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The Influence of Transformational Leadership, Academic Supervision, and Teachers' Pedagogical Competence on the Quality of Education: A Quantitative Study in Public Elementary Schools

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ABSTRACT

The quality of education in public elementary schools is influenced by leadership effectiveness, professional guidance for teachers, and teachers' competence in managing learning. In East Ungaran District, variations in school performance indicate the need to identify key factors affecting educational quality. This study aims to analyze the influence of the principal's transformational leadership, academic supervision, and teachers' pedagogical competence on educational quality. A quantitative approach with a causal survey design was used, involving 148 teachers selected through proportional random sampling. Data were collected using validated and reliable questionnaires and analyzed using multiple linear regression. The findings show that transformational leadership, academic supervision, and pedagogical competence each have a positive and significant effect on educational quality, both partially and simultaneously. Transformational leadership has the strongest influence among the three variables. The coefficient of determination (R^2) of 0.562 indicates that 56.2% of the variation in educational quality is explained by these factors. The study concludes that strengthening visionary leadership, systematic supervision, and pedagogical capacity is essential to create a collaborative and sustainable quality-oriented school environment.

1. Introduction

The quality of education is a fundamental foundation in national development because it is closely related to enhancing human resources that are competent, competitive, and have strong character. Efforts to improve the quality of education are not only related to student learning outcomes but also encompass the processes, inputs, and governance of educational institutions in an effective and sustainable manner (Hadis & Nurhayati, 2023). Fattah (2017) emphasized that improving educational quality is a continuous process that requires a quality assurance system at every level of educational units. In the context of primary education, the

challenges are quite complex, including low teacher professionalism, weak school leadership, and suboptimal implementation of academic supervision. These conditions demand serious attention from all stakeholders to ensure equitable improvement in education quality.

Education in Indonesia still experiences fluctuations in quality at both national and regional levels. Azizah (2021) explained that equitable educational quality can be achieved if quality improvement policies are implemented comprehensively across all levels, both in public and private schools, involving society, government, and the private sector synergistically. Ismanto (2016) added that community participation in educational financing and supervision significantly affects the success of school quality improvement. Furthermore, Law No. 20 of 2003 concerning the National Education System mandates that educators and education personnel are obliged to commit professionally to improving educational quality. This underscores the importance of professionalism, innovation, and social responsibility of all school elements to realize education that is relevant to the demands of the times (Sallis, 2023; Soetopo, 2019).

The 2024 education report card for public elementary schools in East Ungaran District indicates a decline in achievement across various indicators, including learning outcomes, educational equity, teacher competence, and participatory and accountable school management. This condition reflects fundamental problems in educational governance in the region, which need to be examined in depth through variables that directly affect educational quality, namely transformational leadership of school principals, academic supervision, and teachers' pedagogical competence.

Transformational leadership of school principals is a key factor that determines the direction and success of educational quality improvement. Bass and Avolio (1993) define transformational leadership as a leader's ability to inspire and motivate subordinates to exceed personal interests for the achievement of organizational goals. Transformational leaders foster commitment, enhance creativity, and encourage innovation in learning (Danim, 2022; Wibowo, 2021). Studies indicate that this leadership style positively contributes to improving teacher professionalism and school quality (Aminah et al., 2025; Rukmana, Wiguna, & Muchtar, 2022; Sugiharto, 2024). Rahayu (2023) found that principals who apply transformational leadership can cultivate work discipline, collaboration, and a reflective culture within schools. However, in East Ungaran District, many principals have not fully implemented these principles, particularly in terms of inspirational motivation, individualized consideration, and intellectual stimulation, as highlighted by Rafferty and Griffin (2017). Consequently, an innovative and collaborative culture within schools has not yet been optimally established.

In addition to leadership, principals' academic supervision also plays a strategic role in ensuring the quality of learning. Academic supervision is a professional development process aimed at improving teachers' abilities to design, implement, and evaluate learning effectively (Depdiknas, 2004; Ware, 2020). Research shows that well-planned academic supervision can enhance teacher performance, work

motivation, and student learning outcomes (Suwartini, 2017; Erna Dewi Palupi et al., 2022; Jumali, Yuliejantiningasih, & Haryati, 2023; Sutarsih, Kusumaningsih, & Ginting, 2025). Verdiana, Soegeng, and Kusumaningsih (2025) even emphasized that the effectiveness of academic supervision, when combined with a strong work culture and teacher discipline, can significantly strengthen school quality. However, initial observations in East Ungaran District indicate that the implementation of academic supervision is not yet optimal due to time constraints, administrative burdens, and lack of follow-up on supervision findings, so the intended guidance function is not fully realized.

Furthermore, teachers' pedagogical competence plays a critical role in determining educational success. Teachers with high pedagogical competence are able to understand students' characteristics, design innovative learning, and create a conducive learning environment (Rusdiana & Heryati, 2015; Haryono, 2020). According to Wardani et al. (2022), pedagogical competence is a determining factor in improving teacher performance and professionalism. Pricilia et al. (2024) found that pedagogical competence has a significant relationship with improving the quality of learning in elementary schools. In the context of public elementary schools in East Ungaran District, observations indicate that some teachers have not maximized classroom management and the use of diverse learning media. This condition impacts low student participation and decreases the quality of the learning process. The decline in the average pedagogical competence scores of teachers over the past three years, from "good" to "adequate," further emphasizes the urgency of enhancing teachers' professional capacity through training, mentoring, and continuous reflection (Irina & Mata, 2019).

Based on the above description, it can be concluded that the low quality of education in public elementary schools in East Ungaran District is closely related to suboptimal transformational leadership of school principals, inconsistent implementation of academic supervision, and teachers' underdeveloped pedagogical competence. These three factors are interrelated in forming a high-quality school ecosystem. Therefore, this study aims to analyze the influence of transformational leadership of school principals, academic supervision, and teachers' pedagogical competence, both partially and simultaneously, on the quality of education in public elementary schools in East Ungaran District. The results of this study are expected to provide theoretical contributions to the development of educational management science, as well as practical benefits for principals, supervisors, and teachers in enhancing the effectiveness of performance and the quality of primary education sustainably.

2. Methodology

This study employed a quantitative approach with a causal survey design. A quantitative approach was chosen because the study aims to test theories through the measurement of variables that can be quantified numerically and analyzed statistically to identify relationships among variables (Sugiyono, 2019). The causal research design was used to determine the influence or cause-and-effect

relationships between predetermined independent and dependent variables, namely transformational leadership of school principals, academic supervision, and teachers' pedagogical competence on educational quality. This approach is considered the most appropriate for addressing the research problem because it allows researchers to test hypotheses objectively and systematically (Arikunto, 2019; Ghozali, 2018).

The study was conducted at public elementary schools in East Ungaran District, Semarang Regency, over six months from February to July 2025. The location was selected based on the results of educational quality evaluations that showed variations in school quality, necessitating an empirical study to identify factors influencing the improvement of educational quality in the region. The research was conducted in stages, including proposal development, instrument testing, survey implementation, data analysis, and report preparation. The research design was structured to provide a systematic direction for each research stage, including problem identification, hypothesis formulation, determination of variables and operational definitions, population and sample selection, development of research instruments, data collection, and result analysis. Each step was carried out based on methodological principles to ensure the internal and external validity of the study (Sugiyono, 2019; Mulyasa, 2019).

The population in this study consisted of all elementary school teachers in East Ungaran District, totaling 235 individuals. The population is defined as the generalization area consisting of subjects with specific characteristics determined by the researcher to be studied and from which conclusions are drawn (Sugiyono, 2019). The sample was determined using Slovin's formula (Sujarweni, 2019) with a 5% margin of error, resulting in a sample of 148 teachers. The sample was selected using proportional random sampling, in which members were randomly drawn proportionally from each school regardless of population strata (Sugiyono, 2017). This technique ensures that the sample represents the entire population of teachers in the study area proportionally and objectively.

The research instrument was a questionnaire using a five-point Likert scale, ranging from "strongly agree" to "strongly disagree." Questionnaires were considered appropriate because they efficiently capture respondents' perceptions, attitudes, and experiences in large numbers (Sugiyono, 2019). The instrument was developed based on theoretical indicators for each variable studied, namely: transformational leadership of school principals, academic supervision, teachers' pedagogical competence, and educational quality. Instrument development involved several stages, including determining indicators, drafting questions, and conducting a preliminary trial to measure validity and reliability.

Validity testing was conducted to determine the extent to which the items accurately measured the intended constructs. Validity was calculated using the Pearson Product-Moment correlation by comparing the r -value with the r -table at a 5% significance level. Items were considered valid if $r\text{-count} > r\text{-table}$ (Sugiyono, 2019). All items meeting the validity criteria were used in the study. Reliability testing was conducted using Cronbach's Alpha to ensure internal consistency

among items (Arikunto, 2019). The reliability criterion was Cronbach's Alpha > 0.70, indicating high instrument reliability (Ghozali, 2018). Reliability testing results for all study variables showed Cronbach's Alpha > 0.90, thus the instruments were deemed highly reliable and suitable for use.

Operational definitions were established to provide clear boundaries for each measured concept. Educational quality is defined as the ability of the educational system to manage inputs, processes, and outputs effectively and efficiently to produce competitive and high-quality graduates (Fattah, 2017; Sallis, 2023). Transformational leadership of school principals reflects the principal's ability to motivate, inspire, and develop subordinates' potential to achieve school goals (Bass & Avolio, 1993; Danim, 2022). Academic supervision refers to professional guidance by principals aimed at improving the quality of the learning process (Depdiknas, 2004; Hasanah & Kristiawan, 2019). Teachers' pedagogical competence is defined as the ability to understand students, design and implement learning, and conduct evaluations to optimally develop students' potential (Rusdiana & Heryati, 2015; Irina & Mata, 2019). Primary data were collected through the distribution of questionnaires to teachers, providing factual information about respondents' perceptions and direct experiences regarding leadership, supervision, and pedagogical practices in schools (Assingkily & Mesiono, 2019). The data were processed and analyzed using SPSS version 26 to facilitate statistical analysis.

Data analysis began with classical assumption testing, including tests for normality, linearity, multicollinearity, and heteroscedasticity, to ensure the data met regression analysis requirements. Normality was tested using the One-Sample Kolmogorov-Smirnov Test to determine whether data were normally distributed (Savitri et al., 2021). Linearity testing ensured a linear relationship between independent and dependent variables. Multicollinearity was assessed using the Variance Inflation Factor (VIF) and tolerance; data were considered free from multicollinearity if VIF < 10 and tolerance > 0.1. Heteroscedasticity was tested using the Glejser method to detect variance inequality in the regression model residuals (Ghozali, 2018).

Inferential analysis was conducted using hypothesis testing with Pearson Product-Moment correlation to examine relationships between independent and dependent variables (Sugiyono, 2019). If the correlation was significant, the coefficient of determination (R^2) was calculated to measure the effect size of independent variables on the dependent variable. Interpretation criteria followed Ghozali (2018), with R^2 values ranging from 0 to 1, where values closer to 1 indicate a stronger model in explaining variable relationships.

Simple regression analysis was used to test the partial effect of each independent variable on educational quality, while multiple regression analysis tested the simultaneous effect of all three independent variables. The regression equation followed the formula $Y = a + b_1X_1 + b_2X_2 + b_3X_3$ (Sugiyono, 2015). Significance testing was conducted using t-tests and F-tests at a 95% confidence level ($\alpha = 0.05$). Structural modeling was tested using the Partial Least Squares (PLS) approach to examine relationships among latent variables through path coefficients and R-

square values. Bootstrapping results were considered significant if t -statistics > 1.96 at a 5% significance level (Ghozali, 2018).

Overall, the research methods were designed to produce empirical findings that are valid, reliable, and generalizable, contributing scientifically to the development of educational management and the improvement of primary school quality.

3. Results and Discussion

Before the data analysis was conducted, the research instruments in the form of questionnaires were distributed to the respondents. The questionnaire consisted of statements measured using a 5-point Likert scale, ranging from “strongly disagree” to “strongly agree.” The researcher distributed the questionnaires directly to teachers at each school during working hours, ensuring that respondents filled out the questionnaires independently without external influence. To maintain data accuracy, the researcher also provided brief instructions and clarified any questions regarding the meaning of the statements. All questionnaires distributed were returned and complete, so no data reduction was required during the processing stage. Examples of the questionnaire items used in this study are presented in Table 1

Table 1. Examples of Questionnaire Items for Each Research Variable

Variable	Example Item Statement	Scale Used
Transformational Leadership of School Principals	“The principal encourages teachers to innovate in learning.”	Likert 1–5
Academic Supervision	“The supervisor provides constructive feedback to improve my teaching performance.”	Likert 1–5
Teachers’ Pedagogical Competence	“I am able to apply varied learning methods according to students’ characteristics.”	Likert 1–5
Educational Quality	“Learning activities in my school effectively support student achievement.”	Likert 1–5

The examples of questionnaire items presented in Table 1 illustrate how each research variable was operationalized into measurable indicators. The statements were formulated to reflect observable behaviors and perceptions related to leadership practices, supervision activities, pedagogical performance, and educational quality. The use of a 5-point Likert scale enabled respondents to express the intensity of their agreement objectively, allowing the data to be analyzed quantitatively. Additionally, the clarity and simplicity of the statements ensured that teachers could understand and respond to the items accurately, minimizing response bias. This design supports the validity of the instrument in capturing authentic conditions in the field.

The research instruments comprised four variables: transformational leadership of school principals, academic supervision, teachers’ pedagogical competence, and educational quality. Based on the validity test using the Pearson Product-Moment correlation, all statement items had r -values greater than the r -table at a 5% significance level, indicating that all items were valid. Furthermore, the reliability

test showed that Cronbach's Alpha values for each variable were above 0.90, indicating that all instruments had very high reliability. Therefore, the questionnaires used were suitable for measuring the research variables. The validity and reliability results for each variable are presented in Table 2.

Table 2. Results of Instrument Validity and Reliability Test

Variable	Cronbach's Alpha	Criteria
Transformational Leadership of School Principals	0.931	Reliable
Academic Supervision	0.921	Reliable
Teachers' Pedagogical Competence	0.914	Reliable
Educational Quality	0.937	Reliable

Research Data Description

This study involved 148 respondents, who were teachers from 14 public elementary schools in East Ungaran District. Based on descriptive analysis, the average scores for each variable indicate that the conditions of leadership, supervision, teacher competence, and educational quality in the study area fall within high to very high categories. This suggests that schools in the region have established relatively good managerial systems and learning quality. The descriptive statistical results for each research variable are summarized in Table 3 below.

Table 3. Descriptive Results of Research Variables

Variable	Mean	Category
Transformational Leadership of School Principals	4.35	Very High
Academic Supervision	4.29	High
Teachers' Pedagogical Competence	4.21	High
Educational Quality	4.32	High

From these results, it can be concluded that principals are considered to have a visionary and inspirational leadership style, academic supervision is effective in providing guidance to teachers, and teachers possess strong pedagogical skills in designing and implementing learning. This condition positively contributes to improving educational quality in public elementary schools in East Ungaran District.

Multiple Linear Regression Results

The results of the multiple linear regression analysis indicated that transformational leadership of school principals, academic supervision, and teachers' pedagogical competence simultaneously had a positive effect on educational quality. The regression equation obtained was: $Y = 7.268 + 0.257X_1 + 0.213X_2 + 0.204X_3$. This equation indicates that an increase of one unit in each independent variable proportionally increases educational quality. In other words, better school principal leadership, more effective academic supervision, and higher teacher pedagogical competence correspond to higher educational quality. The results of the regression analysis are presented in Table 4.

Table 4. Results of Multiple Linear Regression

Independent Variable	Coefficient (B)	t-value	Sig.	Description
Transformational Leadership of School Principals	0.257	6.417	0.000	Significant
Academic Supervision	0.213	5.996	0.000	Significant
Teachers' Pedagogical Competence	0.204	5.631	0.000	Significant

Simultaneous Test (F-Test) and Coefficient of Determination

The simultaneous test showed that the three independent variables together significantly influenced educational quality. The F-value was 61.825, higher than the F-table value of 2.67 at a significance level of $0.000 < 0.05$. This indicates that the regression model is appropriate for explaining the relationship between the three independent variables and educational quality. Additionally, the coefficient of determination (R^2) was 0.562, indicating that 56.2% of the variation in educational quality can be explained by transformational leadership of school principals, academic supervision, and teachers' pedagogical competence, while the remaining 43.8% is influenced by factors outside this research model. The results of the F-test and coefficient of determination are summarized in Table 5.

Table 5. Results of Simultaneous Test (F-Test) and Coefficient of Determination

Statistical Test	Value	Significance Criteria	Description
F-value	61.825	$0.000 < 0.05$	Significant
F-table	2.67	-	-
Coefficient of Determination (R^2)	0.562	-	Moderate-Strong

Interpretation of Research Results

Overall, the study results indicate that the three main variables play a crucial role in determining educational quality. Transformational leadership of school principals provides direction and inspiration for teachers in performing their duties. Academic supervision functions as a tool for guidance and monitoring of learning implementation, while teachers' pedagogical competence is a key factor in ensuring the quality of the learning process and outcomes. The combination of these three variables creates strong synergy in efforts to improve educational quality in public elementary schools in East Ungaran District. Principals who implement transformational leadership, accompanied by effective academic supervision and strong teacher pedagogical competence, are able to create a learning environment that is conducive, collaborative, and oriented toward improving student learning outcomes.

Discussion

The Influence of School Principals' Transformational Leadership on Educational Quality

The results of the study indicate that school principals' transformational leadership has a positive and significant effect on educational quality. Principals who have a clear vision, the ability to motivate, and lead by example are able to create a productive and innovative school environment. Transformational leadership encourages teachers to work beyond personal interests for the success of the school (Bass, 2023). Principals who implement this leadership style foster teachers' confidence and responsibility toward the quality of learning (Rahayu & Miyono, 2023).

Aminah et al. (2025) also found that transformational leadership increases organizational commitment and teachers' work enthusiasm. Similar results were reported by Qudsiyyah (2024), who observed that transformational principals effectively build a collaborative work culture in elementary schools. Additionally, Nenosaban and Kolo (2024) emphasized that leadership styles emphasizing inspiration and motivation create participative and quality-oriented work environments. These findings support Yukl's (2018) theory, which states that transformational leadership shapes subordinates' behavior through idealized influence, inspirational motivation, and intellectual stimulation. Therefore, improving educational quality is determined not only by programs and policies but also by the principal's ability to lead visionarily, provide exemplary behavior, and empower all school elements toward shared goals.

The Influence of Academic Supervision on Educational Quality

Academic supervision has been proven to have a significant effect on educational quality. Effective supervision improves learning quality through professional development of teachers. According to Mulyasa (2019), systematic academic supervision helps teachers address weaknesses in lesson planning and implementation. These findings support Erna Dewi Palupi et al. (2022), who stated that principals' academic supervision directly positively impacts teachers' performance and students' learning outcomes.

Jumali, Yuliejantiningih, and Haryati (2023) reinforced that regular academic supervision increases teachers' motivation and professional responsibility. Similar findings were reported by Sutarsih, Kusumaningsih, and Ginting (2025), highlighting that the success of academic supervision depends on the quality of communication between principals and teachers. Wardani et al. (2022) further stated that academic supervision serves as a key determinant in improving educational quality, acting as a bridge between leadership and teacher competence. Thus, the effectiveness of academic supervision depends not only on its frequency but also on a communicative approach, principal support, and consistent follow-up. Humanistic and collaborative supervision is proven more effective in enhancing teacher professionalism and learning quality in elementary schools.

The Influence of Teachers' Pedagogical Competence on Educational Quality

Teachers' pedagogical competence is a key factor in determining the success of the learning process and educational quality. Teachers with high pedagogical competence can understand students' characteristics, select appropriate instructional strategies, and create interactive classroom environments. According to Rusdiana and Heryati (2015), pedagogical competence includes reflective, empathetic, and adaptive abilities to meet students' needs. Irina and Mata (2019) also found that teachers with strong pedagogical competence can manage learning more effectively and student-centered.

Wardani et al. (2022) confirmed that pedagogical competence significantly affects teachers' performance and students' learning outcomes. Pricilia et al. (2024) added that highly competent teachers can create creative, relevant learning oriented toward achieving 21st-century competencies. Haryono (2020) also showed that pedagogical competence contributes to enhancing learning effectiveness in elementary schools. Verdiana, Soegeng, and Kusumaningsih (2025) demonstrated that improving teachers' pedagogical competence directly correlates with school quality improvement. Therefore, strengthening teachers' pedagogical competence should be a primary priority in human resource development for education. Professional and adaptive teachers can create effective and high-quality learning processes, ultimately improving educational quality.

Simultaneous Influence of Transformational Leadership, Academic Supervision, and Pedagogical Competence on Educational Quality

The study found that transformational leadership of school principals, academic supervision, and teachers' pedagogical competence simultaneously have a significant effect on educational quality. The synergy among these three variables creates a sustainable and well-directed education management system. Transformational principals create a positive work climate, academic supervision serves as professional guidance ensuring learning quality, and teachers' pedagogical competence represents the tangible outcomes of such guidance.

Rukmana, Wiguna, and Muchtar (2022) found that the combination of transformational leadership and academic supervision greatly contributes to improved teacher performance. Lustiawati, Abdullah, and Sudana (2024) reported that principal leadership and teacher competence together determine elementary school quality. Marsya, Wijaya, and Rohman (2025) also demonstrated that effective principal leadership strongly influences motivation and learning outcomes through continuous guidance. Meanwhile, Sugiharto (2024) emphasized that integrating leadership, supervision, and teacher competence is a key determinant of elementary education success. Hence, educational quality should be viewed as the result of the synergistic interaction among leadership, professional guidance, and competence. When these elements support one another, an adaptive, collaborative, and student-centered education system emerges.

4. Conclusion

This study indicates that school principals' transformational leadership, academic supervision, and teachers' pedagogical competence have a positive and significant effect on educational quality at public elementary schools in Ungaran Timur District, both partially and simultaneously. Principals who implement transformational leadership are able to provide inspiration, build trust, and foster teachers' work motivation to collectively achieve the school's vision and goals. Planned and continuous academic supervision plays a crucial role in enhancing teachers' professionalism, serving as a means of guidance and evaluation of the learning process. Meanwhile, teachers' pedagogical competence is a key determinant in creating effective, interactive, and student-centered learning. These three variables interact to form a sustainable system for improving educational quality.

Simultaneously, transformational leadership, academic supervision, and pedagogical competence contribute 56.2% to the variation in educational quality. This demonstrates that these factors constitute the main pillars for effective and high-quality management of elementary schools. Therefore, efforts to improve educational quality in Ungaran Timur District's public elementary schools should focus on strengthening visionary principal leadership, implementing collaborative academic supervision, and continuously enhancing teachers' pedagogical competence. These findings also emphasize that educational quality depends not only on structural policies but also on the synergy between inspirational educational leaders, effective professional guidance systems, and competent teachers in implementing learning. By reinforcing these three aspects, educational quality at the elementary school level is expected to improve consistently and sustainably.

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