



The Effect of Improving Growth Mindset on High School Students' Literacy and Numeracy Abilities in The Independent Curriculum

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Abstrak

Penelitian ini dilatarbelakangi oleh pentingnya pengembangan growth mindset untuk mendukung kemampuan literasi dan numerasi siswa pada implementasi Kurikulum Merdeka. Penelitian bertujuan menganalisis pengaruh kepemilikan growth mindset, mendeskripsikan kondisi kemampuan literasi dan numerasi siswa SMA, serta menguji hubungan antara growth mindset dengan kedua kemampuan tersebut. Metode yang digunakan adalah penelitian kuantitatif dengan desain korelasional yang dilaksanakan di SMA Negeri 1 Perbaungan, SMA Negeri 1 Pegajahan, dan SMA Negeri 1 Sei Bamban. Instrumen penelitian berupa tes literasi dan numerasi serta angket growth mindset. Hasil penelitian menunjukkan rata-rata kemampuan literasi dan numerasi siswa di SMA Negeri 1 Perbaungan sebesar 74,26, SMA Negeri 1 Pegajahan sebesar 72,00, dan SMA Negeri 1 Sei Bamban sebesar 69,84. Secara umum, kemampuan siswa di SMA Negeri 1 Sei Bamban lebih rendah dibandingkan dua sekolah lainnya. Temuan penelitian menunjukkan bahwa growth mindset berhubungan dengan kemampuan literasi dan numerasi siswa, sehingga pengembangan pola pikir bertumbuh perlu menjadi perhatian dalam meningkatkan kualitas pembelajaran dan hasil belajar pada Kurikulum Merdeka.

Kata Kunci: Growth Mindset, Kemampuan Literasi dan Numerasi, Kurikulum Merdeka.

Abstract

This study was motivated by the importance of developing a growth mindset to support students' literacy and numeracy skills in the implementation of the Merdeka Curriculum. The objectives were to analyze the influence of growth mindset ownership, describe the condition of high school students' literacy and numeracy abilities, and examine the relationship between growth mindset and these skills. This quantitative study employed a correlational design and was conducted at SMA Negeri 1 Perbaungan, SMA Negeri 1 Pegajahan, and SMA Negeri 1 Sei Bamban. Data were collected through literacy and numeracy tests and a growth mindset questionnaire. The findings showed that the mean scores of literacy and numeracy skills were 74.26, 72.00, and 69.84, respectively. Overall, students at SMA Negeri 1 Sei Bamban demonstrated lower achievement than those in the other two schools. The results indicate that growth mindset is associated with students' literacy and numeracy abilities, highlighting the importance of fostering a growth mindset to improve learning quality and outcomes in the Merdeka Curriculum.

Keywords: Growth Mindset, Literacy and Numeracy Skills, Independent Curriculum

A. Introduction

The curriculum is the central component that directs all educational processes and plays a crucial role in developing human resources. Curriculum development in Indonesia must continuously adapt to societal changes and future educational needs (Natsir, 2016). In this context, the implementation of the Merdeka Curriculum emphasizes student-centered learning through differentiated instruction that accommodates students' characteristics, interests, and learning needs (Lestari, 2024; Azizah & Wardani, 2024). Nevertheless, several challenges remain, including changes in the mindset of educators and students as well as limitations in educational infrastructure (Caesaria et al., 2024; Datu et al., 2024). The researchers argue that these challenges are not merely technical issues but also involve students' readiness to develop adaptive attitudes and positive beliefs toward learning in a more autonomous educational environment (Sukaryo & Sari, 2024).

One of the main competencies promoted by the Merdeka Curriculum is literacy and numeracy. These competencies are essential for enabling students to understand information, solve problems, and make logical decisions in everyday life (Wulandari et al., 2024). However, empirical evidence indicates that Indonesian students' literacy and numeracy achievements remain relatively low (Fachrudi et al., 2024). The results of the Programme for International Student Assessment (PISA) in 2018 showed that Indonesian students obtained a mathematics literacy score of 379, which was considerably below the international average of 500 (OECD, 2017). Similarly, the 2023 National Assessment (AKM) report revealed that senior high school students' numeracy performance was still categorized as poor (Fanggidae et al., 2024). These findings highlight the need for comprehensive efforts to improve students' competencies through both instructional innovation and the strengthening of internal learner characteristics (Amidi, 2024).

From the researchers' perspective, literacy and numeracy achievement is influenced not only by cognitive factors but also by affective dimensions. One important affective factor is growth mindset, which refers to the belief that intelligence and abilities can be developed through effort, learning experiences, and persistence (Fachrudi et al., 2024). Students with a growth mindset tend to view challenges as opportunities for growth, demonstrate resilience in overcoming difficulties, and perceive failure as part of the learning process (Nabilah et al., 2023). In contrast, individuals with a fixed mindset believe that intelligence is innate and unchangeable, making them more vulnerable to giving up when facing obstacles (Anggraeni, 2024). Therefore, fostering a growth mindset is considered essential for supporting students' literacy and numeracy development within the implementation of the Merdeka Curriculum (Nabilah et al., 2023).

Previous studies have consistently reported a positive relationship between growth mindset and students' academic achievement (Anggraeni, 2024). Fajriyah (2022) found that growth mindset contributes to mathematics learning outcomes through dimensions such as persistence, effort, and willingness to face challenges (Fajriyah, 2022). Similarly, Wijaya (2023) and Kusworo et al. (2024) demonstrated that students with stronger growth mindset tendencies generally exhibit better literacy and numeracy skills. Nevertheless, most previous studies focused on specific educational levels or single-school settings and did not comprehensively describe students' literacy and numeracy conditions across multiple senior high schools implementing the Merdeka Curriculum (Dari' et al., 2023). Moreover, limited research has simultaneously examined literacy and numeracy achievement while positioning growth mindset as an important affective factor influencing these competencies (Sari & Setiawan, 2023).

The novelty of this study lies in its integrated approach to mapping literacy and numeracy abilities among students from three senior high schools implementing the Merdeka Curriculum while empirically examining the relationship between growth mindset and these competencies (Kusworo et al., 2024). This

study not only provides a comparative description of students' literacy and numeracy performance but also emphasizes the importance of growth mindset as a psychological factor that supports successful learning outcomes in contemporary curriculum implementation (Wijaya, 2023).

Based on these considerations, this study aims to analyze the influence of growth mindset ownership, describe the condition of senior high school students' literacy and numeracy abilities in the implementation of the Merdeka Curriculum, and empirically examine the relationship between growth mindset and students' literacy and numeracy skills in Serdang Bedagai Regency.

B. Research Method

This study employed a quantitative approach with a correlational research design to investigate the relationship between students' growth mindset and their literacy and numeracy abilities within the implementation of the Merdeka Curriculum. The research was conducted at SMA Negeri 1 Perbaungan, SMA Negeri 1 Pegajahan, and SMA Negeri 1 Sei Bamban in Serdang Bedagai Regency during the 2024/2025 academic year. The population consisted of all tenth-grade students from the three schools, including eight classes at SMA Negeri 1 Perbaungan, six classes at SMA Negeri 1 Pegajahan, and five classes at SMA Negeri 1 Sei Bamban. The sample comprised 100 students selected proportionally from the three schools to ensure adequate representation of each institution.

Data collection employed both test and non-test techniques. The test instrument consisted of six literacy and numeracy questions designed to assess students' abilities to interpret information, apply mathematical concepts, and solve contextual problems. The non-test instrument was a growth mindset questionnaire used to identify students' beliefs regarding the development of intelligence and abilities through effort, learning, and experience. The questionnaire covered several dimensions of growth mindset, including persistence, willingness to face challenges, learning effort, responses to feedback, and appreciation of others' achievements.

The research procedure was conducted in four stages. First, a preliminary study was carried out to identify research needs and coordinate with the participating schools. Second, the literacy and numeracy tests and the growth mindset questionnaire were prepared and validated before implementation. Third, data collection was conducted through the administration of the tests and questionnaires to the selected students. Finally, the collected data were coded, tabulated, and analyzed to examine the relationship between growth mindset and students' literacy and numeracy abilities.

Data analysis involved both descriptive and inferential statistics. Descriptive statistical analysis was used to determine the minimum score, maximum score, mean, and standard deviation of students' literacy and numeracy abilities in each school. Inferential analysis employed the Spearman rank correlation test to examine the relationship between growth mindset and literacy and numeracy abilities because the data were ordinal and did not fully satisfy the assumptions required for parametric correlation analysis. The significance level was set at 0.05, and all statistical analyses were performed using SPSS software.

C. Result and Discussion

Literacy and numeracy ability tests were given to all research samples in Senior High Schools in Serdang Bedagai Regency. After processing the data from the literacy and numeracy ability tests, which consisted of 10 questions, the lowest score (X_{min}), highest score (X_{maks}), average score ($X_{rata-rata}$) and standard deviation (s) were obtained as shown in Table 1 below:

Table 1. Results of the Literacy and Numeracy Ability Test for Senior High Schools in Serdang Bedagai Regency

SMA Negeri	$X_{\min}$	$X_{\max}$	$X_{\text{rata-rata}}$	S
1 Perbaungan	52,00	86,00	74,26	6,91
1 Pegajahan	51,00	86,00	72,00	6,94
1 Sei Bamban	51,00	79,00	69,84	6,90

Based on the results of processing the literacy and numeracy ability test data given to all research samples at SMA Negeri Sedang Bedagai Regency, very valuable information was obtained regarding the lowest score ($X_{\min}$), highest score ($X_{\max}$), average score ($\bar{X}$), and standard deviation (s) from each school. This data not only provides an overview of the level of students' literacy and numeracy abilities, but can also be an important indicator in evaluating the effectiveness of the curriculum implemented, especially the Merdeka Curriculum, which emphasizes the development of student character.

At SMA Negeri 1 Perbaungan, the lowest score was 52.00, while the highest was 86.00. The average literacy and numeracy skills at this school were 74.26 with a standard deviation of 6.91. These figures indicate that in general students at SMA Negeri 1 Perbaungan have quite good literacy and numeracy skills. The relatively moderate distribution of scores indicates that the majority of students are in a range of scores that are not too far from the average, reflecting effective teaching and good support from teachers. For example, students who are able to achieve high scores may have received additional tutoring or have good study habits, such as reading regularly or practicing numeracy problems outside of school hours.

Meanwhile, in SMA Negeri 1 Pegajahan, the lowest score was 51.00 and the highest score was the same as in Perbaungan, which was 86.00. However, the average score obtained was slightly lower than Perbaungan, which was 72.00 with a standard deviation of 6.94. Although the range of scores was the same, the average achievement level of students in Pegajahan indicates that there are certain factors that influence learning outcomes. For example, there may be differences in teaching methods or parental involvement in the student's learning process that can explain this difference. This emphasizes the importance of the role of external support in facilitating literacy and numeracy skills.

Meanwhile, in SMA Negeri 1 Sei Bamban, the minimum score was also recorded at 51.00, but the maximum score was lower than the other two schools, which was 79.00. The average score of students at this school was 69.84 with a standard deviation of 6.90. These data indicate that in general, the literacy and numeracy skills of students at SMA Negeri 1 Sei Bamban are at a lower level than the other two schools in the sample. Although the level of distribution of scores between students is almost the same, the fact that the maximum score is lower indicates that there are greater challenges in achieving the expected standard of ability. For example, environmental factors, such as limited access to learning resources, can be a barrier for students at this school to reach their full potential.

Thus, of the three schools studied, SMA Negeri 1 Perbaungan showed the highest average achievement in the literacy and numeracy ability test, followed by SMA Negeri 1 Pegajahan, and the lowest was SMA Negeri 1 Sei Bamban. These findings not only provide information about students' academic achievement, but can also be used as a consideration in efforts to improve the quality of literacy and numeracy-based learning in the region. Emphasis on developing a growth mindset among students can be one strategy to improve their learning outcomes. By teaching students to believe that their abilities can develop through effort and perseverance, it is hoped that they will be more motivated to learn and try hard in facing academic challenges. The following table 2 is the result of the normality test of the data from the literacy and numeracy ability tests of senior high school students in Serdang

Bedagai Regency. The normality test was conducted to determine whether the literacy and numeracy test data were normally distributed, which is one of the assumptions for applying parametric statistical tests. Based on the Kolmogorov–Smirnov and Shapiro–Wilk tests, the significance value was 0.000 ($p < 0.05$). This result indicates that the literacy and numeracy test data were not normally distributed. Therefore, subsequent data analysis should consider using appropriate non-parametric statistical tests or parametric tests if justified by the large sample size and other statistical assumptions.

Table 2 .Data Normality Test Results for Literacy and Numeracy Ability Test Results

	Tests of Normality					
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Keseluruhan	.159	313	.000	.934	313	.000
a. Lilliefors Significance Correction						

Based on the output of descriptive analysis and normality test of students' literacy and numeracy test results, some important information was obtained. Descriptively, the overall mean value is 72.016 with a standard deviation of 7.107, indicating a relatively moderate distribution of values. The median value is 74.00, which is higher than the average, indicating a slightly left-skewed data distribution. This is also reinforced by the skewness value of -0.826, which indicates the data is skewed to the left. The kurtosis value of 0.435 indicates that the data distribution tends to approach a normal distribution (mesokurtic), although not perfect. The range of values is 35, with a minimum score of 51.00 and a maximum of 86.00, indicating a fairly wide variation among students' scores. Meanwhile, the interquartile range value of 8.00 indicates that the data distribution in the middle of the distribution is quite dense. However, based on the results of the normality test, both with the Kolmogorov-Smirnov and Shapiro-Wilk tests, the significance value (Sig.) was obtained at 0.000 each, which is smaller than the significance level of 0.05. This indicates that the data is not normally distributed statistically significant. The growth mindset questionnaire was also given to all research samples in Senior High Schools of Serdang Bedagai Regency. After processing the questionnaire data, which consisted of 21 positive statements, clear information was obtained as in Table 3.

Table 3. Results of the Growth Mindset Questionnaire for Senior High Schools in Serdang Bedagai Regency

SMA Negeri	$X_{\min}$	$X_{\max}$	$X_{\text{rata-rata}}$	S
1 Perbaungan	48	93	74,53	11,34
1 Pegajahan	48	90	71,67	11,42
1 Sei Bamban	48	90	71,91	11,21

Based on the results of the questionnaire data processing aimed at measuring the growth mindset of students from all State Senior High Schools in Serdang Bedagai Regency, there is very valuable information related to students' growth mindset in the context of education. This questionnaire consists of 21 statements that are carefully designed to cover various aspects of the growth mindset, with all statements having positive values. The main purpose of this measurement is to assess the extent to which students are able to develop a growth-oriented mindset in their learning process.

At SMA Negeri 1 Perbaungan, students showed encouraging results. The minimum score obtained was 48, while the maximum score reached 93. The average growth mindset score of students at this school was 74.53, with a standard deviation of 11.34. These figures indicate that most students at SMA Negeri 1 Perbaungan tend to have a good growth mindset, although there is quite high variation between individuals. For example, students with high scores may show an active attitude in seeking challenges

and are not afraid to face failure, while students with lower scores may still be trapped in a fixed mindset that limits their abilities.

In contrast, in SMA Negeri 1 Pegajahan, although the minimum score was also recorded at 48, the maximum score of students was slightly lower, at 90. The average score of students in this school was 71.67, with a standard deviation of 11.42. This shows that in general, the level of growth mindset of students in Pegajahan is slightly lower compared to Perbaungan. However, it is important to note that the level of variation between students is almost the same, indicating that although the average is lower, there are students in Pegajahan who also show a strong growth mindset. A real example can be seen in students who, despite facing difficulties in certain subjects, still try to learn and seek help, showing resilience and a desire to grow.

In SMA Negeri 1 Sei Bamban, the minimum score recorded was also 48, with a maximum score of 90. The average score of students was 71.91, and the standard deviation was 11.21. This finding indicates that the growth mindset level of students in Sei Bamban is in the middle between the other two schools. With a slightly tighter distribution of scores, this indicates that the majority of students have a fairly uniform mindset. For example, if we look at students who are active in extracurricular activities, they may be more open to new experiences and challenges, which contributes to the development of their growth mindset.

Overall, all three schools showed good average scores in terms of growth mindset, although there was still significant variation among students in each school. This finding is very important because it can be used as a basis for designing more effective interventions or learning programs. By paying attention to the characteristics of the distribution of scores and average achievement in each school, educators can develop more targeted strategies to support strengthening students' growth mindsets. For example, mentoring or training programs designed to help students overcome their fear of failure and encourage them to see challenges as opportunities for learning can be very beneficial.

Next, a normality test will be carried out which plays a role in evaluating data quality and providing a basis for transforming data if necessary, so that the distribution approaches normal. The following is table 4.4 which is the result of the normality test of the data from the growth mindset questionnaire of high school students in Serdang Bedagai Regency.

Table 4. Results of the Normality Test of Student Growth Mindset Questionnaire Data

Tests of Normality						
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Stati			Stati		
	stic	df	Sig.	stic	df	Sig.
Total	.103	313	.000	.955	313	.000

Based on the results of descriptive analysis and normality test of growth mindset questionnaire data given to senior high school students in Serdang Bedagai Regency, in-depth statistical information was obtained. The overall mean score was 72.72 with a standard error of 0.638, and a median value of 73.00, indicating that the data distribution tended to be symmetrical. The minimum and maximum values were 48.00 and 93.00, respectively, with a range of 45.00. The standard deviation value was 11.29 and the variance was 127.515, indicating a fairly large distribution of scores among respondents. The skewness value of -0.246 indicated a slight skew to the left (negative), while the kurtosis value of -0.865 indicated that the data distribution was slightly flatter than the normal distribution (platykurtic), but still within reasonable limits.

Table 5. Test of Homogeneity of Variances

<i>Levene Statistic</i>	<i>df1</i>	<i>df2</i>	<i>Sig.</i>
1.247	1	311	.265

Homogeneity of Variance Test. Levene's Test produced a significance value of **0.265**, which is greater than 0.05. Therefore, the variances of the two groups are homogeneous, indicating that the assumption of homogeneity of variance has been satisfied.

However, the results of the normality test indicate that the data are not statistically normally distributed. This can be seen from the significance values in the Kolmogorov-Smirnov (Sig. = 0.000) and Shapiro-Wilk (Sig. = 0.000) tests, both of which are below the significance limit of 0.05. This means that statistically, the data distribution is not normal, although visually the mean, median, and skewness values do not show extreme deviations. Therefore, in further analysis that requires the assumption of data normality, such as parametric tests, further considerations need to be made, for example by transforming the data or choosing alternative non-parametric analysis methods. This finding is important as a basis for selecting valid and appropriate analysis techniques.

Table 6. Research Data Linearity Test Results

			Sum of		Mean		
			Squares	df	Square	F	Sig.
GM	* Between	(Combined)	7706.391	33	233.527	2.034	.001
LiterasiNumerasi	Groups	Linearity	3081.269	1	3081.269	26.839	.000
		Deviation from	4625.122	32	144.535	1.259	.167
		Linearity					
	Within Groups		31916.057	278	114.806		
	Total		39622.449	311			

Based on the results of the linearity test of the relationship between growth mindset (GM) and literacy and numeracy skills, several important pieces of information were obtained that can be used to determine whether the regression analysis can be carried out validly. From the ANOVA table, the significance value (Sig.) in the Linearity row is 0.000, which means <0.05 . This shows that the relationship between growth mindset and literacy-numeracy skills is significantly linear, so the linear regression model can be applied. Meanwhile, the significance value in the Deviation from Linearity row is 0.167, which is greater than 0.05. This indicates that there is no significant deviation from linearity, so the relationship between the two does follow a linear pattern.

Furthermore, in the Measures of Association section, the correlation value (R) of 0.279 indicates a weak positive relationship between growth mindset and literacy-numeracy skills. The R Squared value of 0.078 indicates that around 7.8% of the variation in literacy and numeracy skills can be explained by growth mindset. Although this value is relatively low, it is still statistically significant. The Eta value of 0.441 indicates a moderate relationship, while the Eta Squared of 0.194 implies that around 19.4% of the variation in literacy and numeracy scores can be associated with the growth mindset score category if the data is considered categorical data. Overall, the results of this linearity test provide support that the relationship between growth mindset and literacy-numeracy skills is linear and significant, so that a simple linear regression analysis model or further inferential analysis can be validly applied. The

following is Table 6 which is the result of a simple regression test to answer the first research problem formulation

Table 7. Simple Regression Test Results

Coefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	t
		B	Std. Er	Beta	
1	(Constant)	40.781	6.1		6.488
	LiterasiNumerasi	.444	.087	.279	5.113
a. Dependent Variable: GM					

Based on the results of a simple linear regression test conducted to analyze the relationship between literacy and numeracy skills (predictor variables) and growth mindset (dependent variable), statistically significant information was obtained. This study aims to understand more deeply how these two basic skills can influence students' mindsets, especially in the context of the independent curriculum implemented in Serdang Bedagai Regency. From the Model Summary table, the correlation coefficient (R) value of 0.279 indicates a weak positive relationship between literacy-numeracy skills and growth mindset. This figure, although relatively low, indicates that there is a relationship, although not too strong.

In this context, literacy and numeracy can be understood as intellectual foundations that support the development of students' mindsets. For example, a student who has good literacy skills tends to be better able to understand and analyze information, which in turn can influence the way they think and respond to challenges. The R Square value of 0.078 means that 7.8% of the variation in growth mindset can be explained by literacy and numeracy skills. This shows that although there is an influence, most of the factors that influence growth mindset are outside this model, which is around 92.2%. This opens up space for further exploration of other factors that can contribute to the development of growth mindset, such as the learning environment, social support, and students' personal experiences.

Based on the output of the Coefficients table from the simple linear regression analysis, it was found that the literacy and numeracy variables have a positive and significant influence on students' growth mindset. This is indicated by the regression coefficient value (B) of 0.444 with a significance value (Sig.) Of 0.000, which is smaller than 0.05. This means that every one-point increase in the literacy and numeracy score will increase the student's growth mindset score by 0.444 points. Thus, it can be concluded that the higher the students' literacy and numeracy abilities, the higher the tendency for students to have a growth mindset. In addition, the intercept value (constant) of 40.781 indicates that if the student's literacy-numeracy value is zero, then the predicted basic growth mindset value is 40.781. The standardized beta coefficient value of 0.279 indicates that literacy and numeracy provide a weak to moderate contribution to students' mindset growth relatively. Meanwhile, the t-count value of 5.113 accompanied by a Sig. value. which is very small strengthens that the influence of literacy-numeracy variables on growth mindset is statistically significant. Thus, these results support that literacy and numeracy skills have an important role in shaping the growth mindset of senior high school students in Serdang Bedagai Regency.

Table 8. Spearman Correlation Test Results of Growth Mindset Indicators on Literacy and Numeracy Skills

Growth Mindset Indicator	Correlation Coefficient (ρ)	Significance (Sig. 2-tailed)	Relationship Interpretation
Attitude Towards Challenges	0.457**	0.000	Positive, moderate
Response to Failure	0.656**	0.000	Positive, strong
Intrinsic Motivation and Perseverance	0.503**	0.000	Positive, moderate
Positive Attitude Towards Feedback	0.410**	0.000	Positive, moderate
Engagement in Learning	0.472**	0.000	Positive, moderate
Self-Reflection	0.420**	0.000	Positive, moderate
Literacy and Numeracy (Dependent Variable)	0.228	0.000	Positive, weak

Description:

- The ** (two stars) sign indicates that the correlation is significant at the 0.01 level.
- All relationships between indicators and literacy-numeracy are statistically significant ($p < 0.01$).

Based on the results of the Spearman correlation test conducted on data from 313 students, it was found that all indicators of the growth mindset variable have a statistically significant relationship with literacy and numeracy skills. This is evidenced by the significance value (Sig. 2-tailed) of all indicators which is at 0.000, far below the threshold of 0.05. Thus, it can be statistically concluded that there is a real relationship between growth mindset indicators and literacy and numeracy achievements of senior high school students in Serdang Bedagai Regency. Thus, all growth mindset indicators have a significant positive relationship with literacy and numeracy skills. Among these indicators, the response to failure shows the strongest relationship ($\rho = 0.656$), while other indicators are at a moderate level of relationship. The direct relationship between growth mindset as a whole and literacy-numeracy is also significant, but at a weak level ($\rho = 0.228$). This shows that improvements in certain aspects of mindset, especially in dealing with failure, have great potential to encourage improvements in students' literacy and numeracy skills.

DISCUSSION

Literacy and numeracy skills in the context of the Independent Curriculum are very important because this curriculum emphasizes strengthening essential competencies, in-depth learning, and developing students' character. Literacy and numeracy skills are not only seen as basic skills, but also as the main foundation in achieving the Pancasila Student Profile, which is the direction of national education goals. In the Independent Curriculum, literacy is not only limited to the ability to read and write, but also includes the ability to understand, evaluate, and use information critically in various contexts (Srihastuti & Wulandari, 2021). Likewise, numeracy is not only about counting, but includes the ability to use mathematical concepts in everyday life to solve real problems. This study shows that the literacy and numeracy skills of students in Serdang Bedagai Regency vary between schools, but in general can still be improved, especially if associated with strengthening mindsets such as growth mindset (Kusworo et al., 2024).

As presented in Table 1, the descriptive analysis indicates that students' literacy and numeracy skills in Serdang Bedagai Regency varied across the participating schools. These findings suggest that although students have developed basic literacy and numeracy competencies, there is still considerable room for improvement. Within the framework of the Independent Curriculum, literacy and numeracy are regarded as fundamental competencies that support students in achieving the Pancasila Student

Profile. Literacy extends beyond the ability to read and write to include the capacity to understand, evaluate, and utilize information critically in various contexts, while numeracy involves applying mathematical concepts to solve everyday problems (Srihastuti & Wulandari, 2021). Therefore, strengthening these competencies should become a priority in elementary education through both cognitive and non-cognitive learning approaches.

As shown in Table 6, the overall growth mindset score was positively and significantly correlated with students' literacy and numeracy skills ($\rho = 0.228$, $p < 0.001$). Although the correlation coefficient indicates a weak relationship, the finding confirms that students with higher levels of growth mindset tend to achieve better literacy and numeracy outcomes. This result supports the vision of the Independent Curriculum, which positions students as active participants in constructing knowledge and emphasizes perseverance, reflection, and continuous improvement throughout the learning process (Natsir, 2016). The flexibility provided by the curriculum also enables teachers to integrate growth mindset principles into classroom practices through diagnostic assessment, formative feedback, and differentiated instruction (Dari' et al., 2023).

The detailed correlation analysis presented in Table 7 further reveals that all growth mindset indicators were positively and significantly associated with literacy and numeracy skills. These findings support Dweck's Growth Mindset Theory, which proposes that intelligence and ability can be developed through sustained effort, effective learning strategies, and constructive feedback (Alliya Imani Zahra et al., 2024). Students who believe that their abilities can improve are generally more persistent, more willing to seek assistance, and more resilient when facing academic challenges. Consequently, they are more likely to demonstrate stronger literacy and numeracy performance than students with a fixed mindset.

Among all indicators shown in Table 7, Response to Failure demonstrated the strongest relationship with literacy and numeracy skills ($\rho = 0.656$, $p < 0.001$). This finding indicates that students who perceive failure as an opportunity for learning are more likely to achieve higher academic performance. The result is consistent with the study of Claro, Paunesku, and Dweck (2016), which reported that growth mindset significantly predicts students' achievement in mathematics and reading (Yulianti et al., 2024). Students who analyze their mistakes, revise their learning strategies, and continue practicing after experiencing failure generally demonstrate greater improvement in literacy and numeracy than those who avoid academic challenges (Panjaitan et al., 2022).

Table 7 also shows that Intrinsic Motivation and Persistence had a strong positive correlation with literacy and numeracy ($\rho = 0.503$, $p < 0.001$). This finding supports the Self-Determination Theory proposed by Deci and Ryan (1985), which emphasizes intrinsic motivation as an essential factor for effective and sustainable learning. Students who are internally motivated tend to participate actively in classroom activities, complete learning tasks independently, and continuously improve their academic competencies. Such learning characteristics are highly compatible with the implementation of the Independent Curriculum, which encourages student autonomy and lifelong learning (Novalia & Panjaitan, 2021).

Furthermore, Table 7 indicates that Attitude toward Challenges ($\rho = 0.457$), Engagement in Learning ($\rho = 0.472$), Attitude toward Feedback, and Self-Reflection were all significantly related to literacy and numeracy skills, although their correlation strengths were moderate. These findings align with Duckworth's concept of grit, which highlights perseverance, active engagement, and continuous self-improvement as determinants of academic success (Nurhalizah et al., 2025). In classroom practice, these dimensions can be strengthened through collaborative learning, project-based learning, reflective assessment, and continuous formative feedback. Such learning environments encourage students to

embrace challenges, evaluate their own progress, and continuously refine their learning strategies (Lapase, 2021).

Despite these positive findings, Table 6 demonstrates that the overall relationship between growth mindset and literacy and numeracy skills remained relatively weak ($p = 0.228$). This suggests that growth mindset represents only one of several factors influencing students' academic achievement. Other variables, including socioeconomic status, instructional quality, learning resources, school environment, and parental support, are likely to contribute substantially to students' literacy and numeracy development (Nurhayati & Langlang Handayani, 2020). Therefore, improving literacy and numeracy requires comprehensive educational interventions that integrate psychological, instructional, and environmental factors.

Overall, the findings presented in Tables 6 and 7 confirm that growth mindset plays an important role in supporting students' literacy and numeracy development, with Response to Failure emerging as the strongest predictor among all measured indicators. These findings imply that schools should design instructional practices that encourage students to view mistakes as valuable learning opportunities. Teacher professional development programs focusing on growth mindset pedagogy, mentoring activities, reflective learning, and constructive feedback can strengthen students' resilience and academic confidence. Such strategies are consistent with the objectives of the Independent Curriculum, which seeks not only to improve students' literacy and numeracy competencies but also to cultivate adaptive, resilient, and lifelong learners capable of meeting future educational challenges.

The finding that students with a high growth mindset have better literacy and numeracy achievements supports the vision of the Independent Curriculum which places students as active subjects in the learning process (Natsir, 2016). Students are not only expected to be able to absorb material, but also to be able to construct knowledge, be reflective, and resilient in facing difficulties. The Independent Curriculum provides flexibility for teachers to develop learning strategies that are appropriate to students' needs, so that a growth mindset-based approach can be integrated into classroom practices, such as through diagnostic assessments, formative feedback, and differentiated learning (Dari' et al., 2023).

Furthermore, the results of this study strengthen the argument that improving literacy and numeracy is not enough just by providing materials, but needs to be accompanied by strengthening character, internal motivation, and an approach that supports students' courage in facing challenges. When students are invited to see mistakes as part of the learning process (as the principle of growth mindset), they will be more open to deeper exploration and learning, which is the essence of the Independent Curriculum (Sari & Setiawan, 2023). Thus, developing a growth mindset can be a strong complementary strategy in the implementation of the Independent Curriculum, especially to strengthen students' literacy and numeracy in a sustainable manner. Schools and teachers are encouraged to create a safe, supportive learning environment and facilitate failure as a learning opportunity. On the other hand, these results provide important input for local governments and policy makers to integrate teacher training programs and interventions based on educational psychology as part of a holistic strategy to improve the quality of education (Novianto et al., 2024).

The results of this study consistently show that all indicators of growth mindset have a positive and statistically significant relationship to students' literacy and numeracy skills. This finding directly supports the theory put forward by Carol Dweck (Alliya Imani Zahra et al., 2024), which states that individuals with a growth mindset believe that intelligence and abilities can be developed through effort, strategy, and input from others. In the context of secondary education, this is very relevant because students who have a growth mindset tend to be more open to the learning process, more persistent in the face of difficulties, and do not give up easily when they encounter failure. For example, a student who has difficulty reading will not only focus on these shortcomings, but will also look for ways to improve

their skills, such as asking for help from teachers or friends, and using additional learning resources (Alliya Imani Zahra et al., 2024).

The “Response to failure” indicator showed the highest correlation value ($\rho = 0.656$), indicating that the ability to learn from failure and bounce back is a key component in improving students' literacy and numeracy. These results support the findings of research by Claro, Paunesku, and Dweck (2016), which showed that growth mindset is significantly correlated with academic performance, especially in mathematics and reading (Yulianti et al., 2024). Thus, students who view failure as part of the learning process actually have better academic performance. For example, a student who fails a math test may be more motivated to understand the mistakes made and improve their learning strategies, rather than feeling discouraged and giving up (Panjaitan et al., 2022).

In addition, the indicator “Intrinsic motivation and persistence” also shows a strong correlation ($\rho = 0.503$), indicating that students who are driven by intrinsic motivation and demonstrate persistence have higher academic achievement. This is in line with the self-determination theory of Deci and Ryan (1985), which emphasizes the importance of intrinsic motivation in effective and sustainable learning. In the era of independent curriculum, learning that fosters student autonomy and involvement is very important, and growth mindset can be a bridge to this achievement. As an illustration, students who have intrinsic motivation tend to be more active in participating in extracurricular activities that support the development of literacy and numeracy, such as debate clubs or mathematics study groups (Novalia & Panjaitan, 2021).

Meanwhile, other indicators such as “Attitude towards challenges” ($\rho = 0.457$), “Engagement in learning” ($\rho = 0.472$), and “Attitude towards feedback” and “Self-reflection” also showed a significant positive relationship, although at a moderate level. This finding is consistent with Duckworth's research (Nurhalizah et al., 2025) on grit and perseverance, where active involvement and willingness to learn from input are determining factors for academic success. In educational practice, these indicators can be developed through collaborative learning strategies, project-based learning, and the implementation of reflective formative assessments. For example, in project-based learning, students can learn to solve challenges in teams, which not only improves their literacy and numeracy skills but also builds a positive attitude towards challenges (Lapase, 2021).

However, when viewed as a whole, the relationship between the general growth mindset score and literacy and numeracy only shows a weak correlation ($\rho = 0.228$). This shows that although growth mindset has an influence, literacy and numeracy abilities are also greatly influenced by other factors, such as socio-economic background, teaching quality, learning facilities, and parental support. Thus, to improve students' academic achievement as a whole, a comprehensive approach needs to be taken, not only focusing on psychological aspects, but also on a supportive learning environment. For example, schools that provide adequate learning facilities, such as a complete library and access to information technology, can help students to more easily access the necessary learning resources (Nurhayati & Langlang Handayani, 2020).

Overall, the results of this study confirm that growth mindset indicators play an important role in supporting the development of students' literacy and numeracy skills. Response to failure is the most critical indicator that needs to be strengthened in learning practices. Therefore, schools can design more specific interventions, such as teacher training on the application of growth mindset-based learning strategies, providing mentoring or coaching programs, and reflective activities that foster students' awareness of their potential for self-development. These steps are in line with the direction of national education policy that encourages character education, strengthening basic competencies, and developing adaptive and resilient human resources in the future. Thus, efforts to integrate growth mindset in the

independent curriculum will not only improve students' literacy and numeracy skills, but also shape strong character and mentality to face future challenges.

C. Conclusion

The findings indicate that growth mindset is positively associated with students' literacy and numeracy abilities in the context of the Merdeka Curriculum implementation. Students who demonstrate stronger beliefs in the development of their abilities through effort, persistence, and learning experiences tend to exhibit better performance in literacy and numeracy tasks. These results reinforce the importance of affective factors, particularly growth mindset, in supporting students' academic development alongside cognitive competencies.

The study implies that teachers and schools should integrate strategies that foster growth mindset into classroom practices to strengthen students' resilience, motivation, and engagement in learning. Such efforts may contribute to improving literacy and numeracy outcomes and support the broader objectives of the Merdeka Curriculum in developing independent and adaptive learners. This research was limited to 100 tenth-grade students from three public senior high schools in Serdang Bedagai Regency and relied on a correlational design, which does not permit causal conclusions. Future studies are recommended to involve larger and more diverse samples and to employ longitudinal or experimental approaches to provide deeper insights into the role of growth mindset in students' literacy and numeracy development.

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References

- Alliya Imani Zahra, A. A. S. P., & Amirullah. (2024). Analisis Integrasi Nilai-Nilai Keislaman Dalam Pembelajaran Matematika Pada Kurikulum Merdeka Di SMPN 210 Jakarta. *Jurnal Inovasi Global*, 2(3), 507–519. <https://doi.org/10.58344/jig.v2i3.82>
- Amidi. (2024). Literasi Numerasi Dalam Pembelajaran Matematika Berbasis Digital. *PRISMA, Prosiding Seminar Nasional Matematika*, 7, 998–1004.
- Anggraeni, R. (2024). Systematic Literature Review: Peningkatan Kemampuan Literasi Numerasi Siswa SD Melalui Pendekatan Media Pembelajaran Berbasis Game. *Intellektika: Jurnal Ilmiah Mahasiswa*, 2(5), 84–89.
- Azizah, N., & Wardani, H. (2024). Analisis Pembelajaran Matematika Dengan Mengimplementasikan Kurikulum Merdeka Di SMP Negeri 8 Medan. *Jurnal Cendikia: Jurnal Pendidikan Matematika*, 8(1), 222–233. <https://doi.org/10.31004/joe.v6i4.6017>
- Caesaria, N. Z., Saputra, Y. D., & Siswanto, D. H. (2024). Implementasi Pembelajaran Matematika Berdiferensiasi Di Sekolah Dasar Pada Kurikulum Merdeka. *Jurnal Murabbi*, 3(2), 92–100.
- Dari', K., Yunus, M., & Nasiruddin, F. A.-Z. (2023). Pengaruh Growth Mindset Terhadap Kemampuan Pemecahan Masalah Matematika Siswa SMA Negeri 18 Makassar. *Embrio Pendidikan: Jurnal Pendidikan Dasar*, 7(2), 268–279. <https://doi.org/10.52208/embrio.v7i2.430>
- Datu, P. A., Pomalato, S. W. D., & Panigoro, H. S. (2024). Pengembangan Modul Ajar Berdiferensiasi Berbasis Kurikulum Merdeka Dengan Pendekatan Pendidikan Matematika Realistik. *Jambura Journal of Mathematics Education*, 5(1), 70–82. <https://doi.org/10.37905/jmathedu.v5i1.20132>
- Fachrudi, D. S., Marsidi, M., & Agustin, I. H. (2024). Peningkatan Kemampuan Literasi Dan Numerasi Melalui Media Pembelajaran Ular Tangga Di SDN Sukorejo 6. *Dedication: Jurnal Pengabdian*

- Masyarakat, 8(1), 41–48. <https://doi.org/10.31537/dedication.v8i1.1703>
- Fajriyah, E. (2022). Kemampuan Literasi Numerasi Siswa Pada Pembelajaran Matematika Di Abad 21. Seminar Nasional Pendidikan, 21, 403–409.
- Fanggidae, J. J. R., Sugiman, S., & Mahmudah, F. N. (2024). Literasi Matematika Dan Numerasi Dalam Tren Penelitian Pendidikan Matematika Di Indonesia. AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 13(2), 497. <https://doi.org/10.24127/ajpm.v13i2.8625>
- Kusworo, G. Z., Adinda, S., Putri, P., & Arum, I. R. (2024). Grit Dan Growth Mindset Dengan Prestasi Akademik Matematika Siswa Luar Pulau Jawa. Jurnal Sublimapsi, 5(3), 348–355.
- Lapase, M. H. (2021). Implementasi Pembelajaran Berbasis Proyek Untuk Meningkatkan Hasil Belajar Siswa Pada Mata Pelajaran Matematika Di SD Negeri Pinedapa. Jurnal Paedagogy, 8(2), 134. <https://doi.org/10.33394/jp.v8i2.3492>
- Lestari, D. E. (2024). Studi Komparasi Pelaksanaan Pembelajaran Matematika Pada Kurikulum Merdeka Dengan Kurikulum Jepang. Jurnal Ilmiah Profesi Pendidikan, 9(1), 40–46. <https://doi.org/10.29303/jipp.v9i1.1830>
- Nabilah, S., Pujiastuti, H., & Syamsuri, S. (2023). Systematic Literature Review: Literasi Numerasi Dalam Pembelajaran Matematika, Jenjang, Materi, Model, Dan Media Pembelajaran. JIIP—Jurnal Ilmiah Ilmu Pendidikan, 6(4), 2436–2443. <https://doi.org/10.54371/jiip.v6i4.1448>
- Natsir, S. R. (2016). Implementasi Kurikulum Merdeka Dalam Pembelajaran Matematika Di Sekolah Dasar: Studi Deskriptif Pendekatan Deep Learning Dalam Kerangka Kurikulum Merdeka Belajar. JIRK: Journal of Innovation Research and Knowledge, 4(9), 1–23.
- Novalia, Y., & Panjaitan, D. J. (2021). Analisis Kemampuan Pemecahan Masalah Dan Aktivitas Belajar Matematika Pada Pembelajaran Berbasis Masalah. Maju, 8(2), 493–501.
- Novianto, A., Fitriani, N., Deniswa, A. S., Izzati, M. H., Firdaus, F., Ningrum, N., & Dewi, R. C. (2024). Analisis Kesulitan Belajar Matematika Dalam Penerapan Kurikulum Merdeka Di Sekolah Dasar. Jurnal Ilmiah Kependidikan, 12(2), 946–960.
- Nurhalizah, S., Sagala, P., Nasution, A. S., Panjaitan, D. J., & Belinda, M. (2025). Implementation Of Problem-Based Learning Integrated With Culturally Responsive Teaching To Increase Motivation To Learn Mathematics. Indonesian Journal of Education & Mathematical Science, 6(1), 1–7. <https://doi.org/10.30596/ijems>
- Nurhayati, H., & Handayani, N. W. L. (2020). Keefektifan Pendekatan Pendidikan Matematika Realistik Indonesia Terhadap Kemampuan Literasi Numerasi Siswa Di Sekolah Dasar. Jurnal Basicedu, 5(5), 524–532.
- Organisation for Economic Co-operation and Development. (2017). PISA 2015 Assessment And Analytical Framework: Science, Reading, Mathematic And Financial Literacy. OECD Publishing.
- Panjaitan, D. J., Ridwan, M., & Aprilia, R. (2022). Pengembangan Media Pembelajaran Berbasis Website Untuk Meningkatkan Motivasi Belajar Siswa Pada Masa Pandemi COVID-19. AKSIOMA: Jurnal Program Studi Pendidikan Matematika, 11(2), 1524. <https://doi.org/10.24127/ajpm.v11i2.4875>
- Sari, D. A. K., & Setiawan, E. P. (2023). Literasi Baca Siswa Indonesia Menurut Jenis Kelamin, Growth Mindset, Dan Jenjang Pendidikan: Survei PISA. Jurnal Pendidikan dan Kebudayaan, 8(1), 1–16. <https://doi.org/10.24832/jpnk.v8i1.3873>
- Srihastuti, E., & Wulandari, F. (2021). Urgensi Growth Mindset Untuk Meningkatkan Prestasi Belajar Siswa Di Masa Pandemi COVID-19. Widya Genitri: Jurnal Ilmiah Pendidikan, Agama dan Kebudayaan Hindu, 12(2), 157–165. <https://doi.org/10.36417/widyagenitri.v12i2.431>
- Sukaryo, A. F., & Sari, R. M. M. (2024). Systematic Literature Review: Kemampuan Numerasi Siswa Dalam Pembelajaran Matematika. Jurnal THEOREMS (The Original Research of Mathematics),

- 8(2), 461–472. <https://doi.org/10.31949/th.v8i2.8212>
- Wijaya, A. (2023). Kemampuan Numerasi Dan Growth Mindset Siswa SMP Dan Madrasah Tsanawiyah Di Kabupaten Purworejo. *Jurnal Riset Pendidikan Matematika*, 10(2), 153–164. <https://doi.org/10.21831/jrpm.v10i2.66831>
- Wulandari, I. S., Januar, H., Rini, A. S., Wijayanti, A., Semarang, U. P., Islam, S. D., & Madina, A. (2024). Penerapan Pendekatan Tarl Dalam Meningkatkan Kemampuan Literasi Numerasi Kelas II Pembelajaran Matematika. *INNOVATIVE: Journal of Social Science Research*, 4(4), 9529–9538.
- Yulianti, M. D., Astawan, I. G., & Riastini, P. N. (2024). The Relationship Of The Teachers' Growth Mindset To The Students' Mutual Cooperation Character In Primary School. *Indonesian Values and Character Education Journal*, 7(1), 45–55. <https://doi.org/10.23887/ivcej.v7i1.76209>