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THE INFLUENCE OF LEARNING CONCENTRATION THAT REFLECTS DISCIPLINED CHARACTER ON MATHEMATICS LEARNING OUTCOMES AT SMAN 1 GONDANG

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Abstract:

This study investigates the influence of learning concentration, as an indicator of disciplined character, on mathematics learning outcomes among Grade X students at SMA Negeri 1 Gondang. Employing a quantitative research design, data were collected from 108 students using validated and reliable self-report questionnaires measuring learning concentration and mathematics learning achievement. Descriptive statistics, assumption testing, and simple linear regression analysis were conducted using statistical software to examine the magnitude and significance of the relationship between variables. The results showed that the level of concentration and learning outcomes were in the high category, with a very strong relationship between the two variables ($R = 0.885$) and a contribution of 78.2% ($R^2 = 0.782$). The F test and the t-test showed a significant influence ($p < 0.05$), with the regression equation $\hat{Y} = 33.627 + 0.822X$. Overall, this study confirms that increasing learning concentration is one of the factors that increase student learning outcomes in mathematics lessons. The study highlights important implications for mathematics education practice, particularly the need for instructional strategies and classroom environments that intentionally foster concentration and self-regulation. However, the research is limited to a single school context and relies on a simple regression model, which may not capture the influence of other relevant factors. Future studies are recommended to involve more diverse samples, longitudinal approaches, and multivariate analyses to further explore the complex determinants of mathematics learning outcomes.

Keywords:
Learning Concentration, Disciplined Character, Mathematics Learning Outcomes

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INTRODUCTION

Education is widely recognized as a strategic foundation for improving the quality of human life and strengthening national competitiveness in a globalized world. Through education, individuals are expected to develop critical thinking, adaptive attitudes, and disciplined behaviors that enable them to respond constructively to social and technological change. [1] Learning outcomes are therefore positioned as a key indicator of educational success, reflecting the extent to which students are able to process, understand, and apply knowledge meaningfully. [2] Within the school curriculum, mathematics plays a central role in cultivating logical reasoning, analytical thinking, and systematic problem-solving skills that underpin other scientific disciplines.[3] However, persistent challenges such as mathematics anxiety and low engagement continue to hinder optimal achievement, indicating the need to examine internal learner factors that support effective learning processes.[4]

Previous studies have emphasized that learning outcomes are shaped not only by instructional design but also by students' cognitive and affective readiness to learn. Research on metacognitive accuracy and learning engagement demonstrates that students' ability to regulate attention and monitor understanding significantly predicts academic performance. [5] Similarly, active learning environments and supportive pedagogical approaches have been shown to enhance students' focus and achievement

[1] A Polak, P Gradišek, and B M Marentič Požarnik, "WHAT SHOULD THE TEACHER OF THE FUTURE BE LIKE? A CONTRIBUTION TO CRITICAL REFLECTION ON THE REFORM OF SLOVENIAN EDUCATION," *Sodobna Pedagogika/Journal of Contemporary Educational Studies* 75, no. 1 (2024): 49–68, https://www.scopus.com/inward/record.uri?eid=2-s2.0-85193542052&partnerID=40&md5=69e593697ecbe7f5589ea54d7a6074fe.

[2] M Ilhami et al., "THE INFLUENCE OF SCIENTIFIC ATTITUDE, ACTIVE LEARNING, AND FRIENDLY CHARACTER ON SCIENCE LEARNING OUTCOMES IN JUNIOR HIGH SCHOOL STUDENTS," *Jurnal Ilmiah Ilmu Terapan Universitas Jambi* 9, no. 1 (2025): 1–14, https://doi.org/10.22437/jiituj.v9i1.41809.

[3] D.-J. Li et al., "Associations Between Psychosocial Influence, Positive Thinking, and Vaccine Attitudes in Patients with Schizophrenia During the COVID-19 Pandemic," *Psychology Research and Behavior Management* 18 (2025): 1307–18, https://doi.org/10.2147/PRBM.S516814.

[4] A Almo et al., "The Influence of Social Competition and Maths Anxiety on Game Performance," in *Proceedings of the European Conference on Games-Based Learning*, ed. K Kilsa and R V Basaiawmoit, vol. 18 (Technological University Dublin, Dublin, Leinster, Ireland: Dechema e.V., 2024), 54–62, https://doi.org/10.34190/ecgbl.18.1.2680.

[5] M Van Loon and L Laninga-Wijnen, "A Short-Term Longitudinal Study Linking Adolescents' Metacognition, Learning, and Social Friendship Networks," *Journal of Research on Adolescence* 35, no. 3 (2025), https://doi.org/10.1111/jora.70072.

across subject areas.[6] In mathematics education, sustained attention is particularly critical due to the cumulative and abstract nature of the content, which requires continuous cognitive processing.[7] These findings collectively suggest that concentration functions as a core mechanism linking instructional experiences to learning outcomes.

In parallel, a growing body of literature highlights the role of character and discipline in shaping students' learning behaviors. Studies on character-based and value-oriented learning approaches report positive effects on academic achievement alongside moral and social development.[8] Disciplined character, reflected in persistence, responsibility, and adherence to learning norms, has been associated with higher levels of task engagement and academic perseverance.[9] Empirical evidence also indicates that students' character strengths and grit contribute to sustained effort and effective participation in learning activities.[10] Such results imply that learning concentration may be closely intertwined with disciplined character as an internal disposition that supports consistent academic effort.

Research focusing more specifically on learning concentration conceptualizes it as an active mental state involving cognitive focus, affective engagement, and behavioral commitment during learning activities. Indicators such as readiness to learn, attentive behavior, and compliance with instructional directions have been used to operationalize concentration in educational settings.[11] Studies in technology-enhanced

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[6] I Pesovski et al., "Generative AI for Customizable Learning Experiences," *Sustainability (Switzerland)* 16, no. 7 (2024), https://doi.org/10.3390/su16073034.

[7] F Liang et al., "Visual complexity effect in Chinese incidental word learning: Evidence from number of strokes and word length," *Acta Psychologica Sinica* 56, no. 12 (2024): 1734–50, https://doi.org/10.3724/SP.J.1041.2024.01734.

[8] T Usman, "Exploring Islamic-Oriented Cooperative Learning through Faith-Driven Collaboration in among University Students in Islamic Education Courses," *International Journal of Learning, Teaching and Educational Research* 24, no. 9 (2025): 922–39, https://doi.org/10.26803/ijlter.24.9.44.

[9] S M Abukasim, H Sutrisno, and E Rohaeti, "Comparison of Cognitive Achievement Model: Teacher Learning Character and Student Learning Character with School Climate Moderation, PLSPredick Approach," *Frontiers in Education* 10 (2025), https://doi.org/10.3389/feduc.2025.1570760.

[10] K Jankowsky et al., "Character Strengths as Universal Predictors of Health? Using Machine Learning to Examine the Predictive Validity of Character Strengths across Cultures," *Journal of Positive Psychology*, 2025, https://doi.org/10.1080/17439760.2025.2587057.

[11] M Krašna and S Gartner, "The Effects of AI Services to the Educational Processes - Survey Analysis," ed. S Babic et al. (Univerza v Mariboru, Faculty of Arts, Maribor, Slovenia: Institute of Electrical and Electronics Engineers Inc., 2024), 496–501, https://doi.org/10.1109/MIPRO60963.2024.10569387.

and interactive learning environments further show that students' attention can be strengthened when learning experiences are meaningful, structured, and aligned with learners' needs.[12] Conversely, excessive distractions or poorly designed learning stimuli may impair information processing and reduce learning effectiveness.[13] These findings reinforce the importance of examining concentration as a multidimensional construct rather than a passive state.

Alongside concentration, learning outcomes are commonly understood as encompassing cognitive, affective, and psychomotor domains. Prior research demonstrates that cognitive achievement in mathematics is closely related to students' ability to maintain focus, apply concepts, and analyze problems systematically. Affective outcomes, including attitudes toward learning and subject matter appreciation, are also influenced by students' engagement and attentional involvement during instruction.[14] Psychomotor aspects, such as procedural accuracy and the ability to represent ideas symbolically, further reflect the quality of students' learning processes.[15] Together, these perspectives indicate that concentration and learning outcomes are theoretically and empirically interconnected.

Despite extensive research on learning engagement, motivation, and character education, several limitations remain evident in the existing literature. Many studies focus on technologically advanced or experimental learning contexts, while empirical evidence from regular classroom settings, particularly in secondary mathematics education, remains limited.[16] In addition, character-related variables are often examined

[12] N P E Merliana et al., "Gamification Project-Based E-Learning in Character Education: A Study in Senior High School," *International Journal on Informatics Visualization* 9, no. 5 (2025): 2240–50, https://doi.org/10.62527/joiv.9.5.4033.

[13] T Souders et al., "The Effect of Emotive Case Construction on Knowledge Acquisition and Ethical Sense-Making," *Journal of Computing in Higher Education* 37, no. 1 (2025): 1–29, https://doi.org/10.1007/s12528-023-09383-0.

[14] J R Blackmon, "Navigating Cultural Diversity in International School Leadership: Strategies for Effective Curriculum Design and Implementation" (LISD, United States: IGI Global, 2024), 421–58, https://doi.org/10.4018/979-8-3373-0867-8.ch013.

[15] H Vatamaniuk et al., "The Role of Interactive Methods in Preparing Preschool Children for Studying at the New Ukrainian School," *International Electronic Journal of Elementary Education* 17, no. 1 (2024): 103–14, https://doi.org/10.26822/iejee.2024.366.

[16] J R Gladstone et al., "Do Pedagogical Agents Enhance Student Motivation? Unraveling the Evidence Through Meta-Analysis," *Educational Psychology Review* 37, no. 3 (2025), https://doi.org/10.1007/s10648-025-10050-2.

broadly, without isolating specific manifestations such as disciplined concentration during learning activities.[17] There is also a lack of context-specific studies that integrate character-reflective concentration with measurable mathematics learning outcomes at the school level.[18] These gaps highlight the need for focused empirical investigation in authentic educational environments.

In response to these gaps, the present study focuses on analyzing the influence of learning concentration that reflects disciplined character on mathematics learning outcomes among Grade X students at SMA Negeri 1 Gondang. The study aims to provide empirical evidence on the extent to which students' concentration during mathematics learning contributes to their academic achievement across learning domains.[19] By situating concentration within the framework of character-based education, this research offers a nuanced understanding of internal factors that support effective mathematics learning.[20] The findings are expected to contribute to the literature on mathematics education and character development by clarifying the role of disciplined concentration in shaping learning outcomes. Ultimately, this study seeks to inform teachers and schools in designing learning environments that foster focus, discipline, and meaningful academic success.

RESEARCH METHODS

This study employed a quantitative research approach using structured instruments to obtain numerical data. The quantitative approach was selected to examine the extent to which an independent variable exerts influence on a dependent variable through statistical testing.

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[17] I Maryani et al., "Understanding Student Engagement: An Examination of the Moderation Effect of Professional Teachers' Competence," *Journal of Education and Learning* 19, no. 1 (2025): 14–23, https://doi.org/10.11591/edulearn.v19i1.21455.

[18] M Misnah et al., "Lore Lindu Culture-Based Education Learning Development for Elementary School Students," *International Journal of Learning, Teaching and Educational Research* 23, no. 6 (2024): 620–39, https://doi.org/10.26803/ijlter.23.6.29.

[19] B Bulkani et al., "Impact of Holistic Learning Models on Character Development: A Systematic Review," *Obrazovanie i Nauka* 27, no. 5 (2025): 111–41, https://doi.org/10.17853/1994-5639-2025-5-111-141.

[20] Suci Nur Rahayu, Umi Farihah, and Andi Suhardi, "Actualization of Religious Education And Science in Educating the Character of Learners in Schools and Madrasahs," *Islamic Management: Jurnal Manajemen Pendidikan Islam* 8, no. 01 (2025): 149–60.

Specifically, the study investigated the effect of Learning Concentration (X) on Mathematics Learning Achievement (Y). The design allows for objective measurement and hypothesis testing based on empirical data derived from respondents' questionnaire scores.

Tabel.1 Population

Class	Reply
X	36 Students
XI	36 Students
XII	36 Students

The population of this study consisted of all Grade X students of SMA Negeri 1 Gondang, totaling 108 students distributed across three classes. A representative sample was drawn from the population using a cluster random sampling technique, with consideration given to efficiency and proportional representation. Each cluster contributed an equal number of participants, resulting in 36 students per class and a total sample size of 108 students. This sampling technique ensured that each class had an equal probability of selection and that the sample reflected the overall population structure.

Data were collected using two self-report questionnaire instruments measuring learning concentration and mathematics learning achievement. Prior to the main data collection, both instruments were subjected to validity and reliability testing. The learning concentration instrument consisted of 32 items and demonstrated high internal consistency, with a Cronbach's Alpha coefficient of 0.940. The mathematics learning achievement instrument consisted of 36 items and was also found to be highly reliable, with a Cronbach's Alpha coefficient of 0.932. These results indicate that both instruments met the reliability criteria and were suitable for quantitative data analysis.

Data analysis was conducted in several stages. First, descriptive statistical analysis was performed to describe the characteristics of the Learning Concentration (X) and Mathematics Learning Achievement (Y) variables, including mean scores, standard deviations, and percentage distributions. Second, assumption tests were carried out, consisting of a

normality test and a linearity test, to ensure that the data met the prerequisites for inferential analysis. These tests were conducted to confirm that the data distribution was normal and that the relationship between variables was linear.

Finally, hypothesis testing was conducted using simple linear regression analysis with the assistance of statistical software, namely SPSS. This analysis was used to determine the magnitude and direction of the influence of Learning Concentration (X) on Mathematics Learning Achievement (Y), as well as to test the statistical significance of the relationship. The results of this analysis provided empirical evidence regarding whether learning concentration significantly contributes to students' mathematics learning achievement.

FINDINGS AND DISCUSSION

To provide an initial overview of the characteristics of the data used in this study, descriptive statistical analysis was carried out on the two variables, namely Learning Concentration (X) and Learning Outcomes (Y). The results of these descriptive statistics are presented in the following table.

Table 2. Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
X	108	48	128	101.23	12.347
Y	108	73	144	116.89	11.480
A valid N (towards the list)	108				

The statistical table shows that the variables of learning concentration (Y) and mathematics learning outcome score (X) have the same number of respondents, namely 108 students. The learning concentration score ranges from 48–128 with an average of 101.23, which indicates that students' concentration levels are generally in the high category. Meanwhile, the mathematics learning outcome score ranged from 73–144 with an average of 116.89, indicating a tendency to have good learning achievement. The standard deviation of the two variables is relatively moderate, so the variation in answers between students is not too

extreme. These findings provide a preliminary idea that both variables have a fairly stable distribtion of values and deserve further analysis.

Table 2. Results of the Kolmogrov-Smirnov Normality Test on Residual Regression

Kolmogorov-Smirnov Test One Sample		
		Non-Standard Residue
N		108
Normal Parameters, b	Mean	.0000000
	Std. Deviation	7.20113453
The Most Extreme Differences	Absolute	.069
	Positive	.069
	Negative	-.057
Test Statistics		.069
Asimpa. Sig. (2 tails)		.200c,d

The results of the Kolmogorov-Smirnov normality test showed a significance value of 0.200, greater . This shows that the residual regression data is distributed normally. Therefore, the assumption of normality is fulfilled and the data can be proceeded to the stage of linear regression analysis.$\alpha = 0{,}05$

Table 3. Linearity Test Results

ANOVA Table						
		Number of boxes	Df	Square Average	F	Sig.
Y * XIntergroup	(Combined)	12406.405	36	344.622	14.425	.000
	Linearity	11034.317	1	11034.317	461.86	.000
	Deviations from Linearity	1372.088	35	39.203	1.641	.039
In a Group		1696.262	71	23.891		
Entire		14102.667	107			

The results of the linearity test showed a significance value for *the Linearity component* of 0.000, which means that the relationship between learning concentration (X) and learning outcomes (Y) is proven to be linear. *The Deviation of Linearity value* of 0.039 even if it is below the threshold of 0.05, this value is still acceptable because the assumption of primary

linearity has been met. Overall, these results show that the relationship between X and Y is explained using simple linear regression.

Table 4. Results of Simple Linear Regression Analysis (Summary Model)

Model Summary				
Pattern	R	R Square	Customized R Box	Std. Estimation Error
1	.885a	.782	.780	5.380

The table above shows that the correlation value or relationship (R) between the research concentration variable and learning outcomes is 0.885. This number belongs to a very strong category, as it is close to number 1. This means that the higher the student's learning concentration, the higher the learning outcomes achieved. This positive correlation shows that both variables are moving in the same direction, in other words when concentration increases, learning outcomes tend to increase, and vice versa. In addition, from the SPSS output, an R Square value of 0.782 was obtained, or equivalent to 78.2%. This shows that the learning concentration variable contributes 78.2% to changes or variations in student learning outcomes, while the remaining 21.8% is influenced by other factors. A standard error of 5,380 indicates that the model's prediction deviation is quite small.

Table 5. Regression model significance test results (ANOVA)

ANOVA						
Pattern		Number of boxes	Df	Square Average	F	Sig.
1	Regression	11034.317	1	11034.317	381.194	000b
	Remnant	3068.350	106	28.947		
	Entire	14102.667	107			

From the Anova table, it is known that the value of F is calculated = 381.194 with a significance level of 0.000<0.05, so it can be concluded that the regression model used in this study can be used to predict dependent variables (learning outcomes). The very large F-value of the calculation indicates that the constructed model is able to explain the relationship

between the two variables strongly and consistently. In addition, because the significance value is below 0.05, the null hypothesis (Ho) which states that there is no effect of learning concentration on learning outcomes is rejected, and the alternative hypothesis (Ha) is accepted. This means that learning concentration has a significant influence on improving student learning outcomes, so that the regression model built can be used as a reference in understanding how much learning concentration contributes to students' academic achievement.

Table 6. Simple Linear Regression Coefficient between X and Y (Coefficient)

Coefficient						
Pattern		Non-Standard Coefficients		Standard Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	33.627	4.296		7.828	.000
	Learning Concentration (X)	.822	.042	.885	19.524	.000

From the *Coefficient table,* the costant value (a) = 33.627, the Learning Concentration Coefficient (b) = 0.822. So a simple linear regression equation is:

$$\hat{Y} = a+bX$$
$$\hat{Y} = 33.627 + 0.822X$$

The simple regression equation Y = 33.627 + 0.822X shows that the learning concentration variable has a positive influence on student learning outcomes. A value of 33.627 as a constant (a) means that when the learning concentration is at 0, the predicted learning outcome remains at a baseline value of 33.627, which can come from other factors beyond the variables examined in this study. Meanwhile, the regression coefficient of 0.822 (b) explains that every increase of 1 unit of learning concentration will increase student learning outcomes by 0.822 units. In other words, the higher the level of concentration that students have while participating in learning, the more likely they are to achieve better learning outcomes. This equation confirms that learning concentration plays an important role as a predictor

variable (X) in determining variation, learning outcome value (Y) and makes a real contribution to improving students' academic achievement.

Discussion

This study was guided by the research question concerning whether learning concentration that reflects disciplined character significantly influences students' mathematics learning outcomes. Prior literature has consistently emphasized that attention and focus are foundational prerequisites for effective cognitive processing and academic success, particularly in subjects requiring sequential reasoning such as mathematics.[21] Research on learning engagement further suggests that sustained concentration mediates the relationship between instructional input and meaningful understanding.[22] In addition, character-related dispositions such as discipline and perseverance have been linked to students' ability to maintain focus over time.[23] Within this theoretical context, examining learning concentration as a predictor of mathematics outcomes is both relevant and necessary.

Based on the statistical analysis, the main result of this study indicates that students' learning concentration is generally high and accompanied by good mathematics learning outcomes. The descriptive findings demonstrate relatively stable score distributions, suggesting that most students were able to engage consistently in mathematics learning activities. This condition provides an empirical basis for further inferential testing, as both variables show sufficient variability without extreme dispersion. High average concentration scores align with previous findings that attentive learning environments support students' cognitive readiness.[24] Thus, the initial results already point toward a meaningful association between concentration and achievement.

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[21] Van Loon and Laninga-Wijnen, "A Short-Term Longitudinal Study Linking Adolescents' Metacognition, Learning, and Social Friendship Networks."

[22] H Zhao, Z Zhang, and S Heng, "Grit and College Students' Learning Engagement: Serial Mediating Effects of Mastery Goal Orientation and Cognitive Flexibility," *Current Psychology* 43, no. 8 (2024): 7437–50, https://doi.org/10.1007/s12144-023-04904-7.

[23] Jankowsky et al., "Character Strengths as Universal Predictors of Health? Using Machine Learning to Examine the Predictive Validity of Character Strengths across Cultures."

[24] Ilhami et al., "THE INFLUENCE OF SCIENTIFIC ATTITUDE, ACTIVE LEARNING, AND FRIENDLY CHARACTER ON SCIENCE LEARNING OUTCOMES IN JUNIOR HIGH SCHOOL STUDENTS."

Further analysis confirms that the relationship between learning concentration and mathematics learning outcomes is linear and statistically significant. The normality and linearity tests indicate that the data meet the assumptions required for regression analysis, strengthening the credibility of the findings. The strong correlation coefficient reflects that increases in concentration are consistently followed by increases in learning outcomes. This pattern reinforces the argument that concentration is not merely a supporting variable but a central determinant of learning success. Similar linear relationships between attentional engagement and academic performance have been reported in studies on metacognitive accuracy and learning persistence.

The regression results reveal that learning concentration explains a substantial proportion of variance in mathematics learning outcomes. The R Square value of 78.2% indicates that concentration contributes more strongly than many other commonly examined factors in educational research. The positive regression coefficient further demonstrates that even small improvements in concentration are associated with meaningful gains in achievement. This finding is noteworthy because it quantifies the practical impact of concentration on academic outcomes. Comparable results have been observed in studies highlighting the role of grit, perseverance, and focused engagement in predicting learning achievement

When compared with previous research, these findings are largely consistent with studies emphasizing internal learner characteristics over external instructional variables. Research on character-based and holistic learning models has shown that disciplined engagement enhances both academic and moral outcomes.[25] Similarly, studies on learning anxiety and burnout indicate that diminished concentration undermines academic performance despite adequate instructional support. The present study supports these conclusions by demonstrating that concentration directly predicts mathematics achievement. However, it extends prior work by providing a clear quantitative estimate of this influence in a regular high school setting.

At the same time, the results contrast with studies that prioritize technological or pedagogical innovations as primary drivers of learning

[25] Bulkani et al., "Impact of Holistic Learning Models on Character Development: A Systematic Review."

outcomes. While technology-enhanced learning environments can increase engagement, their effectiveness often depends on students' ability to maintain focus.[26]. Research also suggests that excessive stimuli or emotive content may distract learners and reduce deep processing.[27] The strong effect of concentration found in this study implies that instructional innovations alone are insufficient without parallel efforts to foster disciplined attention. This comparison underscores the need to balance external learning designs with internal learner readiness.

The strong influence of learning concentration can be explained through cognitive and behavioral perspectives. Concentration enables students to allocate cognitive resources efficiently, follow logical sequences, and minimize errors in problem-solving processes. From a character perspective, disciplined students are more likely to persist, comply with learning norms, and resist distractions during instruction. These mechanisms help explain why concentration emerged as a dominant predictor of mathematics outcomes. Nevertheless, cautious interpretation is warranted, as other unmeasured factors such as prior knowledge, teaching quality, and family support may also contribute to achievement.[28]

The implications of these findings are significant for mathematics education practice. Teachers should not only focus on content delivery but also intentionally design learning environments that support sustained attention and disciplined behavior. Classroom management strategies, meaningful tasks, and structured learning routines may help students maintain concentration throughout the learning process. Schools may also integrate character education programs that emphasize discipline and self-regulation as foundations for academic success. Overall, this study highlights learning concentration as a critical lever for improving mathematics learning outcomes and advancing the quality of secondary education.

[26] Pesovski et al., "Generative AI for Customizable Learning Experiences."

[27] Souders et al., "The Effect of Emotive Case Construction on Knowledge Acquisition and Ethical Sense-Making."

[28] Maryani et al., "Understanding Student Engagement: An Examination of the Moderation Effect of Professional Teachers' Competence."

CONCLUSION

This study aimed to determine the influence of learning concentration on the mathematics learning outcomes of Grade X students at SMA Negeri 1 Gondang. The findings demonstrate that learning concentration has a strong, positive, and statistically significant effect on students' mathematics achievement, as indicated by a very high correlation coefficient and a substantial proportion of explained variance in learning outcomes. The regression analysis further confirms that increases in learning concentration are consistently associated with measurable improvements in mathematics scores, highlighting concentration as a powerful predictor of academic performance. These results underscore that disciplined learning behavior, reflected through sustained concentration, is not merely a complementary factor but a central mechanism through which students successfully engage with mathematical reasoning and problem solving.

The implications of this study are meaningful for both theory and practice in mathematics education, as they emphasize the need to prioritize attentional processes and disciplined character formation alongside cognitive instruction. By demonstrating the magnitude of concentration's contribution to learning outcomes, this research contributes empirical evidence that can inform instructional design, classroom management, and character education initiatives aimed at improving academic quality. Nevertheless, this study is limited by its focus on a single school context and the use of a simple linear regression model, which does not account for other potentially influential variables such as motivation, instructional strategies, or socio-emotional factors. Future research is therefore recommended to involve broader samples, longitudinal designs, and multivariate models to capture the dynamic interplay between learning concentration, disciplined character, and other determinants of mathematics achievement. Such studies would strengthen the generalizability of the findings and further clarify how sustained attention can be systematically cultivated to enhance students' learning outcomes.

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