

The influence of principal leadership, school culture, and digital literacy on the performance of teachers at state vocational high schools in Rantau utara

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ABSTRACT

This study aims to examine the influence of principal leadership, school culture, and digital literacy on teacher performance at state vocational high schools in Rantau Utara. A quantitative research approach was employed using path analysis to examine the relationships among the variables. The study involved 65 teachers selected through proportional random sampling. Data were collected using structured questionnaires and analyzed using descriptive statistics, assumption tests, simple correlation, and multiple correlation analyses with SPSS version 22.0. The findings reveal that principal leadership has a positive and significant influence on teacher performance ($r = 0.535$, p lower than 0.001), followed by digital literacy ($r = 0.528$, p lower than 0.001) and school culture ($r = 0.416$, p lower than 0.001). Simultaneously, principal leadership, school culture, and digital literacy explain 60.2% of the variance in teacher performance ($R^2 = 0.602$). These findings indicate that strengthening instructional leadership, fostering a positive school culture, and improving teachers' digital literacy are essential strategies for enhancing teacher performance. This study highlights the importance of integrating effective leadership, a supportive organizational culture, and digital competence to improve instructional quality and support the achievement of educational goals in vocational schools.

Keyword: principal leadership; school culture; digital literacy; teacher performance; vocational high school

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1. INTRODUCTION

The low quality of human resources is a fundamental issue that can hinder national economic development and progress. Therefore, human resource development must be pursued gradually and continuously through a high-quality education system encompassing formal, informal, and non-formal education from basic to higher education. Mulyasa (2021) emphasizes the importance of developing a quality education system, as various indicators demonstrate that education is capable of producing human resources that meet the evolving needs of society and national development.

Siska (2017) describes teacher performance as the actions and behaviors demonstrated by teachers in carrying out their assigned duties. Teacher performance encompasses all activities undertaken to achieve predetermined educational goals and reflects the extent to which teachers fulfill their professional responsibilities.

In the context of national educational development, teachers are pivotal figures who significantly influence the quality of education, as the performance of competent teachers directly contributes to educational quality within schools. Istikomah (2018) defines performance as the outcome of an individual's work in accordance with assigned responsibilities and expected results. In the educational context, teacher performance refers to the effective implementation of professional duties and responsibilities. Therefore, teachers must fully understand and carry out their responsibilities in order to perform their duties effectively and successfully.

Preliminary observations based on information obtained from the Vocational High School (SMK) Supervisor of Regional Branch VII reveal the current condition of teachers at state vocational high schools in Rantau Utara. The data indicate that approximately 72% of teachers have prepared lesson plans (*RPP*) in accordance with existing regulations. However, these lesson plans remain largely administrative in nature and have not fully integrated innovative instructional methods and educational technology. Meanwhile, 28% of teachers have not yet prepared lesson plans optimally. Regarding instructional implementation, 65% of teachers conduct classroom instruction in accordance with their lesson plans; however, their teaching remains predominantly conventional with limited active learning strategies. In contrast, 35% of teachers continue to experience difficulties in optimizing classroom management and utilizing instructional media. Furthermore, approximately 70% of teachers conduct student assessments but still rely primarily on written examinations, while the remaining 30% have not yet implemented authentic assessment methods or fully utilized digital technology. These findings indicate that teacher performance at state vocational high schools in Rantau Utara still requires improvement to support the continuous enhancement of educational quality.

School principals play a significant role in improving teacher performance, as both principals and teachers share the common objective of achieving meaningful educational improvement. Leaders and their subordinates influence one another through continuous interaction while working toward shared institutional goals. Consequently, principal leadership has a substantial and often decisive influence on school development. According to Ardansyah et al. (2025), principals must demonstrate high integrity because they occupy a central leadership position within the organization and are responsible for guiding all members of the school community.

Hermaida (2023) found that principal leadership and school culture significantly influence teacher performance, demonstrating that effective leadership fosters a positive school culture and encourages teachers to perform more professionally. Furthermore, Sulastika et al. (2025) concluded that principal leadership and school culture positively affect teacher performance, particularly in improving responsibility, discipline, and the quality of instructional practices. These findings suggest that strengthening principal leadership and fostering a positive school culture are important strategies for improving teacher performance.

A principal's leadership serves not only as a managerial function but also as a means of shaping the values and behavior of the school community. Through consistent leadership, principals cultivate a school culture that serves as a shared foundation for educational activities. Such leadership plays a strategic role in developing a positive school culture that is responsive to technological advancements. A supportive school culture also promotes teachers' digital literacy, which ultimately enhances their performance in the teaching and learning process. Therefore, school culture represents an essential component of the educational system, serving as the foundation for all educational activities within the school.

Flores (2004) reported that a school culture supporting teachers' continuous professional learning contributes significantly to improving instructional quality and overall school effectiveness. Such a culture enables teachers to share best practices, engage in collaborative reflection, and develop instructional strategies that are responsive to students' learning needs.

Beyond its influence on instructional quality, school culture also has important implications for interpersonal relationships within the school environment. A culture characterized by openness, mutual respect, and collaboration creates a harmonious and supportive working atmosphere. Such an environment encourages teachers to participate actively in both instructional and institutional development activities. Dutta & Sahney (2016) emphasized that the synergy between school leadership and a positive organizational culture contributes significantly to enhancing teacher performance and overall school quality.

In today's rapidly evolving educational environment, school culture not only influences the behavior and performance of the school community but also plays an important role in fostering teachers' digital literacy. Digital competence refers to the ability to effectively utilize information and communication technology (ICT) to search for, evaluate, apply, create, and share information. This competence integrates cognitive, ethical, socio-emotional, and technological dimensions (Restianty, 2018).

Judijanto et al. (2024) stated that aligning technological advancements with instructional standards remains a major challenge because many educators continue to rely on traditional teaching approaches that prioritize content delivery solely to complete the curriculum. Therefore, strengthening teachers' digital literacy has become increasingly important in improving teacher performance and instructional quality in the era of technology-based education.

This study aims to examine: (1) the influence of principal leadership on teacher performance at state vocational high schools (SMK Negeri) in Rantau Utara; (2) the influence of school culture on teacher performance; and (3) the influence of digital literacy on teacher performance.

2. RESEARCH METHOD

This study employed a quantitative research design, with data analyzed using path analysis. According to Kline (2023), path analysis is used to examine patterns of relationships among variables and to determine the direct and indirect effects of a set of independent (exogenous) variables on a dependent (endogenous) variable. The study was conducted at state vocational high schools (*SMK Negeri*) in Rantau Utara from November 2025 to March 2026.

According to Arikunto (2020), a sample is a portion of the population selected to represent the characteristics of the entire population. The sample size for this study was determined using Slovin's formula, which is commonly employed to calculate the minimum sample size from a known population at a specified margin of error. The final sample consisted of 65 respondents.

The data were analyzed using descriptive statistics, including the mean, median, range, and standard deviation. Before testing the research hypotheses, several statistical assumption tests were conducted, including multicollinearity, heteroscedasticity, and normality tests.

Hypothesis testing was performed using SPSS version 22.0 for Windows to examine the individual and simultaneous effects of principal leadership, school culture, and digital literacy on teacher performance.

3. RESULTS AND DISCUSSION

This study aims to examine the influence of principal leadership (X_1), school culture (X_2), and digital literacy (X_3) on teacher performance (Y) at state vocational high schools (*SMK Negeri*) in Rantau Utara. The analysis was conducted using data collected from 65 teachers selected through proportional random sampling.

As an initial step, descriptive analysis was conducted to examine data trends and to understand teachers' perceptions of principal leadership, school culture, digital literacy, and teacher performance before proceeding with further statistical analyses.

A. Research Data Description

Table 1 presents the descriptive statistics, including the mean, standard deviation, minimum score, and maximum score for each research variable.

Table 1. Descriptive Statistics of the Research Variables

Variable	N	Minimum Score	Maximum Score	Mean	Standard Deviation
Principal Leadership	65	34	91	65.83	13.629
School Culture	65	32	96	67.03	15.305
Digital Literacy	65	34	100	67.32	17.317
Teacher Performance	65	35	97	67.97	17.270

The descriptive analysis indicates that teachers' perceptions of all research variables tend to be positive. This is reflected in the relatively high mean scores for each variable: 65.83 for principal leadership, 67.03 for school culture, 67.32 for digital literacy, and 67.97 for teacher performance. These findings suggest that, overall, respondents provided favorable responses to the statements included in the research instrument. Therefore, it can be concluded that teachers at state vocational high schools (*SMK Negeri*) in Rantau Utara generally hold positive perceptions of principal leadership, school culture, digital literacy, and their own professional performance.

Furthermore, the minimum and maximum scores indicate considerable variation in respondents' answers while maintaining an overall positive trend. The principal leadership variable ranged from 34 to 91, the school culture variable from 32 to 96, the digital literacy variable from 34 to 100, and the teacher performance variable from 35 to 97. Meanwhile, the standard deviation values of 13.629, 15.305, 17.317, and 17.270 indicate a reasonable level of variability among respondents without excessive dispersion.

Overall, these findings suggest that teachers generally perceive principal leadership, school culture, digital literacy, and their own professional performance positively. Consequently, the variables examined in this study demonstrate favorable characteristics and warrant further statistical analysis to investigate the relationships among them.

Following the descriptive analysis, the next step was to verify that the data satisfied the required statistical assumptions. Therefore, a series of assumption tests, including normality, multicollinearity, and correlation analyses, was conducted before hypothesis testing.

B. Normality Test

Table 2. Results of the One-Sample Kolmogorov–Smirnov Normality Test

		Principal Leadership	School Culture	Digital Literacy	Teacher Performance
N		65	65	65	65
Normal Parameters ^{a,b}	Mean	65.83	67.03	67.32	67.97
	Std. Deviation	13.629	15.305	17.317	17.270
	Most Extreme Differences	Absolute	.090	.094	.072
	Positive	.057	.071	.072	.052
	Negative	-.090	-.094	-.071	-.085
Kolmogorov-Smirnov Z		.726	.762	.582	.682
Asymp. Sig. (2-tailed)		.668	.608	.887	.741

The normality test results indicate that the Principal Leadership variable obtained a Kolmogorov–Smirnov Z value of 0.726 with an Asymp. Sig. (2-tailed) value of 0.668. Since the significance value exceeds 0.05 (0.668 > 0.05), the data for the Principal Leadership variable are normally distributed.

Similarly, the School Culture variable produced a Kolmogorov–Smirnov Z value of 0.762 and an Asymp. Sig. (2-tailed) value of 0.608. Because the significance value is greater than 0.05 (0.608 > 0.05), the School Culture data also follow a normal distribution.

For the Digital Literacy variable, the Kolmogorov–Smirnov Z value was 0.582 with an Asymp. Sig. (2-tailed) value of 0.887. As this value exceeds 0.05 (0.887 > 0.05), the Digital Literacy data are considered normally distributed.

Likewise, the Teacher Performance variable yielded a Kolmogorov–Smirnov Z value of 0.682 and an Asymp. Sig. (2-tailed) value of 0.741. Since the significance value is greater than 0.05 (0.741 > 0.05), the Teacher Performance data also satisfy the assumption of normality.

Overall, these results indicate that all research variables are normally distributed and therefore meet one of the fundamental assumptions required for subsequent statistical analyses.

C. Multicollinearity Test

Table 3. Results of the Multicollinearity Test

		Principal Leadership	School Culture	Digital Literacy
Principal Leadership	Pearson Correlation	1	.052	.121
	Sig. (2-tailed)		.682	.336
	N	65	65	65
School Culture	Pearson Correlation	.052	1	.179
	Sig. (2-tailed)	.682		.154
	N	65	65	65
Digital Literacy	Pearson Correlation	.121	.179	1
	Sig. (2-tailed)	.336	.154	
	N	65	65	65

The correlation analysis between the independent variables shows that the correlation coefficient between Principal Leadership (X₁) and School Culture (X₂) is $r_{12} = 0.052$, which is lower than the critical value ($r_{\text{table}} = 0.244$) at the 5% significance level. Therefore, Principal Leadership and School Culture are statistically independent.

Similarly, the correlation coefficient between Principal Leadership (X₁) and Digital Literacy (X₃) is $r_{13} = 0.121$, which is also lower than the critical value ($0.121 < 0.244$). This result indicates that these two variables are statistically independent.

The correlation coefficient between School Culture (X₂) and Digital Literacy (X₃) is $r_{23} = 0.179$, which likewise remains below the critical value ($0.179 < 0.244$). Consequently, School Culture and Digital Literacy do not exhibit a significant correlation.

Overall, the results indicate that the independent variables are not significantly correlated with one another, suggesting that multicollinearity is not a concern in this study.

D. Simple Correlation

Table 4. Results of the Simple Correlation Analysis

		Teacher Performance
Principal Leadership	Pearson Correlation	.535**
	Sig. (2-tailed)	.000
	N	65
School Culture	Pearson Correlation	.416**
	Sig. (2-tailed)	.001

		Teacher Performance
	N	65
Digital Literacy	Pearson Correlation	.528**
	Sig. (2-tailed)	.000
	N	65

The correlation analysis shows that the correlation coefficient between Principal Leadership (X_1) and Teacher Performance (Y) is $r = 0.535$, which exceeds the critical value ($r\text{-table} = 0.244$) at the 5% significance level. Therefore, Principal Leadership has a positive and significant relationship with Teacher Performance at state vocational high schools (*SMK Negeri*) in Rantau Utara.

The correlation coefficient between School Culture (X_2) and Teacher Performance (Y) is $r = 0.416$, which is also higher than the critical value ($0.416 > 0.244$). This finding indicates a positive and significant relationship between School Culture and Teacher Performance.

Similarly, the correlation coefficient between Digital Literacy (X_3) and Teacher Performance (Y) is $r = 0.528$, which exceeds the critical value ($0.528 > 0.244$). Accordingly, Digital Literacy is positively and significantly associated with Teacher Performance at state vocational high schools (*SMK Negeri*) in Rantau Utara.

E. Multiple Correlation

Table 5. Results of the Multiple Correlation Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	F	Sig.
1	.776	.602	.583	11.158	30.767	.000

Predictors: (Constant), Digital Literacy, Principal Leadership, and School Culture.

Table 5 presents the results of the multiple correlation analysis examining the relationship between principal leadership, school culture, digital literacy, and teacher performance at state vocational high schools (*SMK Negeri*) in Rantau Utara. The analysis produced a multiple correlation coefficient of $R = 0.776$, an F-value of 30.767, and a significance value of 0.000, indicating that the model is statistically significant.

The coefficient of determination ($R^2 = 0.602$) indicates that 60.2% of the variance in teacher performance can be explained jointly by principal leadership, school culture, and digital literacy. The remaining 39.8% is attributable to other factors not included in the present study.

F. Overview of the Research Findings

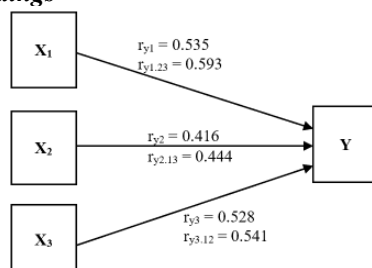


Figure 1. Overview of the Research Findings

1) The Influence of Principal Leadership on Teacher Performance

The findings indicate that principal leadership has a positive and significant influence on teacher performance at state vocational high schools (*SMK Negeri*) in Rantau Utara. Effective principal leadership contributes substantially to improving teachers' instructional performance.

These findings are consistent with those reported by Parveen et al. (2022) and Alzoraiki et al. (2023), who concluded that transformational principal leadership plays a crucial role in improving teachers' instructional performance. Inspirational leadership enhances teachers' commitment, which ultimately contributes to sustained improvements in instructional quality.

Instructional leadership also plays an essential role in strengthening teachers' competence and professionalism. Guidance and mentoring can be provided through academic supervision, professional development programs, collaborative discussions, and constructive feedback on instructional practices. Principals who actively provide such support help teachers overcome instructional challenges and continuously improve the quality of classroom teaching. These findings are consistent with those of Rachman et al. (2022) and Bush (2020), who reported that principal leadership has a positive and significant influence on teacher performance. Principals who actively provide academic guidance are better able to improve instructional quality and teacher productivity.

Furthermore, principal support for teacher creativity contributes to a more productive and innovative working environment. This finding is supported by Suhartono and Hariyani (2025), Nugraha et al. (2022), and Ulfa et al. (2023), who concluded that effective principal leadership positively influences teacher performance. Strong leadership enhances teachers' professionalism in carrying out instructional responsibilities and supports the delivery of high-quality educational services.

2) The Influence of School Culture on Teacher Performance

Teacher performance is reflected in teachers' ability to plan and implement instruction, evaluate learning outcomes, and effectively perform their professional responsibilities. Consistent with the findings of Ulfa et al. (2022) and Nora and Ustradi (2023), the results of this study indicate that school culture significantly influences teacher performance. A positive organizational culture encourages teachers to strengthen their sense of responsibility, commitment, and instructional quality, ultimately contributing to improved student learning outcomes.

When teachers feel valued and supported, they experience greater job satisfaction and stronger organizational commitment, leading to improved performance. These findings are consistent with those reported by Rosida et al. (2025), who found that a positive school culture characterized by integrity, collaboration, effective communication, and strong leadership enhances teachers' motivation, commitment, and professionalism, thereby improving teacher performance.

A positive school culture also creates an organized and disciplined working environment with clear expectations and procedures. Such an environment provides teachers with a sense of security in carrying out their professional duties, enabling them to work more consistently while focusing on improving instructional quality. These findings are in line with those of Nisa et al. (2025), Tahniah et al. (2021), and Damanik and Widodo (2024), who reported that school culture significantly influences teachers' contextual performance by promoting collaboration, professionalism, and adaptability within the workplace.

3) The Influence of Digital Literacy on Teacher Performance

Numerous studies have demonstrated that digital literacy significantly influences teacher performance in the digital era. Ardansyah et al. (2025) found that digital literacy positively affects teachers' professional performance by promoting greater instructional creativity. Teachers with strong digital literacy skills are better able to utilize technology effectively, thereby improving both the effectiveness and quality of instruction. Likewise, Zakir (2025) reported that digital literacy plays a crucial role in enhancing teachers' academic competence and instructional effectiveness by strengthening self-efficacy and the ability to utilize educational technologies.

Similarly, Hizam (2021) explained that teachers' digital competence positively influences their performance in virtual learning environments. Teachers who effectively utilize digital learning technologies are more capable of improving work efficiency and instructional management. Supriyadi and Zaharuddin (2023) further reported that digital literacy serves as a mediating variable that strengthens the influence of digital leadership on teacher performance during the transition toward technology-based education. These findings indicate that higher levels of digital literacy are associated with better professional performance throughout the teaching and learning process.

Furthermore, Nugraha et al. (2023) found that digital literacy has a positive and significant influence on teacher performance. Teachers with strong digital literacy skills are able to utilize a wide range of technology-based learning resources to improve instructional quality. Likewise, Abrar et al. (2025) demonstrated that digital literacy serves as a mediating variable that strengthens the relationship between competence, emotional intelligence, and teacher performance. In addition, Dewanto et al. (2024) reported that digital literacy significantly improves teacher performance by encouraging innovative work behavior and enhancing communication during the instructional process. Collectively, these findings confirm that digital literacy is a critical factor in improving teachers' professional performance in the era of technology-based education.

4. CONCLUSION

The findings of this study demonstrate that principal leadership, school culture, and digital literacy each have a positive and significant influence on teacher performance at state vocational high schools (*SMK Negeri*) in Rantau Utara. Effective principal leadership, characterized by the ability to influence, guide, mentor, motivate, and encourage teacher creativity, contributes significantly to improving teachers' performance in carrying out their instructional responsibilities. Likewise, a positive school culture characterized by discipline, collaboration, and effective communication among members of the school community enhances teachers'

professionalism and commitment to their work. In addition, digital literacy plays a crucial role in improving teacher performance by enabling teachers to effectively access information, develop knowledge, and integrate digital technology into the teaching and learning process, thereby improving the quality and effectiveness of instruction.

Based on these findings, several recommendations can be proposed. School principals are encouraged to strengthen their leadership by continuously providing motivation, guidance, and professional support to teachers in order to optimize their instructional performance. Teachers should continuously enhance their professional competencies, particularly in digital literacy, so that they can utilize educational technologies more effectively and innovatively in classroom instruction. Furthermore, schools should foster and sustain a positive organizational culture through effective collaboration, communication, and discipline to support continuous improvements in teacher performance. Future researchers are also encouraged to extend this study by incorporating additional variables, such as work motivation, job satisfaction, professional competence, or the work environment, in order to obtain a more comprehensive understanding of the factors influencing teacher performance.

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