



THE INFLUENCE OF MATHEMATICS ACHIEVEMENT ON FURTHER STUDY PLANS IS REVIEWED FROM LEARNING INTEREST AND LEARNING MOTIVATION

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ABSTRACT

Mathematics achievement is one of the important indicators in assessing students' academic readiness to continue their education to a higher level. This study aims to analyze the influence of mathematics achievement on students' further study plans, both directly and indirectly through learning interests and learning motivation as mediating variables. This study uses a quantitative approach with the type of explanatory research. The subject of the study was 80 students of grade XII Science in one of the state aliyah madrasahs. Mathematics achievement data was obtained from the report cards of Compulsory Mathematics and Advanced Mathematics, while data on learning interests, learning motivation, and further study plans were collected through a Likert scale questionnaire. Data analysis was carried out using *Partial Least Squares - Structural Equation Modeling* (PLS-SEM). The results of the study showed that mathematics achievement had a positive and significant effect on students' learning interests, learning motivation, and further study plans. Learning motivation has a significant effect on further study plans and acts as a partial mediating variable in the relationship between mathematics achievement and further study plans. On the other hand, interest in learning had no significant effect on the further study plan and did not function as a mediating variable. These findings confirm that learning motivation has a more dominant role than learning interest in determining students' further study planning.

A. Introduction

Mathematics achievement is one of the important indicators in evaluating learning success at the secondary education level because it reflects the mastery of concepts, mathematical thinking skills, and academic readiness of students in facing further education (Harianja, 2024; T et al., 2023). Mathematics has a strategic role in the curriculum because it demands the ability to think logically, analytically, and problem-solving which is the foundation for various fields of study in college. Therefore, students' mathematical achievements, especially those reflected in report card scores, are often used as a basis for assessing students' academic potential and readiness to continue their education to a higher level (Harahap et al., 2024).

Mathematical achievement is not only influenced by cognitive abilities, but also by internal psychological factors of students. Learning interests play a role in shaping students' active involvement during the mathematics learning process, which is reflected through attention, activeness, and seriousness in understanding the material. Students with good learning interests tend to show more optimal learning involvement so that it has a positive impact on academic achievement achieved (Munthe & Pasaribu, 2023; Syaputra, 2019). In addition to interest in learning, learning motivation is also an important factor that encourages students to strive consistently in achieving their academic goals (Ugi et al., 2023). Learning interests and motivation are internal factors that are interrelated to student learning achievement and affect their involvement in the learning process (Acosta-Gonzaga, 2023; Desmiarni et al., 2025).

Various studies show that interest and motivation for learning have a significant relationship with math achievement. High learning motivation encourages students to be more diligent, confident, and ready to face the challenges of mathematics learning, thereby contributing to the achievement of better learning outcomes (Syaputra, 2019). In addition, a strong interest in learning contributes to increased student involvement in the learning process, which ultimately affects the mathematical achievement achieved (Sirait et al., 2025).

Furthermore, mathematics achievement not only has an impact on short-term academic achievement, but also has the potential to affect students' future orientation, especially in planning further studies. The further study plan is part of the future orientation of education that reflects the clarity of the academic objectives, the

intention to continue their education to higher education, and the readiness of students to assess the suitability between academic ability and the demands of the chosen field of study (Winurini, 2021). Research shows that learning achievement has a relationship with students' interest in continuing education to a higher level, especially when supported by strong learning motivation and positive perceptions of their academic abilities (Harahap et al., 2024).

In addition to academic achievement, internal psychological factors such as interest and motivation for learning also play a role in the formation of students' further study plans. Learning motivation encourages students to have a long-term goal orientation and stability in determining further education options (Arifin et al., 2017). High interest in learning in academic activities and certain fields of study is also related to the clarity of the further study plan, as students tend to be more active in exploring educational options that suit their interests and abilities (Winurini, 2021).

Although various studies have examined the relationship between learning achievement, learning interest, and motivation to learn, most of these studies still place interest and motivation as independent variables that have a direct effect on learning outcomes or interest in continuing education. Research that examines the role of learning interest and learning motivation as mediating variables in the relationship between mathematics achievement and students' further study plans is still relatively limited, especially in the context of madrasah aliyah. In addition, the use of Compulsory Mathematics and Advanced Mathematics report cards as indicators of sustainable learning achievement has also not been widely studied in previous research.

Based on these conditions, this study aims to analyze the influence of mathematics achievement on students' further study plans, both directly and indirectly through the role of learning interest and learning motivation. This research is expected to make an empirical contribution to the study of mathematics education, especially in understanding the psychological mechanisms underlying the planning of students' continuing education at the secondary education level.

B. Research Methodology

This study uses a quantitative approach with the type of explanatory research that aims to test the causal relationship between variables, both directly and indirectly. This approach was chosen because it is suitable for testing a research model that involves a mediated relationship between mathematical achievement, learning interest, learning motivation, and students' further study plans.

The research was carried out at MAN 2 Kuningan in the even semester of the 2025 - 2026 school year. The subjects of the study were all students of grade XII Science totaling 114 people, with a sampling technique in the form of total sampling. Of these, as many as 80 students returned the questionnaire completely and were suitable for analysis so that it became the final sample of the research. This sample count is considered adequate for *the analysis of Partial Least Squares-Structural Equation Modeling* (PLS-SEM), as this method does not require large sample sizes and is suitable for research models with latent variables and mediating relationships (Hair et al., 2022).

Mathematics achievement is measured using data on the report card of Compulsory Mathematics and Advanced Mathematics in grade XI as an indicator of student academic achievement. The variables of learning interest, learning motivation, and further study plan were measured using a questionnaire distributed online through *Google Form* with a five-level Likert scale. The questionnaire instrument has gone through a content validation process by mathematics education experts before being used in research.

The research construct Mathematics Achievement (X), Learning Interest (M1), Learning Motivation (M2) and Further Study Plan (Y). Each construct consists of several dimensions and indicators that are compiled based on theoretical studies and previous research. The dimensions and number of question items used in this study are presented in the following table.

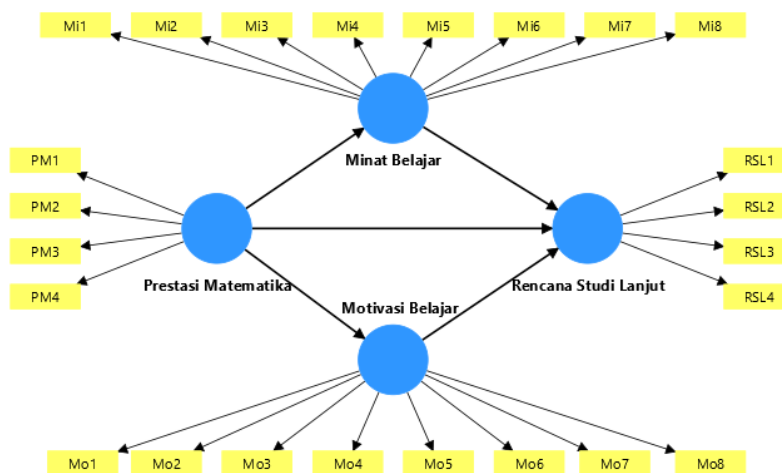
Table 1 Number of Question Items

No.	Variabel/ Construct	Dimensions/Sub Constructs	Question Items
1.	Math Achievement (X)	Compulsory Mathematics Report Card Score Semester 1	PM1
		Compulsory Mathematics Report Card Score Semester 2	PM2

		Advanced Mathematics Report Card Score Semester 1	PM3
		Advanced Mathematics Report Card Score Semester 2	PM4
2.	Learning Interest (M1)	Ketertarikan	Mi1
		Fun	Mi2, Mi3
		Exploration	Mi4
		Preferences	Mi5, Mi6
		Independence	Mi7, Mi8
3.	Learning Motivation (M2)	Understanding	Mo1, Mo2
		Efforts	Mo3, Mo4
		Target	Mo5, Mo6
		Focus	Mo7
		Self-efficacy	Mo8
4.	Advanced Study Plan (Y)	Clarity of purpose	RSL1
		Academic relevance	RSL2
		Intention to study	RSL3
		Stability of choice	RSL4

Data analysis was carried out using SmartPLS 4 software. The analysis stage includes the evaluation of the measurement model (*outer model*) to test the validity and reliability of the construct, as well as the evaluation of the structural model (*inner model*) to test the relationship between variables. The criteria used in the evaluation of the measurement model included *an outer loading* value of ≥ 0.70 , *an Average Variance Extracted (AVE)* of > 0.50 , and *a value of Composite Reliability and Cronbach's Alpha* ≥ 0.70 . Furthermore, hypothesis testing was carried out using a *bootstrapping* technique with a significance level of 5%.

Gambar 1 Model Penelitian



C. Results and Discussion

Evaluation of the measurement model was carried out to assess the validity and reliability of the constructs used in the research. Based on the results of the PLS-SEM analysis, several indicators with loading factor values below 0.70 were eliminated. After this process, all indicators used have an outer loading value above 0.70, thus meeting the convergence validity criteria.

The *Average Variance Extracted (AVE)* value for each construct is also above the minimum limit of 0.50. This shows that the construct is able to explain more than 50% of the variance of its indicators. In addition, *Cronbach's Alpha* and *Composite Reliability* values for the entire construct were above 0.70, which indicates that the research instrument has good internal consistency and reliability.

Table 2 AVE Values, Cronbach's Alpha, and Composite Reliability

Construct	AVE	Cronbach's Alpha	Composite Reliability
Interest in Learning	0,608	0,840	0,886
Learning Motivation	0,655	0,824	0,883
Math Achievement	0,865	0,948	0,962
Further Study Plan	0,640	0,812	0,876

Based on Table 2, all constructs have an AVE value above 0.50 and a reliability value above 0.70. This shows that the construct is able to adequately explain the variance of its indicators and has good internal consistency. Thus, the measurement model is considered feasible to continue at the structural model evaluation stage.

Discriminant validity was tested using the *Heterotrait–Monotrait Ratio* (HTMT) value. The results of the analysis show that the entire HTMT value is below 0.85, so it can be concluded that each construct has a clear difference and there is no problem of discriminant validity.

Structural model evaluation was carried out to assess the ability of exogenous variables to explain endogenous variables. The value of the determination coefficient (R^2) is used as the basis for the assessment. The results of the R^2 analysis for each endogenous variable are presented in the following table.

Tabel 3 Nilai R-Square

Variable endogenous	R^2
Interest in Learning	0,404
Learning Motivation	0,160
Further Study Plan	0,413

Based on Table 3, Mathematics Achievement was able to explain the variation in Learning Interest by 40.4% and Learning Motivation by 16%. Meanwhile, the variables of the Advanced Study Plan can be explained by 41.3% by Mathematics Achievement, Learning Interest, and Learning Motivation. This value is classified as a moderate category, so the structural model has quite good predictive capabilities.

Furthermore, the effect size (f^2) is used to see the magnitude of the contribution of each exogenous variable to the endogenous variable. The results of the f^2 analysis are presented in the following table.

Table 4 Value Effect Size (f^2)

Variable Relationships	f^2	Category
Math Performance → Learning Interest	0,677	Large
Math Achievement → Learning Motivation	0,190	Medium
Study Motivation → Further Study Plan	0,304	Medium
Mathematics Achievement → Further Study Plan	0,093	Small-Medium
Interest in Learning → Further Study Plan	0,002	Very Small

Based on Table 4, Mathematics Achievement has a major influence on Learning Interest and moderate influence on Learning Motivation. Learning Motivation has a moderate influence on the Further Study Plan, while Learning Interest shows a very small influence on the Further Study Plan.

Hypothesis testing was carried out using the *bootstrapping technique* to determine the significance of the influence between variables. The results of the hypothesis test are presented in the following table.

Table 5 Hypothesis Test Results

Hubungan	Coefficin (β)	p-value	Remarks
Interest in Learning → Further Study Plan	-0,048	0,713	Insignifikan
Study Motivation → Further Study Plan	0,489	0,000	Signifikan
Math Performance → Learning Interest	0,635	0,000	Signifikan



Math Achievement → Learning Motivation	0,400	0,000	Signifikan
Mathematics Achievement → Further Study Plan	0,306	0,018	Signifikan

Based on Table 5, the results of the analysis show that mathematics achievement has a positive and significant effect on students' learning interests, learning motivation, and further study plans. In addition, learning motivation also has a positive and significant effect on further study plans. In contrast, learning interest does not show a significant influence on a student's further study plan.

The results of the structural analysis showed that mathematics achievement had a positive and significant effect on students' interest in learning. These findings indicate that students with better academic achievement in mathematics tend to have a higher interest in learning mathematics. Success in completing math tasks and obtaining good grades provides a positive learning experience, thus fostering a sense of fun and active involvement of students in the learning process. This condition is in line with the findings of Syaputra (2019) who stated that the success of learning mathematics is related to increasing students' interest in learning. Thus, mathematical achievement not only reflects cognitive achievement, but also serves as a reinforcement of students' interest in learning psychologically.

In addition to affecting learning interests, mathematics achievement has also been shown to have a positive and significant effect on students' learning motivation. These findings show that academic success in mathematics is able to increase students' internal drive to study harder and maintain their academic performance. Students who experience learning success tend to have higher confidence and clearer learning goals, so they are motivated to keep striving for better results. These findings are in line with research by Ugi et al. (2023) who showed that learning motivation has a significant relationship with students' mathematics learning achievement. Thus, mathematics achievement plays an important role in building sustainable learning motivation.

The results of further research showed that learning motivation had a positive and significant effect on students' further study plans. These findings indicate that students with high learning motivation tend to have a clearer educational orientation and more mature readiness in planning for the continuation of their studies to a higher level. Learning motivation encourages students to set long-term goals, consider their academic abilities, and assess the relevance of continuing education to their future aspirations. These findings reinforce the view that learning motivation is an internal factor that plays an important role in determining students' academic decisions (Winurini, 2021). Thus, learning motivation can be seen as a key factor that bridges the current learning experience with future educational planning.

Mathematics achievement has also been shown to have a direct and significant effect on students' further study plans, although with a smaller influence than learning motivation. These findings show that academic achievement remains an important consideration for students in determining the continuation of education, especially as an indicator of academic readiness to face the demands of higher education. Students with good math scores tend to have greater confidence in their ability to continue their studies, especially in areas of study that require logical and analytical thinking skills. These results are in line with research (Fitri & Baskoro, 2025) which concludes that learning achievement contributes to students' readiness and stability in determining further study choices. These findings confirm that mathematical achievement serves as a rational basis for students' further education decision-making.

In contrast to other variables, learning interest did not show a significant influence on students' further study plans. These findings indicate that students' interest in learning mathematics does not necessarily directly influence long-term decisions regarding further education. Learning interests tend to be situational and focus on current learning experiences, so their influence on further study planning is limited if it is not accompanied by strong motivation and adequate academic achievement. These results are in line with the findings (Winurini, 2021) which states that future educational orientation is more influenced by motivation and perception of one's abilities than mere interest in learning. Thus, learning interests need to be supported by other internal factors in order to make a real contribution to further education planning.

Overall, the results of this study show that learning motivation plays a role as a partial mediating variable in the relationship between mathematics achievement and students' further study plans. Good math achievement can increase learning motivation, which further strengthens students' readiness to plan further studies. These findings confirm that improving the quality of mathematics learning should not only focus on achieving cognitive learning outcomes, but also on strengthening students' motivation to learn. The practical implications of this study suggest that mathematics teachers need to design learning experiences that provide a successful



learning experience, positive feedback, and meaningful challenges so that students have strong motivation and more mature continuing education planning.

D. Conclusions and Suggestions

Based on the results of the analysis using the PLS-SEM method, it can be concluded that mathematics achievement has an important role in shaping students' learning interests, learning motivation, and further study plans. Mathematics achievement has been shown to have a positive and significant effect on learning interest and learning motivation, which shows that good academic achievement is able to encourage students' interest and internal drive in the learning process.

In addition, mathematics achievement also has a direct effect on students' further study plans. These findings indicate that students with better math achievement tend to have higher readiness and inclination to continue their education to the next level.

Learning motivation has proven to be the most influential factor on students' further study plans. This shows that internal motivation has a more dominant role than learning interest in determining students' decisions to continue their education. Students who have high learning motivation tend to have clearer educational goals and more mature planning for further study.

Conversely, interest in learning does not have a significant effect on students' further study plans. These findings suggest that students' interest in learning mathematics does not necessarily directly influence their decisions in planning further study, without being supported by adequate motivation and academic achievement.

Overall, the results of this study confirm that improving mathematics achievement and student learning motivation are key factors in encouraging further study planning. Therefore, efforts to improve the quality of mathematics learning should not only focus on achieving learning outcomes, but also on strengthening students' learning motivation.

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