Jurnal Pustaka Indonesia (JPI)
2026, Vol. 6, No. 3, 296–315
https://doi.org/10.62159/jpi.v6i3.2999

OPEN ACCESS
Research Article

Predictive Contribution of Principals' Transformational Leadership and Academic Supervision to Teachers' Professional Competence

Dinar Dwie Santosa[1], Nur Khoiri[2*], and Lilik Ariyanto[3],
[1-3] Universitas Persatuan Guru Republik Indonesia Semarang, Semarang, Indonesia

Abstract
The aim of this research was to investigate the simultaneous impact of transformational leadership by school principals and academic supervision on the professional competence of elementary school educators in Ngaliyan District, Semarang City. This quantitative research employing a correlational framework involved a cohort of 361 educators from 28 public elementary institutions, with a sample of 190 teachers chosen by a proportional random sampling method. The information gathered through a standardized five-point Likert scale questionnaire was utilized to assess transformational leadership, academic supervision, and teachers' professional competence as multidimensional variables, thereafter evaluated via multiple linear regression. The findings of the research indicated that the principal's transformational leadership and academic supervision collectively exerted a favorable and substantial impact on teachers' professional competence, with a coefficient of determination contributing 52.7%. The research determined that integrating transformational leadership with organized academic oversight could establish an efficient management system to enhance material mastery, learning execution, curriculum application, and the professional growth of elementary educators.

ARTICLE HISTORY
Received : 26 June 2026
Revised : 4 September 2026
Accepted : 12 October 2026

KEYWORDS
Educational Management; Teacher Professional Competence; Transformational Leadership; Academic Supervision.

PUBLISHER'S NOTE
This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY 4.0) license.

CORRESPONDING AUTHOR
***Nur Khoiri**, Universitas Persatuan Guru Republik Indonesia Semarang, Semarang, Indonesia. Email: nurkhoiri@upgris.ac.id

Introduction

Improving the quality of education at the elementary school level depends substantially on teachers' ability to perform effective, adaptive, and continuous professional tasks. Teachers are expected not only to deliver learning materials but also to master subject matter, design and adapt instruction, respond to students' characteristics, conduct assessment, and continuously develop their competence in response to curriculum and technological changes (Dorukbaşi & Cansoy, 2024). These demands are reinforced by the implementation of the Merdeka Curriculum and its emphasis on deep learning, which promotes competency-based, collaborative, and meaningful learning while requiring teachers to perform instructional tasks effectively and efficiently (Satosa et al., 2025).

Teachers' professional competence in this study is anchored in the Regulation of the Director General of Teachers and Education Staff Number 2626/B/HK.04.01/2023, which defines professional competence as the ability to understand subject matter comprehensively and deeply as a basis for determining learning objectives and developing student-centered knowledge content. This regulatory framework indicates that professional competence extends beyond mastery of scientific content to include the ability to translate knowledge into appropriate learning practices, consider students' characteristics, and use the curriculum as a basis for instructional planning. Thus, although professional competence may overlap in practice with pedagogical competence, the two

constructs are not treated as synonymous in this study. Professional competence is conceptualized as an integrated capacity encompassing knowledge of learning content and how to teach it, understanding students' characteristics and learning methods, mastery and use of the curriculum, continuing professional development, and the use of technology for learning and professional development. These dimensions reflect the capacity to transform professional knowledge into contextually appropriate instructional practice while maintaining continuous professional growth.

Recent studies further associate teachers' professional competence with the ability to develop contextual learning materials, conduct professional reflection, participate in continuous competence development, and utilize technology in learning (Mirsa, 2024; Prasetya et al., 2026; Zahra et al., 2026). Professional competence, therefore, should not be viewed solely as an individual attribute but as a capacity that is realized through practice and developed in response to curricular demands, student characteristics, and technological developments.

The development of this competence is also related to the organizational environment in which teachers perform their professional responsibilities. Professional development opportunities, organizational support, working conditions, and support from school principals can create conditions that encourage teachers to improve their instructional practices continuously (Rahmadani & Marsidin, 2023; Wati & Nurhasannah, 2024; Yuswardi, 2021). Schools that provide opportunities for mentoring, sharing best practices, reflection, and instructional innovation may further strengthen teachers' professional capacity (Hallinger et al., 2023). This perspective positions professional competence not merely as an individual characteristic but also as a capacity that can be reinforced through managerial practices within the school.

This issue is particularly relevant in public elementary schools in Ngaliyan District, Semarang City. Data from the Ngaliyan District Education Supervisory Unit (*Korsatpen*) for 2025 show that 23 of 28 public elementary schools (82%) had submitted their learning objective sequences, while five schools (18%) had not. Similarly, 25 schools (89%) had developed teaching modules, whereas three schools (11%) had not yet done so independently. Beyond document completion, several schools still faced challenges related to the quality and contextual relevance of teaching materials. Some materials remained generic and were not fully adapted to student characteristics and school contexts, while the utilization of digital learning technology was also suboptimal. These conditions indicate a gap between the expected professional competence of teachers and its implementation in instructional practice, highlighting the importance of managerial support for professional development.

Within this context, the principal's managerial role becomes important in creating an environment that supports teachers' professional growth (Rahmadani & Marsidin, 2023; Wati & Nurhasannah, 2024). The principal is not only an administrator but also a leader who can foster school culture, facilitate teacher development, and promote educational innovation (Abbaspour et al., 2024; Tusmiarifudin et al., 2024). Two managerial factors are particularly relevant: transformational leadership and academic supervision. Transformational leadership emphasizes vision, motivation, intellectual stimulation, and individualized attention, thereby creating an organizational context that encourages teachers' professional growth (Karacabey et al., 2022; Raharja et al., 2022; Yani et al., 2026). Academic supervision, in contrast, provides a more direct professional support mechanism through observation, feedback, reflection, and follow-up aimed at improving instructional practice (Kusmei et al., 2021).

Transformational leadership can support professional competence by creating organizational conditions that motivate teachers to adapt, innovate, and improve their instructional practices. Through idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration, principals can communicate a clear direction, encourage new ideas, support problem solving, and provide individualized assistance to teachers (Bass & Avolio, 2021; Bellibaş et al., 2021; Li & Liu, 2022; Mulyasa, 2022). Such leadership may therefore be associated with a professional environment that supports continuous teacher learning and capacity development.

Academic supervision provides a complementary mechanism because it is directly connected to teachers' instructional practices. It is a systematic process of professional assistance intended to support teachers in planning, implementing, evaluating, and improving instruction (Glickman & Gordon, 2016; Mok & Staub, 2021). Through observation, feedback, reflection, and follow-up, supervision enables teachers to identify strengths and weaknesses and to determine appropriate actions for instructional improvement (Munawir et al., 2025; Maryati et al., 2025; Sofia et al., 2022). In this sense, transformational leadership may establish the organizational conditions for professional growth, whereas academic supervision provides a more direct mechanism for translating those conditions into instructional improvement.

Empirical studies provide support for the relevance of both factors. Academic supervision has been associated with elementary school teachers' professional competence (Kusmei et al., 2021), while transformational leadership has been associated with professional competence through idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration (Karacabey et al., 2022; Raharja et al., 2022; Yani et al., 2026). Other studies have linked transformational leadership and academic supervision with teacher performance and professionalism, either separately or together with other organizational factors (Adripen et al., 2021; Hermansah et al., 2025; Joen et al., 2022; Kustianah et al., 2023; Rohman & Ruhiat, 2024; Sukarsono et al., 2024). However, much of this literature has focused on teacher performance or professionalism in a broad sense rather than on the specific construct of professional competence.

A further research gap concerns the simultaneous examination of principals' transformational leadership and academic supervision in relation to teacher professional competence. Existing studies have examined academic supervision in relation to elementary school teachers' professional competence (Kusmei et al., 2021) and transformational leadership in relation to professional competence (Karacabey et al., 2022; Raharja et al., 2022; Yani et al., 2026), whereas studies examining both predictors concurrently remain comparatively limited. Research encompassing all public elementary schools within a single sub-district is also limited, despite the variation in school conditions within such settings. Examining both variables in the same model is therefore relevant because they represent distinct but complementary managerial dimensions: transformational leadership concerns the organizational and motivational context for professional growth, whereas academic supervision concerns direct professional support for instructional improvement.

Based on this conceptualization, the present study examines the association of principals' transformational leadership and academic supervision with teachers' professional competence in public elementary schools in Ngaliyan District, Semarang City. The study contributes to educational management research by examining two complementary managerial factors within the same analytical model and by focusing specifically on teacher professional competence rather than teacher performance in general. Practically, the findings may provide school principals and education

administrators with evidence concerning managerial practices that can support teacher professional development amid continuing curricular and technological changes.

Accordingly, the study proposes a conceptual model in which principals' transformational leadership (X1) and academic supervision (X2) are independently associated with teachers' professional competence (Y), while their simultaneous inclusion represents two complementary managerial pathways within the school environment. The hypotheses are formulated as follows: H1, principals' transformational leadership is significantly and positively associated with teachers' professional competence; H2, academic supervision is significantly and positively associated with teachers' professional competence; and H3, principals' transformational leadership and academic supervision are jointly and significantly associated with teachers' professional competence.

Method

This study adopts a quantitative technique with a correlational strategy. The quantitative approach is used to acquire data in the form of numerical scores and to test hypotheses statistically. The correlational design is applied to investigate the relationship and association of the principal's transformational leadership (X1) and academic supervision (X2) with teachers' professional competence (Y) without modifying the research variables (Arikunto, 2021; Sugiyono, 2022).

The Ngaliyan District of Semarang City's public elementary schools served as the study's sites. A total of 361 teachers from 28 public elementary schools made up the study population. A sample size of 189.75, rounded to 190 teachers, was determined using Slovin's formula with a 5% margin of error. The number of responders from each school was calculated proportionately depending on the total number of teachers at that school using proportional random sampling (Sugiyono, 2022). Specifically, the number of respondents allocated to each school was calculated using the formula $ni = (Ni/N) \times n$, where ni is the sample size for school i, Ni is the number of teachers at school i, N is the total population (361), and n is the total sample size (190); within each school, respondents were then drawn using simple random sampling from the list of eligible teachers. Eligible respondents were actively teaching civil-servant or permanently assigned teachers; teachers on extended leave, those newly assigned to the school for less than six months, and school principals themselves were excluded from the sampling frame. Of the 190 questionnaires distributed, all 190 were returned complete and used in the analysis, yielding a response rate of 100% with no missing data.

A questionnaire on a five-point Likert scale strongly agree (5), agree (4), somewhat agree (3), disagree (2), and strongly disagree (1) is the research tool. Three research variables principal transformational leadership, academic supervision, and teacher professional competence were measured using the instrument. Tables 1, 2, and 3 below list the dimensions and indicators for the instruments that have 32 items for X1, 30 items for X2, and 30 items for Y.

Table 1. Dimensions and Indicators of School Principal Transformational Leadership (X1)

No	Dimensions	Indicator	Item
1	Idealized Influence	(1) Exemplary conduct and integrity; (2) building respect and trust; (3) prioritizing the school's interests; (4) instilling positive school values and culture.	8
2	Inspirational Motivation	(1) Communicating the school's vision and goals; (2) providing encouragement and motivation; (3) fostering optimism; (4) building shared commitment and driving achievement.	8

No	Dimensions	Indicator	Item
3	Intellectual Stimulation	(1) Encourage creativity and innovation; (2) provide opportunities to share ideas; (3) encourage critical and rational problem-solving; (4) support innovation and technology-based learning.	8
4	Individualized Consideration	(1) Providing coaching, guidance, and mentoring; (2) understanding teachers' needs and potential; (3) providing recognition; (4) supporting the development of teachers' competence and careers.	8
		Count	32

Source: (Bass & Avolio, 2021; Northouse, 2021; Bellibaş et al., 2021).

Table 2. Dimensions and Indicators of Academic Supervision (X2)

No	Dimensions	Indicator	Item
1	Supervision Planning	(1) Develop a supervision program; (2) determine supervision objectives; (3) prepare the supervision schedule and instruments.	6
2	Implementation of Supervision	(1) Conduct learning observations; (2) monitoring the learning process; (3) collect data on supervision results.	6
3	Supervision Evaluation	(1) Analyze observation results; (2) evaluate the implementation of instruction; (3) identify the teacher's strengths and weaknesses.	6
4	Feedback and Reflection	(1) Provide constructive feedback; (2) discuss supervision results; (3) encourage teachers to engage in reflection.	6
5	Supervision Follow-up	(1) Conduct guidance based on supervision results; (2) provide mentoring; (3) develop an improvement program.	6
		Count	30

Source: (Mulyasa, 2022; Maisyaroh et al., 2021).

Table 3. Dimensions and Indicators of Teacher Professional Competence (Y)

No	Dimensions	Indicator	Item
1	Knowledge of Learning Content and How to Teach It	(1) Mastering the subject matter, concepts, structure, and interrelationships between topics; (2) selecting and applying appropriate strategies, methods, teaching materials, and media; (3) developing materials creatively and contextually.	6
2	Understanding the Characteristics and Learning Methods of Students	(1) Understanding the characteristics, needs, prior knowledge, and diversity of learners; (2) adapting materials, strategies, and learning experiences; (3) using assessment and feedback.	6
3	Curriculum Mastery and Its Use	(1) Understand the components, achievements, and objectives of learning; (2) use the curriculum in determining objectives, materials, activities, and assessments; (3) adapt instruction to curricular demands and learners' context.	6

No	Dimensions	Indicator	Item
4	Continuing Professional Development	(1) Reflecting on teaching practices; (2) participating in training, learning communities, scholarly activities, or professional development; (3) collaborating and sharing best practices.	6
5	Leveraging Technology for Learning and Professional Development	(1) Utilizing ICT in learning; (2) utilizing digital resources and media; (3) utilizing technology for self-development and professional learning.	6
		Count	30

Source: (Prasetya et al., 2026; Mirsa, 2024; Widodo et al., 2022; Utaminingsih et al., 2024).

Item development for each instrument was guided by the dimensions and indicators summarized in Tables 1–3, which were adapted from established theoretical frameworks. Content adequacy was subsequently evaluated empirically through pilot testing and exploratory factor analysis, as reported below.

Before being used for primary data collection, the instrument was pilot-tested with thirty non-sampling respondents elementary school teachers not included in the research sample. Empirical validity was evaluated using the Pearson product-moment correlation, comparing the computed r-value with the critical r-value at a 5% significance level. The critical r-value was 0.361 based on 30 pilot test participants. As shown in Table 4, each item was deemed valid if the computed r-value was greater than 0.361.

Table 4. Summary of Instrument Validity Test Results

Variable	Number of Items	Range of calculated r-values	r-table
Teacher Professional Competence (Y)	30	0.512–0.907	0.361
Transformational Leadership (X1)	32	0.653–0.966	0.361
Academic Supervision (X2)	30	0.467–0.933	0.361

According to the validity test results, every item in all three instruments satisfied the requirements for validity. For the teacher professional competence, transformational leadership, and academic supervision instruments, the computed r-values varied from 0.512 to 0.907, 0.653 to 0.966, and 0.467 to 0.933, respectively. All 92 instrument elements were considered valid since all of these values were higher than the r-table value of 0.361.

Because item-total correlation alone provides limited evidence of construct validity, an Exploratory Factor Analysis (EFA) using Principal Component Analysis (PCA) was additionally conducted for each of the three instruments to confirm their unidimensionality. Sampling adequacy was evaluated using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity, item-level adequacy was assessed through the Anti-image Correlation (MSA), and factor extraction required an eigenvalue ≥ 1.00 and a cumulative explained variance ≥ 50%. As summarized in Table 5, all three instruments showed high sampling adequacy (KMO = 0.971–0.973), significant Bartlett's tests ($p < 0.001$), and factor loadings well above the conventional threshold, with each instrument reduced to a single dominant component explaining more than 50% of the total variance. These results provide stronger evidence of construct validity and unidimensionality for all three instruments, supporting their use in the subsequent regression analysis.

Table 5. Summary of Exploratory Factor Analysis (EFA) Results

EFA Parameter	Transformational Leadership (X1)	Academic Supervision (X2)	Teacher Professional Competence (Y)
Number of Items	32 item	30 item	30 item
KMO MSA	0.973	0.972	0.971
Bartlett's Sphericity ($\chi 2$)	4,479.713 ($p<0.001$)	4,174.656 ($p<0.001$)	4,981.483 ($p<0.001$)
Communalities Range	0.496–0.646	0.490–0.626	0.545–0.673
Factor Loading Range	0.705–0.804	0.705–0.791	0.738–0.821
Eigenvalue (Component 1)	18.112	17.061	18.721
Variance Explained (%)	56.60%	56.87%	62.40%

Because all three constructs were measured through self-report administered to the same respondents at a single point in time, the design is susceptible to common-method and social-desirability bias. To mitigate this risk, respondents were assured of the anonymity and confidentiality of their responses and informed that there were no right or wrong answers.

Cronbach's alpha coefficient was used for reliability testing. If an instrument's alpha value is more than 0.60, it is deemed reliable (Arikunto, 2021). The test results show that the principal transformational leadership instrument had an alpha of 0.989, the academic supervision instrument had an alpha of 0.984, and the teacher professional competence instrument had an alpha of 0.970.

Table 6. Summary of Instrument Reliability Test

Variable	Cronbach's Alpha	Threshold	Decision
Teacher Professional Competence (Y)	0.970	0.60	Reliable
Transformational Leadership (X1)	0.989	0.60	Reliable
Academic Supervision (X2)	0.984	0.60	Reliable

To complement the Cronbach's alpha estimates and address potential concerns about item redundancy given the high alpha values, item-total correlations and McDonald's omega (ω) were additionally computed from the full sample (n = 190) for each instrument. Table 7 presents the results of these supplementary reliability diagnostics.

Table 7. Item-Total Correlation and McDonald's Omega

Variable	Number of Items	Item-Total Correlation Range	McDonald's Omega (ω)
Teacher Professional Competence (Y)	30	0.719–0.805	0.980
Transformational Leadership (X1)	32	0.683–0.773	0.977
Academic Supervision (X2)	30	0.467–0.933	0.975

As shown in Table 7, all item-total correlations exceeded the conventional 0.30 threshold, and the omega coefficients for all three instruments were consistently above 0.97, closely converging with the Cronbach's alpha values reported in Table 6. These results indicate that the high internal consistency reflects genuinely strong item-construct alignment rather than an artifact of the alpha formula alone.

Data collection was conducted pursuant to Research Permit Number 366/T.51/PL/VIII/2026, issued on August 26, 2026, by the Graduate School of Universitas Persatuan Guru Republik Semarang; this permit authorized the piloting of the research instrument and data collection at public elementary schools in Ngaliyan District. Data collection took place over approximately one week, from August 28 to September 3, 2026, using Google Forms. Prior to completing the questionnaire,

respondents were informed of the research objectives, the voluntary nature of their participation, and the guarantee of confidentiality regarding their responses. Completed questionnaires were checked for completeness before data processing began.

Prerequisite tests and inferential analysis were used to examine the data. Normality, multicollinearity, heteroscedasticity, and linearity were all tested as prerequisites. The distribution of residuals was evaluated using normality testing; correlations between independent variables were found using multicollinearity testing; residual variance inequality was examined using heteroscedasticity testing; and the linear relationship between the independent and dependent variables was verified using linearity testing.

Prior to multiple linear regression analysis, residual normality, linearity, heteroscedasticity, and multicollinearity were assessed. Residual normality was tested using the One-Sample Kolmogorov-Smirnov test, with $p > 0.05$ indicating normally distributed residuals (Santoso, 2019; Sugiyono, 2022). Linearity was evaluated using the significance of Deviation from Linearity, where $p > 0.05$ indicated no significant deviation from a linear relationship. Heteroscedasticity was examined using the Glejser test by regressing absolute residuals on the independent variables; $p > 0.05$ indicated no evidence of heteroscedasticity (Santoso, 2019). Multicollinearity was assessed using tolerance and variance inflation factor (VIF), with tolerance > 0.10 and VIF < 10 indicating no problematic multicollinearity.

Multiple linear regression was used to test hypotheses. This approach was used to look at how teachers' professional competence was associated with the principal's transformational leadership and academic supervision. Each independent variable's partial association was evaluated using the t-test. If the Sig. value is less than 0.05 (or, similarly, if |t-calculated| > |t-table|), the association is deemed significant at a 5% significance level; if the Sig. value is greater than 0.05, the partial association is not significant (Sugiyono, 2022). The simultaneous association of the principal's transformational leadership and academic supervision with teachers' professional competence was assessed using the F-test. If the ANOVA table's Sig. value is less than 0.05 or if F-calculated > F-table, the simultaneous association is deemed significant at a 5% significance level. On the other hand, the simultaneous association is not significant if the Sig. value is greater than 0.05 or if the F-calculated ≤ F-table (Sugiyono, 2022). The percentage of the variation in teachers' professional competence that can be accounted for by the two independent variables was calculated using the coefficient of determination. The model's ability to explain the variation in the dependent variable is shown by a higher R^2 score.

Because the 190 teacher respondents were nested within 28 schools, the intraclass correlation coefficient (ICC(1)) was calculated for each variable using a random-intercept model with school as the clustering unit, to assess the extent to which scores clustered by school. To evaluate whether this clustering affected the precision of the regression estimates, the multiple regression model was re-estimated using cluster-robust standard errors (clustered by school), and the resulting inferences were compared with those obtained from ordinary least squares (OLS).

Result and Discussion

Result

Based on the statistical analysis techniques used, the research data analysis results are presented in this part. To make sure the data satisfy the requirements for multiple linear regression analysis, the study starts with traditional assumption testing, which includes tests for normality, linearity,

heteroscedasticity, and multicollinearity. Multiple linear regression analysis is then used to evaluate the hypothesis by looking at regression coefficients, correlation coefficients, ANOVA results, and coefficients of determination. Data from 190 respondents served as the foundation for the entire investigation.

Normality Test

To ascertain whether the residuals in the regression model are normally distributed, a normality test was performed. The One-Sample Kolmogorov-Smirnov method was used in the test, with a significance level of 0.05. Table 8 displays the test results.

Table 8. Residual Normality Test Results

Statistics	Value
N	190
Test Statistic	0.044
Asymp. Sig. (2-tailed)	0.200
Monte Carlo Sig.	0.516

Table 8 indicates that the Asymp. Sig. (2-tailed) value is 0.200. Since this number is higher than 0.05, the residuals of the regression model can be regarded as normally distributed. These findings show that the data are appropriate for multiple linear regression analysis and that the normality assumption is satisfied.

Linearity Test

To ascertain whether there is a linear relationship between the independent and dependent variables, a linearity test was performed. If the "Deviation from Linearity" value is more than 0.05, the connection is regarded as linear. Table 9 displays the findings of the linearity tests concerning the connections between academic supervision and teachers' professional competence and between transformational leadership and teachers' professional competence.

Table 9. Linearity Test Results

Relationship Between Variables	F Deviation from Linearity	Sig.	Decision
Transformational Leadership – Teachers' Professional Competence	1.392	0.062	Linear
Academic Supervision – Teacher Professional Competence	1.122	0.295	Linear

According to Table 9, the "Deviation from Linearity" significant value for the link between transformational leadership and teachers' professional competence is 0.062, but it is 0.295 for the association between academic supervision and teachers' professional competence. Since both values are greater than 0.05, the linearity assumption is satisfied in the link between each independent variable and teachers' professional competence.

Heteroscedasticity Test

To ascertain whether the residual variances in the regression model are unequal, a heteroscedasticity test was performed. The absolute values of the residuals were regressed against the independent variables in order to conduct the test using the Glejser technique. Table 10 displays the analysis's findings.

Table 10. Heteroscedasticity Test Results

Source	F	Sig.
Regression	2.174	0.117

A significance value of 0.117 was determined based on Table 10. Since this value is higher than 0.05, the regression model shows no signs of heteroscedasticity. As a result, the heteroscedasticity requirement is met and the residual variance can be regarded as homogeneous.

Multicollinearity Test

To find out if there was an unduly high correlation between the independent variables in the regression model, a multicollinearity test was performed. A tolerance value > 0.10 and a VIF < 10 were the conditions that were used. Table 11 displays the test results.

Table 11. Multicollinearity Test Results

Independent Variable	Tolerance	VIF	Decision
Transformational Leadership	0.672	1.487	Multicollinearity is not present.
Academic Supervision	0.672	1.487	Multicollinearity is not present.

Both independent variables have a tolerance value of 0.672 and a VIF of 1.487, as shown in Table 11. The VIF is less than 10 and the tolerance value is more than 0.10. As a result, the research model showed no evidence of multicollinearity between academic supervision and transformational leadership. Multiple linear regression analysis can be used to assess the research hypotheses since the results of these four tests show that the research model satisfies all traditional assumptions.

To assess whether any individual cases exerted disproportionate influence on the regression estimates, standardized residuals, leverage values, and Cook's distance were examined for all 190 cases. Nine cases (4.7%) exceeded the conventional Cook's distance threshold of $4/n$ (0.021), with a maximum Cook's distance of 0.046 well below the commonly used concern threshold of 1.0, indicating no case exerted a strong influence on the regression coefficients. The same nine cases also exceeded the leverage threshold of $2(k+1)/n$ (0.032), with a maximum leverage of 0.050. No case had a studentized residual exceeding ±3, indicating the absence of extreme outliers in the dependent variable. Re-estimating the model after excluding these nine cases changed the regression coefficients by less than 0.02 units and left both predictors statistically significant ($p < 0.001$), confirming that the reported results are not driven by a small number of influential observations.

ANOVA Test

To ascertain whether the principal's transformational leadership and academic supervision are jointly and significantly associated with teachers' professional competence, the ANOVA test was employed. Table 12 displays the results of the ANOVA test.

Table 12. ANOVA Regression Test Results

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	37,843.162	2	18,921.581	103.984	<0.001
Residual	34,027.701	187	181.966		
Total	71,870.863	189			

Table 12 yielded an F-value of 103.984 at a significance level of less than 0.001. Overall, the regression model is statistically significant because this significance value is smaller than 0.05. Teachers' professional competency is thus significantly associated with the principal's transformational leadership and academic supervision considered jointly. The findings show that changes in teachers' professional competence can be substantially explained by both independent factors working together. Thus, stronger academic supervision alongside greater transformational leadership is associated with higher levels of teachers' professional competence.

Correlation and Determination Coefficients

The correlation coefficient is used to assess how strongly transformational leadership and academic supervision are related to teachers' professional competence. In the meantime, the coefficient of determination is used to ascertain the degree to which the two independent variables account for the variation in teachers' professional competence. Table 13 displays the analysis's findings.

Table 13. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.726	0.527	0.521	13.489

Table 13 displays a correlation coefficient (R) of 0.726, indicating a strong association between transformational leadership and academic supervision considered jointly and teachers' professional competence. The model yielded an R^2 of 0.527 and an adjusted R^2 of 0.521, indicating that transformational leadership and academic supervision jointly account for approximately 52.7% of the variance in teachers' professional competence (adjusted for the number of predictors, 52.1%), while the remaining 47.3% is explained by variables outside the research model. The small difference between R^2 and adjusted R^2 suggests that the model is not overfitted and that both predictors contribute meaningfully to explaining the variance in the dependent variable. These findings show that the model contributes substantially to explaining the variation in teachers' professional competence.

Regression Coefficient

The direction and strength of each independent variable's association with teachers' professional competence were ascertained by analyzing the regression coefficients. Table 14 displays the analysis's findings.

Table 14. Multiple Linear Regression Coefficient Results

Variable	B	Std. Error	Beta	t	Sig.	95% CI (Lower, Upper)
Constant	10.225	7.928	–	1.290	0.199	(−5.42, 25.87)
Transformational Leadership	0.481	0.064	0.460	7.496	<0.001	(0.36, 0.61)
Academic Supervision	0.393	0.068	0.357	5.812	<0.001	(0.26, 0.53)

Table 14 shows that transformational leadership has a t-value of 7.496, a regression coefficient (B) of 0.481, and a significance level of <0.001, with the 95% confidence interval for this coefficient ranging from 0.36 to 0.61, not crossing zero. These findings suggest that teachers' professional competence is positively and significantly associated with the principal's transformational leadership. In contrast, academic supervision has a t-value of 5.812, a significance level of less than 0.001, and a regression coefficient (B) of 0.393, with a 95% confidence interval ranging from 0.26 to 0.53. This suggests that teachers' professional competence is positively and significantly associated with academic supervision as well. According to the standardized beta coefficients, transformational leadership has a value of $\beta = 0.460$ and academic supervision has a value of $\beta = 0.357$. Based on these standardized coefficients, transformational leadership appears to be somewhat more strongly associated with teachers' professional competence than academic supervision within this model; however, this difference was not formally tested for statistical significance, and the finding should therefore be interpreted with caution rather than as a definitive ranking of importance. The resulting multiple linear regression equation is: $Y = 10.225 + 0.481X_1 + 0.393X_2$. Holding academic supervision constant, each one-unit increase in transformational leadership is associated with an estimated increase of 0.481 units in teachers' professional competence. Similarly, holding transformational

leadership constant, each one-unit increase in academic supervision is associated with an estimated increase of 0.393 units in teachers' professional competence.

Table 15. Intraclass Correlation and Design Effect by Variable

Variable	ICC(1)	Design Effect	Effective N
Teacher Professional Competence (Y)	0.031	1.18	≈161
Transformational Leadership (X1)	0.143	1.83	≈104
Academic Supervision (X2)	0.182	2.05	≈93

As shown in Table 15, the ICC for teachers' professional competence (Y) was small (ICC = 0.031), indicating that only about 3% of the total variance in professional competence was attributable to between-school differences, with the remaining variance occurring within schools (i.e., among teachers in the same school). The ICCs for transformational leadership (ICC = 0.143) and academic supervision (ICC = 0.182) were higher, which is conceptually expected because these variables reflect teachers' shared perceptions of the same principal and supervisory system within each school.

Table 16. Comparison of OLS and Cluster-Robust Standard Errors

Variable	B	SE (OLS)	SE (Cluster-Robust)	Sig. (OLS)	Sig. (Cluster-Robust)
Transformational Leadership (X1)	0.481	0.064	0.056	<0.001	<0.001
Academic Supervision (X2)	0.393	0.068	0.088	<0.001	<0.001

To account for the clustering identified above, the regression model was re-estimated using standard errors clustered by school. As shown in Table 16, the cluster-robust standard error for academic supervision increased by approximately 30% relative to the OLS estimate (from 0.068 to 0.088), consistent with the moderate ICC observed for this variable, whereas the cluster-robust standard error for transformational leadership was similar to its OLS counterpart. Importantly, both transformational leadership and academic supervision remained statistically significant predictors of teachers' professional competence under cluster-robust standard errors ($p < 0.001$ for both), indicating that the study's substantive conclusions are robust to the nested structure of the data.

Discussion

The findings indicate that teachers' professional competence in public elementary schools in Ngaliyan District, Semarang City, is positively and significantly associated with principals' transformational leadership and academic supervision considered simultaneously. The ANOVA result supports the adequacy of the regression model ($F = 103.984$, $p < 0.001$), while the correlation coefficient ($R = 0.726$) indicates a strong association between the predictors and teachers' professional competence. The coefficient of determination ($R^2 = 0.527$) indicates that 52.7% of the observed variance in professional competence is statistically accounted for by transformational leadership and academic supervision in the model. The remaining 47.3% is associated with factors outside the model. Thus, the findings position teachers' professional competence not simply as an individual attribute but also as a construct associated with the organizational and instructional conditions established within schools.

Transformational leadership provides a theoretical basis for understanding this association. In this perspective, the principal is not limited to an administrative role but acts as a leader who establishes direction, motivates teachers, stimulates new ways of thinking, and responds to

individual developmental needs (Fayzhall et al., 2020; Kang, 2021). The four dimensions of transformational leadership idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration describe distinct but related ways in which principals may create conditions that support teacher development (Mulyasa, 2022; Toprak et al., 2023). Idealized influence can establish professional norms through the principal's example, inspirational motivation can provide shared direction, intellectual stimulation can encourage teachers to reconsider instructional practices and develop innovative solutions, and individualized consideration can connect leadership support with differences in teachers' developmental needs (Purnama & Hayati, 2024; Purwanto, 2021; Zaini, 2025). These processes provide a plausible organizational pathway through which leadership may be associated with professional competence: teachers are more likely to encounter opportunities, expectations, and encouragement for professional learning when leadership creates an environment that values development and adaptation.

This interpretation is particularly relevant because professional competence in the present study is multidimensional. It includes mastery of subject matter and instructional methods, understanding student characteristics and learning styles, application of the curriculum, continuous professional development, and the use of technology for teaching and professional growth. Previous conceptualizations similarly emphasize subject mastery, learning objectives and outcomes, material development, reflection, competency standards, innovation in instructional materials, and the use of information technology (Lin et al., 2022; Prasetya et al., 2026; Zahra et al., 2026; Zhang et al., 2022). The breadth of these dimensions suggests that professional competence cannot be strengthened solely through the acquisition of technical knowledge. It also requires an organizational environment in which teachers can learn, reflect on practice, experiment with instructional approaches, and develop their capacity over time. Transformational leadership is therefore relevant not because leadership directly constitutes teacher competence, but because it may establish organizational conditions that make sustained professional learning more feasible.

The present finding concerning transformational leadership is supported by empirical evidence linking transformational leadership with teacher professionalism, innovation, and performance (Mustotiah et al., 2025; Purnama & Hayati, 2024; Yani et al., 2026). Studies of teacher performance also indicate that transformational leadership may be connected with work outcomes through motivational processes, including work motivation and professional commitment (Hermansah et al., 2025; Joen et al., 2022). However, the relationship is not necessarily uniform across contexts. For example, a recent study in an integrated Islamic elementary school reported that transformational leadership was not significantly associated with teachers' professional competence, whereas academic supervision showed a significant association; nevertheless, both variables were significant when considered simultaneously (Firmanti et al., 2026). This contrasting result suggests that the contribution of transformational leadership may depend partly on how leadership is experienced and translated into teachers' day-to-day professional environments. Differences in organizational context, school characteristics, leadership implementation, or the particular way professional competence is measured may help explain why transformational leadership does not produce identical statistical patterns across studies. The present result should therefore be interpreted as evidence of an important association within the studied context rather than as evidence that transformational leadership uniformly determines teacher competence.

Academic supervision provides a more proximal mechanism because it is directly connected with teachers' instructional practices. Rather than functioning primarily as administrative inspection, academic supervision involves observation, professional dialogue, feedback, coaching, and follow-up intended to improve teaching and learning (Glickman & Gordon, 2016; Maisyaroh et al., 2021; Mok & Staub, 2021). This distinction helps explain why academic supervision is relevant to professional competence. Whereas transformational leadership may establish broad organizational conditions for teacher development, supervision brings professional learning closer to the classroom by identifying instructional needs, examining practice, and providing feedback that can be translated into specific improvements. The mechanism is therefore potentially more immediate: teachers receive information about their instructional practices and opportunities to reflect on how those practices can be improved.

The empirical literature also indicates that the contribution of academic supervision is context-sensitive. Several studies report positive associations between academic supervision and teachers' professional competence, either directly or alongside other teacher-related factors (Istiqomah et al., 2024; Kusmei et al., 2021; Mulyanti et al., 2024; Sofia et al., 2022; Syafitri et al., 2023; Wahyuni et al., 2022). In contrast, Rifqi & Abidin (2023), studying teachers in a public junior high school, found that transformational leadership was significantly associated with professional competence whereas academic supervision was not, although both variables were significant simultaneously. The differing pattern indicates that the presence of a formal supervision program does not necessarily guarantee an observable association with competence in every setting. The quality, frequency, feedback orientation, and follow-up of supervision may matter, as may differences in school level and organizational conditions. The present findings therefore support the relevance of academic supervision while also suggesting that its contribution should be understood in relation to how supervisory practices are implemented rather than merely whether supervision exists.

The complementary relationship between transformational leadership and academic supervision represents the most important theoretical synthesis of the present findings. Transformational leadership and academic supervision address different levels of teacher development. Leadership operates primarily at the organizational level by establishing vision, expectations, motivation, intellectual stimulation, and a climate that values professional learning. Academic supervision operates more proximally at the instructional level by observing teaching, providing feedback, facilitating reflection, and identifying follow-up actions. In this sense, leadership may create the conditions under which professional learning is encouraged, while supervision provides a practical channel through which those expectations are connected to classroom practice. Transformational leadership can therefore be understood as establishing the broader motivational and organizational conditions for development, whereas academic supervision provides more immediate instructional guidance.

This interpretation should, however, be stated carefully. The simultaneous regression result demonstrates that transformational leadership and academic supervision are associated with teachers' professional competence when entered into the same regression model. It does not test whether the two variables statistically interact, nor does it establish that transformational leadership causes supervision to become more effective. Likewise, the regression does not demonstrate a causal mechanism in which leadership produces a particular supervisory response that subsequently increases professional competence. The complementary-mechanism argument is consequently a

theoretical interpretation of the pattern of associations, rather than a directly tested mediation or interaction effect. This distinction is important because the present study provides evidence that the two organizational conditions coexist in explaining variation in professional competence, not evidence of a causal sequence between them.

The broader school ecosystem provides another useful context for interpreting these associations. Research has connected transformational leadership, teacher professional competence, school resources, and academic supervision with broader dimensions of school and instructional quality (Adham et al., 2024; Fayzhall et al., 2020; Lustiawati et al., 2024). Such findings suggest that professional competence develops within an interconnected organizational environment rather than through isolated teacher effort. This is particularly relevant to technology use, which constitutes one component of professional competence in the present study. Tusmiarifudin et al. (2024) argue that transformational leadership in the digital era involves encouraging educational technology, responding to change, and strengthening collaboration. Leadership that communicates the importance of adaptation may thus support an environment in which technology is not merely introduced as a technical requirement but becomes part of teachers' ongoing professional learning.

The R^2 value of 0.527 further emphasizes the importance of interpreting professional competence as a multifactorial construct. Although transformational leadership and academic supervision jointly account for 52.7% of the variance captured by the model, nearly half of the observed variance remains outside the predictors examined here. Teacher competence may also be shaped by professional education, work motivation, self-regulation, professional beliefs, interpersonal capabilities, and individual resources. Research has identified adversity quotient, for example, as a factor associated with professional competence and, in a particular Indonesian context, as a stronger predictor than emotional intelligence (Mirsa, 2024; Widodo et al., 2022; Yuswardi, 2021). Professional education and teachers' ability to develop instructional modules may also contribute to the strengthening of professional competence, particularly in the context of curriculum implementation (Mardhatillah & Surjanti, 2023; Mulyani & Insani, 2023). Accordingly, the present model should not be interpreted as a comprehensive explanation of teacher competence. Rather, it identifies leadership and academic supervision as two organizational variables that are statistically associated with a substantial portion of the variance observed in the participating schools.

Several methodological limitations require particular caution in interpreting the magnitude of the reported associations and the R^2 value. First, the 190 teachers were nested within 28 schools. Teachers in the same school shared exposure to the same principal and supervisory system, meaning that observations were not fully independent. The intraclass correlation coefficient for professional competence was small (ICC = 0.031), and both predictors remained statistically significant when cluster-robust standard errors were used. This suggests that the main associations were not entirely explained by the school-level clustering. Nevertheless, the relatively small number of clusters limits the precision and generalizability of cluster-adjusted estimates.

Second, transformational leadership, academic supervision, and professional competence were measured through self-reported questionnaires completed by the same respondents. This creates the possibility of common-method bias, in which shared measurement source, response tendencies, and common contextual influences may contribute to the observed associations. The possibility is particularly relevant for the interpretation of the R^2 value because the 52.7% explained variance may partly reflect common measurement characteristics rather than only substantive relationships

among the constructs. Third, professional competence itself was self-reported rather than assessed through independent observation, performance assessment, or externally rated evidence. Teachers' perceptions of their own competence may differ from competence demonstrated in actual instructional practice. Consequently, the findings should be interpreted as associations involving perceived professional competence as measured by the study instrument.

Fourth, the cross-sectional design does not establish temporal ordering. The regression results cannot determine whether transformational leadership and academic supervision precede increases in professional competence. An alternative interpretation is that teachers who already possess higher levels of professional competence may perceive, solicit, or respond differently to leadership and supervisory practices. Thus, the direction of the observed associations cannot be established from the present data. Longitudinal studies, repeated measures, or designs incorporating independent observations of leadership, supervision, and teaching practice would provide stronger evidence regarding temporal ordering and potential causal processes. Future research should also consider multilevel designs with larger numbers of schools and more explicit examination of potential moderators or mediators, such as school climate, teacher motivation, professional learning opportunities, or supervision quality.

Taken together, the findings suggest that transformational leadership and academic supervision are associated with teachers' professional competence through conceptually complementary domains. Transformational leadership is associated with the organizational and motivational conditions surrounding teacher development, whereas academic supervision is more closely connected with feedback and reflection on instructional practice. The strength of the present contribution lies not in demonstrating a causal pathway or statistical interaction, but in showing that both dimensions remain relevant when considered simultaneously within the same regression model. The results therefore support viewing teacher professional competence as embedded in a school-based professional development system in which organizational leadership and instructional supervision coexist, while recognizing that individual teacher characteristics and other contextual factors also contribute substantially to the observed variation.

Conclusion

This study shows that the professional competence of teachers in public elementary schools is positively and significantly associated with a school principal's transformational leadership and academic supervision considered jointly. Both academic supervision and transformational leadership are significant predictors on their own, with transformational leadership showing a relatively stronger standardized association. These results suggest that an organizational environment supportive of teachers' professional competence, particularly with regard to subject matter mastery, instructional delivery, curriculum implementation, ongoing reflection, and the use of digital technology, tends to co-occur with the combination of visionary, inspirational leadership and methodical, structured academic supervision.

Taken together, these findings indicate that academic supervision and transformational leadership are associated, both theoretically and empirically, with stronger teacher professional competence, and they offer a basis for schools to consider strengthening both leadership practices and supervision systems as part of a broader professional development strategy. However, because of the study's cross-sectional design, limited geographic scope, and reliance on self-report questionnaires, these findings should be interpreted with caution and do not establish causal effects.

Future research is encouraged to employ longitudinal designs, direct classroom observation, and a broader range of regions and school levels, as well as to account for additional organizational variables, in order to test the consistency and generalizability of these associations.

References

Abbaspour, F., Hosseingholizadeh, R., & Bellibaş, M. Ş. (2024). Uncovering the role of principals in enhancing teacher professional learning in a centralized education system. *International Journal of Educational Management*, *38*(3), 873–889. https://doi.org/10.1108/IJEM-12-2023-0654

Adham, M. A., Yuliejantiningsih, Y., & Haryati, T. (2024). The influence of school leadership and academic supervision on teachers' professional competence. *Journal of Islamic Education*, *7*(2), 525–538. https://doi.org/10.24256/iqro.v7i2.7663

Adripen, Rafli, D., & Amra, A. (2021). Pengaruh pelaksanaan supervisi akademik kepala sekolah dan gaya kepemimpinan terhadap kinerja guru. *Al-Ikhtibar: Jurnal Ilmu Pendidikan*, *8*(2), 109–119. https://doi.org/10.32505/ikhtibar.v8i2.628

Arikunto, S. (2021). *Prosedur penelitian suatu pendekatan praktik*. Rineka Cipta.

Bass, B. M., & Avolio, B. J. (2021). *Improving organizational effectiveness through transformational leadership*. SAGE Publications.

Bellibaş, M. Ş., Kılınç, A. Ç., & Polatcan, M. (2021). The moderation role of transformational leadership in the effect of instructional leadership on teacher professional learning and instructional practice: An integrated leadership perspective. *Educational Administration Quarterly*, *57*(5), 776–814. https://doi.org/10.1177/0013161X211035079

Dorukbaşi, E., & Cansoy, R. (2024). Examining the mediating role of teacher professional learning between perceived instructional leadership and teacher instructional practices. *European Journal of Education*, *59*(3), 1–23. https://doi.org/10.1111/ejed.12672

Fayzhall, M., Asbari, M., Purwanto, A., Sestri Goestjahjanti, F., Yuwono, T., Rasyi Radita, F., Yulia, Y., Cahyono, Y., & Suryani, P. (2020). Transformational versus transactional leadership: manakah yang memengaruhi kepuasan kerja guru? *EduPsyCouns: Journal of Education, Psychology and Counseling*, *2*(1), 256–275. https://doi.org/10.30596/jimb.v22i1.4888

Firmanti, M., Sujino, S., & Noor, M. (2026). Pengaruh gaya kepemimpinan transformasional dan supervisi akademik kepala sekolah terhadap kompetensi profesional guru di SD Islam Terpadu Baitul Muslim Way Jepara Lampung Timur. *Jurnal Manajemen Pendidikan*, *11*(4), 9914–9928. https://doi.org/10.34125/jmp.v11i4.3518

Glickman, C. D., & Gordon, S. (2016). *Supervision and instructional leadership*. Pearson Education.

Hallinger, P., Tran, N. H., & Truong, T. D. (2023). Mapping the professional learning of primary teachers in Vietnam: a multi-method case study. *Professional Development in Education*, *49*(5), 856–870. https://doi.org/10.1080/19415257.2021.1879218

Hermansah, H., Rosmilawati, I., & Juansah, D. E. (2025). Studi analisis pengaruh kepemimpinan transformasional kepala sekolah terhadap kinerja guru dan mutu pendidikan di sekolah dasar. *Jurnal Basicedu*, *9*(4), 824–836. https://doi.org/10.31004/basicedu.v9i4.9995

Istiqomah, D., Mus, S., & Mustafa, M. (2024). Pengaruh supervisi akademik pengawas sekolah terhadap kompetensi profesional guru di sekolah menengah kejuruan. *Jurnal Administrasi, Kebijakan, Dan Kepemimpinan Pendidikan (JAK2P)*, *5*(1), 66–71. https://doi.org/10.26858/jak2p.v5i1.15445

Joen, S., Purnamawati, & Amiruddin. (2022). Pengaruh kepemimpinan transformasional kepala sekolah terhadap kinerja guru melalui motivasi kerja guru. *UNM of Journal Technologycal*, *6*(3), 224–232. https://doi.org/10.26858/ujtv.v6i3.37535

Kang, W. (2021). Explaining effects of transformational leadership on teachers' cooperative professional development through structural equation model and phantom model approach. *Sustainability (Switzerland)*, *13*(19), 1–17. https://doi.org/10.3390/su131910888

Karacabey, M. F., Bellibaş, M. Ş., & Adams, D. (2022). Principal leadership and teacher professional learning in Turkish schools: examining the mediating effects of collective teacher efficacy and teacher trust. *Educational Studies*, *48*(2), 253–272. https://doi.org/10.1080/03055698.2020.1749835

Kusmei, I., Abdullah, G., & Haryati, T. (2021). Pengaruh supervisi akademik kepala sekolah terhadap kompetensi profesional guru sekolah dasar di Kecamatan Comal Kabupaten Pemalang. *Jurnal Manajemen Pendidikan (JMP)*, *10*(2), 291–318. https://doi.org/10.26877/jmp.v10i2.9439

Kustianah, Egar, N., & Rasiman. (2023). Pengaruh kepemimpinan transformasional kepala sekolah, supervisi akademik, dan motivasi kerja guru terhadap kinerja guru sekolah dasar negeri di Kecamatan Boja Kabupaten Kendal. *Didaktik : Jurnal Ilmiah PGSD FKIP Universitas Mandiri*, *9*(2), 1561–1570. https://doi.org/10.36989/didaktik.v9i2.830

Li, L., & Liu, Y. (2022). An integrated model of principal transformational leadership and teacher leadership that is related to teacher self-efficacy and student academic performance. *Asia Pacific Journal of Education*, *42*(4), 661–678. https://doi.org/10.1080/02188791.2020.1806036

Lin, W., Yin, H., & Liu, Z. (2022). The roles of transformational leadership and growth mindset in teacher professional development: The mediation of teacher self-efficacy. *Sustainability (Switzerland)*, *14*(11), 1–13. https://doi.org/10.3390/su14116489

Lustiawati, Y., Abdullah, G., & Sudana, I. M. (2024). Pengaruh kepemimpinan transformasional kepala sekolah, kompetensi profesional guru, dan kualitas sarana prasarana terhadap mutu sekolah pada sekolah dasar negeri di Kecamatan Kedungtuban Kabupaten Blora. *Review Pendidikan Dan Pengajaran*, *7*(4), 12757–12761. https://doi.org/10.31004/jrpp.v7i4.34195

Maisyaroh, Budi Wiyono, B., Hardika, Valdez, A. V., Mangorsi, S. B., & Canapi, S. P. T. (2021). The implementation of instructional supervision in Indonesia and the Philippines, and its effect on the variation of teacher learning models and materials. *Cogent Education*, *8*(1), 1–31. https://doi.org/10.1080/2331186X.2021.1962232

Mardhatillah, O., & Surjanti, J. (2023). Peningkatan Kompetensi Pedagogik dan Profesionalitas Guru di Indonesia Melalui Pendidikan Profesi Guru (PPG). *Jurnal Pendidikan Ekonomi Undiksha*, *15*(1), 102–111. https://doi.org/10.23887/jjpe.v15

Maryati, T., Lapasau, M., & Wahid, S. A. (2025). Enhancing principal effectiveness: a meta-analysis on the roles of academic supervision and instructional leadership. *Jurnal Penelitian Pendidikan IPA*, *11*(9), 146–156. https://doi.org/10.29303/jppipa.v11i9.12849

Mirsa, R. N. P. (2024). Needs assessment for professional competence of elementary school teachers in Yogyakarta. *Indonesian Journal of Classroom Action Research Journal Homepage*, *2*(1), 26–33. https://doi.org/10.53866/ijcar.v2i2.535

Mok, S. Y., & Staub, F. C. (2021). Does coaching, mentoring, and supervision matter for pre-service teachers' planning skills and clarity of instruction? A meta-analysis of (quasi-)experimental studies. *Teaching and Teacher Education*, *107*, 1–14. https://doi.org/10.1016/j.tate.2021.103484

Mulyani, H., & Insani, M. N. (2023). Kompetensi guru Sekolah Penggerak dalam menyusun modul ajar Kurikulum Merdeka. *Jurnal Lingkar Mutu Pendidikan*, *20*(1), 1–10. https://doi.org/10.54124/jlmp.v20i1.95

Mulyanti, S., Hariyati, N., Wardoyo, D. T. W., Khamidi, A., & Syaidul Haq, M. (2024). Hubungan supervisi akademik, pengalaman mengajar, dan kompetensi profesional dengan kinerja guru. *Journal of Education Research*, *5*(3), 3436–3442. https://doi.org/10.37985/jer.v5i3.1061

Mulyasa, E. (2022). *Manajemen dan kepemimpinan kepala sekolah*. Bumi Aksara.

Munawir, Yani, F. P., & Az-zahra, E. A. (2025). Pengembangan profesionalisme guru melalui program pendidikan berkelanjutan: Sebuah kajian literatur. *Indonesian Journal of Learning and Educational Studies*, *3*(1), 14–26. https://doi.org/10.62385/ijles.v3i1.179

Mustotiah, Suriansyah, A., & Ahmad, K. I. (2025). Hubungan gaya kepemimpinan transformasional kepala sekolah terhadap kinerja guru melalui kecerdasan emosional dan disiplin kerja guru. *Jurnal Studi Guru Dan Pembelajaran*, *8*(1), 156–177. https://doi.org/10.30605/jsgp.8.1.2025.5357

Northouse, P. G. (2021). *Leadership*. SAGE Publications.

Prasetya, I., Sihotang, R. B., Rahma, B. S. A., Parhusip, G. A., & Marweki, R. A. (2026). Kompetensi profesional guru: konsep, indikator, dan implikasinya terhadap mutu pendidikan. *Pendas : Jurnal Ilmiah Pendidikan Dasar*, *11*(2), 830–840. https://doi.org/10.23969/jp.v11i02.50125

Purnama, H., & Hayati, N. (2024). The impact of principals' leadership style on teachers' work ethic and professional competence. *Jurnal Pendidikan Progresif*, *14*(3), 2064–2075. https://doi.org/10.23960/jpp.v14.i3.2024140

Purwanto, R. (2021). Kepemimpinan visioner kepala sekolah terhadap mutu dan kualitas sekolah di SD Negeri Soko. *Jurnal Pendidikan Dan Teknologi Indonesia*, *1*(4), 151–160. https://doi.org/10.52436/1.jpti.26

Raharja, S., Nashir, I. M., & Andriani, D. E. (2022). The effect of principals' transformational leadership and organizational culture on teacher performance. *Jurnal Kependidikan Penelitian Inovasi Pembelajaran*, *6*(2), 152–162. https://doi.org/10.21831/jk.v6i2.49456

Rahmadani, S., & Marsidin, S. (2023). Strategi kepala sekolah dalam meningkatkan kompetensi profesional guru di SMK Negeri 10 Padang. *Journal of Educational Administration And Leadership*, *3*(3), 186–191. https://doi.org/10.24036/jeal.v2i3

Rifqi, N., & Abidin, M. (2023). The effectiveness of head of academic transformation leadership and supervision on teacher professionalism competence. *Educare: Jurnal Ilmu Pendidikan*, *2*(1), 34–43. https://doi.org/10.71392/ejip.v2i1.51

Rohman, M. A., & Ruhiat, Y. (2024). Pengaruh supervisi akademik dan kepemimpinan kepala sekolah terhadap peningkatan kinerja guru. *Jurnal Ilmu Pendidikan*, *6*(6), 6759–6772. https://doi.org/10.31004/edukatif.v6i6.7778

Santoso, S. (2019). *Mahir statistik parametrik*. Elex Media Komputindo.

Satosa, E. B., Sukmawati, F., Ridhani, J., Trisnaningsih, S., & Prihatin, R. (2025). Teachers' readiness to implement the deep learning approach in Merdeka Curriculum: an analysis based on psychopedagogical characteristics. *Jurnal Teknologi Pendidikan*, *2025*(3), 765–773. https://doi.org/10.21009/JTP2001.6

Sofia, C. N., Yusrizal, Y., & Khairuddin, K. (2022). Principal's academic supervision management in fostering teacher professional competence. *AL-ISHLAH: Jurnal Pendidikan*, *14*(4), 7371–7380. https://doi.org/10.35445/alishlah.v14i4.2415

Sugiyono. (2022). *Metode penelitian kuantitatif* (Edisi ke-3). Alfabeta.

Sukarsono, Santosa, C. A. H. F., Tatminingsih, S., & Saabighoot, Y. A. (2024). Hubungan supervisi akademik dan kepemimpinan transformasional kepala sekolah penggerak dengan profesionalisme guru di Korwil Periuk. *As-Sibyan: Jurnal Pendidikan Anak Usia Dini*, *9*(1), 143–154. https://doi.org/10.32678/assibyan.v9i1.10180

Syafitri, I. R., Irsyad, Rifma, & Yahya. (2023). The influence of principals' academic supervision and teacher commitment on the professional competence of state junior high school teachers. *Journal of Education Research and Evaluation*, *7*(3), 434–442. https://doi.org/10.23887/jere.v7i3.65995

Toprak, M., Karakuş, M., & Chen, J. (2023). Transformational school leadership: A systematic review of research in a centralized education system. *Journal of Educational Administration*, *61*(5), 1–21. https://doi.org/10.1108/JEA-10-2022-0185

Tusmiarifudin, Syamsul Hadi, & Widiyanti. (2024). Principals' transformational learning leadership in digital lifestyles and teachers' digital-based learning. *Jurnal Imiah Pendidikan Dan Pembelajaran*, *8*(1), 34–43. https://doi.org/10.23887/jipp.v8i1.66714

Utaminingsih, S., Sundari, S., & Mirana, A. E. (2024). The professional competency development model of science teachers through learning leadership. *Jurnal Pendidikan IPA Indonesia*, *13*(1), 40–54. https://doi.org/10.15294/jpii.v13i1.48477

Wahyuni, E., Ahyani, N., & Mahasir. (2022). Pengaruh supervisi kepala sekolah dan motivasi kerja guru terhadap kinerja guru. *Jurnal Pendidikan Tambusai*, *6*(3), 14018–14017. https://doi.org/10.31004/jptam.v6i3.4930

Wati, S., & Nurhasannah. (2024). Penguatan kompetensi guru dalam menghadapi era digital. *Jurnal Review Pendidikan Dasar*, *10*(2), 149–155. https://doi.org/10.26740/jrpd.v10n2.p149-155

Widodo, W., Gustari, I., & Chandrawaty, C. (2022). Adversity quotient promotes teachers' professional competence more strongly than emotional intelligence: evidence from Indonesia. *Journal of Intelligence*, *10*(3), 1–17. https://doi.org/10.3390/jintelligence10030044

Yani, N., Trisoni, R., Aisyah, D., Jamilus, J., & Herlina, E. (2026). Kepemimpinan transformasional kepala sekolah dalam mengembangkan kompetensi profesional guru di SD Islam Al Muttaqin Kota Sawahlunto. *NUSRA : Jurnal Penelitian Dan Ilmu Pendidikan*, *7*(2), 240–247. https://doi.org/10.55681/nusra.v7i2.6100

Yuswardi. (2021). Analisis faktor-faktor yang memengaruhi kompetensi profesional guru di Perguruan Tamansiswa Pematangsiantar. *MUKADIMAH: Jurnal Pendidikan, Sejarah, Dan Ilmu-Ilmu Sosial*, *5*(2), 328–335. https://doi.org/10.30743/mkd.v5i2.4428

Zahra, N. A., Herpratiwi, Wahyudi, A., Nurwahidin, M., & Yulianti, D. (2026). Development and psychometric validation of a multidimensional scale for assessing elementary school teachers' professional competence. *Education and Human Development Journal*, *11*(1), 81–94. https://doi.org/10.33086/ehdj.v11i1.8757

Zaini, Z. A. H. (2025). Effectiveness of Education Financing Management in Public and Private Schools: Policy Perspective and Implementation. *AL-ISHLAH: Jurnal Pendidikan*, *17*(2), 2331–2344. https://doi.org/10.35445/alishlah.v17i2.7225

Zhang, J., Huang, Q., & Xu, J. (2022). The relationships among transformational leadership, professional learning communities and teachers' job satisfaction in China: What do the principals think? *Sustainability (Switzerland)*, *14*(4), 1–17. https://doi.org/10.3390/su14042362