

THE INFLUENCE OF SCHOOL PRINCIPALS' ACADEMIC SUPERVISION AND TEACHER PROFESSIONAL DEVELOPMENT ON THE QUALITY OF LEARNING IN ELEMENTARY SCHOOLS

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Abstract

This study aimed to examine the influence of principals' academic supervision and teachers' professional development on the quality of learning in public elementary schools. The research was conducted in public elementary schools in Wanasari District, Brebes Regency, Indonesia. A quantitative approach with an *ex post facto* research design was employed. The population of teachers is 211 in Wanasari District, Brebes Regency. Proportional random sampling was used to ensure representation from each school. The study involved 138 teachers selected as the research sample. Data were collected using a structured questionnaire and analyzed through descriptive statistical analysis and multiple linear regression. The results indicated that: (1) principals' academic supervision has a positive and statistically significant effect on the quality of learning; (2) teachers' professional development has a positive and statistically significant effect on the quality of learning; and (3) principals' academic supervision and teachers' professional development simultaneously have a positive and statistically significant effect on the quality of learning. These findings suggest that effective academic supervision by principals, together with continuous professional development of teachers, plays a significant role in improving the quality of learning in elementary schools. Therefore, strengthening academic supervision practices and promoting ongoing professional development are essential strategies for enhancing the quality of teaching and learning.

Keywords

Academic Supervision, Principal, Teacher Professional Development, Learning Quality.



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INTRODUCTION

The quality of education is significantly influenced by the role of qualified teachers, as teacher quality is closely associated with the overall quality of education. Teachers are expected to possess professional competencies and meet established professional standards in order to facilitate high-quality learning. In teaching and learning activities, teachers play a crucial role in determining the success of the learning process, as they are responsible for designing, managing, implementing, and evaluating. Therefore, improving the quality of education should be a primary concern in efforts to develop an educational system that is capable of producing high-quality graduates who possess the competencies required to compete with the demands and rapid developments of the modern era.

(Chairani 2021) explains that learning quality can be defined as the degree or level of achievement attained through reciprocal interactions between students and teachers, as well as among students themselves, during the learning process. Such interactions are expected to foster the desired changes in students' behavior following their participation in teaching and learning activities, encompassing changes in cognitive, psychomotor, and affective domains.

Based on the opinion, it can be concluded that learning quality refers to the level of excellence in managing the learning process effectively and efficiently in order to achieve learning objectives. This quality is reflected in the ability of schools and teachers to manage learning activities in ways that enhance students' engagement, knowledge, skills, attitudes, and learning outcomes in accordance with the objectives that have been established.

According to the Education Report (ULT, Ministry of Primary and Secondary Education 2025), Dimension D1, namely Quality of Learning, is one of the key indicators used to measure the quality of the learning process in the classroom. Learning quality refers to the quality of classroom management and the implementation of interactive learning that is aligned with the learning objectives and students' characteristics.

Based on the Quality of Learning data presented in the 2025 Education Report (BSKAP Kemdikbud 2024) the quality of learning in schools in Wanasari District shows an improvement from 2024 to 2025. Nevertheless, this improvement has not yet resulted in a significant achievement, as the reported scores remain within the range of 55 to 69. This indicates that the learning improvement efforts implemented by schools have had a positive

impact; however, their effectiveness still needs to be further enhanced. Therefore, the development and implementation of more optimal and sustainable learning strategies are necessary to ensure that improvements in learning quality can achieve more significant outcomes in the future.

One of the factors that can contribute to improving learning quality is the implementation of academic supervision by school principals. According to (Abdullah 2020) academic supervision refers to a series of activities planned by supervisors, such as school supervisors and school principals, to improve the management of the learning process. This is achieved by evaluating all learning activities carried out by supervised teachers and assessing the instructional materials and learning plans they have prepared, thereby enabling teachers to improve their professionalism in their respective fields. Mulyana E. (Warman & Lorensious, 2024) further explains that academic supervision is a series of activities aimed at assisting educators in developing their ability to manage the learning process in order to achieve established learning objectives. Through effective supervision, teachers receive constructive feedback, motivation, and professional guidance, which ultimately contribute to improving the quality of learning.

However, in practice, the implementation of academic supervision in schools has not yet been carried out optimally. This condition indicates that the implementation of academic supervision still requires improvement in terms of planning, implementation, follow-up, and continuous professional development to ensure a more substantial contribution to improving learning quality.

Based on the Education Report regarding the implementation of school principal supervision of teachers in schools in Wanasari District during the 2024–2025 period, several areas requiring attention can be identified. In general, the achievement scores of most schools remain within the “moderate” category, ranging from 55 to 70, indicating that academic supervision has been implemented but has not yet reached an optimal level. In addition, fluctuations in achievement scores across years can be observed, with several schools experiencing declines in certain indicators. This condition suggests that the follow-up to academic supervision has not been implemented consistently and has not yet fully contributed to improvements in the learning process.

In addition to the implementation of academic supervision by school principals, teachers are a key component of the education system and play a strategic role in determining the success of the learning process. The quality of classroom learning is largely determined by teachers' competence and professionalism in designing, implementing, and evaluating the teaching and learning process. Along with the development of science and technology and changes in the curriculum, teachers are required to continuously develop their professional capacities so that they can provide learning experiences that are relevant, effective, and meaningful for students.

According to Joan Dean (Siregar 2024), teacher professional development can be defined as a process through which teachers enhance their level of professionalism, with the ultimate goal of enabling them to demonstrate a higher degree of professional competence. Wardoyo (Warman & Lorensious, 2024) further explains that teacher professionalism refers to teachers' perspectives on their profession, including their understanding of why they need to maintain professional standards and how they behave and apply the knowledge and skills relevant to their profession.

Based on an analysis of the Education Report results from schools in Wanasari District concerning the Teacher Professionalism (C3) indicator for 2024 and 2025, the overall results indicate an improvement in 2025 compared with 2024. The most notable improvement can be observed in the Participation in the Merdeka Mengajar Platform (C3.1) component, which was categorized as relatively low in almost all schools in 2024 but experienced a considerable increase in 2025.

Regarding the Other Training (C3.2) component, most schools had already demonstrated relatively high achievement as early as 2024. This indicates that the instructional practices implemented by teachers were generally within the good category. Nevertheless, in 2025, several schools experienced a decline in this component, although their overall scores remained within the moderate to good categories. This condition suggests that some teachers may still be operating within a comfort zone, resulting in less-than-optimal motivation to continuously improve their professional competencies. Such a decline in teacher professionalism may have implications for the development of learning quality, including limited innovation in teaching methods and the use of learning media.

Based on these conditions, systematic efforts are needed to develop teachers' professionalism through various means, including training, workshops, and self-directed learning. Such efforts are expected to have a positive impact on the quality of learning in elementary schools, enabling students to obtain optimal learning experiences that are relevant to the demands and needs of the times.

Several previous studies support the research on the influence of school principal academic supervision and teacher professional development on learning quality in public elementary schools in Wanasari District. (Januarihalimatus, 2026) demonstrated in her research that effective academic supervision contributes significantly to improving the quality of the learning process and achieving educational objectives more optimally. Similarly, (Amri, Syaifuddin, and Tambak 2022) found that academic supervision plays an important role in monitoring the implementation of the educational process through evaluation, thereby contributing to improvements in educational quality.

Another study conducted by (Sam and Sulastri 2024). (Septa, Sandy, Ahyani, Nur Ahyani 2022) also found a positive influence of the variables examined in their study on learning quality.

Research relevant to the present study, entitled *The Influence of School Principal Academic Supervision and Teacher Professional Development on Learning Quality in Public Elementary Schools in Wanasari District, Brebes Regency*, was conducted, (Warisno, Hidayah, and Mustafida 2021) The results revealed a significant influence of academic supervision, with the strength of the influence categorized as very strong. This finding indicates that the higher the level of academic supervision provided by the school principal, the greater the school's influence on teacher professionalism.

(Palupi, Sudharto, and Yuliejantiningih 2023) Found a positive and significant influence of school principal academic supervision and school culture on learning quality. (Purtiningsih, Nurkolis, and Kusumaningsih 2024) reported a significant influence of the roles of school principals, teacher professionalism, and community participation on educational quality in the Kartini Cluster Teacher Working Group (KKG) in Brebes Regency. The study employed a quantitative research approach using statistical and descriptive methods.

(Riyatno, Kusumaningsih, and Soedjono 2024) found that transformational school leadership, teacher professionalism, and the role of school committees significantly influenced educational quality in public senior high schools in Rembang Regency. Similarly, (Salik, Juliejantiningih, and Sudana 2024) demonstrated that school leadership, teacher professionalism, and work motivation jointly influenced school quality, accounting for 52.4% of the variance, with a strong relationship indicated by a mean correlation coefficient of 0.55. School quality consisted of four dimensions, with the lowest mean score found in the outcome dimension (3.76) and the highest mean score in the input dimension (4.65).

Overall, these findings provide empirical support for the importance of school principal academic supervision and teacher professional development in improving the quality of learning and education. The previous studies also indicate that effective supervision, continuous professional development, teacher professionalism, and school leadership are important factors that contribute to the improvement of learning quality. Therefore, the present study seeks to further examine the influence of school principal academic supervision and teacher professional development on learning quality in public elementary schools in Wanasari District, Brebes Regency.

Based on the previous studies, the present study shares both similarities and differences with earlier research. The differences primarily concern the research location, population size, sample size, independent variables, and dependent variable. In several previous studies, only one independent variable was examined, whereas the present study employs two independent variables. Differences can also be found in the dependent variables used in previous studies. In terms of similarities, both the previous studies and the present study employ a quantitative research method. In addition, several independent variables are similar, particularly the school principal's academic supervision and teacher professional development. The dependent variable is also similar, namely, learning quality. Based on the identification of the problems described above, the present study focuses specifically on learning quality in public elementary schools in Wanasari District, Brebes Regency, as influenced by school principal academic supervision and teacher professional development.

METHOD

The research method employed in this study was a descriptive quantitative approach, which is a research approach that deals with numerical data presented in the form of figures and analyzed using statistical methods to address the research hypotheses. This study employed an ex post facto research design, which aimed to empirically examine the relationship between two independent variables, namely school principals' academic supervision (X1) and teacher professional development (X2), and the dependent variable, namely the quality of learning in elementary schools (Y).

The research was conducted in public elementary schools in Wanasari District, Brebes Regency. The research site was selected using a random sampling technique. Data were collected by distributing questionnaires to teachers. The questionnaire consisted of three instruments designed to measure school principals' academic supervision, teacher professional development, and the quality of learning. The primary data were obtained from civil servant (ASN) teachers, while the secondary data were collected from school documents, academic supervision reports, teacher records related to professional development, learning quality assessment results, and relevant scientific references. The selection of primary data sources was based on the consideration that teachers are directly involved in the implementation of academic supervision and professional development activities. Meanwhile, the secondary data served to support and verify the primary data, thereby enhancing the validity and reliability of the research findings.

The population of this study consisted of 211 teachers from public elementary schools in Wanasari District, Brebes Regency. The sample size was determined based on the calculation using the Slovin formula, resulting in a sample of 138 teachers. To determine the appropriate sample size, the Slovin formula was employed (Machali, 2021:77) as follows:

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

Definition:

n : sample size

N: population size

μ : margin of error (the maximum tolerable sampling error), set at 5% (0.05)

Using the formula presented above, the sample size was determined as follows:

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

$$\frac{n = 211}{1 + 211 (0,05)^2} = 138,134$$

The resulting sample size was rounded to 138 respondents, so based on the calculation above, the sample for this study consisted of 138 teachers.

Data were collected using a questionnaire consisting of closed-ended statements rated on a Likert scale. The questionnaire was developed by elaborating the indicators of each variable into a series of questions or statements administered to the respondents. The data analysis techniques employed in this study included validity and reliability tests to determine the validity and reliability of the research instrument for each variable. In addition, the analysis involved normality, heteroscedasticity, and linearity tests, followed by multiple regression analysis. The research design is presented in the following figure.

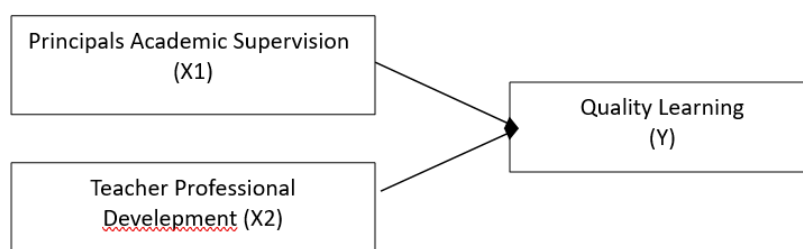


Figure 1. Conceptual framework

FINDINGS AND DISCUSSION

Finding

The data in this study were obtained from respondents who constituted the research sample, consisting of 138 elementary school teachers in Wanasari District, Brebes Regency. The data were collected in the form of scores obtained from questionnaires distributed to the respondents. Three types of questionnaires were administered, namely: (1) the Principal's Academic Supervision questionnaire, (2) the Teacher Professional Development questionnaire, and (3) the Learning Quality questionnaire. Each variable was described based on the scores obtained from the respondents' questionnaire responses. The variables

examined in this study, namely Academic Supervision (X1), Teacher Professional Development (X2), and Learning Quality (Y), are presented in Table 4.1 below.

Table 1. Descriptive Analysis

		Statistics		
		Principal Academic Supervision	Teacher Professional Development	Quality of Learning
N	Valid	138	138	138
	Missing	0	0	0
Mean		105,46	154,93	111,01
Median		104,00	155,50	110,00
Mode		103 ^a	123	90
Std. Deviation		15,208	23,313	16,455
Range		74	90	73
Minimum		66	115	77
Maximum		140	205	150

Source: SPSS 24 Output

Table 1 shows the respondents' responses to the three variables. The learning quality variable (Y), consisting of 30 statements, obtained a minimum score of 77 and a maximum score of 150, with a mean score of 111.01. The academic supervision variable (X1), consisting of 28 statements, obtained a minimum score of 66 and a maximum score of 140, with a mean score of 105.46. Meanwhile, the teacher professional development variable (X2), consisting of 41 statements, obtained a minimum score of 90 and a maximum score of 115, with a mean score of 154.93.

Based on the research findings regarding the variable of principal academic supervision on learning quality, it can be described that, from the 138 respondents who provided responses to the principal academic supervision variable, the mean score was 105.46. This score falls within the range of 93–108, which is categorized as moderate. The maximum score obtained was 140, while the minimum score was 66 respondents.

Academic supervision in this study comprises three dimensions: (1) Dimension of academic supervision planning, (2) dimension implementation of academic supervision, and (3) dimension follow-up of academic supervision. Based on the results of the analysis, the dimension with the largest contribution was the implementation of academic supervision by school principals, with a contribution of 0.893, while the lowest contribution was found in the follow-up of academic supervision, with a contribution of 0.844. Therefore, it can be

concluded that the follow-up dimension of principals' academic supervision had the lowest contribution to the overall academic supervision conducted by principals in public elementary schools in Wanasari District, Brebes Regency.

The results of the correlation analysis between the principal academic supervision variable and learning quality showed a positive relationship, with a calculated correlation coefficient of 0.598. Meanwhile, the *Sig. (1 tailed)* value of 0.000 indicates a unidirectional relationship between X1 and Y, with the relationship being statistically significant. Therefore, it can be concluded that the academic supervision variable has a significant relationship with the quality of learning.

The results of the simple regression analysis indicate that the relationship between academic supervision and quality of learning is statistically significant. The partial *t*-test yielded a significance value of $0.000 < 0.10$, indicating that the independent variable is a significant predictor of the dependent variable. Furthermore, the calculated *t*-value was greater than the *t*-table value, indicating that academic supervision has a statistically significant partial effect on learning quality. To determine whether the hypothesis is accepted or rejected, the results of the ANOVA test were examined. The calculated *F*-value was greater than the *F*-table value, and the significance value was lower than the significance level of 0.05. Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_a) is accepted. This indicates that academic supervision has a statistically significant effect on learning quality.

Multiple regression analysis was used to examine the effect of the independent variables on the dependent variable, namely academic supervision (X1) and teacher professional development (X2), simultaneously on learning quality (Y) in public elementary schools in Wanasari District, Brebes Regency. The regression coefficients can be observed in the following table.

Table 2. Coefficients of correlation Principal Academic Supervision (X1) Teacher Professional Development (X2) on Quality of Learning (Y)

Model		Coefficients ^a			t	Sig.	Collinearity Statistics	
		Unstandardized Coefficients		Standardized Coefficients			Tolerance	VIF
		B	Std. Error	Beta				
1	(Constant)	19,035	7,526		2,529	0,013		
	Principals Academic Supervision	0,350	0,076	0,324	4,631	0,000	0,704	1,421
	Teacher Professional Development	0,355	0,049	0,503	7,194	0,000	0,704	1,421
a. Dependent Variable: Quality Learning								

Based on Table 2, the constant value is 19.035, while the coefficient for academic supervision (X1) is 0.350, and that for teacher professional development (X2) is 0.355. Therefore, the resulting regression equation, based on the regression formula, is as follows: $Y = 19.035 + 0.350X_1 + 0.355X_2$

Based on the regression coefficient analysis, it can be concluded that the positive regression coefficients indicate that improvements in academic supervision and teacher professional development are associated with an increase in learning quality.

The regression coefficient for principal academic supervision was 0.350, indicating a positive effect. This means that every one-unit increase in principal academic supervision is associated with a 0.350-unit increase in learning quality, assuming that teacher professional development remains constant. The regression coefficient for teacher professional development was 0.355, also indicating a positive effect. This means that every one-unit increase in teacher professional development is associated with a 0.355-unit increase in learning quality, assuming that principal academic supervision remains constant.

The table above also presents the significance values. A significance value of less than 0.05 indicates that the independent variable (X) has a statistically significant partial effect on the dependent variable (Y). The results presented in the table indicate the following: 1) The significance value of X1 on Y is 0.000, indicating that principal academic supervision (X1) has a statistically significant effect on learning quality. 2) The significance value of X2 on Y is 0.000,

indicating that teacher professional development (X2) has a statistically significant effect on learning quality (Y).

A partial t-test was subsequently conducted based on the calculated and tabulated values. The t-test was used to determine the effect of the independent variables on the dependent variable. Hypothesis testing in this study was performed using SPSS software at a significance level of 0.05 ($\alpha = 5\%$). The results of the partial t-test based on the calculated and tabulated values, as presented in Table 4.20, are as follows:

1. The principal academic supervision variable has a significance value of 0.000, which is less than 0.05. This indicates that principal academic supervision has a statistically significant partial effect on learning quality.
2. The teacher professional development variable has a significance value of 0.000, which is less than 0.05. This indicates that teacher professional development has a statistically significant partial effect on learning quality.

Furthermore, to determine whether the hypotheses are accepted or rejected, the results of the ANOVA test presented in the following table can be examined:

Table 3. ANOVA Results of Academic Supervision (X1) and Teacher Professional Development (X2) on Quality of Learning (Y)

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	19861,206	2	9930,603	77,791	,000 ^b
	Residual	17233,787	135	127,658		
	Total	37094,993	137			
a. Dependent Variable: Quality of Learning						
b. Predictors: (Constant), Teacher Professional Development, Principal Academic Supervision						

Based on the ANOVA table, the F-test results show a significance value of 0.000, which is less than 0.05. Therefore, H_0 is rejected, and H_a is accepted. This indicates that principal academic supervision and teacher professional development jointly (simultaneously) have a statistically significant effect on learning quality.

Furthermore, to determine the magnitude of the effect of academic supervision (X1) and teacher professional development (X2) on learning quality (Y), the R Square test results can be examined as follows:

Table 4. Summary Test of Principal Academic Supervision (X1) Teacher Professional Development (X2) on Learning of Quality (Y)

Model Summary^b				
Model	R	R Square	Adjusted R-Square	Std. Error of the Estimate
1	,732 ^a	0,535	0,529	11,299
a. Predictors: (Constant), Teacher Professional Development, Principal Academic Supervision				
b. Dependent Variable: Learning of Quality				

Based on the results of the analysis in Table 4, the R Square value was 0.535 or 53.5%. This indicates that 53.5% of the variance in learning quality can be explained by the independent variables, namely principal academic supervision and teacher professional development. Meanwhile, the remaining 46.5% of the variance in learning quality is explained by other variables outside the research model used in this study.

Discussion

Based on the results of data processing, variable dimension analysis, and hypothesis testing conducted in this study, the findings are further discussed as follows:

The Influence of Principal Academic Supervision on Quality of Learning

Based on the research findings regarding the variable of principal academic supervision and its effect on learning quality, it can be described that, among the 138 respondents who provided responses to the principal academic supervision variable, the mean score was 105.46. This score falls within the range of 93–108, which is categorized as moderate. The maximum score obtained was 140, while the minimum score was 66 respondents.

Academic supervision in this study comprises three dimensions: (1) the dimension of academic supervision planning, (2) the dimension of implementation of academic supervision, and (3) the dimension of follow-up of academic supervision. Based on the results

of the analysis, the dimension with the greatest contribution was the implementation of principal academic supervision, with a contribution of 0.893, while the lowest contribution was found in the follow-up of academic supervision, with a contribution of 0.844. Therefore, it can be concluded that the follow-up dimension of principal academic supervision made the lowest contribution to the overall implementation of academic supervision in public elementary schools in Wanasari District, Brebes Regency.

The results of the correlation analysis between principal academic supervision and learning quality showed a positive relationship, with a calculated correlation coefficient of 0.598. Meanwhile, the Sig. (I-tailed) value of 0.000 indicates a unidirectional relationship between X1 and Y, with the relationship being statistically significant. Therefore, it can be concluded that principal academic supervision has a significant relationship with learning quality.

The results of the simple regression analysis showed a statistically significant relationship between principal academic supervision and learning quality. The partial t-test yielded a significance value of $0.000 < 0.10$, indicating that the independent variable was a significant predictor of the dependent variable. Furthermore, the calculated t-value was greater than the t-table value, indicating that principal academic supervision had a statistically significant partial effect on learning quality. To determine whether the hypothesis was accepted or rejected, the results of the ANOVA test were examined. The calculated F-value was greater than the F-table value, and the significance value was lower than the significance level of 0.05. Therefore, H_0 was rejected, and H_a was accepted.

This indicates that principal academic supervision (X1) had a statistically significant influence on the quality of learning (Y), as determined by the R Square value of 35.7%. This indicates that 35.7% of the variance in learning quality was explained by principal academic supervision, while the remaining 64.3% was explained by other variables that were not examined in this study.

Based on the description above, the findings of this study indicate that principal academic supervision has a positive and statistically significant effect on the quality of learning provided by teachers in public elementary schools in Wanasari District, Brebes Regency, accounting for 35.7% of the variance. This means that 35.7% of the improvement in

learning quality can be attributed to principal academic supervision, which serves as a guideline and source of motivation for teachers to improve their performance and achieve optimal learning outcomes. These findings are supported by a study conducted by (Warisno et al. 2021) which found that principal supervision had a positive and statistically significant effect on teacher professionalism.

The findings indicate that the principals are able to plan, implement, and apply academic supervision effectively to teachers in order to improve the quality of learning. Principal academic supervision constitutes an effort to mobilize and manage the organization toward the achievement of its educational objectives. Furthermore, school principals can assist teachers in developing their professional competencies and capabilities. The quality of learning can continue to improve when school principals, through effective academic supervision, are able to manage the teaching and learning process, curriculum, assessment, teacher professional development, and the provision of excellent learning services. These efforts are expected to have a positive impact on improving the overall quality of learning.

The Influence of Teacher Professional Development on the Quality of Learning

Based on the research findings regarding the effect of teacher professional development on learning quality, it can be described that, among the 138 respondents who provided responses to the teacher professional development variable, the mean score was 154.93. This score falls within the interval of 149–167, which is categorized as moderate. The maximum score was 2015, while the minimum score was 115. Based on the analysis of the three dimensions of teacher professional development, the highest contribution was found in intensive development, with a contribution of 0.885, while the lowest contribution was found in self-directed development, with a contribution of 0.801. Therefore, it can be concluded that self-directed development made the lowest contribution to teacher professional development in public elementary schools in Wanasari District, Brebes Regency.

The results of the correlation analysis between teacher professional development and learning quality showed a positive relationship, with a calculated correlation coefficient of 0.679. Meanwhile, the Sig. (t-tailed) value of 0.000 indicates a unidirectional relationship between X2 and Y, with the relationship being statistically significant. Therefore, it can be concluded that teacher professional development has a significant relationship with learning

quality. The results of the simple regression analysis showed a statistically significant relationship between teacher professional development and learning quality. The partial t-test yielded a significance value of $0.000 < 0.10$, indicating that the independent variable was a significant predictor of the dependent variable. Furthermore, the calculated t-value was greater than the t-table value, indicating that teacher professional development had a statistically significant partial effect on learning quality.

To determine whether the hypothesis was accepted or rejected, the results of the ANOVA test were examined. The calculated F-value was greater than the F-table value, and the significance value of 0.000 was lower than the significance level of 0.05. Therefore, H_0 was rejected, and H_a was accepted. This indicates that teacher professional development had a statistically significant effect on learning quality. The magnitude of the effect of teacher professional development (X_2) on learning quality (Y) was determined based on the R Square value of 46.2%. This indicates that 46.2% of the variance in learning quality was explained by teacher professional development, while the remaining 53.8% was influenced by other factors not examined in this study.

Based on the description above, the findings of this study indicate that teacher professional development had a positive and statistically significant effect on learning quality in public elementary schools in Wanasari District, Brebes Regency, accounting for 46.2% of the variance. This finding is consistent with the study conducted by (Purtiningsih et al. 2024)

Teacher professional development needs to be continuously improved so that the quality of learning in schools can also be enhanced, particularly with regard to teaching methods and learning materials. According to Atmosoeprapto (Arifin 2018) Professionalism reflects competence, which encompasses knowledge, skills, and ability, supported by experience. Such professionalism does not emerge spontaneously but develops through a continuous process over time. In this regard, teachers are expected to possess adequate professional competence to carry out their duties effectively.

Therefore, to achieve a high level of teacher professionalism, teachers in public elementary schools in Wanasari District, Brebes Regency, need to maintain a strong work ethic and commitment to professional development. In addition, the role of school principals is essential in improving and developing teachers' professional competencies so that both

student achievement and learning quality can be enhanced. This is supported by the results of the regression analysis, which showed that the coefficient of teacher professional development on learning quality in public elementary schools in Wanasari District, Brebes Regency, was positive and statistically significant.

The results of all analyses and statistical tests related to the regression of teacher professional development on learning quality demonstrated positive findings. Theoretically, when teacher professional development is improved, the quality of learning is also expected to improve.

The Influence of Principal Academic Supervision and Teacher Professional Development on Quality of Learning

Based on the results of the prerequisite analysis conducted prior to hypothesis testing, data were collected using questionnaires administered to 138 respondents from public elementary schools in Wanasari District, Brebes Regency. The results showed that the data for the variables of principal academic supervision, teacher professional development, and learning quality were normally distributed, as indicated by a significance value of 0.66, which was greater than 0.05. Therefore, the data were considered to be normally distributed. The data were subsequently tested for linearity using the Test for Linearity at a significance level of 0.05. The results showed a significance value of 0.184 for the relationship between academic supervision and quality of learning and 0.771 for the relationship between teacher professional development and quality of learning. Thus, both independent variables had linear relationships with the dependent variable. The heteroscedasticity test showed significance values greater than 0.05 for each variable. Therefore, it can be concluded that the data were free from symptoms of heteroscedasticity.

Based on the results of the prerequisite analysis described above, it can be concluded that the variables of principal academic supervision and teacher professional development in relation to quality of learning met the assumptions required for subsequent hypothesis testing. Based on the research findings regarding the variables of principal academic supervision and teacher professional development in relation to quality of learning, the results of the multiple regression analysis showed that the regression model had a positive relationship between principal academic supervision, teacher professional development, and

learning quality. The regression coefficient for principal academic supervision was 0.350, indicating a positive effect. This means that for every one-unit increase in principal academic supervision, learning quality is expected to increase by 0.350 units, assuming the other variable remains constant. Meanwhile, the regression coefficient for teacher professional development was 0.355, which also indicates a positive effect. This means that for every one-unit increase in teacher professional development, the quality of learning will increase by 0.355 units.

The results of the partial t-test showed that the significance value of X1 on Y was less than 0.05, indicating that principal academic supervision had a statistically significant partial effect on quality of learning. Similarly, the significance value of X2 on Y was less than 0.05, indicating that teacher professional development had a statistically significant partial influence on the quality of learning. To determine whether the hypotheses were accepted or rejected, the ANOVA test was examined. The results showed that the significance value was less than 0.05; therefore, H_0 was rejected, and H_a was accepted.

The combined influence of academic supervision (X1) and teacher professional development (X2) on quality of learning (Y) was determined based on the R Square value of 53.5%; the remaining 46.5% was influenced by other factors.

Based on the findings described above, it can be concluded that principal academic supervision and teacher professional development jointly have a positive and statistically significant effect on the quality of learning in Elementary Schools in Wanasari District, Brebes Regency. These findings are supported by the study conducted by (Warisno et al. 2021) which found that principal supervision had a positive and significant effect on teacher professionalism. Similarly (Riyatno et al. 2024) found that school principal leadership and teacher professionalism had an influence on the quality of education. Furthermore, (Salik et al. 2024) The influence of principal leadership and teacher professionalism on school quality. These findings are also consistent with the study conducted by (Purtiningsih et al. 2024) which examined the effects of the role of school principals, teacher professionalism, and community participation on improving educational quality. The study found that the role of school principals influenced teacher professionalism and that community participation contributed to educational quality.

Joan Dean in (Wasitohadi 2024) states that teacher professional development can be understood as a process through which teachers have the ability and willingness to improve their level of professionalism. It is a continuous process aimed at enabling teachers to demonstrate a higher level of professional competence. Based on the findings above, the influence of principal academic supervision and continuous teacher professional development is needed to improve the quality of learning. Teachers are one of the key factors determining the quality of educational outcomes.

CONCLUSION

Based on the data obtained and the analysis conducted, it can be concluded that academic supervision has a positive and significant effect on the quality of learning in public elementary schools in Wanasari District, Brebes Regency. This finding is expressed by the regression equation $Y = 42.793 + 0.647X_1$, with a calculated correlation coefficient (r_{count}) of 0.598. Furthermore, the calculated t-value was greater than the critical t-value ($8.696 > 1.65613$), indicating that academic supervision has a statistically significant partial effect on the quality of learning. The coefficient of determination indicates that the effect of academic supervision (X_1) on the quality of learning (Y) is 35.7%.

Teacher professional development has a positive and significant effect on the quality of learning in public elementary schools in Wanasari District, Brebes Regency. This finding is expressed by the regression equation $Y = 36.709 + 0.480X_2$, with a calculated correlation coefficient (r_{count}) of 0.679. Furthermore, the calculated t-value was greater than the critical t-value ($10.779 > 1.65613$), indicating that teacher professional development has a statistically significant partial effect on the quality of learning. The coefficient of determination indicates that the effect of teacher professional development (X_2) on the quality of learning (Y) is 46.2%.

Academic supervision and teacher professional development have a positive and significant effect on the quality of learning in public elementary schools in Wanasari District, Brebes Regency. This finding is expressed by the multiple regression equation $Y = 19.035 + 0.350X_1 + 0.355X_2$. The correlation coefficient (r) was 0.730, indicating a strong positive relationship between academic supervision and teacher professional development collectively and the quality of learning. The coefficient of determination indicates that the combined effect

of academic supervision (X_1) and teacher professional development (X_2) on the quality of learning (Y) is 53.5%.

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