The Effect of Learning Resources, School Environment, and School Culture in Increasing Accounting Student Learning Outcomes

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Abstract: This study aims to analyze the influence of learning resources, school environment, and school culture on student learning outcomes in the Accounting Department at SMK Negeri 6 Surakarta. A quantitative approach was employed using an explanatory survey method. The sample consisted of 179 students selected through proportionate stratified random sampling from a total population of 323 students. Data were collected using a four-point Likert scale questionnaire that had been tested for validity and reliability. Data analysis was conducted using multiple linear regression. The results showed that the three independent variables simultaneously had a significant effect on student learning outcomes (Prob. F = 0.000; R^2 = 0.719). Partially, school culture had the most dominant influence (β_3= 0.440; p = 0.000), followed by the school environment (β_2= 0.270; p = 0.000), and learning resources (β_1= 0.134; p = 0.024). These findings underscore the importance of a holistic approach in efforts to improve the quality of vocational education, particularly through the optimization of learning resource management, the creation of a conducive school environment, and the strengthening of school culture. This study contributes to the development of an integrated conceptual model relevant to managerial practices and educational policy at the vocational high school level.

Abstrak: Penelitian ini bertujuan untuk menganalisis pengaruh sumber belajar, lingkungan sekolah, dan budaya sekolah terhadap hasil belajar siswa pada Jurusan Akuntansi di SMK Negeri 6 Surakarta. Pendekatan yang digunakan adalah kuantitatif dengan metode survei eksplanatori. Sampel terdiri atas 179 siswa yang dipilih melalui teknik *proportionate stratified random sampling* dari total populasi sebanyak 323 siswa. Instrumen pengumpulan data berupa kuesioner skala Likert empat poin yang telah diuji validitas dan reliabilitasnya. Analisis data dilakukan menggunakan regresi linier berganda. Hasil penelitian menunjukkan bahwa secara simultan ketiga variabel independen berpengaruh signifikan terhadap hasil belajar siswa (Prob. F = 0,000; R^2 = 0,719). Secara parsial, budaya sekolah memberikan pengaruh paling dominan (β_3 = 0,440; p = 0,000), diikuti oleh lingkungan sekolah (β_2 = 0,270; p = 0,000), dan sumber belajar (β_1 = 0,134; p = 0,024). Temuan ini menegaskan pentingnya pendekatan holistik dalam upaya peningkatan mutu pendidikan vokasional, khususnya melalui optimalisasi pengelolaan sumber belajar, penciptaan lingkungan sekolah yang kondusif, serta penguatan budaya sekolah. Penelitian ini memberikan kontribusi terhadap pengembangan model konseptual terintegrasi yang relevan bagi praktik manajerial dan kebijakan pendidikan di tingkat sekolah menengah kejuruan.

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A. Introduction

Education plays a central role in the development of a nation (Schofer et al., 2021). Apart from being a vehicle for transferring knowledge, education also serves as a foundation for character development, enhancing 21st-century skills, and enhancing the competitiveness of human resources. This role is becoming increasingly important amid the growing complexity of global challenges. In formal education, student learning outcomes are the primary indicator of the success of the learning process (Huang, C. L. et al., 2020; Rao, 2020). Learning outcomes reflect the extent to which students can achieve educational goals in terms of cognitive, affective, and psychomotor aspects (Hoque, 2016; Musso et al., 2020). Therefore, understanding the factors that influence learning outcomes is very important for all stakeholders in education.

One of the factors proven to affect learning outcomes is access to learning resources (Christ et al., 2017; Andesta et al., 2021; Distyasa et al., 2021; Agustina et al., 2022; Habibi et al., 2022). Learning resources are not limited to teaching materials and educators but also encompass the physical environment and technological media used in the learning process (Agustina et al., 2022). The availability and optimal utilization of learning resources can enhance concept understanding, foster active student involvement, and boost learning motivation (Almulla & Alamri, 2021; Azzahra et al., 2024).

In addition to learning resources, the school environment also plays a significant role in supporting student learning success (Martina et al., 2019; Bonem et al., 2020; Kibriya & Jones, 2021; Shodiq & Darmawan, 2025). The school environment encompasses various aspects, including the quality of the relationship between teachers and students, the availability of learning facilities, and the level of discipline applied (Barokah & Yulianto, 2019). A clean, safe, and comfortable school environment can create a conducive learning atmosphere and provide psychological comfort for students (Cayubit, 2022). Positive social interactions between teachers and students, a harmonious classroom atmosphere, and adequate physical facilities are important elements of the school environment that support learning (Lakkala et al., 2021).

In addition, school culture also plays a strategic role in shaping character and improving student academic achievement (Amtu et al., 2020; Breinholt & Jæger, 2020; Purnadewi et al., 2023; Tusadya & Sylvia, 2025). School culture reflects the values, norms, and habits adopted and practiced by all school members, ultimately shaping the institutional identity. A strong school culture can foster the development of discipline, responsibility, cooperation, and enthusiasm for learning among students (Koç et al., 2024). A positive culture is also characterized by teachers' collective efficacy, a culture of trust among school members, academic optimism, and a humanistic approach to learning interactions (Pranata & Gistituati, 2024; Jafar, 2022).

These three aspects—learning resources, school environment, and school culture—have been shown to positively influence learning outcomes, although most previous studies have examined them separately. There is still a gap in studies that integrate these three factors as a whole, especially in vocational education in Indonesia. Previous research tends to focus

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on general schools or upper secondary education rather than Vocational High Schools (SMK) (Irwandi & Fajeriadi, 2020; Saputra & Yudha, 2021; Tusadya & Sylvia, 2025). SMK has learning characteristics that are more applicable and oriented toward work skills and readiness to face the world of industry (Rahmi et al., 2021). Therefore, a more comprehensive understanding of how these three factors simultaneously affect student learning outcomes in the SMK environment is needed. Thus, the purpose of this study is to analyze the effect of learning resources, school environment, and school culture on student learning outcomes majoring in Accounting at SMK Negeri 6 Surakarta.

The results of this study are expected to make a practical contribution to education stakeholders, including principals, teachers, and policymakers, in designing strategies to improve learning quality. These strategies include optimizing the use of learning resources, fostering a conducive school environment, and promoting a positive school culture. In addition, the findings of this study are expected to serve as the basis for formulating more targeted and relevant policies, as well as providing a reference for developing programs to enhance the quality of education in Vocational High Schools (SMK). Thus, this research not only addresses academic issues but also provides concrete solutions for strengthening Indonesia's vocational education system.

B. Method

This study employs a quantitative approach with an explanatory survey method (Ivankova et al., 2006; Mulisa, 2022), which aims to examine the effects of learning resources, school environment, and school culture on student learning outcomes in the accounting department at SMK Negeri 6 Surakarta. This approach was chosen because it allows researchers to measure and analyze the influence of each educational factor, both partially and simultaneously, on students' academic achievement. The population in this study comprises all students majoring in accounting in grades X, XI, and XII at SMK Negeri 6 Surakarta, totaling 323 individuals. The sampling technique employs a *proportionate stratified random sampling* approach, ensuring that each stratum (grade level) is proportionally represented (Iliyasu & Etikan, 2021). The number of samples was determined using the Slovin formula (Tejada & Punzalan, 2012) with a *margin of error* of 5%, with the following formula:

$$n = \frac{N}{1 + Ne^2} \quad (1)$$

$$n = \frac{323}{1 + 323(0.05)^2} = \frac{323}{1 + 323(0.0025)} = \frac{323}{1 + 0.8075} = \frac{323}{1.8075} \approx 178.699\ (179) \quad (2)$$

In the formula, n represents the number of samples, N is the population (323 students), and e is the error rate of 0.05. Based on these calculations, a sample size of 179 respondents was obtained, which is considered representative of the population's characteristics as a whole. More detailed information about the population and sample is presented in Table 1.

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Table 1. Details of the Research Population and Sample

Class	Population	Sample
X Accounting	108	59
XI Accounting	107	60
XII Accounting	108	60
Total	323	179

The primary instrument used in this study was a questionnaire with a four-point Likert scale, specifically: 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly Agree (Barua, 2013). The questionnaire was prepared based on the theoretical indicators of each variable. The variables in this study include learning resources, school environment, school culture, and learning outcomes. Full details of the variables in this study can be seen in Table 2.

Table 2. Variable Indicators (Learning Resources, School Environment, School Culture, and Student Learning Outcomes)

Variable	Indicators	Source
Learning Resources	Teaching materials, physical environment, technology media, and educators	(Agustina et al., 2022)
School Environment	Teacher and student relationships, learning facilities, and discipline	(Barokah & Yulianto, 2019)
School Culture	A culture of collective efficacy, a culture of trust, a culture of academic optimism, and a humanistic approach.	(Pranata & Gistituati, 2024)
Learning Outcomes	Cognitive, affective, and psychomotor aspects	(Hoque, 2016)

The content validity of the instrument was assessed through *expert judgment* by academics with expertise in the field of education (Almanasreh et al., 2019). Furthermore, construct validity and item reliability were assessed using item-total correlation analysis and *Cronbach's Alpha* coefficient (Kimberlin & Winterstein, 2008), with a minimum reliability value of 0.600 used as a reference. Data collection was conducted through direct classroom distribution of questionnaires and non-participant observation (Cooper et al., 2004) to strengthen qualitative data related to environmental conditions and school culture. The collected data were analyzed using multiple linear regression methods (Uyanık & Güler, 2013) to test the simultaneous and partial effects of the independent variables on student learning outcomes. The multiple linear regression model used was formulated as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon \quad (3)$$

In the model, Y represents student learning outcomes. The variables X1, X2, and X3 represent learning resources, school environment, and school culture, respectively. Meanwhile, β_0 indicates a constant, while $\beta 1$, $\beta 2$, and $\beta(2)$ are the regression coefficients of each independent variable. Meanwhile, ε represents the *error term* or error factor. Before the

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model is estimated, a classical assumption test is conducted to ensure that the regression model meets the BLUE (*Best Linear Unbiased Estimator*) criteria (Puntanen & Styan, 1989). The assumption tests include a residual normality test using *the Kolmogorov-Smirnov* test (Cardoso & Galeno, 2023), a multicollinearity test through *the Variance Inflation Factor* (VIF) value (O'Brien, 2007), and a heteroscedasticity test with *the Glejser* method (Glejser, 1969).

Hypothesis testing is carried out using two main statistical approaches: the *F-test* (simultaneous) and *the t-test* (partial), which are part of multiple linear regression analysis. The *F-test* is used to test the simultaneous effect of the three independent variables on the dependent variable. The null hypothesis (*H0*) states that there is no joint influence of learning resources, school environment, and school culture on student learning outcomes. Conversely, the alternative hypothesis (*HA*) posits that the three variables collectively impact student learning outcomes. The decision is based on the significance value (*p-value*), where *H0 is* rejected if $p < 0.05$.

In addition to the *F-test*, a *t-test* was also conducted to assess the effect of each independent variable on the dependent variable. The null hypothesis (*H0*) in the *t-test* states that $\beta_i = 0$ ($i = 1, 2,$ and 3), which means that each independent variable does not affect student learning outcomes. Meanwhile, the alternative hypothesis (*HA*) states that $\beta_i \neq 0$, indicating a significant effect of each independent variable on student learning outcomes. The decision is made based on the significance value of the *t-test*, with *H0 rejected* if $p < 0.05$. In addition, the coefficient of determination (R^2) test was also conducted to determine how much the independent variables contributed to explaining variations in the dependent variable.

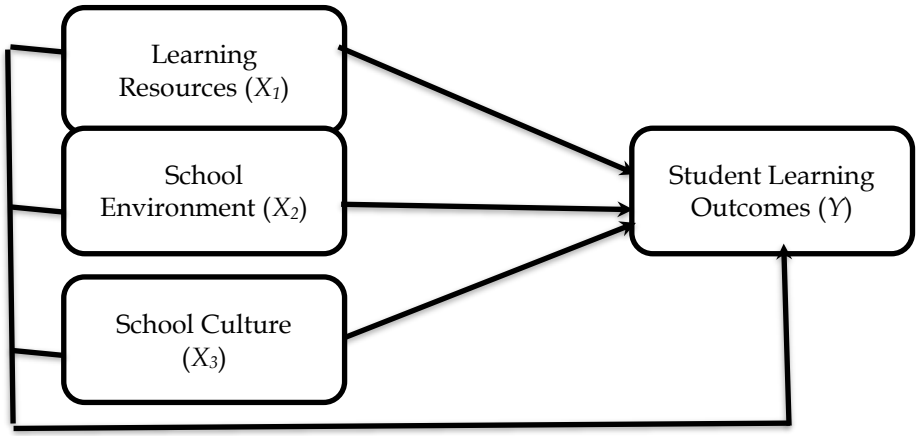

Figure 1. Research Flow

C. Result

The validity test was conducted to assess the extent to which each question item in the instrument accurately measured the intended variable construct. The method used in this test is Pearson correlation analysis, which compares the score of each item with the total score of the variable. The validity test results are presented in detail in Tables 3 (learning resources), 4 (school environment), 5 (school culture), and 6 (learning outcomes).

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Table 3. Validity of Learning Resources Variable (X_1)

Statement	Learning Resources (X_1)	
	Pearson Correlation	Sig.
Item 1	0,784*	0,000
Item 2	0,854*	0,000
Item 3	0,767*	0,000
Item 4	0,802*	0,000
Item 5	0,456*	0,000

Source: Questionnaire, processed by the author 2025.
Notes: **pearson correlation* is significant at *a* (<0.01).

Table 3 shows that all items on the learning resource variable (X_1) have a significant *Pearson* correlation coefficient value at the 0.01 significance level. This is evidenced by the significance value (*Sig*.) of 0.000 for all items, which is smaller than the threshold of 0.01 (0.000 <0.01). Therefore, all items are declared valid. *Pearson* correlation coefficient values range from 0.456 to 0.854. The lowest correlation was found in the 5th item (r = 0.456), while the highest correlation was found in the 2nd item (r = 0.854). Although there are variations in the strength of the correlation, all values remain within the statistically acceptable range for stating item validity, as they meet the significance requirement (p < 0.01). Thus, it can be concluded that all instrument items on the learning resources variable have adequate construct validity.

Table 4. Validity of School Environment Variable (X_2)

Statement	School Environment (X_2)	
	Pearson Correlation	Sig.
Item 1	0,602*	0,000
Item 2	0,655*	0,000
Item 3	0,617*	0,000
Item 4	0,735*	0,000
Item 5	0,608*	0,000
Item 6	0,687*	0,000

Source: Questionnaire, processed by the author 2025.
Notes: **pearson correlation* is significant at *a* (<0.01).

Table 4 shows that all items on the school environment variable (*X2)* have a significant *Pearson* correlation value at the 0.01 significance level, with a significance value of 0.000 for each item. Since the significance value is smaller than the threshold of 0.01 (0.000 < 0.01), all items are statistically valid. The correlation coefficient between items ranged from 0.602 to 0.735, indicating a moderate to strong relationship strength between each item and the total score of the construct. The 4th item shows the highest correlation (r = 0.735), while the 1st item has the lowest correlation (r = 0.602). Nevertheless, all correlation values remain above the minimum limit (r > 0.30), indicating that all items consistently represent the school environment construct and meet the criteria for instrument item validity.

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Table 5. Validity of School Culture Variable (X_3)

Statement	School Culture (X_3)	
	Pearson Correlation	Sig.
Item 1	0,812*	0,000
Item 2	0,635*	0,000
Item 3	0,796*	0,000
Item 4	0,763*	0,000

Source: Questionnaire, processed by the author 2025.
Notes: **pearson correlation* is significant at α (<0.01).

Table 5 shows that all items on the school culture variable (X_3) have significant *Pearson* correlation values at the 0.01 significance level. All items show a significance value of 0.000, which is below the 0.01 threshold (0.000 < 0.01), thus indicating a significant correlation between each item and the total variable score. The item correlation coefficient ranges from 0.635 to 0.812. The 1st item has the highest correlation coefficient (r = 0.812), while the 2nd item shows the lowest correlation (r = 0.635). Based on the criteria for item validity, namely a significant correlation with a value of r> 0.30, all items on the school culture variable can be declared valid and suitable for use in measuring the intended construct.

Table 6. Validity of Student Learning Outcomes Variable (Y)

Statement	Student Learning Outcomes (Y)	
	Pearson Correlation	Sig.
Item 1	0,689*	0,000
Item 2	0,665*	0,000
Item 3	0,614*	0,000
Item 4	0,735*	0,000
Item 5	0,673*	0,000

Source: Questionnaire, processed by the author 2025.
Notes: **pearson correlation* is significant at *a* (<0.01).

Table 6 shows that all items in the student learning outcomes variable (Y) have significant *Pearson* correlation values at the 0.01 significance level. The significance value for all items is 0.000, which is smaller than the threshold of 0.01 (0.000 < 0.01). Thus, all items are statistically valid. The correlation coefficient between items ranges from 0.614 to 0.735, which falls into the moderate to strong category. The 4th item has the highest correlation to the total score (r = 0.735), while the 3rd item shows the lowest correlation (r = 0.614). Although there are differences in the level of correlation, all items still meet the validity criteria and can adequately represent the construct of student learning outcomes.

Table 7. Reliability of Research Variables X_1, X_2, X_3, and Y

Variable	Cronbach's Alpha	Sig.
Learning Resources (X1)	0,786*	0,600

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Variable	Cronbach's Alpha	Sig.
School Environment (X2)	0,727*	0,600
School Culture (X3)	0,739*	0,600
Student Learning Outcomes (Y)	0,700*	0,600

Source: Questionnaire, processed by the author 2025.
Notes: *Cronbach's Alpha is* significant at *a* (> 0.600).

Table 7 presents the *Cronbach's alpha* values for the four variables in this study: learning resources (X1), school environment (X2), school culture (X3), and student learning outcomes (Y), which are 0.786, 0.727, 0.739, and 0.700, respectively. The instrument is declared to have good reliability if *Cronbach's alpha* value exceeds the minimum threshold of 0.600. All values obtained in this study exceed this limit (*a* > 0.600), indicating that each construct has adequate internal reliability. Therefore, the instruments used to measure the four variables are deemed reliable and suitable for further analysis.

Table 8. Multicollinearity Test Results

	Learning Resources	School Environment	School Culture
VIF	1,253	1,982	1,821
Tolerance	0,798	0,504	0,549

Source: Questionnaire, processed by the author 2025.
Notes: VIF (*Variance Inflation Factor).*

Table 8 shows that the multiple linear regression model in this study is free from multicollinearity problems. This is indicated by the *Variance Inflation Factor* (VIF) values for each independent variable: learning resources (1.253), school environment (1.982), and school culture (1.821). All VIF values are far below the standard threshold of 10, even lower than the conservative value of 5. This indicates that there is no high correlation between the independent variables. In addition, the *tolerance* values of the three variables also exceeded the minimum limit of 0.10, at 0.798 (learning resources), 0.504 (school environment), and 0.549 (school culture), respectively. These values indicate that there is no redundancy of information among the independent variables in predicting the dependent variable, namely student learning outcomes. Thus, it can be concluded that all independent variables fulfill the assumption of no multicollinearity. The regression model used warrants further analysis because it meets the *Best Linear Unbiased Estimator* (BLUE) criteria, particularly in terms of independence between predictors.

Table 9. Residual Normality Test Results

Kolmogorov-Smirnov		
Sig.	**α**	**Decision**
0,280	0,1	Data is normally distributed (0.280 > 0.1)

Source: Questionnaire, processed by the author 2025.

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Table 9 shows that the residual distribution in the regression model fulfills the assumption of normality. This is evidenced by the *Kolmogorov-Smirnov* test results, which produce a significance value of 0.280, higher than the alpha (*a*) value of 0.10 (*p* = 0.280 > 0.10). The fulfillment of the residual normality assumption is a crucial prerequisite in classical linear regression, particularly for the validity of hypothesis testing using the *t-test* and *F-test*. If this assumption is not met, the standard error estimates can be inaccurate, which reduces the reliability of model interpretation. Therefore, the results of this test indicate that the regression model in this study has good statistical reliability and can be used for inferential analysis and generalization to the population of vocational students with similar characteristics.

Table 10. Heteroscedasticity Test Results

Glejser Test			
Variable	**Sig.**	**α**	**Decision**
Learning Resources	0,210	0,1	There is no heteroscedasticity problem (0.210 > 0.1)
School Environment	0,242	0,1	There is no heteroscedasticity problem (0.242 > 0.1)
School Culture	0,714	0,1	There is no heteroscedasticity problem (0.714 > 0.1)

Source: Questionnaire, processed by the author 2025.

Table 10 shows that the regression model is free from heteroscedasticity problems, as evidenced by the Glejser test results. The significance value for each independent variable is above the significance limit of 0.10, namely 0.210 (learning resources), 0.242 (school environment), and 0.714 (school culture). These values indicate no systematic pattern in the residual variance, which means that the model fulfills the assumption of homoscedasticity, i.e., constant error variance at all levels of prediction. This condition is important to ensure that regression parameter estimates are efficient and unbiased. Thus, the regression model in this study fulfills the conditions of error stability and can be declared statistically feasible, in line with the *BLUE* principle.

Table 11. Multiple Linear Regression Results

Variable	**Coefficient**	**Sig.**	**Decision**
Learning Resources	0,134	0,024	Significantly influenced (*a* 0.05)
School Environment	0,270	0,000	Significantly influenced (*a* 0.01)
School Culture	0,440	0,000	Significantly influenced (*a* 0.01)
Coefficient of Determination (R^2) = 0,719			
Prob. *F* = 0,000			

Source: Questionnaire, processed by the author 2025.

Table 11 shows that all independent variables-learning resources, school environment, and school culture-have a significant effect on the dependent variable, namely student learning outcomes. The significance value of each variable is below the *a* = 0.05 limit, and even the school environment and school culture show a significance level of *a* = 0.01, indicating a

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powerful relationship. The regression coefficient indicates that school culture has the most significant influence on student learning outcomes ($\beta 3$ = 0.440), followed by school environment ($\beta 2$ = 0.270) and learning resources ($\beta 1$ = 0.134). The coefficient of determination (R^2 = 0.719) indicates that the three independent variables can explain 71.9% of the variation in student learning outcomes, while other factors outside the model explain the remaining 28.1%. In addition, the F probability value of 0.000 indicates that the three independent variables have a significant effect on student learning outcomes simultaneously.

D. Discussion

The results of this study indicate that learning resources have a significant impact on student learning outcomes ($\beta 1$ = 0.134; p = 0.024). This finding confirms the importance of access to relevant, interactive, and quality learning materials in supporting an effective learning process. This aligns with Huang, R. et al (2020), which states that learning resources play a significant role in enhancing students' cognitive and affective engagement. Support for these results was also found in the studies of Al-Abdullatif & Gameil (2021) and García-López et al (2023), which showed that the utilization of educational technologies—such as e-learning and mobile learning—not only increased learning motivation but also had a significantly positive impact on students' academic engagement and achievement. Thus, the quality and variety of learning resources play a strategic role in creating an effective and inclusive learning environment.

This finding is also reinforced by Chen et al (2020), which emphasizes the importance of diversifying learning media, including text, audio, visual, and interactive simulations, in improving concept understanding and retention. In self-paced learning, strategies such as practice testing and distributed practice are effective in strengthening long-term memory and building meaningful knowledge (Gerbier & Toppino, 2015). This finding implies that the development of learning resources should be adaptive, varied, and tailored to each student's learning style and needs. Therefore, the existence of pedagogically designed and technology-based learning resources not only enhances the quality of learning but also supports the implementation of student-centered, differentiated learning in the context of 21st-century education.

This study also found that the school environment has a significant impact on student learning outcomes ($\beta 2$ = 0.270; p = 0.000). A safe, supportive, and inclusive learning environment not only creates physical comfort but also supports students' psychosocial well-being, which is a key prerequisite for learning readiness. Li et al (2018) showed that students' perceptions of emotional and social support at school were positively correlated with academic achievement and mental health. This finding is reinforced by Zysberg et al (2021), who states that a fair and orderly school climate can increase students' intrinsic motivation and self-efficacy. Therefore, the psychosocial dimension of the school environment has been proven to be a significant factor in improving learning outcomes.

The success of creating a conducive learning environment is primarily determined by the quality of the principal's leadership, the professionalism of teachers, and the harmonious

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social relationships among school community members. Dutta & Sahney (2022) assert that these factors have a systemic impact on strengthening positive school culture and encouraging healthy collaboration between students and educators. Thus, education quality improvement policies should not only focus on curriculum and evaluation aspects but also pay attention to reforming the physical and social environment in schools. Improving the overall quality of the learning environment will have a positive impact not only on academic achievement but also on students' character development, empathy, and resilience in facing future challenges.

In addition, school culture was found to have a significant effect on student learning outcomes ($\beta 3 = 0.440$; $p < 0.001$). As a manifestation of values, norms, and practices collectively formed by all school members, school culture influences individual behavior while shaping the learning atmosphere. Bayar & Karaduman (2021) stated that a school culture that focuses on a clear academic vision, high expectations for students, and collaboration between school members consistently contributes to improved academic achievement. Similarly, McChesney Cross (2023) suggests that the internalization of values such as respect for achievement, responsibility, and active engagement is the foundation of a positive learning culture. Within this framework, a strong academic culture serves as a social structure that fosters a sense of belonging, enhances students' intrinsic motivation, and creates a safe and supportive learning environment.

School culture transformation must be designed systematically and sustainably to create an academic climate that is inclusive, adaptable, and innovative. This includes strengthening instructional leadership, providing continuous professional development for teachers, and actively involving parents and communities in building an educational ecosystem that aligns with the school's vision. Implementing a culture that supports lifelong learning, critical thinking, and cross-role collaboration will create an educational ecosystem that is not only responsive to changing times but also able to facilitate holistic student growth. Therefore, developing a school culture that is oriented toward meaningful learning is a fundamental strategy for sustainably improving the quality of education.

Overall, the findings confirm that learning outcomes cannot be separated from the synergy between students' internal and external factors, which include the quality of learning resources, school environment, and institutional culture. Learning outcomes not only refer to academic achievement but also serve as an indicator of success in shaping 21st-century competencies, such as critical thinking skills, effective communication, collaboration, and creativity (Rahmawati & Asmawan, 2024). Therefore, a comprehensive approach to improving learning outcomes is fundamental. This approach is realized through the integration of adaptive learning resources, a supportive learning environment, and a progressive school culture. These three elements form a systemic foundation that allows each student to develop optimally in the cognitive, affective, and psychomotor domains.

The relevance of learning outcomes also needs to be linked to student's readiness to face the growing global challenges. In this case, learning outcomes should reflect a transformative learning process—that is, a process that not only produces academically outstanding students but also individuals who are resilient, reflective, and have an orientation

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towards lifelong learning (Udin & Rezania, 2024). Strengthening learning outcomes must be based on empirical and evidence-based data so that every educational intervention—whether in curriculum development, learning design, or school governance—can be directed at enhancing students' overall learning capacity (Sulastri et al., 2024). Thus, learning outcomes become a strategic benchmark in designing education policies that are inclusive, adaptive, and sustainable in the digital era and globalization

E. Implication

The results of this study make a significant contribution to the development of theory in the field of vocational education, particularly in understanding the synergistic role of learning resources, school environment, and school culture in achieving student learning outcomes. The findings strengthen the theoretical basis that learning outcomes are not only determined by students' intrapersonal factors but are also influenced by the learning system and ecosystem as a whole. Therefore, this finding can be used as a basis for developing a conceptual model that integrates these three variables to measure and improve the quality of learning in Vocational High Schools (SMK).

For principals and managers of vocational education institutions, these results emphasize the importance of increasing the availability and quality of learning resources that are interactive and by the needs of students; creating a safe, orderly, and conducive school environment for the learning process; and strengthening positive school culture through transformational leadership and active participation of all school members. Teachers are also expected to utilize these findings as a basis for designing learning strategies that are adaptive, collaborative, and oriented toward achieving holistic and sustainable learning outcomes.

More broadly, this research contributes to the strengthening of Indonesia's vocational education system. In the face of the Industrial Revolution 4.0 and *Society* 5.0 era, quality vocational education is a crucial pillar in enhancing young people's work skills and reducing unemployment. Therefore, the achievement of optimal learning outcomes, resulting from the integration of learning resources, environment, and school culture, needs to be prioritized in the formulation of national education policy.

This research also provides opportunities for further studies, such as by adding variables like parental involvement, teacher competence, learning motivation, or principal leadership style. A qualitative or mixed-methods approach could be utilized to further explore the dynamics of the relationships between variables. Additionally, testing the model at different levels of education or geographical areas would enhance the generalizability and external validity of the findings.

F. Limitation and Suggestion for Further Research

Although this study makes a meaningful contribution, several limitations should be noted. First, this study was conducted at only one vocational high school, namely SMK Negeri 6 Surakarta, so the findings may not be generalizable to other schools with different characteristics. Second, the approach used was cross-sectional, employing an instrument in

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the form of a questionnaire, which has the potential to cause perception bias and is unable to capture the dynamics of change over time. Third, the variables analyzed were limited to learning resources, school environment, and school culture. At the same time, other potentially influential factors, such as teacher teaching quality, parental involvement, and student motivation, have not been included in the research model.

Future research is recommended to expand the scope by involving multiple SMKs from diverse geographical areas to enhance the generalizability of the results. A longitudinal design could be employed to observe temporal changes in learning outcomes. A qualitative or mixed-method approach is also recommended to enrich the understanding of the experiential dimension of students and the cultural aspects of the school environment. In addition, additional variables such as digital literacy, principal leadership, and teacher pedagogical competence could be included in the model to analyze improved learning outcomes in vocational education more comprehensive.

G. Conclusion

This study demonstrates that learning resources, school environment, and school culture have a significant impact on the learning outcomes of vocational education students. Hypothesis testing through multiple linear regression analysis with *the F* test and *t-test* indicates that the three independent variables simultaneously affect the dependent variable, namely student learning outcomes, with the significance value of the *F* test <0.05. Partially, each variable also had a significant effect, with school culture proving to be the most dominant factor. Thus, the null hypothesis (*H0*) in the *F-test* and *t-test* is rejected, while the alternative hypothesis (*HA*) is accepted. This indicates that simultaneously and partially, the three variables make a real contribution to improving student learning outcomes. The coefficient of determination (*R2*= 0.719) corroborates this finding by showing that the model can explain 71.9% of the variation in student learning outcomes.

The findings have practical implications for the development of vocational education policy and practice. Schools as educational institutions need to strengthen positive school culture, including instilling the values of discipline, work ethic, responsibility, and enthusiasm for learning, as these factors contribute the most to improving learning outcomes. Optimizing the school environment, both from a physical perspective —such as the availability of facilities and infrastructure — and from a social perspective —such as creating a conducive learning climate —also needs to be prioritized. Additionally, providing relevant and accessible learning resources is a crucial element in supporting the effectiveness of the learning process.

To broaden the scope and increase the external validity of the research results, it is recommended that future studies include other variables that have the potential to influence learning outcomes, such as the quality of teaching by teachers, parental involvement, and students' intrinsic motivation. The use of a *mixed-method* approach can provide a more comprehensive understanding of the relationship between variables. Testing the model on a broader and more diverse population, including those with different levels of education or

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residing in various geographical areas, is also necessary to enhance the generalizability of the research results within the scope of national education.

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