

How the Influence of Learning Motivation and Self-Efficacy on Students' Mathematical Achievement During the Covid-19 Pandemic?

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ABSTRACT

The success of students' mathematics learning is impacted by two factors: internal and external influences. Internal factors are the factor that comes from within the students, and external factors are factors that come from the environment of the students. Factors to be noted to improve the mathematical achievement of students are learning motivation and self-efficacy. The purpose of this study was to find out the influence of learning motivation and self-efficacy on students' mathematical achievements during the Covid-19 pandemic. This research is ex post facto research involving a sample of 112 students from class X IPA SMA at Riau selected by using random sampling technique. Data collection used the following instruments: (1) a questionnaire of learning motivation, (2) a questionnaire of self-efficacy, and (3) students' math report cards. The research data were analysed first by some test requirements, which are normality test, heteroscedasticity test, and multicollinearity test. After fulfilling the test requirements, the data were analysed using multiple linear regression. The result showed that: (1) students' learning motivation had a significant influence on students' mathematical achievement, (2) students' self-efficacy had a significant influence on students' mathematical achievement, and (3) students' learning motivation and self-efficacy simultaneously affect students' mathematical achievement.

Keywords: Learning motivation, Self-efficacy, Students' mathematical achievements.

1. INTRODUCTION

In Indonesia, math instructors and parents are concerned about their children's poor performance on math examinations. According to TIMSS, a comprehensive international comparative research in mathematics and science, Indonesian students are still performing poorly in the mathematical ability category. Mathematics is one of the subjects taught at all levels. It is essential to analyse the variables that contribute to the success in learning mathematics. Researchers in mathematics education have attempted to find solutions to the problem of low student competency in mathematics. The focus of these efforts

was largely on cognitive issues, with psychological components receiving little or no attention [1].

The Covid-19 pandemic condition requires every student to stay at home or do online learning. Online learning is important to maximize the achievement of learning objectives, especially mathematics learning. Because many teachers have difficulty delivering learning online so it will affect students' mathematical achievement. Moreover, students' internal and external factors also contribute to their mathematical achievement. The internal factor of the student is the factor that comes from within the student, while the external factor is the factor that comes from the individual environment. Factors to note

in mathematics lessons are learning motivation and students' self-efficacy.

In addition to cognitive aspects, students' learning motivation has an impact on their learning achievement [2],[3]. Motivation is one of the psychological aspects that influence the achievement of students' learning outcomes. Motivation is a change in energy in a person which is characterized by the emergence of "feeling" and is preceded by a response to the existence of a goal. The form of learning motivation in schools is divided into two types, namely, intrinsic motivation and extrinsic motivation [3]. Students who have high motivation to learn will be better at receiving lessons and their attitudes will be more positive in learning [4].

Learning motivation plays a very important role in learning [5] because every individual whose good learning motivation will have good learning spirit even if the learning is carried out online. In addition, Gasco et al.[6] said that "motivation plays a key role in learning; it would largely explain academic performance as it is a construct that integrates both thoughts and feelings." Based on previous theories, it can be concluded that motivation is important for students because motivation will encourage students to do an activity.

Self-efficacy is defined as the ability to exert control over one's passion, behavior, and social environment [7]. The belief in one's own ability to learn or perform at a high level is known as self-efficacy [8]. Individuals' behaviors are impacted by how they see their abilities and the results of their efforts [9]. Self-efficacy is central to Bandura's Social Cognitive Theory. The bulk of what is learned takes place in a social context, or the majority of what is taught is through observation, according to Social Cognitive Theory [10]. Perceived self-efficacy and behavioral change are closely linked, according to Bandura's Social Learning Theory.

The association between academic accomplishment and self-efficacy, as well as the self-control, was shown to be inconsequential [11]. Learners' achievement exhibited a substantial positive link with their self-efficacy, according to Oyelekan et al. [12]. Self-efficacy has a high positive association with learners' achievement [13]. Further, self-efficacy has a statistically beneficial link with academic accomplishment [14]. Academic success was found to have a substantial positive connection with self-efficacy in similar research [12],[13].

Given the importance of learning motivation and self-efficacy researchers are interested in seeing the

influence of learning motivation and self-efficacy on students' mathematical achievements during the Covid-19 pandemic, where almost all mathematical learning processes are conducted online.

2. METHOD

This study is quantitative research with an ex post facto approach. There are two variables in this research, namely, the independent variable and dependent variable. The independent variables are variables of learning motivation and self-efficacy, while the dependent variable is students' mathematical achievement.

This research was conducted in one of the high schools in Riau. The population in this study was grade X IPA students at one of the high schools in Riau. Research samples of 112 students were drawn by a random sampling technique. The instruments used in this study are the questionnaires of learning motivation and self-efficacy, and student report card scores.

The accumulated data of learning motivation and self-efficacy are transformed using the method of successive intervals (MSI). The research data were analysed first by some testing requirements, namely, normality test, heteroscedasticity test, and multicollinearity test [15]. After fulfilling the test requirements, the data were analysed using multiple linear regression.

2.1. Research Design

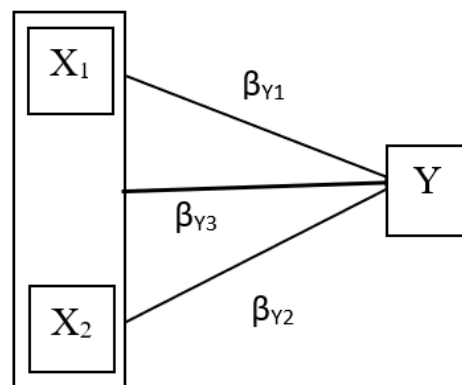


Figure 1 Research design

X_1 is learning motivation, X_2 is self-efficacy, Y is students' mathematical achievement, β_{Y1} is coefficient regression of X_1 to Y , β_{Y2} is coefficient regression of X_2 to Y , and β_{Y3} is coefficient regression of X_1 and X_2 to Y .

2.2. Hypothesis

Hypothesis of this research:

1. Learning motivation has an influence on students' mathematical achievement.
2. Self-efficacy has an influence on students' mathematical achievement.
3. Learning motivation and self-efficacy simultaneously have an influence on students' mathematical achievement.

3. RESULT

3.1. Classical Assumption Tests

3.1.1. Normality Test

Table 1. Normality test result

Variable	Significance
X ₁	
X ₂	0.361
Y	

Table 1 illustrates that the result of the normality test with Kolmogorov-Smirnov significance value 0.361 is greater than 0.05. So that residual values are normally distributed.

3.1.2. Multicollinearity Test

Table 2. Multicollinearity Test result

Variable	Tolerance	VIF
X ₁	0.707	1.415
X ₂	0.707	1.415

Table 2 illustrates that the tolerance value of each variable is more than 0.1, and the Variance Inflation Factor (VIF) value of each variable is less than 10. So, the symptoms of multicollinearity between independent variables do not occur.

3.1.3. Heteroscedasticity Test

Table 3. Heteroscedasticity test result

Variable	Significance
X ₁	0.368
X ₂	0.255

Table 3 illustrates that the heteroscedasticity test yields a significance value of each variable greater than 0.05. So, the regression model does not contain heteroscedasticity.

3.2. Hypothesis Test

3.2.1. Test of Hypothesis 1

Table 4. Hypothesis test result

Variable	Coefficient Regression	t	Significance
Constant	64.721		
X ₁	0.165	2.141	0.034
X ₂	0.147	2.072	0.041

Table 4 shows that the value of t for the influence of learning motivation on student mathematical achievement is 2.141. With the sample size 112 and 3 variables in the research, the t table is 1.982. So, the value of t is greater than t table ($\alpha=0,05$), which means there is an influence of the learning motivation variable on students' mathematical achievements. In addition, based on Table 4, the learning motivation variable has a significant influence on students' mathematical achievement of 0.034.

3.2.2. Test of Hypothesis 2

Table 4 shows that the value of t for the influence of self-efficacy on student mathematical achievement is 2.072 with the sample size 112 and 3 variables in the research, the t table is 1.982. So, the value of t is greater than t table ($\alpha=0,05$), which means there is an influence of the self-efficacy on students' mathematical achievements. In addition, based on Table 4, the self-efficacy variable has a significant influence on students' mathematics learning achievement of 0.041.

3.2.3. Hypothesis Testing 3

Table 5. Hypothesis test result 3.

Variable	Coefficient Regression	F	R ²	Significance
Constant	64.721			
X ₁	0.165	7.542	0.349	0.001
X ₂	0.147			

Based on Table 5, the following regression equation is obtained:

$$Y = 64.721 + 0.165 X_1 + 0.147 X_2 \quad (1)$$

This means that the increase of one unit X_1 will increase the Y by 0.165 and the increase of one unit X_2 will raise the Y by 0.147. Moreover, Table 5 shows that learning motivation and self-efficacy have a joint influence on students' mathematical achievement of grade X IPA students in Riau, which amounted to 34.9% ($R^2 = 0.349$), while the rest was influenced by other variables outside the model. Thus learning achievements can be predicted by learning motivation and self-efficacy.

4. DISCUSSION

The purpose of this study is to see how learning motivation and self-efficacy affect students' mathematical achievement during the covid-19 pandemic. Based on the results of the analysis, learning motivation and self-efficacy affect students' mathematical achievement both simultaneously and directly.

Learning motivation significantly affects students' mathematical achievement which means that learning motivation has a contribution to students' mathematical achievement. This is similar to the results of other research [3], [5], [6] that learning motivation influences students' mathematical achievement. A student who has high learning motivation will have high achievement in learning mathematics because students who have high learning motivation will have good learning spirit so that they will be responsible for the task given, but a student who has low learning motivation will have low mathematical achievement. Through this research, it is very important to note the improvement of students' learning motivation in mathematics learning affects the improvement of the achievement of mathematics.

Moreover, in this study self-efficacy has a significant influence on students' mathematical achievement. This is similar to research conducted by Suryani et al. [3], Oyuga et al. [7], and Asakereh and Yousofi [14] that self-efficacy affects students' mathematical achievement. Every individual who has a high self-efficacy to learn mathematics will have good mathematical achievement because a student who has high self-efficacy will have a good control over one's passion to learn so that it will have a good impact on the tasks done, but a student who has low self-efficacy will have low mathematical achievement.

These findings have some consequences for learning. To improve student learning, their motivation and self-efficacy should be encouraged both at home and at school. For example, to improve students' mathematical achievement encouraging students to trust in their own ability to succeed in a given situation or finish a task would increase their self-efficacy and drive to study. As a consequence, students' academic performance will increase.

5. CONCLUSION

Based on the result of the study, it can be concluded that learning motivation and self-efficacy directly affect students' mathematical achievement. Moreover, learning motivation and self-efficacy simultaneously affect students' mathematical achievement.

AUTHORS' CONTRIBUTIONS

Chelsi Ariati and Aswin compile questionnaires, carry out research, and compile articles. Dadang Juandi provides a guide in the implementation and preparation of the paper.

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REFERENCES

- [1] O. N. Aihie, Self-efficacy and Emotional Intelligence Among Nigerian Adolescents in Single-Sex and Co-Educational Secondary Schools, *J. Educ. Pract.*, vol. 9, no. 11, 2018, pp. 92–98.

- [2] Y.-K. Kim and T.-Y. Kim, An Investigation on Male High School Students' Motivation and Achievement in English Learning., *English Teach.*, vol. 73, no. 1, 2018, pp. 135–160. DOI: <https://doi.org/10.15858/engtea.73.1.201803.135>
- [3] L. Suryani, S. B. Seto, and M. G. D. Bantas, "Hubungan Efikasi Diri dan Motivasi Belajar Terhadap Hasil Belajar Berbasis E-Learning pada Mahasiswa Program Studi Pendidikan Matematika Universitas Flores," *J. Kependidikan J. Has. Penelit. dan Kaji. Kepustakaan di Bid. Pendidikan, Pengajaran dan Pembelajaran*, vol. 6, no. 2, 2020, p. 275. DOI: <https://doi.org/10.33394/jk.v6i2.2609>
- [4] I. P. Budiariawan, "Hubungan Motivasi Belajar Dengan Hasil Belajar Pada Mata Pelajaran Kimia," *J. Pendidik. Kim. Indones.*, vol. 3, no. 2, 2019, p. 103. DOI: <https://doi.org/10.23887/jpk.v3i2.21242>
- [5] H. Tambunan, The Dominant Factor of Teacher's Role as A Motivator of Students' Interest and Motivation in Mathematics Achievement, *Int. Educ. Stud.*, vol. 11, no. 4, 2018, pp. 144–151. DOI: <https://doi.org/10.5539/ies.v11n4p144>
- [6] J. Gasco, A. Goni, and J. D. Villarroel, "Sex differences in mathematics motivation in 8th and 9th grade," *Procedia - Soc. Behav. Sci.*, vol. 116, no. 2014, pp. 1026–1031, 2013. DOI: <https://doi.org/10.1016/j.sbspro.2014.01.340>
- [7] P. A. Oyuga, P. A. Raburu, and P. J. O. Aloka, "Relationship between Self-efficacy and Academic Performance among Orphaned Secondary School Students in Kenya," *Int. J. Psychol. Behav. Sci.*, vol. 9, no. 3, pp. 39–46, 2019. DOI: <https://doi.org/10.5923/j.ijpbs.20190903.02>
- [8] A. Flammer, "Self-Efficacy," *Int. Encycl. Soc. Behav. Sci. Second Ed.*, vol. 4, no. 1994, pp. 504–508, 2015. DOI: <https://doi.org/10.1016/B978-0-08-097086-8.25033-2>
- [9] M. Tuncer and F. Bahadır, "Relationships Between Success Orientation , Self Efficacy on Scientific Research and Metacognitive Thinking Skills," *Eur. J. Educ. Stud.*, vol. 4, no. 10, pp. 49–64, 2018. DOI: <https://doi.org/10.5281/zenodo.1307186>
- [10] A. Bandura, "Self-efficacy: Toward a Unifying Theory of Behavioral Change," *Psychol. Rev.*, vol. 84, no. 2, pp. 191–215, 1977. DOI: <https://doi.org/10.1007/978-3-319-75361-4>
- [11] O. Korkmaz, T. Ilhan, and S. Bardakci, An investigation of self-efficacy, locus of control and academic procrastination as predictors of academic achievement in students diagnosed as gifted and non-gifted, *Eur. J. Educ. Stud.*, vol. 4, no. 7, pp. 173–192, 2018. DOI: <https://doi.org/10.5281/zenodo.1253354>
- [12] O. S. Oyelekan, S. S. Jolayemi, and J. E. Upahi, Relationships among senior school students' self-efficacy, metacognition and their achievement in chemistry, *Cypriot J. Educ. Sci.*, vol. 14, no. 2, 2019, pp. 208–221. DOI: <https://doi.org/10.18844/cjes.v14i2.2564>
- [13] S. W. Njega, J. N. Njoka, and catherine waithera Ndung'u, Assessment of Self-Efficacy on Learners' Academic Performance in Secondary Schools in Kirinyaga and Murang'a Counties, Kenya, *J. Arts Humanit.*, vol. 08, no. 10, 2019, pp. 48–59.
- [14] A. Asakereh and N. Yousofi, Reflective thinking, self-efficacy, self-esteem and academic achievement of Iranian EFL students, *Int. J. Educ. Psychol.*, vol. 7, no. 1, 2018, pp. 68–89. DOI: <https://doi.org/10.17583/ijep.2018.2896>
- [15] W. Mendenhall, R. J. Beaver, and B. M. Beaver, *Introduction to Probability and Statistics*, 13th editi. USA: Brooks/Cole, 2009.