



# Learning Interest as a Predictor of Mathematics Achievement among Indonesian Junior High School Students

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## Abstract

Programme for International Student Assessment (PISA) reported that many countries, including Indonesia, have not yet reached the expected levels of mathematics proficiency, highlighting the importance of examining internal factors such as students' learning interest. This study aims to examine students' learning interest and how it relates to and predicts their mathematics achievement. This quantitative correlational study involved 65 randomly selected seventh-grade students from SMPN 160 East Jakarta, Indonesia. Learning interest was measured using a validated 20-item questionnaire, and mathematics achievement was obtained from mid-semester test scores. Data were analyzed using descriptive statistics, Spearman's correlation, and rank-based and multiple regression analyses in SPSS 27. The results showed that students generally had moderate levels of learning interest ( $M = 3.65$ ) and mathematics achievement ( $M = 78.94$ ). Learning interest was positively related to mathematics achievement ( $r = 0.64$ ) and significantly predicted students' mathematics performance ( $R^2 = 0.52$ ), with persistence ( $p = 0.03$ ) and attention ( $p = 0.04$ ) being the strongest predictors. In conclusion, students' persistence and attention are key factors in mathematics achievement, indicating that sustained focus and perseverance play a central role in improving mathematics performance.

**Keywords:** learning interest; mathematics achievement; junior high students

## Abstrak

Programme for International Student Assessment (PISA) melaporkan bahwa banyak negara, termasuk Indonesia, belum mencapai tingkat kemampuan matematika yang diharapkan, menunjukkan pentingnya mengkaji faktor internal siswa, seperti minat belajar. Penelitian ini bertujuan untuk menelaah minat belajar siswa dan hubungannya dengan prestasi matematika serta kemampuannya dalam memprediksi prestasi tersebut. Penelitian korelasional kuantitatif ini melibatkan 65 siswa kelas VII SMPN 160 Jakarta Timur yang dipilih secara acak. Minat belajar diukur menggunakan kuesioner 20 item yang telah tervalidasi, sedangkan prestasi matematika diperoleh dari nilai tes tengah semester. Data dianalisis menggunakan statistik deskriptif, korelasi Spearman, serta regresi berbasis peringkat dan regresi berganda dengan SPSS 27. Hasil penelitian menunjukkan bahwa siswa secara umum memiliki tingkat minat belajar ( $M = 3.65$ ) dan prestasi matematika ( $M = 78.94$ ) yang sedang. Minat belajar memiliki hubungan positif dengan prestasi matematika ( $r = 0.64$ ) dan secara signifikan memprediksi kinerja matematika siswa ( $R^2 = 0.52$ ), dengan ketekunan ( $p = 0.03$ ) dan perhatian ( $p = 0.04$ ) menjadi prediktor terkuat. Kesimpulannya, ketekunan dan perhatian siswa merupakan faktor utama

dalam pencapaian matematika, menunjukkan bahwa fokus dan ketekunan yang berkelanjutan berperan penting dalam meningkatkan prestasi matematika.

**Kata Kunci:** minat belajar; prestasi belajar matematika; siswa sekolah menengah pertama

## 1. INTRODUCTION

Mathematics achievement at the school level is widely recognized as a key indicator of students' academic success and future educational opportunities across countries. Strong mathematics competence supports logical reasoning, problem solving, and participation in science, technology, engineering, and mathematics (STEM) fields (Kotsis, 2025; Nitzan-Tamar & Kohen, 2022), which are essential for global competitiveness in the twenty-first century. However, international assessments such as PISA show that many students worldwide still fail to reach expected levels of mathematics proficiency, indicating a persistent gap between curriculum goals and actual learning outcomes (Kandeel, 2021; Kusmaryono & Kusumaningsih, 2023; Pritchett & Viarengo, 2021; Wang et al., 2023). This situation suggests that traditional teaching approaches alone are not sufficient and that greater attention should be given to internal learner factors that influence how students engage with mathematics (Geary, 2022; Khanal, 2022; Ngunjiri, 2022). Among these factors, learning interest has been widely identified as a crucial driver of engagement, persistence, and effort, as it shapes students' willingness to participate actively, maintain attention during complex problem solving, and continue learning despite difficulties (Harefa, 2023; Nusantara et al., 2025). Therefore, understanding the role of learning interest is essential for explaining differences in students' mathematics performance and for designing more effective educational interventions.

In Indonesia, this global challenge is also evident at the junior high school level, where mathematics achievement remains a critical indicator of students' academic success, yet many students continue to struggle despite ongoing instructional efforts, highlighting a inconsistency between curriculum expectations and actual performance (Aisyah & Juandi, 2022; Utomo & Santoso, 2021). In response to this issue, the Indonesian government introduced *Asesmen Kompetensi Minimum* (AKM) as a national assessment policy aimed at strengthening numeracy and mathematics achievement across schools (Tim Substansi Asesmen Akademik, 2023). Assessment of student numeration literacy levels based on the 2021 National Assessment Data indicated that the average numeracy scores of students, both at the education level and at the provincial level in Indonesia, remain in the lower-middle category (Safari & Khasanah, 2023), suggesting that structural reforms and assessment policies alone may not fully address the underlying determinants of mathematics achievement. At the classroom level, achievement is influenced not only by curriculum and assessment systems but also by students' internal learning factors (Anggraeni et al., 2024). Among these factors, learning interest plays a central role because it affects students' willingness to invest effort and sustain engagement in a learning process (Liu, 2022).

Learning interest, defined as students' tendency to engage, enjoy, and persist in learning activities, plays a critical role in mathematics achievement (Kariimah & Auliya Fatikhah, 2024; Karlina et al., 2019). According to Hidi & Renninger's (2006) *Four-Phase Model of Interest Development*, interest progresses from situational engagement to a well-developed individual interest, fostering sustained attention and deeper cognitive processing. *Expectancy-Value Theory* (Eccles & Wigfield, 2020) suggests that students are more likely to invest effort and achieve higher outcomes when they value a subject and perceive it as personally meaningful. In addition, *Self-Regulated Learning Theory* (Zimmerman, 2002) emphasizes that students who actively regulate their attention, persistence, and participation are more likely to achieve better learning outcomes. Together, these theories indicate that learning interest not only motivates engagement but also strengthens cognitive and behavioral strategies, ultimately enhancing mathematics achievement. These theoretical perspectives further suggest that learning interest may function not only as a related factor but also as a predictor of academic success, particularly when examined across its specific dimensions.

Empirical evidence indicates that students' learning interest is positively associated with mathematics achievement, yet most existing studies rely primarily on correlational designs and do not examine predictive relationships in depth (Harefa, 2023; Ili et al., 2021; Pebriani et al., 2024; Wahid et al., 2025). Students with higher academic interest tend to achieve better outcomes, even after controlling for cognitive ability, suggesting that learning interest makes a unique contribution to mathematics performance (Asanre et al., 2024; Asare et al., 2023; Park & Han, 2023; Wahid et al., 2025). In Indonesia, similar findings have been reported among junior high school students, where learning interest shows a positive correlation with mathematics achievement (Arigiyati et al., 2023; Asri et al., 2021; Pahanael et al., 2024; Wijaya et al., 2022). However, these studies provide limited insight into how specific dimensions of learning interest contribute to achievement. Furthermore, inconsistent findings have also been reported, indicating that higher interest does not always result in higher performance, highlighting the complex nature of this relationship (C. Du et al., 2021; Fosu et al., 2023; Lehtikoinen et al., 2025; Leyva et al., 2022; Scalise et al., 2025).

These limitations reveal several important research gaps. First, the predictive role of learning interest and its dimensions remains insufficiently examined, particularly through regression-based approaches. Second, although learning interest is recognized as a multidimensional construct—including persistence, attention, motivation, and participation (Wahyuni & Ariyanto, 2024; Zakaria, 2024)—limited research has analyzed the relative contribution of each dimension to mathematics achievement. Third, few studies have applied an integrated analytical framework that combines descriptive, correlational, and predictive analyses within a single study, especially in the Indonesian junior high school context. Unlike previous Indonesian studies that mainly rely on correlational analysis, this study applies regression-based prediction to examine the

predictive role of learning interest and its dimensions. Moreover, this study evaluates the relative contribution of each dimension, providing more precise evidence at the dimension level. Furthermore, this study integrates descriptive, correlational, and predictive analyses within a single analytical framework to offer a more systematic and comprehensive explanation of how learning interest influences mathematics achievement.

Building on these gaps, this study aims to examine junior high school students' learning interest and its role in predicting mathematics achievement in Indonesia. Accordingly, the study addresses the following research questions: (1) To what extent do students demonstrate learning interest and mathematics achievement? (2) Is there a significant relationship between learning interest, its dimensions, and mathematics achievement? and (3) To what extent do learning interest and its dimensions predict mathematics achievement? By addressing these questions, this study contributes to the literature in several ways. Theoretically, it contributes to the global literature by providing empirical evidence that learning interest operates as a multidimensional predictor of mathematics achievement. Methodologically, it offers an integrated and replicable analytical framework for examining motivational variables in education. Practically, the findings provide useful insights for educators and policymakers to develop strategies that strengthen students' interest, engagement, and persistence in mathematics learning, particularly in the Indonesian junior high school context.

## 2. RESEARCH METHOD

This study adopted a quantitative correlational design to examine how students' learning interest relates to their mathematics achievement. From population of 189 seventh-grade students at SMPN 160 East Jakarta, Indonesia, 65 students who had completed a one-semester mathematics course and submitted complete data were selected using simple random sampling, as this technique provides researchers with an opportunity to select participants for their study randomly without a bias (Noor & Tajik, 2022). Ethical approval was obtained from the school administration and mathematics teacher prior to data collection.

The independent variable, students' learning interest, was measured using a 20-item, five-point Likert-scale questionnaire (never to always) covering persistence in learning, attention, motivation to learn, participation and effort to succeed. Its construct validity was examined using Pearson item-total correlations ( $r = 0.29-0.69$ ), and reliability was estimated with Cronbach's alpha ( $\alpha = 0.81$ ). The dependent variable, mathematics achievement, was obtained from scores of mid-tests aligned with the taught syllabus and developed as part of the standard curriculum.

Descriptive statistics were used to answer research question one that summarizes students' learning interest, its dimensions and mathematics achievement, with the

former categorized into low (1.50–3.15), medium (3.20–3.85), and high (3.90–5.00) levels and the latter classified into low (57–70), medium (73–83), and high (87–97) categories. As most variables were non-normally distributed as indicated in *Kolmogorov-Smirnov test*, *Spearman's rank-order correlation* ( $\rho$ ) was used to address research question two, and non-parametric rank-based regression for research question three. Multiple regression was further conducted to examine the relative contribution of each learning interest dimension, as it is relatively robust to violations of normality when assumptions are evaluated at the residual level and the analysis focuses on prediction (Schmidt & Finan, 2018). All analyses were performed using SPSS version 27.

### 3. RESULTS AND DISCUSSION

#### 3.1. Results

This section presents the findings of the study regarding junior high school students' learning interest, mathematics achievement, and the predictive role of learning interest on their performance. The results are organized into three main subsections in the order of the research questions, aiming to provide a clear and systematic understanding of the study's outcomes.

##### 3.1.1. Levels of Students' Learning Interest and Mathematics Achievement

To provide a detailed overview of students' learning interest and mathematics achievement, descriptive statistics for overall scores and each dimension are presented in Table 1, highlighting the central tendencies, variability, and level of engagement among the participants. The table also includes results of the normality test, which serve as the basis for selecting appropriate statistical analyses in the subsequent subsections.

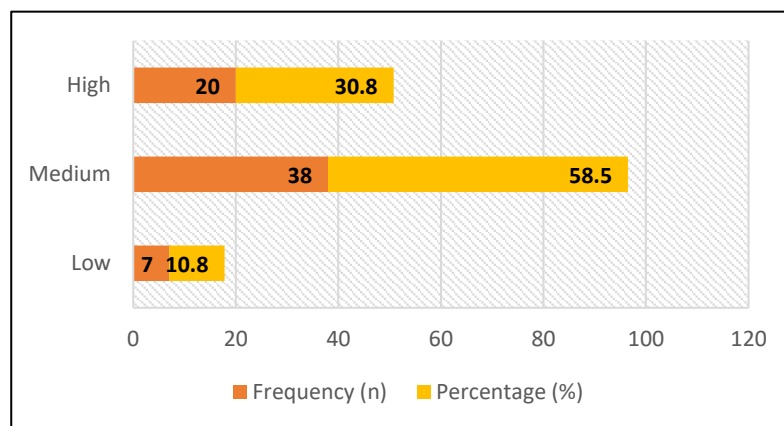
**Table 1.** Descriptive Statistics of Learning Interest and Mathematics Achievement

Variables	M	SD	Level	K-S p-value
Overall learning interest	3.65	0.43	Medium	0.20
Persistence in learning	3.44	0.44	Medium	0.00
Attention	3.52	0.58	Medium	0.05
Motivation to learn	3.56	0.54	Medium	0.03
Participation	4.21	0.52	High	0.00
Effort to succeed	3.52	0.72	Medium	0.00
Mathematics achievement	78.94	9.56	Medium	0.00

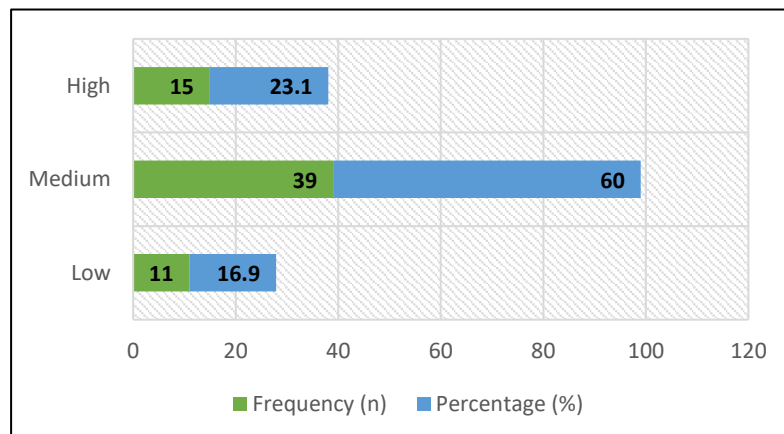
Table 1 shows that students' learning interest ( $M = 3.65$ ,  $SD = 0.43$ ) and mathematics achievement ( $M = 78.94$ ,  $SD = 9.56$ ) were both at medium levels. Figure 1 illustrates the distribution of learning interest, revealing that 7 students (10.8%) fell into the low category, 38 students (58.5%) were classified as medium, and 20 students (30.8%) were placed at a high level. Further analysis of the specific dimensions of learning interest revealed that the majority of students fell within the medium range: persistence in learning ( $M = 3.44$ ,  $SD = 0.44$ ), attention ( $M = 3.52$ ,  $SD = 0.58$ ), motivation to learn ( $M =$

3.56, SD = 0.54), and effort to succeed (M = 3.52, SD = 0.72). Only participation was notably high (M = 4.21, SD = 0.52), indicating that students were particularly active in engaging with learning activities, while other dimensions reflected moderate commitment and involvement.

Moreover, Figure 2 depicts the distribution of mathematics achievement, with 11 students (16.9%) identified as low achievers, 39 students (60.0%) ranked as medium achievers, and 15 students (23.1%) demonstrated high achievement. Overall, these findings suggest that the majority of students exhibited medium levels of both learning interest and mathematics achievement, while only a smaller proportion showed either low or high levels, reflecting a relatively balanced distribution across the sample.



**Figure 1.** The Distribution of Overall Learning Interest



**Figure 2.** The Distribution of Mathematics Achievement

### 3.1.2. Correlation between Learning Interest and Mathematics Outcomes

Building on the descriptive findings of students' learning interest and mathematics achievement, the next step was to examine the relationships between these variables. Correlation analysis provides insight into how overall learning interest and its specific dimensions are associated with students' mathematics outcomes, allowing a deeper understanding of which aspects of engagement may be most relevant to academic performance. The results of this analysis are presented in Table 2.

**Table 2.** Correlation Matrix between Learning Interest and Mathematics Achievement

Variables	1	2	3	4	5	6	7
1. Overall learning interest	1						
2. Persistence in learning	0.77	1					
3. Attention	0.85	0.57	1				
4. Motivation to learn	0.76	0.46	0.54	1			
5. Participation	0.82	0.57	0.59	0.59	1		
6. Effort to succeed	0.70	0.50	0.57	0.44	0.48	1	
7. Mathematics achievement	0.64	0.59	0.53	0.49	0.60	0.35	1

Table 2 presents *Spearman correlation* matrix between overall learning interest, its dimensions, and mathematics achievement. Overall learning interest was strongly correlated with its components: persistence in learning ( $\rho = 0.77$ ,  $p = 0.001$ ), attention ( $\rho = 0.85$ ,  $p = 0.001$ ), motivation to learn ( $\rho = 0.76$ ,  $p = 0.001$ ), participation ( $\rho = 0.82$ ,  $p = 0.001$ ), and effort to succeed ( $\rho = 0.70$ ,  $p = 0.001$ ). This indicates that students with higher overall learning interest tended to score higher across all dimensions of learning engagement.

Regarding the relationship with mathematics achievement, overall learning interest showed a positive correlation ( $\rho = 0.64$ ,  $p = 0.001$ ). Among its dimensions, persistence in learning ( $\rho = 0.59$ ,  $p = 0.001$ ) and participation ( $\rho = 0.60$ ,  $p = 0.001$ ) were moderately associated with mathematics achievement, while attention ( $\rho = 0.53$ ,  $p = 0.001$ ) and motivation to learn ( $\rho = 0.49$ ,  $p = 0.001$ ) were slightly lower, and effort to succeed exhibited the weakest correlation ( $\rho = 0.35$ ,  $p = 0.004$ ). These results suggest that both overall learning interest and specific engagement aspects contribute to students' mathematics performance, with persistence and participation appearing particularly influential.

### 3.1.3. Predictive Role of Learning Interest on Mathematics Achievement

To extend the analysis beyond correlations, a rank-based regression was first conducted, followed by multiple regression to identify which aspects of engagement most directly contribute to academic performance. The results of this analysis are presented in Table 3.

**Table 3.** Multiple Regression for Predicting Mathematics Achievement by Learning Interest

Model	Unstandardized coefficients		Standard coefficients	F	R	R <sup>2</sup>	t	p
	B	SE	$\beta$					
Constant	17.83	7.86					2.27	0.03
Persistence in learning	6.00	2.60	0.28	12.98	0.72	0.52	2.31	0.03
Attention	2.11	2.09	0.13				1.01	0.04
Motivation to learn	4.58	2.25	0.26				2.03	0.32
Participation	4.19	2.28	0.23				1.84	0.07
Effort to succeed	-0.26	1.51	-0.02				-0.17	0.86

As presented in Table 3, multiple regression analysis demonstrated that learning interest and its dimensions jointly provided a statistically significant prediction of mathematics achievement ( $F = 12.98$ ,  $R = 0.72$ ,  $R^2 = 0.52$ ). This indicates that approximately 52% of the variance in students' mathematics achievement was explained by the combined effects of persistence, attention, motivation to learn, participation, and effort to succeed, reflecting a substantial predictive capacity of learning interest in the model. Practically, this  $R^2$  value suggests a moderately strong effect, indicating that fostering students' learning interest can meaningfully improve mathematics performance in educational settings.

At the dimension level, persistence in learning emerged as a significant predictor of mathematics achievement ( $B = 6.00$ ,  $\beta = 0.28$ ,  $p = 0.03$ ), indicating that students who showed higher persistence tended to achieve higher mathematics scores. Attention also made a statistically significant contribution ( $B = 2.11$ ,  $\beta = 0.13$ ,  $p = 0.04$ ), suggesting that greater attentiveness during learning was associated with better achievement. In contrast, motivation to learn ( $p = 0.32$ ), participation ( $p = 0.07$ ), and effort to succeed ( $p = 0.86$ ) did not significantly predict mathematics achievement, with its negative coefficient likely reflecting overlap with other variables, not a true negative effect. These findings indicate that the predictive power of learning interest mainly comes from students' persistence and attentional engagement rather than by their overall motivation, participation, or general effort.

### 3.2. DISCUSSION

This study investigated junior high school students' learning interest and its predictive role in mathematics achievement. The findings revealed that most students demonstrated moderate levels of both overall learning interest and mathematics achievement, with active participation being the only dimension rated as high. In addition, the results indicated a positive relationship between learning interest and its dimensions with mathematics achievement, where persistence and participation exerted the strongest influence. Regarding predictive capacity, learning interest was found to significantly predict students' mathematics achievement, with persistence and attention emerging as the most influential predictors, while motivation, participation, and effort showed no significant direct effects. These findings provide a comprehensive overview of the

students' learning interest profile and its impact on academic performance in mathematics, establishing a foundation for the subsequent interpretation and theoretical discussion.

The moderate levels of overall learning interest suggest that students are generally engaged in mathematics learning, yet many remain in the early phase of interest, which Hidi and Renninger's (2006) *Four-Phase Model* describes as situational engagement. At this stage, students' involvement is often triggered by external classroom structures rather than by a well-developed individual interest. Within this framework, the finding that active participation was the only high-rated dimension does not necessarily contradict its non-significant predictive effect on achievement. Instead, it suggests that the observed participation may reflect situationally stimulated behavioral engagement rather than well-developed individual interest. This inconsistency may be related to classroom structures that emphasize teacher-centered instruction and procedural task completion which can increase observable participation but do not necessarily foster sustained cognitive processing or independent problem-solving (Sparapani et al., 2023), skills more closely linked to persistence and attention. It may also reflect the cultural characteristics of Indonesian junior high school classrooms in which students' participation is strongly shaped by expectations of obedience (Maulida et al., 2025), respect for authority (Pratama & Mukhlis, 2024), and adherence to classroom norms (Wanti & Darmawan, 2024). Students are frequently encouraged to respond to teachers' questions and complete assigned tasks as part of maintaining classroom order and demonstrating respect (Maulida et al., 2025). As a result, participation may reflect behavioral compliance rather than deep cognitive engagement, which helps explain why it is descriptively high but does not necessarily translate into higher academic achievement.

The reported positive relationships between learning interest and mathematics achievement can be explained through the lens of *Expectancy-Value Theory* (Eccles & Wigfield, 2020), which posits that students are more likely to invest effort and achieve higher outcomes when they perceive a subject as valuable and personally meaningful. This suggests that students who value mathematics are more likely to engage persistently, resulting in better performance. In addition, the strong predictive role of persistence and attention supports *Self-Regulated Learning Theory* (Zimmerman, 2002), emphasizing that students who actively regulate their focus, effort, and participation are more likely to achieve higher learning outcomes, emphasizing the strong predictive role of persistence and attention. While motivation, participation, and effort may not directly predict achievement, they likely contribute indirectly by supporting self-regulated learning behaviors, reinforcing the central importance of persistence and attention. Furthermore, the assessment system plays a key role, as mathematics performance is often measured through summative written examinations that prioritize accuracy,

sustained concentration, and procedural consistency, making attentional control and persistence especially critical for success.

The findings of this study are generally consistent with previous research highlighting the importance of persistence and attention in academic achievement. For example, Wheeler and Cabigas (2024) reported that students who maintain effort and focus are more likely to achieve higher results in mathematics, and Maamin et al. (2021) found that active engagement supports better performance, which aligns with the strong predictive role of persistence and attention observed in the present study. However, some earlier studies suggest that motivation (Abiodun et al., 2025; Tran & Nguyen, 2021), participation (W. Du et al., 2025), and effort directly influence performance (Wawan & Retnawati, 2022; Xu et al., 2021; You et al., 2021), contrasting with the present results, where these factors did not demonstrate a significant direct effect. This discrepancy may be attributed to differences in study context, sample characteristics, or the way these dimensions interact with learning behaviors. Overall, these comparisons indicate that while engagement and motivation remain important, the ability to sustain attention and persistence appears to play a more central role in determining mathematics achievement among junior high school students.

An analysis of the specific dimensions of learning interest indicates that persistence and attention are the most influential factors in predicting mathematics achievement, while motivation, participation, and effort do not show significant direct effects. These results are consistent with previous studies demonstrating that sustained focus and continuous effort contribute more strongly to academic performance than other dimensions of engagement (Estévez et al., 2021; Jian, 2022; Smith et al., 2023). The lack of direct influence from motivation, participation, and effort may reflect their indirect role in supporting behaviors such as persistence and attention, which in turn enhance achievement (How et al., 2024; Purmadhani et al., 2024; Sattar et al., 2022; Suharnadi et al., 2024; Sumpter et al., 2025). These findings suggest that interventions aiming to improve mathematics performance should prioritize strategies that strengthen students' persistence and attentional control, while also recognizing the supportive, though indirect, contribution of other engagement dimensions.

These findings offer important implications for both theory and practice. From a theoretical perspective, the study shows that the regulatory dimensions of learning interest, especially persistence and attention, act as key links between students' interest and their mathematics achievement, while motivation and participation may play more indirect roles. The results indicate that some components may have a more direct effect on performance, while others contribute in a more supportive way within the overall engagement process. This perspective encourages a more careful and differentiated understanding of how learning interest operates in academic contexts. From a practical perspective, the findings imply that schools should not rely only on visible classroom

engagement as an indicator of learning quality. Instead, instructional planning and student support programs should place stronger emphasis on developing stable learning habits and deeper cognitive involvement over time. By treating sustained engagement as a core learning skill, educational practices may support more consistent improvement in mathematics achievement.

#### 4. CONCLUSION

This study examined how Indonesian junior high school students' interest in learning mathematics is related to their performance by focusing on persistence, attention, motivation, participation, and effort. The results showed that most students demonstrated moderate levels of both learning interest and mathematics achievement, with active participation being the highest-rated dimension. Persistence and attention were identified as the most important factors influencing mathematics performance, while motivation, participation, and effort did not directly affect outcomes, indicating that students' ability to stay focused and persist in learning plays a more critical role in academic success than other components of learning interest. This study contributes to the literature by identifying which specific dimensions of learning interest most strongly influence mathematics achievement.

Importantly, these findings reinforce *Self-Regulated Learning Theory* by emphasizing the importance of attention regulation and sustained effort and align with *Expectancy-Value Theory* in highlighting the role of meaningful engagement in supporting achievement. However, limited by a small sample from a single school, the study's generalizability is constrained, pointing to the need for future research with larger and more diverse populations. Overall, this research underscores the importance of fostering students' focus, perseverance, and sustained engagement and offers practical guidance for educators to design targeted interventions in mathematics learning, with the novelty lying in the detailed analysis of individual learning interest dimensions and their differential impact on achievement.

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#### 6. RECOMMENDATIONS

Based on these findings, mathematics teachers are encouraged to use learning activities that help students stay focused and keep trying, such as breaking problems into clear steps, giving short and focused practice sessions, and providing regular feedback when students face difficulties. Teachers can also ask students to set simple learning goals and use progress notes or checklists to help them monitor their own learning and persistence,

while schools may support this effort through extra practice sessions or small-group guidance for students who struggle to maintain attention. For future research, scholars are encouraged to explore classroom-based interventions that directly train students' attention and persistence, particularly through experimental or longitudinal designs that implement specific strategies such as goal-setting training, self-monitoring checklists, or structured focused-practice sessions over a defined period, compare the effectiveness of these strategies in supporting sustained engagement, and examine their causal effects on mathematics achievement across different grade levels and learning contexts.

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