelty because no one has ever researched student self-efficacy and anxiety, especially with college students' research subjects.

METHOD

This research is quantitative research using multiple linear regression analysis. The variables in this research consist of two independent variables, namely self-efficacy and mathematical anxiety, and one dependent variable, namely student learning outcomes. The thinking framework chart in this research is shown in this figure.

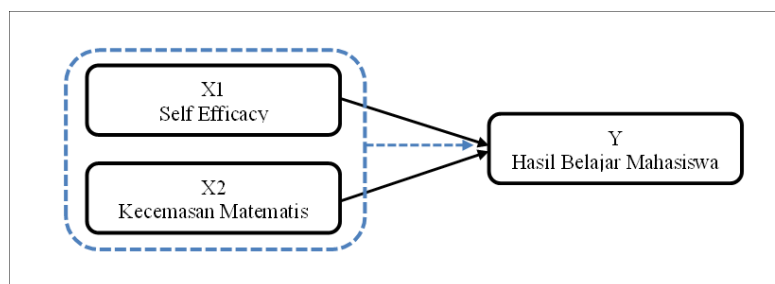


Figure 1. The thinking framework

The population of this study was all STES Manna Wa Salwa students. Meanwhile, the research sample was 50 students from the Sharia Economics and Banking Study Program, taken using a purposive sampling technique, namely students who had taken the Economic Statistics course. The instruments used in this research were tests and non-tests. The test is used to measure students' economic statistics learning outcomes. Meanwhile, the non-test is in the form of a self-efficacy and mathematical anxiety questionnaire with 20 statement items. Data collection in the form of tests and questionnaires was carried out after the last meeting of the economic statistics lecture. Indicators used in self-efficacy questionnaires according to Bandura in (Ramadhani & Siregar, 2021) presented in Table 1.

Table 1. Aspects and Indicators of Self-Efficacy

Aspect	Indicator
<i>Magnitude</i>	Confident in your ability to take action to achieve a result.
	Confident in your ability to overcome difficult tasks.
	Think positively when doing assignments.
<i>Strength</i>	Positive in responding to various situations and conditions.
	Using experience to solve problems.
<i>Generality</i>	Confident in carrying out the learning process.
	Believe in the potential of completing the task.
	Not giving up easily and being enthusiastic even if you encounter problems in completing tasks
	Committed to completing tasks well.

Meanwhile, the indicator of mathematical anxiety is adapted from a research (Putri et al., 2020) presented in Table 2.

Table 2. Aspects and Indicators of the Mathematical Anxiety Questionnaire

Aspects	Indicators
Affective	Tense, nervous, and restless when studying economic statistics material. Tense, nervous, and restless during the lecture process. Tense, nervous, and restless when facing exams or statistics questions.
Cognitive	Difficulty in understanding economic statistics material. Difficulty following the economic statistics lecture process. Difficulty in completing exams or statistics questions.
Somatic	Heart pounding, stomach ache, and cold sweats when studying economic statistics material. Heart pounding, stomach ache, and cold sweats during the lecture process. Heart palpitations, stomach ache, and cold sweats when facing exams or statistics questions.

There are three hypotheses in this research, namely:

1. H0: $\beta_1 = \beta_2 = 0$ (There is no significant influence between self-efficacy and mathematical anxiety simultaneously on student learning outcomes)
H1: $\beta_1 \neq \beta_2 \neq 0$ (There is a significant influence between self-efficacy and mathematical anxiety simultaneously on student learning outcomes)
2. H0: $\beta_1 \leq 0$ (There is no influence between self-efficacy on student learning outcomes partially)
H1: $\beta_1 > 0$ (There is a partial influence of self-efficacy on student learning outcomes)
3. H0: $\beta_2 \leq 0$ (There is no influence between mathematical anxiety and partial student learning outcomes)
H1: $\beta_2 > 0$ (There is a partial influence between mathematical anxiety on student learning outcomes)

The data analysis used is multiple linear regression to test the research hypothesis. Before data analysis is carried out, the first step requires a classical assumption test which includes a normality test, heteroscedasticity test, and multicollinearity test. The next step is the significance test, namely testing the research hypothesis

RESULTS

Respondent Description

The following is an overview of the characteristics of respondents in this study based on gender, age, and study program which are presented in Table 3.

Table 3. Description of Research Respondents

Aspect	Category	Amount	Percentage
Gender	Man	19	38 %
	Woman	31	62 %
Age	18 – 19	9	18 %
	19 – 20	21	42 %
	20 – 21	10	20 %
Study program	Sharia Economics	27	54 %
	Sharia Banking	23	46 %

Based on Table 3, it can be seen that 62% of the respondents were women with an average age of 19 - 20 years, 42%. Meanwhile, more respondents came from Sharia Economics study programs.

Classic Assumption Test Results

Before carrying out a Significance Test, it is necessary to carry out prerequisite tests or classic assumption tests which include normality tests, heteroscedasticity, and multicollinearity tests. The normality test is carried out to determine whether the data to be analyzed is normally distributed. Based on the results of the normality test using the Shapiro-Wilk test, the Asymp value was obtained. Sig. for each variable the value is > 0.05 , so the research data is normally distributed. For more clarity, the results of the normality test can be seen in Table 4.

Table 4. Normality Test Results

Variable	Sig.	Interpretation
Self-Efficacy (X1)	0,621	Normally distributed
Mathematical Anxiety (X2)	0,066	Normally distributed
Learning outcomes (Y)	0,442	Normally distributed

From Table 4 it can be seen that the data is normally distributed, then a heteroscedasticity test will be carried out to test whether, in a regression model, there is an inequality of residual variance between one observation and another. The results of the heteroscedasticity test show the value of Sig. X1 is 0.879 and Sig. X2 is 0.959 where both variables have a Sig value > 0.05 , so there are no symptoms of heteroscedasticity. The results of the heteroscedasticity test are presented in Table 5.

Table 5. Heteroscedasticity Test Results

Variable	Sig.	Interpretation
Self-Efficacy (X1)	0,879	Heteroscedasticity free
Mathematical Anxiety (X2)	0,959	Heteroscedasticity free

From Table 5 it can be seen that there are no symptoms of heteroscedasticity. Furthermore, the results of the multicollinearity test show that variables X1 and X2 have a VIF value, namely 1.030, and Tolerance, namely 0.971. So, it can be concluded that both variables X1 and the results of the multicollinearity test can be seen in Table 6.

Table 6. Multicollinearity Test Results

Variable	Tolerance	VIP	Interpretation
Self-Efficacy (X1)	0,971	1,030	Heteroscedasticity free
Mathematical Anxiety (X2)	0,971	1,030	Heteroscedasticity free

Based on the results in Table 6, it is known that there are no symptoms of multicollinearity. So, it can be concluded that no correlation was found between the independent variables, namely self-efficacy and mathematical anxiety.

Significance Test Results

The first step taken was to determine the multiple linear regression equation between self-efficacy and mathematical anxiety and determine the coefficients of the regression equation. From the results of the analysis, the linear regression equation for the dependent variable learning outcomes (Y) on the independent variables self-efficacy (X1) and mathematical anxiety (X2) is $Y = 7.905 + 0.381X1 + 0.193X2$.

Table 7. Partial Correlation Results (t-Test)

Variable	Sig.	t hitting
self-efficacy (X1)	3,077	0,003
Mathematical anxiety (X2)	1,948	0,057

The significance test of the regression equation coefficients was carried out to test the hypothesis: $H_0: \beta_1 \leq 0$ vs $H_1: \beta_1 > 0$ and $H_0: \beta_2 \leq 0$ vs $H_1: \beta_2 > 0$. For the hypothesis $H_0: \beta_1 \leq 0$ vs $H_1: \beta_1 > 0$. Table 7 shows that statistical test results show a Sig value of 0.003 where this value is < 0.05 , then H_0

is rejected, meaning that self-efficacy has a partial positive effect on learning outcomes. Apart from that, the calculated t value is 3.077, which is $>$ from t table = 2.011, so H_0 is rejected, meaning that there is a partial influence of self-efficacy on learning outcomes. The level of student self-efficacy is determined by the data from questionnaires obtained in Table 8.

Table 8. Student Self-Efficacy Level

Category	Interval	Number of Students	Percentage
Low	$SE < 50$	19	38%
Currently	$50 \leq SE \leq 75$	24	48%
High	$SE < 75$	7	14%
Total		50	100%

Based on Table 8, it can be seen that 48% of students have a moderate level of self-efficacy, and only 14% have a high level of self-efficacy. Meanwhile, the average student learning outcomes in each category of self-efficacy level are presented in Table 9.

Table 9. Average Student Scores Based on Self-Efficacy Level

Self Efficacy Category	Average Student Grade
Low	45,5
Currently	68,9
High	89,5

The results in Table 8 show that students with high levels of self-efficacy have high learning outcomes in statistics courses, and vice versa. Students with low levels of self-efficacy have low average learning outcomes.

Meanwhile, to test the hypothesis $H_0: \beta_2 \leq 0$ vs $H_1: \beta_2 > 0$, the statistical test results obtained a Sig value of 0.057, where this value is > 0.05 , so H_0 is accepted, meaning there is no partial influence of anxiety on learning outcomes. Apart from that, the calculated t value was obtained at 1.948 which was $<$ from t table = 2.011, so H_0 was accepted, meaning that there was no partial influence of anxiety on learning outcomes. The level of student mathematical anxiety is determined by the data from questionnaires obtained in Table 10.

Table 10. Student Anxiety Levels

Category	Interval	Number of Students	Percentage
Low	$KM < 50$	12	24%
Currently	$50 \leq KM \leq 75$	28	56%
High	$KM > 75$	10	20%
Total		50	100%

Table 10 shows that as many as 20% of students have high levels of anxiety. Not much different from 24% of students with low anxiety levels of 12 people. Furthermore, the average student learning outcomes in each category of mathematical anxiety level are presented in Table 11.

Table 11. Average Student Scores Based on Mathematical Anxiety Level

Category of Mathematical Anxiety	Average Student Grade
Low	78,67
Currently	79,05
High	70,65

The results in Table 11 show that students with low levels of anxiety do not show high average scores. Students who are in the moderate anxiety category have the highest average learning outcomes.

The second step is to test the significance of the multiple regression equation. This test was carried out to test the hypothesis: $H_0: \beta_1 = \beta_2 = 0$ vs $H_1: \beta_1 \neq \beta_2 \neq 0$. Following are the results of The Simultaneous Influence of Self-Efficacy and Mathematical Anxiety on Student Learning Outcomes

Table 12. Simultaneous test results (F test)

R²	Sig.	F value
0,227	0,002	6,892

From the results of the statistical test, a Sig value of 0.02 is obtained, where this value is <0.05 , then H_0 is rejected, meaning there is an influence of Self-efficacy and mathematical anxiety regarding learning outcomes simultaneously. Apart from that, the calculated F value is 6.892, which is $>$ from F table = 3.195, so H_0 is rejected, meaning that there is a simultaneous influence of self-efficacy and mathematical anxiety on learning outcomes. Meanwhile, the coefficient of determination value is shown by R square = 0.227, which means that 22.7% of the variability in learning outcomes (Y) can be influenced by self-efficacy (X1) and mathematical anxiety (X2). It can also be assumed that simultaneously self-efficacy and mathematical anxiety increase learning outcomes by 22.7%, while 77.3% is influenced by other factors not studied.

DISCUSSION

The Partial Effect of Self-Efficacy on Student Learning Outcomes

The research results show that self-efficacy has a positive effect on student learning outcomes in the Economic Statistics course. This is in line with the results of research from Chotima et al. (2019) which states that students who have high self-efficacy tend to have high mathematical problem-solving abilities as well. Among the test question indicators used, one of them is mathematical problem-solving. Apart from that, there is a significant positive relationship between self-efficacy on their performance and mathematics learning outcomes (Ablian & Parangat, 2022; Dela Cruz et al., 2022; Indirwan et al., 2021). This certainly shows that self-efficacy also has a significant effect on mathematical learning outcomes. So lecturers need to increase students' self-efficacy to improve their learning outcomes later. Apart from that, self-efficacy is related to academic achievement in mathematics exams because the beliefs they develop help the knowledge and skills they have which ultimately determine their academic achievement (Callaman & Itaas, 2020). Lecturers need to provide lots of examples and practice economic statistics questions so that students become more skilled so that learning outcomes increase and mathematical anxiety decreases. This is reinforced by research by Živković et al. (2023) which states that providing practice questions can increase mathematical competence and simultaneously strengthen self-efficacy which ultimately leads to a reduction in negative emotions.

The Partial Effect of Mathematical Anxiety on Student Learning Outcomes

The results of the research show that there is no influence of mathematical anxiety on student learning outcomes in the Economic Statistics course. The opinion of Anita (2014) said that The causes of mathematics anxiety can be classified into three categories, namely personality factors, environmental and social factors, and intellectual factors Based on the results of interviews with students, students tend not to care about mathematics learning they face, therefore mathematics anxiety does not affect their learning outcomes. These results are strengthened by research from Amelia & Ulfah (2022) which also shows that there is no significant influence between mathematical anxiety and mathematical reasoning abilities. In line with research results from (Dzulfikar, 2022) statistical anxiety hurts students' statistical problem-solving abilities. Contrary to Santoso (2021) research results show that mathematical anxiety influences a person's mathematical abilities. Usually, students will feel nervous when studying mathematics, especially during exams and tests. The negative relationship between mathematics anxiety and learning achievement is because mathematics anxiety causes them to avoid mathematics subjects and can interfere with performance in solving mathematics problems (Ablian & Parangat, 2022). Even though mathematics anxiety is a problem that can hurt learning achievement (Putri et al., 2020). Although this research found that mathematical anxiety did not affect learning outcomes in economic statistics, lecturers need to pay attention to mathematical anxiety in students. Excessive anxiety, especially during lectures, is certainly not good for students' emotional development. Help to overcome mathematics anxiety can be offered at different levels: by educational institutions, teaching staff, changes in instructional approaches to learning, parents, or the person concerned (Luttenberger et al.,

2018). Educators should be able to create a fun and contextual learning atmosphere to reduce students' mathematics anxiety (Omika, 2022).

The Simultaneous Influence of Self-Efficacy and Mathematical Anxiety on Student Learning Outcomes

The research results show that there is an influence between self-efficacy and mathematical anxiety on student learning outcomes. These results are supported by research from (Ablian & Parangat, 2022) which states that there is a significant but negative relationship between the level of mathematical anxiety and students' academic achievement in mathematics material. There is also a significant positive relationship between the level of perceived self-efficacy and students' academic achievement in the material. mathematics. Apart from that, it is also confirmed by the results of research from (Dela Cruz et al., 2022) which states that there is a significant relationship between overall mathematics self-efficacy and mathematics tests so the lower the level of mathematics anxiety, the higher the level of student self-efficacy and vice versa. This shows that mathematics anxiety has a relationship with self-efficacy Hamizah Amiruddin et al. (2022a) and Ulfah et al. (2021). Mathematical anxiety causes a person to lose self-confidence (Panitz, 2023). Students are afraid of mathematics because the way they understand the material is inappropriate, especially at the beginning of the lesson (Putri et al., 2020). When students are brave and confident to express that they do not understand the material, the lecturer can repeat the explanation. So that attention from teachers/lecturers can increase self-efficacy and reduce mathematical anxiety (Hamizah Amiruddin et al., 2022)

CONCLUSION

Based on the results and discussion, it can be concluded that: 1) Self-efficacy has a significant effect on the learning outcomes of Economic Statistics students, 2) Mathematical anxiety has no significant effect on the learning outcomes of Economic Statistics students, and 3) Self-efficacy and mathematical anxiety have a significant effect on student learning outcomes Economic Statistics and these two variables can explain 22.7% of students' Economic Statistics learning outcomes, while 77.3% of student learning outcomes are influenced by other variables. It is recommended that lecturers pay attention to students' mathematical self-efficacy and anxiety so that students can be more confident and no longer anxious when faced with mathematical problems, especially economic statistics. Lecturers can develop self-efficacy by providing positive feedback, opportunities, and support in facing challenges in the form of Economic Statistics questions or assignments. Students themselves can also strengthen their self-efficacy by planning realistic goals, recognizing and overcoming self-doubt, and engaging in activities that increase their self-confidence. Apart from that, to overcome mathematical anxiety, students must practice frequently and actively participate in discussions, and ask lecturers or friends. For other researchers, it is recommended to examine other factors that can influence student learning outcomes, apart from the two variables examined in this research.

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