

The Influence of Achievement Motivation and Mathematical Resilience in Online Learning on Mathematics Learning Achievement

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Abstract. This research was motivated by the desire to see: (1) the influence of achievement motivation and mathematical resilience in online learning on mathematics learning achievement, (2) The influence of achievement motivation in online learning on mathematics learning achievement, (3) The influence of mathematical resilience in online learning on mathematics learning achievement. This research is quantitative and employs an ex-post facto design. The population in this study was all 344 class VII students at MTs Negeri 1 Kolaka. Sampling using a proportional random sampling technique obtained a sample of 44 students. Data collection methods included questionnaires and documentation. Data analysis uses multiple linear regression analysis. The research results show: (1) $F_{count} = 24.31970 \geq F_{table} = 3.220$, which means that there is a positive and significant influence of achievement motivation and mathematical resilience in online learning on mathematics learning achievement; (2) $t_{count} = 4.333 > t_{table} = 2.01954$, which means that there is a positive and significant influence of achievement motivation in online learning on mathematics learning achievement; (3) $t_{count} = 4.989 > t_{table} = 2.01954$, which means that there is a positive and significant influence of mathematical resilience in online learning on mathematics learning achievement.

Keywords: Achievement motivation, mathematical resilience, learning achievement

INTRODUCTION

Education must be obtained by every Indonesian citizen so that the development of a nation and state can run well. This is also contained in Article 31 of the 1945 Constitution, which states that every citizen has the right to education. The statement in Article 31 is also a basis for and guarantees that every Indonesian citizen can obtain an education without distinction of ethnicity, religion, and class (Sirait, 2016). Various efforts are made to obtain education. Education can also be obtained through school, apart from within the family.

One of the subjects taught at school is mathematics. According to the Ministry of Education and Culture (Kemdikbud, 2013), "Mathematics is a universal language for presenting ideas or knowledge formally and precisely so that it does not allow for multiple interpretations, the delivery is by bringing concrete ideas and knowledge to abstract form through defining variables and parameters in accordance with what you want to present, presenting it in abstract form through mathematics will make subsequent analysis and evaluation easier" (Susilo & Agustin, 2015).

Student achievement in all fields of study, including mathematics, is still relatively low (Nurdianti et al., 2021). Even though mathematics lessons have been taught from elementary school to university, this can be seen from the low learning achievement of students at every level of education. The 2018 Program for International Student Assessment (PISA) study results,

published in March 2019, showed that Indonesian students were ranked 35th out of 41 countries for mathematics ability (OECD, 2018). These results have remained relatively high in the last 10-15 years.

Similarly, the 2015 Trends in Mathematics and Science Study (TIMSS) indicated that Indonesian students ranked 44th out of 49 countries in mathematics achievement (Mullis et al., 2015). Furthermore, the results of the Computer Based National Examination (UNBK) for SMP/MTs, which are summarized in the Puspendik of the Ministry of Education and Culture of the Republic of Indonesia, the mathematics test scores obtained by SMP/MTs students in Indonesia are still below 55 (threshold) which is considered the competency standard with an average score of average 46.34. This fact shows that Indonesia's mathematics achievements still need to improve nationally and internationally.

This is increasingly worrying with online learning during the pandemic. Online learning is a learning process supported by internet networks and digital media that can help convey lesson material to students (Rofiah, 2021). However, the phenomenon of learning from home carried out during the pandemic was not as expected (Farman et al., 2022). Many students complain about the convenience of studying with an online learning system (Dewantoro & Rachmawati, 2020), including internet connection, data package costs, mastery of material, assignments, and workload (Arbain & Farman, 2021). Online learning makes students bored when given assignments by the teacher because students are required to truly study independently at home, which is very different from usual, where students usually do activities at school and always meet with their friends. Several studies show that online learning only produces a small number of results. Research conducted by Yunitasari & Hanifah (2020) found that online learning during the COVID-19 pandemic significantly influenced students' interest in learning; as they felt bored due to the lack of direct interaction with their friends and teachers. Furthermore, Rofiah (2021) indicated that online learning during the COVID-19 pandemic could increase students' academic stress; this happened because the learning system changed from face-to-face to online learning. This can indirectly affect student learning achievement.

Factors that can influence students' mathematics learning achievement originate from within the student, including psychological factors such as self-confidence, achievement motivation, discipline, mathematical resilience, and study habits. Factors originating from outside the student, namely natural environmental factors, socio-economic factors, teachers, curriculum, teaching methods, facilities, and infrastructure (Fitrianti & Nur, 2018; Nurdianti et al., 2021; Purnomo, 2017). Achievement motivation is one of the factors that influences learning achievement. Achievement motivation is the driving force within a person so that the person tries to carry out a good action or activity and achieves the title of excellence. This motivation can come from within him or from outside him. Goodenought in Trisnowali (2017) said that motivation is a significant variable in determining success in learning. A learner or student fails his academic assignments because he is not sufficiently motivated. According to Nurhidayah (2016), achievement motivation is essential in the teaching and learning process because it is needed to foster interest in the teacher's lessons. The following indicators of achievement motivation have been identified: the desire to compete healthily with oneself and others; the drive to perform well; realistic thinking, including an awareness of one's strengths and weaknesses; personal responsibility; the ability to think innovatively; strategic long-term thinking; and the utilisation of feedback for improvement (Rahim et al., 2021).

Apart from achievement motivation, students must have good fighting power in solving problems, have self-confidence, work hard, be persistent, and have a high curiosity about mathematics lessons; this is also called mathematical resilience (Iman & Firmansyah, 2020). Mathematical resilience is a soft mathematical skill that is important for students. Resilience is an attitude of self-confidence to succeed in learning mathematics through hard effort, perseverance in solving challenges, and the desire to discuss, reflect, and analyze. Through resilience, students can overcome obstacles and difficulties in learning (Dilla et al., 2018) and be motivated to be active and enthusiastic in learning mathematics (Farman et al., 2021). According to Sumarmo, indicators of mathematical resilience include perseverance, self-confidence, hard work, and toughness in facing problems, failure, and uncertainty; socialize easily, providing help, discussing with peers, and adapting to the surrounding environment; generate new ideas and find creative solutions; using failure experiences to build self-motivation; demonstrate curiosity, reflection, research, and use various sources; have language skills, self-control, and awareness of their feelings (Azizah & Abadi, 2022).

Several previous studies stated that there is an influence between achievement motivation and mathematical resilience on mathematics learning achievement. The results of Nurhidayah (2016) research stated that achievement motivation influenced the learning achievement of class VIII students in junior high school mathematics subjects. Trisnowali (2017) also states that achievement motivation influences students' mathematics learning achievement. Iman & Firmansyah (2020) stated that mathematical resilience abilities influence junior high school students' learning outcomes. In line with research results, Mukhlisin & Ibrahim (2021) also said the same thing, that resilience in learning mathematics has a significant effect on mathematics learning achievement.

This research examines the influence of achievement motivation and mathematical resilience in online learning on students' mathematics learning achievement. The difference between this research and previous research is the research population, where the population of this research is class VII junior high school students. Apart from that, this research was also carried out using multiple regression analysis. In contrast, other research that examined achievement motivation, mathematical resilience, and student mathematics learning achievement was limited to correlation and simple regression analysis.

METHOD

This research type is ex-post facto with a quantitative approach to test or explain the relationship between variables through hypothesis testing. The research method used is quantitative. This quantitative research examines the influence of achievement motivation and mathematics resilience on learning achievement.

The population of this research is all class VII students at MTs Negeri 1 Kolaka, which consists of 11 classes, 344 students. Sampling in this research was carried out using proportional random sampling technique, which determines the sample by randomly taking representatives from each group in the population whose numbers are adjusted to the subject members in each group. The sample used in this research was 44 students (12.7% of 344). Because the sample size was 44 people, the sample size was determined by drawing the names of students in each class proportionally to obtain the required sample. The sample size in each class (stratified) was a

proportional allocation, so the sample taken was more proportional; four students were selected for each class. The variables in this research consist of independent variables, namely achievement motivation (X_1) and mathematical resilience (X_2), and the dependent variable, namely student mathematics learning achievement (Y). The research design is presented in Figure 1

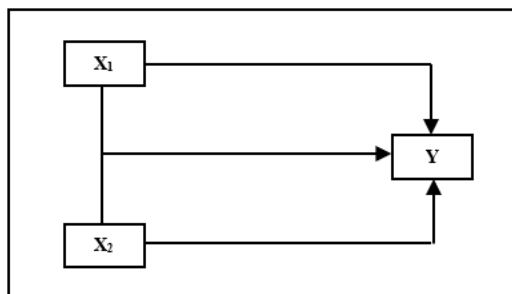


Figure 1. Research Design

Data collection techniques in this research used questionnaires and documentation methods. The questionnaire in this research was used to obtain information about achievement motivation and mathematical resilience of class VII students at MTs Negeri 1 Kolaka. The documentation technique in this research was used to obtain data such as a list of names and data on students' final even semester mathematics exam scores as research material to determine the mathematics learning achievement of class VII students at MTs Negeri 1 Kolaka. The instrument used in this research is a non-test instrument using a questionnaire. Alternative answers in this questionnaire are determined by the score for each option using a five-level Likert scale. The achievement motivation and mathematical resilience questionnaires that had been prepared were then tested first. The test results questionnaire was then analyzed for its validity and reliability. The validation results showed that ten out of 40 statements from the achievement motivation questionnaire and eight numbers out of 40 numbers from the mathematical resilience questionnaire statements that had been tested were declared invalid. The criteria use the critical number $r_{dk} = n - 2$ with a significance level of $\alpha = 0.05$, for $n = 44$ where $r_{table} = 0.297$, it is said to be valid if $r_1 > r_{table}$. The results of data analysis of the achievement motivation questionnaire and mathematical resilience questionnaire obtained the reliability coefficients of the achievement motivation and mathematical resilience questionnaires were 0.91 and 0.84, respectively. Meanwhile, based on the interpretation of the reliability coefficient, it can be concluded that the reliability coefficient value of the achievement motivation and mathematical resilience questionnaire is in the very high category. Thus, this instrument can be used to collect research data.

The data in the research were analyzed using descriptive and inferential statistical analysis techniques. Descriptive statistical analysis includes mean (\bar{x}), standard deviation (SD), maximum value, and minimum score. Next, the tendency for mathematical achievement motivation and resilience is determined by categorizing based on the values obtained from the descriptive analysis, namely the conversion score, mean, and standard deviation (Sudijono, 2006). Categorization of students' mathematics learning achievements is categorized into five categories (Annajmi, 2018). Meanwhile, inferential statistical analysis is used to test research hypotheses. The results of inferential analysis in this research are intended to test hypothesis testing assumptions and test research hypotheses. Hypothesis testing uses multiple linear analysis. Testing was carried out using the SPSS 26 computer program.

FINDINGS

Based on the results of the analysis that has been carried out, descriptive data on achievement motivation, mathematical resilience, and student mathematics learning achievement was obtained as in Table 1

Table 1. Results of Descriptive Analysis of Achievement Motivation, Mathematical Resilience and Mathematics Learning Achievement

	Statistics	Score
Achievement Motivation	Maximum Score	87,50
	Minimum Score	65,00
	Mean (\bar{x})	77,50
	Standard Deviation (S)	4,974
Mathematical Resilience	Maximum Score	82,81
	Minimum Score	57,03
	Mean (\bar{x})	72,53
	Standard Deviation (S)	6,227
Mathematics Learning Achievement	Maximum Score	88,80
	Minimum Score	70,00
	Mean (\bar{x})	77,91
	Standard Deviation (S)	5,472

As illustrated in the table above, the highest score for achievement motivation is 87.50, while the lowest is 65.00. The mean is 77.50, and the standard deviation is 4.974. The highest score for mathematical resilience is 82.81, while the lowest is 57.03. The mean is 72.53, and the standard deviation is 6.227. With regard to mathematics learning achievement, the highest score was 88.80, the lowest score was 70.00, the mean was 77.91, and the standard deviation was 5.472. The categories of student achievement motivation are presented in Table 2 below.

Table 2. Distribution of Student Achievement Motivation Categories

Category	Score Range	Frequency	Percentage
Very High	$84,96 < X_1$	2	4,55%
High	$79,99 < X_1 \leq 84,96$	15	34,09%
Medium	$75,01 < X_1 \leq 79,99$	15	34,09%
Low	$70,04 < X_1 \leq 75,01$	8	18,18%
Very Low	$X_2 \leq 70,04$	4	9,09%
Total		44	100%

As illustrated in the table above, two (4.55%) students out of the 44 students in the sample were classified as exhibiting very high achievement motivation. Fifteen (34.09%) students were in the high and medium category, eight (18.18%) students were in the low category, and four (9.09%) students were in the very low category. Meanwhile, regarding the mean score, motivation achievement is in the medium category. So, it can be concluded that the motivation for achievement of students is medium. The distribution of mathematical resilience data categories is presented in Table 3 below.

Table 3. Distribution of Students' Mathematical Resilience Categories

Category	Score Range	Frequency	Percentage
Very High	$81,87 < X_2$	2	4,55%
High	$75,64 < X_2 \leq 81,87$	13	29,55%
Medium	$69,42 < X_2 \leq 75,64$	18	40,91%
Low	$63,19 < X_2 \leq 69,42$	6	13,64%
Very Low	$X_2 \leq 63,19$	5	11,36%
Total		44	100%

As illustrated in the table above, it can be observed that of the 44 students sampled in this study, two (4.55%) were classified as exhibiting high mathematical resilience. There were 13 (29.55%) students classified as exhibiting high mathematical resilience. The medium category consisted of 18 students (40.91%). Meanwhile, six (13.64%) students were in the low category, and five (11.36%) were in the very low category. So, it can be concluded that the mathematical resilience of students is in the medium category. Based on the reference distribution of mathematics learning achievement data, the categorization can be presented in Table 4 below.

Table 4. Distribution of Students' Mathematics Learning Achievement Categories

Category	Score Range	Frequency	Percentage
Very High	$90 \leq X \leq 100$	0	0%
High	$80 \leq X < 90$	14	31,82%
Medium	$65 \leq X < 80$	30	68,18%
Low	$55 \leq X < 65$	0	0%
Very Low	$0 \leq X < 55$	0	0%
Total		44	100%

As illustrated in the table above, 14 of the 44 (31.82%) students in this research exhibited high levels of mathematical learning achievement. The medium category comprises 30 (68.18%) students. So, it can be concluded that the students' mathematics learning achievement is of a medium category.

Parameter Estimation Results

In light of the findings of the analysis above, the resulting parameter estimation is as follows:

Table 5. Parameter Estimation Results

Parameter	Value
b_0	4,953
b_1	0,507
b_2	0,464
σ^2	14,366

The table shows that the values $b_0 = 4.953$, $b_1 = 0.507$, $b_2 = 0.464$, and $\sigma^2 = 14.366$. So, the multiple linear regression line equation that connects the variables achievement motivation (X_1) and mathematical resilience (X_2) to mathematics learning achievement is as follows:

$$\hat{Y} = 4,953 + 0,507X_1 + 0,464X_2$$

The equation shows that the achievement motivation parameter (b_1) value is positive, namely 0.507 (achievement motivation has a positive effect on mathematics achievement). This means that any increase in the average value of X_1 will increase the value of Y , or the higher the achievement motivation, the higher the achievement in mathematics learning and vice versa. Meanwhile, the value of the mathematics resilience parameter (b_2) is positive, namely 0.464 (mathematics resilience has a positive effect on mathematics learning achievement), which means that each increase in the average value of X_2 will increase the value of Y , or the higher the value of mathematics resilience, the higher the achievement in learning mathematics and vice versa.

Hypothesis Testing Assumptions

Several hypothesis testing assumptions will be carried out after the data is obtained, including the random error having a mean of 0 and the residuals in this study being equal to 0, so it can be concluded that the random error has a mean of 0. The heteroscedasticity test using Scatterplot shows that there are no symptoms of heteroscedasticity, the multicollinearity test with the help of SPSS 26 obtained $VIF = 1.011 < 10$ and the Tolerance value = 0.989 or close to 1, meaning that there were no symptoms of multicollinearity. Next, the normality test using the Liliefors test obtained random errors with a normal distribution.

Simultaneous Testing (F Test)

The results of the test analysis are displayed in the form of an ANOVA table as follows:

Table 6. Anova Test Results

Variance Source	Sum of Squares	Independence degree	Mean of Square	F _{Count}
Regresi Full/ Regresi (β)	267797,074873	3		
Regresi (β_0)	267098,334017	1		
Regresi ($\beta_1, \beta_2 \beta_0$)	698,740856	2	349,370428	24,31970
Residu	588,995127	41	14,36573	
Total	268386,07	44		

The table shows that $F_{count} = 24.31970 \geq F_{table} = 3.220$, so H_0 is rejected. Thus, it is concluded that achievement motivation and students' mathematical resilience in online learning affect mathematics learning achievement in class VII MT's Negeri 1 Kolaka.

Partial Test (t-Test)

The results of the analysis are presented in table form as follows:

Table 7. Results of t-test analysis

Variable	T
Motivation of Achievement	4,333
Mathematics resilience	4,989

Based on the results of t-test calculations for achievement motivation, $t_{count} = 4.333 > t_{table} = 2.01954$, so H_0 is rejected. Because H_0 was rejected, it was concluded that there was an influence of achievement motivation in online learning on the mathematics learning achievement of class VII students at MT's Negeri 1 Kolaka. If the influence of mathematical resilience was considered, and the calculation results of the mathematical resilience t test obtained $t_{count} = 4.989 > t_{table} = 2.01954$ then H_0 rejected. Because H_0 was rejected, it was concluded that mathematical resilience in online learning influenced the mathematics learning achievement of class VII students at MT's Negeri 1 Kolaka if the influence of achievement motivation was considered.

Analysis of the Coefficient of Determination (R²)

The results of the analysis of the coefficient of determination (R²) are presented in Table 8.

Table 8. Results of Determination Coefficient Analysis (R²)

JK_{Res}	J_{YY}	R^2
589,0218	1287,7338	0,543

Table 8 indicates that the coefficient of determination (R^2) is 0.543. This suggests that the combined influence of achievement motivation and mathematical resilience variables on mathematics learning achievement is 54.3%, while the remaining 45.7% is attributed to unidentified variables.

Analysis of Relative Contributions and Effective Contributions

Effective contribution (SE%) determines the comparative percentage of effectiveness given by one variable to the dependent variable with other variables studied or not studied. The relative contribution (SR%) is employed to ascertain the influence of each independent variable when comparing the dependent variable. The results of the calculations are presented in the following table, which also includes the analysis of relative and effective contributions.

Table 9. Results of Analysis of Relative and Effective Contributions

Variable	B	$\sum xy_i$	$JK_{\text{Reg}(\beta_1, \beta_2 \beta_0)}$	R^2	SR%	SE%
X_1	0,507	266287,1389	267797,074873	0,543	50,41%	27,37%
X_2	0,464	249496,8490			43,23%	23,47%
Total					93,64%	50,84%

DISCUSSION

Achievement motivation is a desire to achieve good performance. According to Goodenought in Trisnowali (2017), motivation is a significant variable to determine success in learning, a student who fails in their academic assignments because they are not sufficiently motivated. In connection with achievement motivation, students must have good fighting power in solving problems, have self-confidence, work hard, be diligent, and have a high curiosity about mathematics lessons; this is also called mathematical resilience (Iman & Firmansyah, 2020).

Based on the analysis of the achievement motivation questionnaire, it was found that the achievement motivation of class VII students at MTs Negeri 1 Kolaka was in the high and medium categories, namely 34.09% of the research sample. This was because students were less enthusiastic about learning mathematics, easily bored when given assignments, and took lessons solely to avoid missing class and not to increase their knowledge. Furthermore, the results of the analysis of the mathematical resilience questionnaire showed that the mathematical resilience of class VII students at MTs Negeri 1 Kolaka was also in the medium category, namely 40.91% of the research sample; this was because students lacked confidence in the results they had obtained, and were embarrassed to convey learning difficulties in learning. So, this can affect students' mathematics learning achievement. This medium motivation for achievement and mathematical resilience also causes learning achievement to be in the medium category.

The findings of this study indicate that the achievement motivation variable positively influences mathematics learning achievement. Achievement motivation in this study provided an effective contribution of 27.37% and a relative contribution of 50.41% to mathematics learning achievement. The findings of this study are corroborated by previous research by Nurhidayah (2016), who concluded that achievement motivation influences mathematics learning achievement. This shows that achievement motivation plays a very important role in learning. Achievement motivation will encourage someone to do better in completing something to achieve success than what was previously created or achieved. With this motivation, students become diligent in

learning, and with motivation, the quality of student learning achievement is likely to be realized well. Students in the teaching and learning process have strong motivation for achievement, are persistent, and are likely to obtain satisfactory learning achievements (Arvyaty et al., 2017).

Furthermore, mathematical resilience has been demonstrated to exert a beneficial influence on mathematics learning achievement. Mathematical resilience in this study provides an effective contribution of 23.47% and a relative contribution of 43.23% to mathematics learning achievement. The findings of this study are corroborated by the results of Setiantanti (2017), who concluded that student resilience positively influences mathematics learning achievement. This shows that mathematical resilience is also important in achieving mathematics learning achievement. Students need mathematical resilience to foster self-confidence, resulting in better learning results and achievements (Azizah & Abadi, 2022).

The study results show that achievement motivation and mathematical resilience in online learning positively influence mathematics learning achievement. The magnitude of the influence exerted by the combination of achievement motivation and mathematical resilience variables on learning achievement is 54.3%. It is acknowledged that 45.7% is influenced by other variables not included in this study. The analysis indicates that, regarding their impact on mathematics learning achievement, the two variables exert a comparable influence. However, achievement motivation is found to have a more dominant effect than mathematical resilience.

This research only examines achievement motivation and resilience factors in student mathematics learning achievement. Although the results of this study show that achievement motivation and resilience factors need to be maintained or improved to achieve good mathematics learning achievement, teachers still need to pay attention to other factors that encourage students to achieve achievement. Therefore, researchers can examine other mathematical soft skill factors influencing maximum learning achievement in future studies.

CONCLUSION

In general, the achievement motivation, mathematical resilience and mathematics learning achievement of class VII MTs Negeri 1 Kolaka students are within the medium category. The findings indicate that achievement motivation and mathematical resilience in online learning have a positive influence on the mathematics learning achievement of class VII students at MTs Negeri 1 Kolaka. This influence is observed both simultaneously and partially.

This study shows that schools need to pay more attention to students' achievement motivation and mathematical resilience during learning, which will support effective learning and improve learning achievement, especially in mathematics subjects. Teachers are expected to be able to think creatively and try to use innovation in fun learning to increase students' achievement motivation and mathematical resilience. In this way, students can increase their achievement motivation, mathematical resilience, and learning achievement in all fields of study, especially mathematics. In the future, further research can examine other factors that influence students' mathematics learning achievement and provide the best solutions to problems that occur to provide contributions and benefits to education.

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