

The Determinants of Instructional Leadership, Teacher Competence, and Data-Based Planning on School Quality: A Study of Public Elementary School in Gunem District Rembang Regency

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ABSTRACT

This study aims to analyze the influence of instructional leadership, professional competence, and data-based planning on the quality of public elementary schools in Gunem District, Rembang Regency, while highlighting their alignment with contemporary educational leadership theories. Using a quantitative approach with a survey method, data were collected through questionnaires distributed to school principals and teachers, involving 98 respondents from 21 public elementary schools selected through proportional random sampling. Data analysis employed descriptive statistics and multiple linear regression. The findings reveal that instructional leadership, professional competence, and data-based planning each have a significant positive effect on school quality, and jointly explain 43.8% of its variation. These results reinforce prior studies on the critical role of leadership, teacher professionalism, and evidence-based decision-making in educational improvement, while offering a contextual contribution within the Indonesian elementary school setting. The study's novelty lies in its integrated examination of these three determinants in a rural district context, providing practical implications for policymakers and school administrators to develop targeted training programs, strengthen data utilization, and foster collaborative instructional practices to enhance educational quality.

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INTRODUCTION

Improving the quality of basic education is a key pillar in developing superior and competitive human resources. National education in Indonesia functions to develop individuals' capabilities and to shape a dignified national character and civilization, as mandated by Law of the Republic of Indonesia Number 20 of 2003 on the National Education System (Sisdiknas Law, 2003). Both central and local governments are obligated to ensure the provision of quality education without discrimination (Harto dan Syarnubi, 2018).

The quality of education is measured through the achievement of the eight National Education Standards (SNP), which include content standards, process standards, assessment standards, graduation standards, management, financing, infrastructure, and standards for educators and educational personnel. In addition, the National School Accreditation Body (BASN) outlines three dimensions of quality: input, process, and output, which encompass human resources, curriculum, management, and both student and school performance (Kemendikbud, 2003).

However, empirical conditions reveal that the achievement of education quality remains uneven across regions. The 2024 Education Report Card data indicates that public elementary schools (SDN) in Gunem Subdistrict, Rembang Regency, have not yet met the primary achievement standards. The average scores for learning quality (69.03), teacher reflection (65.40), and instructional leadership (63.06) fall into the "low" category, with only literacy (80.44) and numeracy (77.90) rated as "good".

Regulation of the Minister of Education, Culture, Research, and Technology of the Republic of Indonesia Number 16 of 2022 emphasizes that the learning process standards must support the achievement of graduate competency standards. However, the low performance in the domains of learning quality and instructional leadership indicates a gap between actual field conditions and the ideal standards set forth.

One of the main factors influencing education quality is instructional leadership. This form of leadership emphasizes the principal's role in improving teaching and learning outcomes by professionally empowering teachers (Wibowo, 2022). School principals act as agents of change in curriculum, teaching strategies, and learning management (Aslam, 2022), and play a role in creating a conducive learning environment, setting academic visions, and providing continuous pedagogical support (Hallinger, 2020; Ismail, et al., 2018).

Unfortunately, many principals remain confined to administrative leadership models that lack focus on improving instructional quality (Celikten, 2021; Ismail et al., 2018). In this context, effective instructional leadership is essential to balance administrative duties with the substantive responsibility of enhancing education quality (Komariah dan Triatna, 2015; Mulyasa, 2015).

In addition to leadership, teachers' professional competence is key to ensuring effective learning. Law No. 14 of 2005 states that teachers are professional personnel who must possess expertise in delivering subject matter, managing classrooms, and objectively evaluating the learning process. Regulation of the Directorate General of Teachers and Education Personnel Number 2626/B/HK.04.01/2023 defines professional competence as the ability to design, implement, and evaluate student-centered learning. Studies by Wijaya, et al., (2021) and Asrijanti (2021) reinforce the finding that teachers' professional competence significantly influences school quality.

However, initial observations show that teachers in public elementary schools across Gunem Subdistrict still struggle to formulate measurable learning objectives, organize teaching materials systematically, and apply student-centered learning approaches. Only 30% of teachers can formulate operational and measurable learning objectives, and just 25% consistently implement active learning strategies.

The third crucial factor is data-based planning (DBP), which refers to the use of education report card data to design targeted quality improvement interventions and programs. DBP is regarded as a more effective and accountable educational management strategy (Bailey, JMichaels, 2019; Bryson, 2004), supported by valid and structured data systems (Abdurahman, 2018; Hidayatullah, 2020). Regulation of the Minister of Education, Culture, Research, and Technology Number 9 of 2022 affirms the importance of evaluating the education system as the foundation for implementing DBP at the school level.

Given the importance of these three aspects, this study aims to analyze the influence of instructional leadership, professional competence, and data-based planning on the quality of public elementary schools in Gunem Subdistrict, Rembang Regency. This research is expected to contribute to strengthening data-driven education management systems and to promote the enhancement of leadership capacity and professional competence at the basic education level.

Quality of Elementary Schools

The quality of elementary schools refers to the institution's ability to deliver educational services that meet or exceed established standards while satisfying the needs of all stakeholders. Quality is not solely focused on student achievement outcomes but also includes the quality of inputs, learning processes, and resulting outputs. Sallis (2020) explains that quality can be viewed from three perspectives: as an absolute concept (ideal), a relative concept (standard-based), and from

the consumer's perception (customer satisfaction). According to Muchtar (2024), school quality encompasses three key dimensions: input, process, and output. Inputs include educational personnel, students, facilities and infrastructure, and funding. The process comprises the curriculum and teaching materials, teaching and learning activities, as well as school management and leadership. Outputs include student academic achievement, the performance of teachers and school principals, and the overall accomplishments of the school. Current education quality policy is also reinforced through the Education Report Card, as stipulated in the Regulation of the Minister of Education, Culture, Research, and Technology (Permendikbudristek) No. 9 of 2022, which evaluates the quality of services and institutional performance as part of a continuous education quality improvement effort. The quality dimensions assessed in the Report Card include literacy and numeracy proficiency, teaching quality, instructional leadership, and the overall learning environment.

Instructional Leadership

Instructional leadership is a leadership style in which school principals focus on improving the quality of teaching and student learning outcomes. This type of leadership requires principals to play an active role in mentoring teachers, managing the curriculum, and evaluating the learning process. Mulyasa (2023) emphasizes that principals should foster a school climate that supports continuous learning and teacher development. According to Wibowo (2022), instructional leadership empowers the entire school community through structured programs aimed at enhancing educational quality. Sanjaya (2023) and Hermawan (2023) underscore that instructional leadership places learning at the center of school priorities and requires principals to be actively involved in guiding teachers to implement instructional innovations. Raihani (2020) found that instructional leadership by Indonesian principals plays a significant role in developing effective schools, particularly through teacher professional development and the improvement of learning quality. This is aligned with the views of Werdiningsih and Ayu (2022), who emphasize the principal's responsibility in managing the curriculum, mentoring teachers, and evaluating learning processes. Hallinger (2020) outlines that instructional leaders must foster a shared sense of purpose, establish a high-expectation climate, monitor student learning outcomes, and maintain a visible presence to shape the school culture.

Teachers' Professional Competence

Teachers' professional competence refers to the ability to master subject matter comprehensively and deeply, understand the structure of scientific knowledge, and teach it effectively. Mulyasa (2020) notes that professional competence includes mastery of subject content, competence standards, and teaching methodologies. According to Wijaya and Utami (2021), professional competence consists of subject mastery, understanding of the curriculum, the ability to engage in continuous professional development, and the integration of technology in learning. Regulation of the Directorate General of Teachers and Education Personnel (Dirjen GTK) No. 2626/B/HK.04.01/2023 further emphasizes that professional competence entails mastery of learning content, understanding students' characteristics, and the implementation of learner-centered curricula. Factors influencing professional competence include the teacher's level of education, teaching experience, professional training, school environmental support, as well as personal motivation and commitment. Sari dan Nugroho (2022) add that the ability to integrate technology is also a key indicator of teacher professionalism in the digital age.

Data-Based Planning (DBP)

Data-based planning is a strategic approach to decision-making that relies on the analysis of accurate and relevant educational data. Bailey and Michaels (2019) and Bryson (2004) argue that well-designed, data-driven planning enhances the success of educational program implementation. According to Fitriani and Usman (2017), data must be validated to serve as a sound foundation for developing effective plans. In the school context, data sources may include teachers, parents,

students, and the broader community (Asrijanti, 2021). The Ministry of Education, Culture, Research, and Technology promotes the use of the Education Report Card as a tool for schools to formulate contextually relevant and measurable educational interventions. This platform provides school performance indicators that serve as a basis for designing data-driven activities. The success of DBP is influenced by several factors, including data quality and availability, educators' data literacy competence, school leadership, technological infrastructure, and stakeholder engagement (Kemendikbudristek, 2023; Mulyasa, 2020; Fullan, 2011; OECD, 2019)

METHODS

This study employs a quantitative explanatory approach to test and explain causal relationships between independent and dependent variables through objective statistical analysis. The explanatory model was chosen because it is relevant for measuring the influence of instructional leadership (X_1), teachers' professional competence (X_2), and data-based planning (X_3) on elementary school quality (Y), as well as for providing empirical evidence aligned with contemporary educational management research emphasizing data-driven decision-making (Sugiyono, 2022; Napitupulu dan Mulyanto, 2023). This approach is consistent with previous studies that successfully used quantitative explanatory designs to examine similar leadership and instructional variables (Wibowo, 2022; Wijaya & Utami, 2021). The research focuses on all public elementary schools (SD Negeri) in Gunem Subdistrict, Rembang Regency, involving school principals and teachers as primary respondents.

The research design applied is causal-comparative, suitable for identifying and quantifying the effects among variables without direct manipulation (Ghozali, 2021). This design is particularly appropriate for field-based educational research, where natural conditions are maintained, yet statistical tools can still detect the strength of relationships between factors. Data were collected using a closed-ended Likert scale questionnaire that was systematically developed based on theoretical indicators for each variable, ensuring content validity through expert judgment and empirical validity through Pearson correlation testing. Reliability was measured using Cronbach's Alpha, producing coefficients above 0.90, indicating excellent internal consistency (Sugiyono, 2022; Ghozali, 2021).

The study was conducted in 20 public elementary schools in Gunem Subdistrict, Rembang Regency, from May to July 2025. This site was purposively selected as it reflects diverse school quality levels in a rural context, aligning with recommendations to situate school improvement research in underrepresented regions (Mustaqimah and Abdullah, 2022). The population comprises all principals and teachers, totaling 148 individuals. A proportional random sampling technique was used to ensure representation from each school, with the sample size determined using the Slovin formula at a 5% margin of error, resulting in 108 respondents (Sugiyono, 2022).

The variables in this study are defined as follows: instructional leadership (X_1) refers to the principal's capacity to guide learning processes and support teacher professional growth (Hallinger and Murphy, 2020); teachers' professional competence (X_2) includes mastery of subject matter, curriculum understanding, and adaptive teaching methods (Ministry of Education, 2023; Wijaya & Utami, 2021); data-based planning (X_3) involves formulating school improvement plans grounded in concrete evidence such as learning outcomes and attendance data (Bailey & Michaels, 2019; Putri & Anwar, 2025); and school quality (Y) encompasses input, process, and output indicators such as staff performance and student achievement (Ismail et al., 2018).

Data collection was carried out by directly distributing the questionnaires to respondents, ensuring a high response rate and minimizing bias (Wahyuni & Suryadi, 2023). Data analysis employed multiple linear regression to test the simultaneous and partial effects of the independent variables on school quality. Prior to regression analysis, prerequisite tests were performed, including normality testing with the Kolmogorov-Smirnov test, linearity and homogeneity testing using ANOVA, and multicollinearity testing to ensure independence among predictors (Santoso, 2015; Siregar, 2014). Hypothesis testing integrated Pearson correlation, ANOVA, and regression results to

provide a robust and triangulated understanding of variable influences, consistent with best practices in educational leadership research.

FINDINGS AND DISCUSSION

This study examined the effects of instructional leadership, teacher professional competence, and data-based planning (DBP) on the quality of public elementary schools in Gunem Subdistrict, Rembang Regency. A total of 108 teachers participated as respondents, and data were collected using a five-point Likert scale questionnaire. The descriptive analysis revealed that all four variables had high mean scores. Instructional leadership had an average score of 89.30 (SD = 4.217), professional competence averaged 89.90 (SD = 3.415), DBP averaged 91.00 (SD = 3.250), and school quality scored the highest with a mean of 99.03 (SD = 0.826), indicating overall strong positive perceptions.

Despite high average values, the frequency distribution revealed variation in perceptions. Most respondents (90.74%) strongly agreed that school quality was high, showing general consensus. However, instructional leadership received mixed responses, with a notable percentage of teachers expressing disagreement. Similarly, the professional competence of teachers was still perceived variably, and DBP implementation was also considered suboptimal by a portion of respondents.

Dimensional analysis confirmed that each variable had theoretically valid constructs. Instructional leadership (X1) was composed of five dimensions, with curriculum and instructional management scoring the highest ($M = 18.71$) and expectations toward staff and students scoring the lowest ($M = 17.67$). For professional competence (X2), subject mastery was strongest ($M = 23.58$), while technology integration remained a challenge ($M = 22.73$). In DBP (X3), data analysis led with the highest mean score ($M = 23.26$), whereas stakeholder participation in planning was weakest ($M = 21.45$). The dependent variable, school quality (Y), comprised three dimensions, with the educational process dimension scoring the highest ($M = 33.30$), followed by educational output and input.

Prior to hypothesis testing, the dataset passed all required assumptions for multiple regression analysis. Normality was confirmed ($Sig. = 0.200$), relationships between variables were linear ($Sig. < 0.05$), homoscedasticity was observed through random scatterplot distribution, and multicollinearity was ruled out with VIF values below 10 and tolerance above 0.10.

Hypothesis testing using multiple linear regression revealed that all three independent variables significantly influenced school quality. Simultaneous testing produced an F value of 25.981 ($Sig. = 0.000$), and the model explained 43.8% of the variation in school quality ($R^2 = 0.438$). Partial tests indicated that instructional leadership ($B = 0.048$, $t = 2.794$, $Sig. = 0.006$), professional competence ($B = 0.056$, $t = 2.496$, $Sig. = 0.014$), and DBP ($B = 0.057$, $t = 2.423$, $Sig. = 0.017$) each had significant positive effects on the dependent variable.

Table 1. Results of t-Test for Regression Analysis

Variable	B	Std. Error	Beta	t	Sig.
Instructional Leadership	0.048	0.017	0.244	2.794	0.006
Professional Competence	0.056	0.022	0.230	2.496	0.014
Data-Based Planning	0.057	0.023	0.223	2.423	0.017

The results confirmed that instructional leadership, teacher competence, and data-based planning all contribute significantly and positively to the quality of elementary schools. These findings reinforce the theoretical proposition that educational success is closely tied to leadership effectiveness, professional standards of teaching staff, and the strategic use of educational data.

The Influence of Instructional Leadership on School Quality

The results of the simple regression analysis indicate that principals' instructional leadership has a positive and significant effect on the quality of elementary schools in Gunem District, Rembang Regency. The regression coefficient value of 0.056 and a significance level of 0.003 suggest that a one-point increase in instructional leadership score leads to a 0.056-point increase in school quality. The

coefficient of determination (R^2) of 0.083 shows that 8.3% of the variation in school quality can be explained by instructional leadership, while the remaining 91.7% is influenced by other factors beyond this model.

Substantively, effective instructional leadership plays a key role in quality improvement, particularly through the development of school vision and mission, supervision of instruction, and professional development of teachers. Principals who consistently perform these functions are able to create a conducive learning climate that supports students' academic achievement. Although the statistical contribution is not dominant, the role of the principal remains crucial as a guide, coach, and driver within the school quality management system.

These findings are consistent with (Suriansyah, 2017), who found that instructional leadership directly influences teacher effectiveness and student learning outcomes. Similarly, Hallinger dan Wang (2015) concluded that leaders who focus on instructional processes have a significant impact on academic progress. Wibowo dan Sunaryo (2019) also emphasized that the quality of school leadership determines the success of quality improvement programs. Furthermore, Nasution et al. (2021) confirmed that instructional leadership contributes to the creation of a school climate conducive to learning improvement.

The Influence of Professional Competence on School Quality

The simple regression analysis also reveals that teachers' professional competence has a positive and significant effect on school quality, with a regression coefficient of 0.08 and a significance level of 0.001. The coefficient of determination (R^2) of 0.108 indicates that 10.8% of the variance in school quality is explained by professional competence.

This suggests that professional competence which includes mastery of subject matter, teaching ethics, and instructional strategies significantly contributes to educational quality. Competent teachers are not only effective in content delivery but also capable of creating a participatory and reflective learning environment. However, perception data from this study shows that confidence in professional competence still requires improvement, as most respondents have not rated their own competence highly. Therefore, teacher development and capacity-building programs should be prioritized in school improvement strategies.

These results are supported by Susanto dan Hartati (2018), who stated that teachers with high professional competence are more innovative and responsive in the teaching and learning process. Kusumawardani, et al. (2020) also highlighted that teacher competence is a strong predictor of student academic performance. Tanjung, 2017) previously noted a positive correlation between teachers' mastery of subject content and student learning outcomes. Additionally, Kurniasih dan Sani (2022) emphasized the importance of continuous professional development to maintain teacher and school quality.

The Influence of Data-Based Planning on School Quality

Another finding of this study shows that data-based planning (DBP) also has a positive and significant impact on school quality, with a regression coefficient of 0.082 and a significance level of 0.001. The R^2 value of 0.105 indicates that 10.5% of the variance in school quality is explained by the quality of DBP implementation.

DBP is a managerial practice that involves collecting, analyzing, and utilizing data in the planning and decision-making process at schools. In this context, data is not limited to administrative records but also includes assessment results, student achievement, attendance, and education report cards. Schools that effectively implement DBP can identify priority issues, formulate appropriate interventions, and evaluate outcomes more accurately. Although not all schools in the study demonstrated uniform DBP implementation, its potential to support quality management is strong, underscoring the need for further promotion through data literacy training and a reflective school culture.

This finding is supported by Bailey dan Jakicic (2017), who asserted that schools that consistently apply DBP are more effective in improving learning outcomes. Wahyuni dan Ahmad

(2020) confirmed that the use of education report card data encourages more targeted program planning. Moreover, Sugiyanto dan Handayani (2019) found that teacher involvement in data analysis enhances school accountability. Similarly, Marzuki et al. (2021) concluded that data-driven school planning accelerates decision-making and improves the achievement of quality indicators.

Simultaneous Influence of Instructional Leadership, Professional Competence, and DBP on School Quality

Simultaneously, the three independent variables instructional leadership, professional competence, and data-based planning have a significant effect on the quality of elementary schools. The F-test result shows an F-value of 9.686 with a significance level of 0.000 (< 0.05), and an R² value of 0.218. This indicates that 21.8% of the variance in school quality is explained collectively by these three variables, while 78.2% is influenced by other factors.

The regression coefficients for each variable in the multiple regression model are 0.048 for instructional leadership, 0.056 for professional competence, and 0.057 for DBP. These positive and significant coefficients indicate that improvements in each of these aspects, collectively, contribute to enhanced school quality.

This finding reinforces the systems approach in education management, which emphasizes the importance of synergy between school leaders, teachers, and data-driven management systems. The combination of these three elements fosters a professional, adaptive, and quality-oriented school ecosystem. In practice, the principal's role as an instructional leader must align with teacher competence and DBP implementation to achieve the desired quality outcomes systematically.

Huda and Saputra (2016) showed that the combined effect of leadership and teacher competence is critical to the quality of educational services. Similarly, Munir et al (2019) confirmed that school quality improves significantly when there is alignment between school leadership and teacher capacity. Anggraeni and Sutisna (2020) also found that DBP enhances the accuracy of school planning when integrated with leadership and teacher engagement. Additionally, Putra dan Salim (2023) concluded that a combination of strategic management, human resource competence, and data-driven governance is a key driver in achieving educational quality.

CONCLUSION

This study concludes that instructional leadership, teachers' professional competence, and data-based planning have a positive and significant influence on the quality of public elementary schools in Gunem District, Rembang Regency. Individually, each variable contributes to school quality improvement through different pathways and mechanisms, while collectively, they create a synergistic effect. Instructional leadership from school principals establishes direction, supervision, and an academic climate conducive to high-quality learning; teachers' professional competence enhances classroom instruction through mastery of subject matter and pedagogical approaches; and data-based planning provides a measurable framework for effective decision-making. Practically, these findings suggest that strengthening principal leadership capacity, providing continuous teacher training, and implementing systematic data-driven planning can significantly improve basic education quality. However, this study is limited to three variables and one regional context, so future research should explore additional factors such as community involvement, learning resources, and policy support in broader settings to deepen and expand these insights. The specific contribution of this study is providing an empirical framework that can be adapted by other schools as a practical strategy for improvement based on leadership, competence, and data.

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