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The Influence of Flipped Classroom on Student Engagement Considering Growth Mindset in Secondary Schools in Indonesia

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ABSTRACT

Student engagement is a crucial factor in determining the effectiveness of the learning process in secondary education. However, traditional teaching methods often limit students' active participation in classroom activities. Therefore, innovative learning approaches such as the flipped classroom have gained attention as a strategy to enhance student engagement. This study aims to examine the effect of the flipped classroom on student engagement while considering the role of growth mindset among Indonesian high school students. The study employed a quantitative research design involving 150 students as respondents. Data were collected using a structured questionnaire measured with a five-point Likert scale. The collected data were analyzed using SPSS version 25 through descriptive statistics, validity and reliability testing, and multiple linear regression analysis. The results indicate that the flipped classroom has a positive and significant effect on student engagement ($\beta = 0.421$, $p < 0.05$). In addition, growth mindset also significantly influences student engagement ($\beta = 0.356$, $p < 0.05$). The simultaneous analysis shows that both variables significantly contribute to student engagement with a coefficient of determination (R^2) of 0.507, indicating that 50.7% of the variation in student engagement can be explained by the flipped classroom and growth mindset variables. These findings suggest that integrating flipped classroom learning strategies with the development of a growth mindset can enhance students' participation, motivation, and involvement in the learning process. The study provides practical implications for educators to adopt more interactive instructional approaches while fostering positive learning beliefs among students in Indonesian high schools.

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1. INTRODUCTION

Education in the twenty-first century is increasingly shaped by rapid technological advancement and the growing demand for student-centered learning environments. Traditional teacher-centered approaches that emphasize lectures and passive learning are gradually being reconsidered because they may not adequately promote active participation, critical thinking, and meaningful engagement among students, particularly in contexts such as Indonesian

high schools. Student engagement is widely recognized as a key factor influencing academic achievement, motivation, and overall learning outcomes, making the identification of effective instructional strategies an important priority. One approach that has gained significant attention is the flipped classroom, which reverses the traditional structure of instruction by delivering learning materials—such as video lectures or digital resources—before class, while classroom time is used for discussions, collaborative learning, and problem-solving activities. This model enables students to interact with content in advance and participate more actively during classroom sessions, thereby increasing engagement and improving the learning experience [1], [2].

Previous studies have shown that flipped learning environments can significantly enhance student engagement, satisfaction, and participation in collaborative activities while also supporting self-paced learning [1], [2]. In addition, the flipped classroom encourages the development of critical thinking and learning autonomy by allowing students to explore instructional materials independently before applying their knowledge through interactive classroom activities [3]. Such an approach supports a more active and student-centered learning process that helps students prepare for real-world challenges [1]. Nevertheless, the successful implementation of flipped learning still faces several challenges, including the digital divide, limited teacher training, and the need for adequate technological infrastructure [3]. Therefore, continuous investment in technology and professional development for educators is essential to maximize the potential of flipped classroom models in modern education [3].

Student engagement is a multidimensional concept that encompasses behavioral, emotional, and cognitive involvement in the learning process. Behavioral engagement refers to students' participation in academic activities such as attending classes and completing assignments, emotional engagement relates to students' interest and enthusiasm toward learning, while cognitive engagement reflects the level of effort and mental investment students put into understanding the material. Among these dimensions, cognitive engagement is often considered the strongest predictor of academic achievement, while behavioral and emotional engagement also contribute to students' learning outcomes and satisfaction with the learning experience [4], [5]. Therefore, strategies that support these dimensions of engagement are essential for creating effective and motivating learning environments in schools.

In addition to instructional strategies, psychological factors also play an important role in shaping students' engagement in learning, one of which is growth mindset. Introduced by Carol Dweck, growth mindset refers to the belief that intelligence and abilities can develop through effort, persistence, and learning. Students who possess a growth mindset are more likely to embrace challenges, persist when facing difficulties, and view mistakes as opportunities for learning, which strengthens their engagement in academic activities [6]. Conversely, students with a fixed mindset tend to see intelligence as static and may avoid challenging tasks due to fear of failure. As a result, growth mindset has been associated with higher motivation, resilience, and deeper cognitive engagement in the learning process [6].

Integrating the flipped classroom model with students' psychological characteristics, particularly growth mindset, can provide a deeper understanding of how instructional strategies influence student engagement. The flipped classroom encourages students to prepare learning materials independently before class and participate actively during classroom activities, which may be particularly effective for students who believe that their abilities can improve through effort and persistence. In this context, a growth mindset can strengthen the effectiveness of flipped learning by fostering a proactive attitude and resilience in facing academic challenges. However, despite the growing global adoption of flipped classroom strategies,

empirical studies examining their effectiveness in Indonesian high schools remain limited. Many schools still rely on traditional teaching methods, and the integration of digital and student-centered learning models is still developing. Moreover, research that simultaneously considers instructional approaches and psychological factors—such as growth mindset—in influencing student engagement is still scarce. Therefore, this study aims to examine the effect of the flipped classroom approach on student engagement while considering the role of growth mindset among high school students in Indonesia, with the expectation that the findings will contribute to more effective instructional practices and improvements in the quality of learning.

2. LITERATURE REVIEW

2.1 Flipped Classroom in Modern Education

The flipped classroom is an innovative instructional model that reverses the traditional sequence of learning activities by requiring students to access instructional materials—such as recorded lectures, digital modules, or readings—before class, while classroom time is used for interactive activities like discussions, collaboration, and problem-solving. This approach shifts the focus from teacher-centered to student-centered learning and integrates technology to support independent preparation and active participation during class [7]. Through pre-class learning, students are able to study materials at their own pace, revisit complex topics, and develop critical thinking, independent learning, and intrinsic motivation [8]. During classroom sessions, learning activities emphasize interaction, peer collaboration, and problem-solving, enabling deeper engagement with the material while allowing teachers to guide and mentor students more effectively [2], [9]. Supported by digital resources such as video lectures and online modules, the flipped classroom also provides flexible access to learning materials that students can revisit when needed, making it a versatile pedagogical strategy that aligns with constructivist learning principles and supports the development of critical thinking, collaboration, and problem-solving skills in modern education [10].

2.2 Student Engagement in the Learning Process

Student engagement is a key element of effective learning and refers to the level of attention, interest, and involvement students demonstrate during the learning process. It consists of three main dimensions: behavioral, emotional, and cognitive engagement. Behavioral engagement relates to students' participation in academic activities such as attending classes and completing assignments and has been shown to strongly predict academic performance [11]. Emotional engagement reflects students' interest and enthusiasm toward learning and contributes to a positive classroom environment [11], while cognitive engagement refers to the mental effort students invest in understanding complex concepts and mastering learning materials [11]. High levels of engagement are associated with stronger motivation, better academic performance, and greater persistence in learning. Instructional strategies also play an important role in fostering engagement, and studies indicate that the flipped classroom model can enhance behavioral, emotional, and cognitive engagement by encouraging active participation, peer interaction, and better preparation before class [12], [13]. As a result, the flipped classroom approach can increase student enthusiasm and readiness to learn, contributing to a more dynamic and engaging learning environment [13].

2.3 Growth Mindset in Education

The concept of growth mindset, introduced by Carol Dweck, refers to the belief that intelligence and abilities can develop through effort, practice, and perseverance. Individuals with a growth mindset tend to view challenges as

opportunities for improvement, while those with a fixed mindset believe intelligence is innate and unchangeable. In educational contexts, students with a growth mindset are more likely to embrace challenges, persist when facing difficulties, and view mistakes as part of the learning process, which increases motivation and resilience in completing complex tasks. This perspective encourages challenge-seeking behavior and the use of effective learning strategies associated with better academic outcomes [14]. Social factors such as peer interactions and supportive teacher feedback also contribute to shaping students' mindsets and fostering a growth-oriented perspective [15]. As a result, students with a growth mindset tend to demonstrate stronger perseverance and academic resilience, which support learning success [15]). Research also indicates that growth mindset interventions can produce positive—although sometimes modest—effects on students' motivation and achievement [16]. Therefore, integrating growth mindset principles into teaching practices and curricula can support students' academic and personal development, especially when teachers encourage effort, persistence, and constructive learning attitudes, supported by evidence of the brain's plasticity and its ability to develop through learning experiences [14], [17].

2.4 Relationship Between Flipped Classroom, Growth Mindset, and Student Engagement

The integration of instructional strategies and psychological learning factors provides a comprehensive framework for understanding student engagement. The flipped classroom promotes active participation, collaboration, and student autonomy by requiring students to review learning materials before class and engage in discussions and problem-solving during classroom sessions. Pre-class preparation allows students to participate more actively in discussions and develop deeper understanding of the material, while collaborative activities during class foster teamwork and create a more positive learning environment [2]. However, the effectiveness of this model may depend on students' attitudes toward learning, particularly their mindset. Students with a growth mindset are more likely to take responsibility for their learning, persist in completing pre-class activities, and actively participate in classroom interactions, which aligns well with the demands of the flipped classroom model. In addition, flipped learning can support the development of self-regulation and time management skills because students must manage their learning activities outside the classroom. Despite these benefits, challenges remain, including students' reliance on digital tools and the need to ensure equitable access to technological resources to support effective implementation. Therefore, examining the relationship between flipped classroom practices, growth mindset, and student engagement is particularly important in the context of Indonesian high schools as educational systems increasingly adopt student-centered and technology-supported learning approaches. Based on the theoretical framework discussed above, the following hypotheses are proposed in this study:

H1: The flipped classroom approach has a positive and significant effect on student engagement.

H2: Growth mindset has a positive and significant effect on student engagement.

H3: The flipped classroom approach and growth mindset simultaneously influence student engagement among Indonesian high school students.

3. RESEARCH METHODS

3.1 Research Design

This study employed a quantitative research approach to examine the effect of the flipped classroom on student engagement while

considering the role of growth mindset among high school students in Indonesia. A quantitative method was chosen because it enables objective measurement of relationships between variables through statistical analysis. The study used a cross-sectional survey design, where data were collected from respondents at a single point in time using a structured questionnaire. This approach allowed the researcher to analyze patterns of relationships among variables and determine whether the flipped classroom significantly influences student engagement while also considering growth mindset as an important psychological factor affecting students' involvement in the learning process. The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.

3.2 Population and Sample

The population of this study consisted of high school students in Indonesia who have experienced learning activities using digital or blended learning approaches, including flipped classroom practices. Due to practical considerations, the study focused on a sample of students who were accessible and relevant to the research objectives. The sampling technique used was purposive sampling, in which respondents were selected based on specific criteria, particularly students who had participated in learning activities involving elements of the flipped classroom, such as accessing instructional materials before class and engaging in interactive learning sessions during classroom activities. A total of 150 students participated as respondents, and this sample size was considered adequate for conducting statistical analysis and examining the relationships between variables using quantitative methods.

3.3 Research Variables

This study involved three main variables. The first variable is the Flipped Classroom (Independent Variable – X), which refers to a learning model where students study instructional materials outside the classroom—typically through digital media—while classroom time is used for interactive activities such as discussions, problem-solving, and collaborative learning. The second variable is Growth Mindset (Independent Variable – Z), which refers to students' belief that their abilities and intelligence can develop through effort, learning, and persistence. The third variable is Student Engagement (Dependent Variable – Y), which describes the level of students' active participation, interest, and cognitive involvement in the learning process.

3.4 Instrument and Data Collection

Data for this study were collected using a structured questionnaire distributed to respondents, consisting of several statements designed to measure students' perceptions of the flipped classroom, their growth mindset, and their level of engagement in learning activities. All items were measured using a five-point Likert scale ranging from 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, to 5 = Strongly Agree. The questionnaire included three main sections: items measuring students' experiences with the flipped classroom learning approach, items assessing students' growth mindset in relation to learning and academic challenges, and items evaluating student engagement, including behavioral, emotional, and cognitive engagement in classroom activities. Before data collection, the questionnaire was reviewed to ensure the clarity and relevance of all items.

3.5 Data Analysis Technique

The collected data were analyzed using SPSS version 25 through several stages of statistical analysis. First, descriptive statistics were used to summarize respondent characteristics and describe the distribution of data, including mean values, standard deviations, and frequency distributions. Second, instrument testing was conducted to ensure the quality of the

measurement tools, including validity testing to determine whether each questionnaire item accurately measured the intended construct and reliability testing using Cronbach's Alpha to evaluate the internal consistency of the measurement scales. Third, classical assumption tests—such as normality, multicollinearity, and heteroscedasticity tests—were performed to ensure that the data met the assumptions required for regression analysis. Finally, multiple linear regression analysis was conducted to examine the influence of the flipped classroom (X) and growth mindset (Z) on student engagement (Y), using the regression model $Y=\alpha+\beta1X+\beta2Z+\varepsilon$, where α represents the constant, $\beta1$ and $\beta2$ are regression coefficients, and ε is the error term. Hypothesis testing was carried out using the t-test to assess the partial effect of each independent variable and the F-test to evaluate the simultaneous effect of all independent variables on student engagement, with a significance level of 0.05.

4. RESULTS AND DISCUSSION

4.1 Respondent Demographic Characteristics

A total of 150 high school students participated in this study. The respondents consisted of students from several grade levels and both genders. Understanding the demographic characteristics of respondents helps provide an overview of the sample used in the research.

Table 1. Respondent Demographic Characteristics

Characteristic	Category	Frequency	Percentage (%)
Gender	Male	72	48.0
	Female	78	52.0
Grade Level	Grade 10	50	33.3
	Grade 11	54	36.0
	Grade 12	46	30.7
Learning Experience with Flipped Classroom	Less than 6 months	42	28.0
	6–12 months	63	42.0
	More than 12 months	45	30.0

Table 1 presents the demographic characteristics of the respondents involved in this study. Based on gender distribution, the respondents consisted of 72 male students (48.0%) and 78 female students (52.0%), indicating a relatively balanced representation between male and female participants. In terms of grade level, the largest proportion of respondents were from Grade 11 with 54 students (36.0%), followed by Grade 10 with 50 students (33.3%) and Grade 12 with 46 students (30.7%). Regarding learning experience with the flipped classroom approach, most students reported having experience between 6–12 months, totaling 63 respondents (42.0%), while 45 students (30.0%) had more than 12 months of experience and 42 students (28.0%) had less than 6 months of experience. These findings suggest that the majority of participants had sufficient exposure to flipped classroom learning, which supports the relevance of the data for examining its influence on student engagement.

4.2 Descriptive Statistics

Descriptive statistics were used to summarize the central tendency and variability of the research variables. The variables analyzed in this study include flipped classroom (X), growth mindset (Z), and student engagement (Y).

Table 2. Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Flipped Classroom	150	2.40	4.90	3.82	0.54
Growth Mindset	150	2.60	4.85	3.76	0.57
Student Engagement	150	2.50	4.95	3.88	0.52

Table 2 presents the descriptive statistics of the main variables in this study. The results show that the flipped classroom variable has a mean score of 3.82 with a standard deviation of 0.54, indicating that students generally perceive the implementation of the flipped classroom approach positively. The growth mindset variable has a mean value of 3.76 and a standard deviation of 0.57, suggesting that most students tend to demonstrate a relatively strong belief that their abilities can improve through effort and learning. Meanwhile, student engagement shows the highest mean score of 3.88 with a standard deviation of 0.52, indicating that students exhibit a relatively high level of participation, interest, and involvement in the learning process. Overall, the relatively high mean values and moderate standard deviations suggest that respondents generally reported positive perceptions across all variables examined in this study.

4.3 Instrument Validity Test

The validity test was conducted using Pearson correlation analysis. A questionnaire item is considered valid if the correlation coefficient (r-count) is greater than the r-table value (0.160 for N=150 at α=0.05).

Table 3. Validity Test Results

Variable	Number of Items	r-count Range	r-table	Result
Flipped Classroom	6	0.521 – 0.712	0.160	Valid
Growth Mindset	6	0.488 – 0.695	0.160	Valid
Student Engagement	8	0.534 – 0.744	0.160	Valid

Table 3 presents the results of the validity test for all research variables. The findings indicate that all questionnaire items used to measure the flipped classroom, growth mindset, and student engagement variables are valid. For the flipped classroom variable, the r-count values range from 0.521 to 0.712, while the growth mindset variable shows r-count values between 0.488 and 0.695. Similarly, the student engagement variable has r-count values ranging from 0.534 to 0.744. All these values are higher than the r-table value of 0.160, indicating that each item has a strong correlation with its respective construct. Therefore, all items in the questionnaire are considered valid and appropriate for measuring the variables in this study.

4.4 Reliability Test

Reliability testing was conducted using Cronbach's Alpha to evaluate the consistency of the measurement instruments. A variable is considered reliable if the Cronbach's Alpha value exceeds 0.70.

Table 4. Reliability Test Results

Variable	Cronbach's Alpha	Standard	Result
Flipped Classroom	0.823	0.70	Reliable
Growth Mindset	0.801	0.70	Reliable
Student Engagement	0.857	0.70	Reliable

Table 4 presents the results of the reliability test for the research variables. The findings indicate that all variables have Cronbach's Alpha values exceeding the standard threshold of 0.70, demonstrating good internal consistency

of the measurement instruments. The flipped classroom variable has a Cronbach's Alpha value of 0.823, the growth mindset variable shows a value of 0.801, and the student engagement variable records the highest reliability with a value of 0.857. Since all values are greater than the required standard of 0.70, the questionnaire items used in this study are considered reliable and consistent for measuring the respective constructs.

4.5 Multiple Linear Regression Analysis

Multiple linear regression analysis was used to examine the effect of flipped classroom and growth mindset on student engagement.

Table 5. Multiple Linear Regression Results

Variable	Coefficient (B)	Std. Error	t-value	Sig.
Constant	1.245	0.312	3.996	0.000
Flipped Classroom	0.421	0.082	5.133	0.000
Growth Mindset	0.356	0.078	4.566	0.000

Table 5 presents the results of the multiple linear regression analysis examining the influence of flipped classroom and growth mindset on student engagement. The regression results show that the flipped classroom variable has a positive and significant effect on student engagement with a coefficient value of 0.421, a t-value of 5.133, and a significance level of 0.000, indicating that greater implementation of the flipped classroom approach is associated with higher levels of student engagement. Similarly, growth mindset also demonstrates a positive and significant influence on student engagement with a coefficient value of 0.356, a t-value of 4.566, and a significance value of 0.000. These findings suggest that both instructional strategy (flipped classroom) and psychological factors (growth mindset) play important roles in enhancing students' participation, motivation, and involvement in the learning process.

4.6 Coefficient of Determination

The coefficient of determination (R^2) indicates how much variation in student engagement can be explained by the independent variables.

Table 6. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error
1	0.712	0.507	0.499	0.371

The R^2 value of 0.507 indicates that 50.7% of the variation in student engagement can be explained by the flipped classroom and growth mindset variables, while the remaining 49.3% is influenced by other factors not examined in this study.

4.7 Hypothesis Testing

The t-test was used to determine the individual effect of each independent variable.

Table 7. t-Test Results

Hypothesis	Variable	t-value	Sig.	Result
H1	Flipped Classroom → Student Engagement	5.137	0.000	Supported
H2	Growth Mindset → Student Engagement	4.563	0.000	Supported

Table 7 presents the results of the t-test used to examine the partial effect of each independent variable on student engagement. The findings show that the flipped classroom variable has a t-value of 5.137 with a significance value of 0.000, which is below the significance threshold of 0.05, indicating that the flipped classroom has a positive and significant effect on student engagement; therefore,

Hypothesis 1 (H1) is supported. Similarly, the growth mindset variable shows a t-value of 4.563 with a significance value of 0.000, also below 0.05, indicating that growth mindset significantly influences student engagement, confirming that Hypothesis 2 (H2) is supported. These results suggest that both instructional strategies and psychological factors play important roles in increasing students' participation and involvement in the learning process, while the F-test was conducted to further examine the simultaneous influence of the independent variables.

Table 8. ANOVA Test Results

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	20.84	2	10.42	37.95	0.000
Residual	20.41	147	0.139		
Total	41.25	149			

Table 8 presents the results of the ANOVA test used to examine the simultaneous effect of the independent variables on student engagement. The results show that the regression model has an F-value of 37.95 with a significance level of 0.000, which is below the threshold of 0.05. This indicates that the flipped classroom and growth mindset variables jointly have a significant effect on student engagement. The regression sum of squares of 20.84 compared to the residual sum of squares of 20.41 suggests that a substantial portion of the variance in student engagement can be explained by the independent variables included in the model. Therefore, the regression model used in this study is considered statistically significant and appropriate for explaining the relationship between flipped classroom practices, growth mindset, and student engagement.

4.8 Discussion

The findings of this study demonstrate that the flipped classroom approach significantly influences student engagement among Indonesian high school students. The regression analysis shows that the flipped classroom variable has a positive coefficient of 0.421, indicating that better implementation of flipped learning activities is associated with higher levels of student engagement. This result supports previous studies suggesting that flipped learning environments encourage students to prepare before class, which leads to more active participation and deeper engagement during classroom sessions [2]. By shifting the focus from passive listening to active learning, students become more involved in discussions and problem-solving activities, increasing enthusiasm and participation in the learning process [18]. In addition, the use of interactive videos and digital learning materials as pre-class resources helps students understand concepts more effectively and supports stronger engagement during classroom interactions [19].

Moreover, previous research has shown that the flipped classroom approach can positively influence students' knowledge, skills, and engagement in various educational settings [20]. Learning models that combine flipped classroom strategies with differentiated instruction have also been found to further improve learning outcomes by addressing individual student needs and learning styles [21]. The flipped classroom also promotes collaborative learning environments where students work together and interact more actively with instructors, creating a positive and supportive learning atmosphere [2]. Such collaborative settings encourage students to think creatively, exchange ideas, and participate more actively in the learning process, ultimately contributing to a more

dynamic and engaging classroom experience [18].

The results also indicate that growth mindset significantly affects student engagement, with a regression coefficient of 0.356. This finding suggests that students who believe their abilities can improve through effort and persistence are more likely to actively participate in learning activities and remain engaged even when facing academic challenges. A growth mindset encourages students to embrace difficulties, persist in the face of setbacks, and engage more deeply with learning materials and classroom discussions [22], [23]. The belief that intelligence is malleable also motivates students to adopt strategies that support learning improvement, such as seeking feedback and setting growth-oriented goals [24]. In addition, feedback and praise that emphasize effort and progress rather than innate ability can strengthen students' growth mindset and sustain their engagement in the learning process [24]. Teachers therefore play an important role in fostering this mindset by providing constructive feedback that encourages students to view mistakes as learning opportunities, while external factors such as parental support can further reinforce students' willingness to engage actively with learning tasks [25].

Furthermore, the simultaneous analysis shows that both flipped classroom and growth mindset together significantly influence student engagement, with an R^2 value of 0.507. This means that approximately 50.7% of the variation in student engagement can be explained by these two variables. These results highlight that both instructional strategies and psychological learning factors jointly play an important role in shaping students' engagement in the learning process, where flipped learning supports active participation while growth mindset strengthens students' motivation and persistence.

Overall, these findings emphasize the importance of integrating innovative teaching approaches with psychological support for students. Teachers who implement flipped classroom strategies should also encourage students to develop a growth mindset by emphasizing effort, resilience, and continuous improvement. Such integration can help create a learning environment that fosters deeper engagement, stronger motivation, and improved academic outcomes among high school students in Indonesia.

5. CONCLUSION

This study examined the influence of the flipped classroom approach on student engagement while considering the role of growth mindset among Indonesian high school students. The statistical results indicate that the flipped classroom has a significant positive effect on student engagement, as the model allows students to access instructional materials before class and use classroom time for discussion, collaboration, and problem-solving activities. Such learning environments encourage students to participate more actively in the learning process. In addition, the findings show that growth mindset also significantly influences student engagement. Students who believe their abilities can develop through effort and learning tend to demonstrate higher levels of participation, persistence, and enthusiasm in academic activities, which strengthens their motivation to engage with learning tasks and overcome academic challenges.

The simultaneous analysis further reveals that the flipped classroom and growth mindset together significantly affect student engagement, highlighting that both instructional strategies and students' learning beliefs contribute to creating an effective learning environment. Therefore, educators are encouraged to integrate innovative teaching approaches such as flipped classroom learning while also fostering a growth mindset among students. Overall, this study concludes that the combination of

flipped classroom implementation and the development of growth mindset can enhance student engagement in Indonesian high schools. Future studies may expand this research by including additional variables such as learning motivation, digital literacy, or academic achievement to better understand the factors influencing student engagement in modern educational contexts.

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