Al-Ishlah: Jurnal Pendidikan
Vol.17, 3 (September, 2025), pp. 3939-3951
ISSN: 2087-9490 EISSN: 2597-940X, DOI: 10.35445/alishlah.v17i3. 7435

Mindset and Self-Efficacy as Determinants of Grit: Evidence from a Vocational High School Context

Muhamad Takiuddin[1], Desi Ariska[2], Muhamad Zainul Majdi[3]

[1] Universitas Hamzanwadi, Lombok Timur, Indonesia; takiuddin70@gmail.com
[2] Universitas Hamzanwadi, Lombok Timur, Indonesia; desiariska.psi@gmail.com
[3] Universitas Hamzanwadi, Lombok Timur, Indonesia; mzainulmajdi9628@gmail.com

ARTICLE INFO

Keywords:

mindset;
self-efficacy;
grit;
vocational education;
student psychology

Article history:

Received 2025-03-21
Revised 2025-05-24
Accepted 2025-09-26

ABSTRACT

Grit is a crucial psychological trait for vocational high school students, contributing to their persistence and success in learning and future employment. This study investigates the influence of mindset and self-efficacy on students' grit. A quantitative ex post facto design was used with a sample of 80 students from SMK Negeri 2 Selong, selected through simple random sampling based on Taro Yamane's formula. Data were collected using validated Likert-scale instruments for mindset, self-efficacy, and grit. Multiple regression analysis was conducted using SPSS to assess the relationship and contribution of the independent variables to grit. The results indicated that mindset had a significant positive relationship with grit ($p < 0.05$), while self-efficacy did not show a significant influence ($p = 0.231$). The model explained 22.7% of the variance in grit. The effective contribution of mindset was 23.9%, while self-efficacy had a negative contribution (-1.2%), suggesting that mindset played a more substantial role in predicting grit among students. The relative contribution was 105% for mindset and -5% for self-efficacy, indicating possible multicollinearity or suppression effects. The findings highlight the importance of fostering a growth mindset to enhance grit in vocational students. While self-efficacy is commonly associated with persistence, its non-significant result here suggests that other contextual or psychological factors may moderate its impact. Future research should explore additional variables that influence grit and validate these findings across diverse student populations.

Corresponding Author :
Muhamad Takiuddin
Universitas Hamzanwadi, Lombok Timur, Indonesia; takiuddin70@gmail.com

1. INTRODUCTION

In the context of Indonesia's educational landscape, Vocational High Schools (Sekolah Menengah Kejuruan or SMK) play a strategic role in preparing students for the workforce immediately after graduation. These institutions are designed to equip learners with practical knowledge and job-ready skills for careers in industry, services, and various other sectors (El Syam & Suwondo, 2023). However, technical competence alone does not guarantee students' readiness to meet the challenges of the modern labor market. Increasingly, it is recognized that psychological readiness is equally important. Among the

various psychological attributes that support success in education and employment, grit—defined as perseverance and passion for long-term goals—has emerged as a critical construct (Duckworth et al., 2007; Mafaza, Anggreiny, & Alfara, 2018).

Grit encompasses two main dimensions: consistency of interests and perseverance of effort. For vocational students, these traits are essential not only for completing academic requirements but also for developing the persistence required to thrive in demanding work environments (Kannangara et al., 2018). Grit is often characterized by the ability to sustain interest in a task over long periods, despite setbacks or failure. This is particularly relevant for vocational students who often face practical learning challenges, industry placements, and the pressure of entering employment immediately after school (Hardyanti, Karmiyati, & Hidayati, 2017).

Research indicates that students with high grit levels are more likely to exhibit sustained effort in learning, maintain motivation in the face of adversity, and achieve better academic outcomes (Pate et al., 2017; Banupriya & Rajan, 2019). Bazelais et al. (2018) found that grit is significantly associated with academic achievement and long-term success, even when controlling for intelligence. Similarly, Fernández-Martín et al. (2020) argue that grit is not only predictive of academic outcomes but also of personal and professional success. For students in vocational tracks—where practical skills, discipline, and long-term training are emphasized—grit becomes a particularly relevant personal quality.

Moreover, grit may foster students' engagement in their chosen vocational fields by nurturing long-term goal commitment and continuous practice. Kit Ng, Tsui, and Yuen (2022) emphasize the importance of having clear goals and intrinsic motivation, particularly in technical education. Students must consistently refine their skills, adapt to industry standards, and remain committed to their career aspirations, often in the absence of immediate rewards. This capacity for sustained effort aligns closely with the core components of grit.

Nevertheless, grit does not operate in isolation. Several individual and contextual factors influence its development. Among these, mindset and self-efficacy have received considerable attention in recent psychological and educational research (Tang et al., 2019; Wahyuni, Safira, & Pramesti, 2023). Mindset, particularly the concept of a growth mindset—the belief that abilities can be developed through dedication and effort—has been shown to significantly influence students' perseverance, resilience, and willingness to learn from failure (Dweck, 2006; Zhao, Zhang, Li, & Wang, 2023). Growth mindset encourages students to view challenges as opportunities for improvement, aligning conceptually with the perseverance component of grit.

Multiple studies have affirmed the relationship between mindset and grit. For example, Holdan et al. (2018) demonstrated that students with a growth mindset tend to score higher on grit scales and perform better academically. Similarly, Bazelais et al. (2018) found that mindset and grit are positively correlated and jointly contribute to academic achievement. These findings suggest that mindset may not only support the development of grit but also act as a foundational belief system from which grit emerges.

In addition to mindset, self-efficacy—defined as an individual's belief in their capacity to execute behaviors necessary to produce specific performance attainments—has also been identified as a potential determinant of grit (Bandura, 1997; Mata, 2020). Self-efficacious students are more likely to persevere in difficult tasks, regulate their own learning, and recover from setbacks, all of which are behaviors associated with grit (Polirstok, 2017). Dugan et al. (2019) found that grit mediates the relationship between self-efficacy and performance in high-pressure contexts such as sales. Similarly, Pasha-Zaidi et al. (2019) showed that grit, self-efficacy, and self-regulation are interrelated constructs that collectively influence student motivation and achievement.

However, empirical findings regarding the influence of self-efficacy on grit are not always consistent. Some studies report weak or non-significant relationships, suggesting the need for further investigation, particularly in non-Western or underrepresented educational contexts such as Indonesian vocational schools. Moreover, cultural, educational, and socioeconomic factors may moderate how self-efficacy and mindset relate to grit across different student populations (Wahyuni et al., 2023).

Despite growing interest in grit and its psychological determinants, few studies have specifically explored these relationships in vocational high school settings in Indonesia. This is a critical gap in the literature, considering the pivotal role of SMK graduates in the national economy and the unique challenges they face in transitioning from school to work. Additionally, vocational students often come from diverse backgrounds and are exposed to learning environments that differ substantially from those in general academic high schools. Understanding how mindset and self-efficacy contribute to grit in this context can provide valuable insights for curriculum design, student counseling, and targeted interventions aimed at enhancing students' persistence and work-readiness.

Thus, the present study seeks to investigate the extent to which mindset and self-efficacy influence grit among vocational high school students in Indonesia. By focusing on this specific student population, the study contributes to the broader discourse on educational psychology and career readiness in emerging economies. The findings are expected to offer practical implications for educators, school counselors, and policymakers in developing strategies to cultivate psychological resilience and perseverance among vocational learners.

2. METHODS

This study employed a quantitative ex post facto design, which is used to examine causal relationships between variables without manipulating them directly (Creswell, 2009). The purpose of using this design was to investigate the extent to which mindset and self-efficacy predict grit among vocational high school students.

2.1 Population and Sample

The population of this study consisted of 120 students enrolled in the fashion design program at SMK Negeri 2 Selong, located in East Lombok, Indonesia. From this population, a sample of 80 students was selected using simple random sampling, ensuring that each student had an equal chance of being included in the study. The sample size was determined using Taro Yamane's formula for finite populations, which provides a statistically appropriate estimate based on a predetermined level of precision.

2.2 Instruments

Three validated instruments were used to measure the variables in this study:

1. Grit was measured using a modified version of the Grit Scale originally developed by Duckworth et al. (2007). The scale was adapted linguistically and contextually to fit the Indonesian vocational education context while preserving its core items. It assesses two dimensions: consistency of interests and perseverance of effort.
2. Mindset was assessed using an adapted version of Emily Diehl's Mindset Quiz, which is based on Carol Dweck's theory of growth and fixed mindset. The items were translated and culturally adjusted to reflect students' academic experiences in Indonesian vocational schools.
3. Self-efficacy was measured using a scale adapted from Ariska (2021), which was designed to assess students' beliefs in their ability to succeed in specific academic tasks and challenges. This adaptation also involved contextual and linguistic validation to ensure its suitability for vocational students.

All instruments used a Likert-type scale, with responses ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire consisted of closed-ended items to standardize responses and facilitate quantitative analysis. Prior to data collection, all instruments were tested for reliability and validity, although specific psychometric properties (e.g., Cronbach's alpha) are recommended to be reported in future iterations of the study to enhance transparency.

2.3 Data Collection Procedure

The data collection process was conducted in a single phase, with all participants completing the questionnaires in a supervised classroom setting to minimize response bias and maximize completion rates. Participants were informed about the purpose of the study and gave their consent before participating. Anonymity and confidentiality were maintained throughout the process.

2.4 Data Analysis

The collected data were analyzed using multiple linear regression analysis, with grit as the dependent variable and mindset and self-efficacy as the independent variables. Prior to the main analysis, several classical assumption tests were conducted to ensure the validity of the regression model, including:

1. Normality test using the Kolmogorov–Smirnov test
2. Multicollinearity test using Variance Inflation Factor (VIF) and Tolerance values
3. Heteroscedasticity test using scatterplot analysis
4. Autocorrelation test using the Durbin–Watson statistic

The analysis was performed using the most recent version of SPSS software. Results were interpreted with a significance threshold of $p < 0.05$. Additionally, coefficient of determination (R^2), beta coefficients, and effect size (relative and effective contribution) were calculated to provide deeper insights into the strength and nature of the relationships among variables.

3. FINDINGS AND DISCUSSION

3.1 Descriptive Data Analysis

Descriptive statistics were calculated to provide an overview of the data distribution for each variable: mindset, self-efficacy, and grit. Table 1 summarizes the minimum, maximum, mean, and standard deviation values for each variable.

Table 1. Descriptive Statistics

Variable	N	Min	Max	Mean	Std. Deviation
Mindset	80	51.00	87.00	69.16	8.27
Self-Efficacy	80	60.00	92.00	74.89	6.96
Grit	80	24.00	44.00	35.90	4.31

These values indicate a relatively normal spread of scores across all variables. The mean grit score suggests a moderately high level of perseverance among students.

3.2 Assumption Tests for Regression Analysis

3.2.1 Normality Test

Before conducting regression analysis, it is essential to ensure that the data meet the assumption of normality, particularly for the residuals. A normal distribution of residuals indicates that the regression model is likely to produce valid and unbiased estimates. In this study, the normality of the residuals was tested using the One-Sample Kolmogorov–Smirnov (K–S) test, which is appropriate for assessing whether the sample distribution deviates significantly from a normal distribution. A significance value (p-value) greater than 0.05 suggests that the residuals are normally distributed. The results of the normality test are presented in Table 2 below.

Table 2. Normality Test

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		80
Normal Parameters [a,b]	Mean	.0000000
	Std. Deviation	3.79276400
Most Extreme Differences	Absolute	.053
	Positive	.050
	Negative	-.053
Test Statistic		.053
Asymp.Sig.(2-tailed)		.200[c,d]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is the lower bound of the true significance.

The data results in the table above show that in the Kolmogorov-Smirnov column, the significance value of *Asymp.Sig.(2-tailed)* is greater than 0.05, which is 0.2, so it can be concluded that the research data is normally distributed.

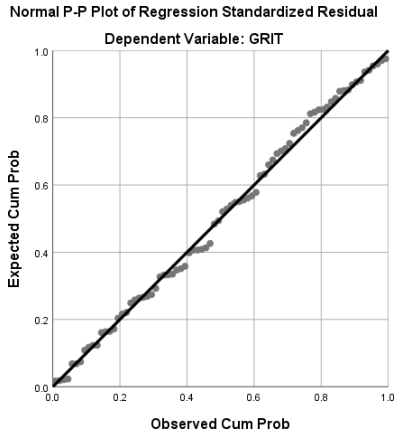

Figure 1. Normality test results

The results of the P-Plot graph above show that the data is spread around the diagonal line and follows the direction of the histograph line towards a normal distribution pattern, so the dependent grit variable (Y) meets the normality test.

3.2.2 Multicollinearity Test

The multicollinearity test results (Table 3) show Variance Inflation Factor (VIF) values of 1.234 for both independent variables, with tolerance values of 0.810, which fall well within acceptable limits (VIF < 10, Tolerance > 0.1). This indicates no significant multicollinearity between mindset and self-efficacy.

Table 3. Regression Coefficients and Collinearity Statistics

Predictor	B (Unstandardized Coefficient)	Std. Error	Beta (Standardized Coefficient)	t	Sig.	Tolerance	VIF
(Constant)	23.431	4.992	–	4.694	.000	–	–
Mindset	0.270	0.058	0.519	4.660	.000	0.810	1.234
Self-Efficacy	-0.083	0.069	-0.134	-1.207	.231	0.810	1.234

The results presented in Table 3 indicate that mindset is a significant positive predictor of grit (B = 0.270, β = 0.519, $p < .001$), suggesting that students with a stronger growth mindset tend to exhibit higher levels of grit. In contrast, self-efficacy does not significantly predict grit (B = -0.083, β = -0.134, $p = .231$), implying that students' belief in their ability to succeed does not directly influence their perseverance and passion for long-term goals in this context. Additionally, the Variance Inflation Factor (VIF) values for both predictors are well below the critical threshold of 10, and the tolerance values exceed 0.1, confirming that multicollinearity is not a concern in this regression model. These findings reinforce the central role of mindset in grit development while highlighting the need to further investigate the complex and potentially indirect role of self-efficacy.

3.2.3 Heteroscedasticity Test

The heteroscedasticity test is carried out to determine whether In the regression model, there is or is an inequality of variance from one residual to another observation. Heteroscedasticity shows the distribution of independent variables. Random distribution shows a good regression model, so it is called homoscedasticity or there is no heteroscedasticity. The results of the heteroscedasticity test in the regression model of this study can be seen in the figure:

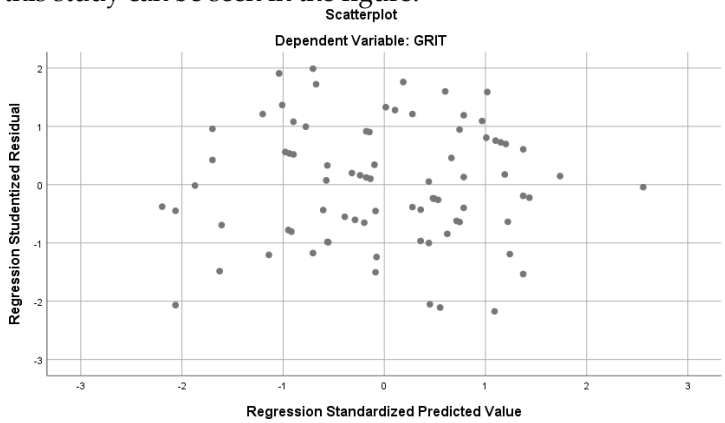

Figure 2. Heteroscedasticity Test

The scatter plot graph above shows that the points on the diagram do not form a clear pattern. The points are spread randomly and are well spread out above or below the number 0 on the Y axis. So it can be concluded that there is no heteroscedasticity problem in the regression model.

3.2.4 Autocorrelation Test

Autocorrelation refers to the correlation of the residuals in a regression model across time or sequence, which violates the assumption of independence in classical linear regression. The presence of autocorrelation indicates that the error terms are not random, which can lead to inefficient estimates and unreliable significance tests. To detect autocorrelation in this study, **the Durbin–Watson (DW) test** was employed. A DW value close to 2 indicates no autocorrelation, while values significantly lower or higher suggest positive or negative autocorrelation, respectively. The results of the autocorrelation test are summarized in Table 4 below.

Table 4. Autocorrelation Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std.Error of the Estimate	Durbin-Watson
1	.476[a]	.227	.206	3.84170	2.530

a. Predictors: (Constant), self-efficacy, mindset
b. Dependent Variable: grit

The Durbin-Watson value was 2.530, which exceeds the upper bound (4 - DU = 2.3165), indicating the presence of negative autocorrelation in the residuals. This violates one of the classical regression assumptions and may affect the reliability of the estimated coefficients. While this is a limitation, the results are still presented with caution, and future studies should consider using generalized least squares (GLS) or correcting the model to address autocorrelation.

3.3 Data Analysis Results

3.3.1 Simultaneous Effect (F-Test)

The results of the Simultaneous Test are in the table below:

Table 5. Data Analysis Results

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regresion	332.780	2	166.390	11.274	.000[b]
	Residual	1126.420	77	14.759		
	Total	1469.200	79			

a. Dependent Variable: GRIT
b. Predictors: (Constant), self-efficacy, mindset

The SPSS output results in the Anova table above show that the mindset and self-efficacy variables have a calculated F value greater than the F table, 11.274 > 3.11 (DF = nk)

Information :
DF = Degree of Freedom
n = number of samples
k = amount of the independent variable

The significance value of the mindset and grit variables is smaller than the significance value of 0.000 <0.05. So it can be concluded that the mindset and self-efficacy variables simultaneously have a relationship to grit in class XI students of SMK Negeri 2 Selong.

3.3.2 Partial Effects (t-Test)

Table 6. Partial Regression Test Results (t-Test)

Predictor	B (Unstandardized Coefficient)	Standard Error	β (Standardized Coefficient)	t	Sig.	Tolerance	VIF
(Constant)	23.431	4.992	–	4.694	.000	–	–
Mindset	0.270	0.058	0.519	4.660	.000	0.810	1.234
Self-Efficacy	-0.083	0.069	-0.134	-1.207	.231	0.810	1.234

a. Dependent Variable: GRIT

The t-test analysis was conducted to examine the individual contribution of each independent variable—mindset and self-efficacy—to the dependent variable, grit. The results showed that the mindset variable had a significant positive effect on grit, with a *p*-value of .000, which is well below the significance threshold of .05. Furthermore, the t-value of 4.660 exceeded the critical t-table value of 1.994 (df = n - k - 1), indicating that the null hypothesis (H_0) could be rejected in favor of the alternative hypothesis (H_1). These results support the conclusion that mindset is significantly associated with grit among Grade XI students at SMK Negeri 2 Selong. On the other hand, the self-efficacy variable yielded a *p*-value of .231, which is greater than the alpha level of .05, and a t-value of -1.207, which falls below

the critical threshold. Therefore, the null hypothesis is retained, and it can be concluded that self-efficacy does not have a statistically significant effect on grit in this sample. These findings highlight the more substantial role of mindset compared to self-efficacy in predicting students' grit.

3.3.3 Coefficient of Determination (R^2)

The determination coefficient is carried out with the aim of measuring the contribution of independent variables to dependent variables. The value of the determination coefficient is between 0 and 1. The following are the results of the determination test in the following table:

Table 7. Test Coefficient Determination (R^2)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std.Error of the Estimate
1	.476[a]	.227	.206	3.84170

a. Predictors: (Constants), self-efficacy. mindset
b. Dependent Variable: grit

Adjusted R-squared (R2) value of 0.227 = 22.7%. It can be concluded that the mindset and self-efficacy variables together account for 22.7% of the variation in the grit variable, while the remaining 77.3% is influenced by other factors outside the research variables studied.

3.3.4 Donation Effective (SE) and Donation Relatively (SR)

Based on the results of the multiple regression analysis, it can be seen that the Effective Contribution (SE) is used to determine the size of the independent variable's contribution to the dependent variable in the regression analysis, calculated from the overall effectiveness of the regression line.

Table 8. Effective and Relative Contributions of Independent Variables

Variable	Standardized Coefficient (β)	Correlation Coefficient (r)	Effective Contribution (EC%)	Relative Contribution (RC%)
Mindset (X1)	0.519	0.460	23.9%	105%
Self-Efficacy (X2)	-0.134	0.092	-1.2%	-5%
Total	–	–	22.7%	100%

Based on the results of the multiple regression analysis, the Effective Contribution (EC) was calculated to determine the actual influence of each independent variable on the dependent variable (grit), using the product of the standardized beta coefficient and the correlation coefficient, multiplied by 100%.

- For the mindset variable, the EC was calculated as:
  0.519 × 0.460 × 100% = 23.9%
- For the self-efficacy variable, the EC was calculated as:
  -0.134 × 0.092 × 100% = -1.2%

These results indicate that the mindset variable made a positive and meaningful effective contribution to grit, while self-efficacy made a slightly negative contribution, suggesting it may not support grit development within this sample or could be acting as a suppressor variable.

The Relative Contribution (RC) was then calculated to show the proportion of each independent variable's contribution in comparison to the total explained variance (R^2 = 22.7%). The relative

contribution of mindset was 105%, while self-efficacy contributed -5%, which reinforces the earlier finding that mindset plays a dominant role in influencing grit, while self-efficacy does not provide a meaningful or supportive contribution in this model.

These findings emphasize the importance of promoting a growth mindset in educational settings, particularly in vocational schools, where perseverance and goal commitment are essential for student success.

Table 9. Summary of Relative and Effective Contributions

No.	Variable	Relative Contribution (%)	Effective Contribution (%)
1	Mindset (X1)	105%	23.9%
2	Self-Efficacy (X2)	-5%	-1.2%
	Total	**100%**	**22.7%**

Based on the calculation results in Table 9, the total effective contribution of the two independent variables—mindset and self-efficacy—to the dependent variable (grit) is 22.7%. Of this, the mindset variable contributes positively and substantially with an effective contribution of 23.9%, while the self-efficacy variable contributes negatively, with an effective contribution of -1.2%. This implies that self-efficacy does not positively influence grit within the context of this study and may even suppress the effect of other variables.

In terms of relative contribution, mindset accounts for 105% of the model's explained variance, whereas self-efficacy contributes -5%, further confirming that mindset is the dominant factor influencing grit. The remaining 77.3% of the variation in grit is attributed to other variables not examined in this study, such as personality traits, intrinsic motivation, resilience, or social support systems.

These findings are in line with prior research by Aulia, Takiuddin, and Rahmatullah (2022), who demonstrated that mindset has a strong relationship with grit, especially when combined with other psychological factors such as personality and academic motivation. Thus, enhancing students' mindset—particularly a growth mindset—should be a central focus in efforts to develop grit among vocational high school students.

Discussion

The present study aimed to examine how mindset and self-efficacy contribute to grit among vocational high school students, using multiple regression analysis. Before interpreting the main findings, descriptive and assumption checking results provided important contextual background.

Interpretation of Descriptive Statistics

The descriptive statistics (Table 1) show that the sample's mean grit score is 35.90 (SD = 4.31) on a possible scale range of approximately 24 to 44, indicating a moderate to relatively high level of perseverance among participants. The distribution of mindset (M = 69.16, SD = 8.27) and self-efficacy (M = 74.89, SD = 6.96) likewise displays reasonable variance, suggesting that individual differences in these psychological constructs exist in the sample. These variations justify the further exploration of their predictive roles.

Assumption Tests

The assumptions of regression were tested thoroughly. The residuals passed the normality test (K–S test, p = .200), and visually the P–P plot suggested near-linearity—validating the assumption of normal residual distribution. Multicollinearity was not a problem, as evidenced by VIF ≈ 1.234 and

tolerance 0.810 for both predictors, which is well within acceptable limits (VIF < 10, tolerance > 0.1). The heteroscedasticity test, via scatterplot, showed no discernible pattern of variance change, indicating consistency in residual variance (homoscedasticity). However, the Durbin–Watson statistic result (DW = 2.530) suggested the presence of negative autocorrelation, because it exceeds the upper bound (4 – DU = 2.3165). Negative autocorrelation implies that error terms may alternate over observations, which can decrease the efficiency of estimates and bias standard errors. Thus, while the model is interpretable with caution, future studies should address this limitation—perhaps via generalized least squares (GLS) or model specification adjustments.

Predictor Effects: Mindset versus Self-Efficacy

The regression output (Table 3) indicates that mindset is a significant positive predictor of grit (B = 0.270, β = 0.519, p < .001). This result supports the hypothesis that students holding a growth mindset—believing that ability and intelligence can be developed through effort—are more likely to demonstrate sustained perseverance, consistency of interest, and resilience in the face of challenges. It aligns with theoretical claims and empirical studies suggesting that a growth mindset fosters adaptive responses to setbacks, enhancing persistence and goal pursuit (Tang, Wang, Guo, & Salmela-Aro, 2019; Zhao, Zhang, Li, & Wang, 2023). In vocational education contexts, where skill mastery and repeated practices are essential, the role of mindset may be especially salient: students who view their traits as malleable are more willing to invest in long-term practice and persist even when immediate success is not evident.

From the effective and relative contribution perspective (Tables 8–9), mindset's effective contribution to grit is 23.9%, and its relative contribution is 105%. These values emphasize that, among the two predictors studied, mindset is the predominant driver of the explained variance in grit. Even though the total $R^2$is modest, mindset's disproportionate share reinforces its primacy in the model.

Why Self-Efficacy Did Not Predict Grit Significantly

Contrary to expectations, self-efficacy did not emerge as a significant predictor (B = –0.083, β = –0.134, p = .231). Instead, it contributed a slightly negative effective contribution (–1.2%) and relative contribution (–5%). This negative sign and lack of significance suggest that—in this vocational student sample—beliefs about one's capability may not directly translate into the perseverance dimension captured by grit, or may interact with other unmeasured variables.

Several possible explanations merit consideration. First, self-efficacy might operate more proximally (i.e., task-specific confidence) rather than globally influencing a trait-level construct like grit. In other words, while self-efficacy may predict short-term performance and persistence in particular tasks, its direct influence on sustained, long-term grit may be weaker. Second, self-efficacy might act as a suppressor variable in this model. Its negative coefficient may suggest that when controlling for mindset, higher self-efficacy detracts marginally from grit prediction—perhaps because overly confident students reduce effort. Suppressor effects are not uncommon in regression when predictors are intercorrelated yet distinct in predictive function. Third, there may be contextual or cultural moderators (e.g., educational environment, social expectations, external supports) that weaken the direct pathway from self-efficacy to grit in the vocational setting. Previous studies (e.g., Pasha-Zaid et al., 2019; Dugan et al., 2019) have documented associations between self-efficacy and grit, but often in more general academic or professional domains. The specific demands and constraints of vocational schooling (e.g., limited resources, practical curricula, pressure for immediate employability) might diminish the salience of self-belief relative to mindset orientation.

Ultimately, the nonsignificant finding does not invalidate the theoretical importance of self-efficacy—it suggests that its impact might be indirect (mediated or moderated). For example, self-efficacy may influence grit through academic motivation, goal clarity, or self-regulated learning practices. Future research employing structural equation modeling (SEM) could test these mediated pathways.

Model Explanation and Unexplained Variance

The adjusted R^2 of 0.206 (total R^2 = 0.227) indicates that mindset and self-efficacy together explain 22.7% of the variance in grit, leaving 77.3% unexplained by the model. This considerable residual suggests that many other factors contribute to grit development among vocational students. Candidate variables include intrinsic motivation, personality traits (e.g., conscientiousness, resilience), goal orientation, social support (teachers, parents, peers), school climate, and opportunities for mastery experience (Allen, Kannangara, & Carson, 2021; Fernández-Martín, Arco-Tirado, & Hervás-Torres, 2020). Incorporating such constructs in expanded models could help account for a greater share of variance.

The presence of negative autocorrelation also suggests that the model residuals contain systematic patterns not captured by the predictors. This limitation underscores the need for caution in interpreting coefficient estimates and standard errors. Future research should consider model refinement—such as adding lagged residual terms, using panel data, or applying GLS estimation—to improve model validity.

Theoretical and Practical Implications

From a theoretical standpoint, this study underscores that growth mindset belongs in the core of psychological models of grit, especially in vocational education settings. While self-efficacy is widely regarded as a key motivational construct, its influence on grit may be conditional on the mindset context or mediated through other variables. The notion that mindset frames the lens through which students interpret challenges, failure, and improvement is reinforced here: mindset appears to govern the persistence trajectory more strongly than confidence alone.

From a practical perspective, vocational schools and educators should prioritize interventions to cultivate a growth mindset, such as explicit teaching about neuroplasticity, framing failure as learning opportunity, and scaffolding incremental progress. Counseling programs, teacher professional development, and curriculum design can integrate mindset-promoting strategies. Because self-efficacy did not directly predict grit in this context, efforts to boost self-efficacy should be designed carefully, ideally coupled with mindset scaffolding or embedded within mastery-oriented tasks, rather than considered sufficient alone.

Limitations and Future Directions

This study has several limitations. First, the cross-sectional design and ex post facto method prevent causal inference. Longitudinal or experimental designs would strengthen claims about directionality between mindset, self-efficacy, and grit. Second, the negative autocorrelation in residuals threatens the statistical assumption of independence, potentially biasing estimates and standard errors. Future studies should adopt advanced techniques (e.g., GLS or time-series modeling) or collect time-sequenced data. Third, self-report questionnaires may be subject to response bias or social desirability. Complementing questionnaires with behavioral measures of persistence or teacher observations would strengthen validity. Fourth, the study sample is limited to one vocational school in a single locale and a single major program (fashion), limiting generalizability. Future research should replicate across multiple vocational disciplines and diverse geographic contexts.

Additionally, exploring mediators and moderators (e.g., motivation, school support, personality traits) via SEM would deepen understanding of how mindset and self-efficacy contribute to grit. Investigating interactive effects—for example, whether high self-efficacy enhances grit only in the presence of growth mindset—could reveal nuanced relationships. Lastly, interventions that longitudinally cultivate mindset and then measure changes in grit would offer practical validation of the theoretical model.

In summary, this study reveals that mindset exerts a strong, positive influence on grit among vocational high school students, whereas self-efficacy does not exert a direct effect in the same model. Mindset accounted for the majority of the explained variance, underscoring its central role in

perseverance and long-term goal pursuit. However, a substantial portion of variance remains unexplained, and methodological issues like autocorrelation caution interpretation. The findings suggest that fostering growth mindset should be a priority in vocational education, and that future research should integrate additional individual, contextual, and motivational variables to build a more comprehensive model of grit development.

4. CONCLUSION

In conclusion, this study found that mindset significantly predicts grit among vocational high school students, while self-efficacy does not have a statistically significant effect. The findings highlight the crucial role of a growth mindset in fostering perseverance and long-term goal commitment in the vocational education context. However, the model explained only 22.7% of the variance in grit, and the presence of negative autocorrelation suggests a limitation in the regression assumptions that may affect the reliability of the results. Additionally, the study was limited by its cross-sectional design, reliance on self-report measures, and sample drawn from a single school and major, which restrict generalizability. Future research should employ longitudinal or experimental designs, include larger and more diverse samples, and explore mediating or moderating variables such as motivation, personality traits, or social support to develop a more comprehensive understanding of grit formation among vocational students.

REFERENCES

Allen, R. A., Kannangara, C. S., & Carson, J. (2021). Grit, resilience, and self-regulated learning: A review of the literature. *International Journal of Learning and Change, 13*(2), 109–132. https://doi.org/10.1504/IJLC.2021.113155

Ariska, D. (2021). *Pengembangan instrumen efikasi diri akademik siswa SMA*. Universitas Hamzanwadi.

Aulia, F., Takiuddin, M., & Rahmatullah, A. H. (2022). Relationship between personality, mindset, and academic motivation on grit (persistence) in middle school students. *Konseli: Jurnal Bimbingan dan Konseling (E-Journal), 9*(1), 27–40. https://doi.org/10.24042/kons.v9i1.11926

Bandura, A. (1997). *Self-efficacy: The exercise of control*. W.H. Freeman.

Bazelais, P., Lemay, D. J., & Doleck, T. (2018). Grit, mindset, and academic performance: A study of pre-university science students. *Eurasia Journal of Mathematics, Science and Technology Education, 14*(12), em1608. https://doi.org/10.29333/ejmste/94570

Banupriya, V., & Rajan, R. (2019). Grit and academic achievement: Is it related? *The International Journal of Indian Psychology, 7*(2), 679–686. https://doi.org/10.25215/0702.081

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). SAGE Publications.

Dugan, R., Hochstein, B., Rouziou, M., & Britton, B. (2019). Gritting their teeth to close the sale: The positive effect of salesperson grit on job satisfaction and performance. *Journal of Personal Selling & Sales Management, 39*(1), 81–101. https://doi.org/10.1080/08853134.2018.1489726

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*(6), 1087–1101. https://doi.org/10.1037/0022-3514.92.6.1087

Dweck, C. S. (2006). *Mindset: The new psychology of success*. Random House.

El Syam, R. S., & Suwondo, A. (2023). Aksentuasi growth mindset dalam pendampingan penerapan disiplin positif. *Jurnal Penelitian dan Pengabdian Kepada Masyarakat Unsiq, 10*(1), 24–32. https://doi.org/10.32699/ppkm.v10i1.3377

Fernández-Martín, F. D., Arco-Tirado, J. L., & Hervás-Torres, M. (2020). Grit as a predictor and outcome of educational, professional, and personal success: A systematic review. *Psicología Educativa, 26*(2),

163–173. https://doi.org/10.5093/psed2020a11

Holdan, G., et al. (2018). Success without grit: An exploratory study of individuals with low grit scores and high academic performance. *International Journal of Current Research*, *10*(09), 73250–73252.

Kannangara, C. S., et al. (2018). All that glitters is not grit: Three studies of grit in university students. *Frontiers in Psychology*, *9*, 1539. https://doi.org/10.3389/fpsyg.2018.01539

Kit Ng, D. T., Tsui, M. F., & Yuen, M. (2022). Exploring the use of 3D printing in mathematics education: A scoping review. *Asian Journal for Mathematics Education*, *1*(3), 338–358. https://doi.org/10.1177/27527263221129357

Mata, P. V. (2020). Grit and academic self-efficacy as predictors of senior high school academic performance. *Journal of Agriculture and Technology Management*, *23*(1), 35–42.

Pasha-Zaidi, N., et al. (2019). Responsibility of learning: A cross-cultural examination of grit, motivational belief, and self-regulation among college students. *Learning Environments Research*, *22*(1), 83–100. https://doi.org/10.1007/s10984-018-9268-y

Polirstok, S. (2017). Strategies to improve academic achievement in secondary school students: Perspectives on grit and mindset. *SAGE Open*, *7*(4). https://doi.org/10.1177/2158244017745111

Tang, X., Wang, M.-T., Guo, J., & Salmela-Aro, K. (2019). Building grit: The longitudinal pathways between mindset, commitment, grit, and academic outcomes. *Journal of Youth and Adolescence*, *48*(5), 850–863. https://doi.org/10.1007/s10964-019-00998-0

Wahyuni, S., Safira, A., & Pramesti, M. (2023). Investigating the impact of growth mindset on empowerment, life satisfaction and turnover intention: Comparison between Indonesia and Vietnam. *Heliyon*, *9*(1), e12741. https://doi.org/10.1016/j.heliyon.2022.e12741

Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper and Row.

Zhao, H., Zhang, M., Li, Y., & Wang, Z. (2023). The effect of growth mindset on adolescents' meaning in life: The roles of self-efficacy and gratitude. *Psychology Research and Behavior Management*, *16*, 4647–4664. https://doi.org/10.2147/prbm.s428397