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The Effect of Academic Supervision and Teacher Professional Competence on Learning Quality with Work Discipline as an Intervening Variable in Public Elementary Schools in Cilegon City

[1)]**Ifa Hafiroh,** [2)]**Furtasan Ali Yusuf,** [3)]**Mutoharoh**

[1,2,3)] Master of Educational Management Study Program, Bina Bangsa University, Banten, Indonesia

Correspondence Author:: ifahafiroh71@gmail.com

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ABSTRACT

This study examined the direct relationships of academic supervision and teacher professional competence with learning quality and the mediating role of work discipline in public elementary schools in Cilegon City, Indonesia. A quantitative approach with a cross-sectional design was used. Data were collected through Likert-scale questionnaires from 150 civil servant teachers selected using proportional random sampling from public elementary schools accredited A and B. The data were analyzed using partial least squares structural equation modeling (PLS-SEM). The results showed that academic supervision ((β = 0.491, p < .001)), teacher professional competence ((β = 0.474, p < .001)), and work discipline ((β = 0.353, p < .001)) had positive and statistically significant direct relationships with learning quality. Academic supervision was also positively associated with work discipline ((β = 0.445, p < .001)), whereas the direct relationship between teacher professional competence and work discipline was not statistically significant ((β = 0.043, p = .534)). The indirect effect of academic supervision on learning quality through work discipline was reported as significant ((β = 0.157)), while the indirect effect of teacher professional competence through work discipline was not significant ((β = 0.015, p = .532)). The model explained 20.1% of the variance in work discipline and 77.2% of the variance in learning quality. These findings indicate a selective mediation pattern in the estimated model. Because the study used cross-sectional, self-reported data from one city, the results should be interpreted as associations and generalized cautiously.

Article Information

Keywords:
Supervisi akademik; kompetensi profesional guru; disiplin kerja; kualitas pembelajaran; analisis jalur

ABSTRACT

Penelitian ini bertujuan menguji hubungan langsung supervisi akademik dan kompetensi profesional guru dengan kualitas pembelajaran serta peran mediasi disiplin kerja pada Sekolah Dasar Negeri di Kota Cilegon. Penelitian menggunakan pendekatan kuantitatif dengan desain potong lintang (cross-sectional). Data dikumpulkan melalui kuesioner berskala Likert dari 150 guru berstatus Pegawai Negeri Sipil yang dipilih menggunakan proportional random sampling dari Sekolah Dasar Negeri berakreditasi A dan B. Data dianalisis menggunakan partial least squares structural equation modeling (PLS-SEM). Hasil menunjukkan bahwa supervisi akademik ((β = 0{,}491; p < 0{,}001)), kompetensi profesional guru ((β = 0{,}474; p < 0{,}001)), dan disiplin kerja ((β = 0{,}353; p < 0{,}001)) memiliki hubungan langsung positif dan signifikan dengan kualitas pembelajaran. Supervisi akademik juga memiliki hubungan positif dan signifikan dengan disiplin kerja ((β = 0{,}445; p < 0{,}001)), sedangkan hubungan langsung kompetensi profesional guru dengan disiplin kerja tidak signifikan secara statistik ((β = 0{,}043; p = 0{,}534)). Pengaruh tidak langsung supervisi akademik terhadap kualitas pembelajaran melalui disiplin kerja dilaporkan signifikan ((β = 0{,}157)), sedangkan pengaruh tidak langsung kompetensi profesional guru melalui disiplin kerja tidak signifikan ((β = 0{,}015; p = 0{,}532)). Model menjelaskan 20,1% variasi disiplin kerja dan 77,2% variasi kualitas pembelajaran. Temuan ini menunjukkan pola mediasi selektif dalam model yang diestimasi. Karena penelitian menggunakan data potong lintang berbasis laporan diri dari satu kota, hasilnya perlu ditafsirkan sebagai hubungan antarvariabel dan digeneralisasikan secara hati-hati.

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✉ ***Corresponding Author:*** (1) Ifa Hafiroh, (2) Department, (3) Bina Bangsa University, (4) Indonesia, (5) Email: ifahafiroh71@gmail.com

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1. Introduction

The quality of basic education has been a persistent concern, both in national policy discourse and the global development agenda. The Education at a Glance report published by the Organization for Economic Cooperation and Development (OECD) confirms that the effectiveness of the teaching and learning process at the primary level is the foundation for determining students' academic success at subsequent levels (OECD, 2023). This strategic position aligns with the global commitment to Sustainable Development Goal 4, which calls for the provision of quality education for all levels of society. The Indonesian government has formulated various regulations to promote this goal, including Government Regulation No. 57 of 2021 concerning National Education Standards, which establishes eight standards as the foundation for providing quality education. However, Indonesia's Human Development Index (HDI) score of 74.39 in 2023 remains below that of neighboring countries such as Malaysia and Thailand (Central Bureau of Statistics, 2023), indicating that efforts to improve education quality, including at the primary school level, require continued hard work.

The educational context of Cilegon City provides a relevant setting for examining the relationships among academic supervision, teacher professional competence, work discipline, and learning quality. Official information published by the Cilegon City Education and Culture Office reports 149 public elementary schools in the city, based on the 2024 Education Profile. This figure provides a reference for describing the scale of public elementary education in Cilegon City. However, the number of schools alone does not establish the extent of challenges in instructional quality, teacher competence, or academic supervision. Claims regarding these conditions therefore need to be supported by monitoring reports that identify the reporting period, the population or units covered, the indicators assessed, and the criteria used to classify the results.

Accordingly, this study distinguishes between official administrative statistics describing the local education system and monitoring data intended to indicate the quality of teaching practices or the implementation of academic supervision. The former establishes the institutional context, whereas the latter requires evidence specific to the relevant indicators and reporting period. This distinction is important to ensure that the rationale for the present study is grounded in traceable evidence rather than in percentages whose definitions or coverage are unclear.

On the other hand, teacher professional competence has also come under scrutiny. The results of the Teacher Competency Test published by the Ministry of Education and Culture show that the national average for elementary school teachers only reached 62.5 out of a scale of 100, below the minimum threshold of 70 set by the government, and the achievement in Cilegon City is in a similar range. A third factor that is no less important is teacher work discipline, namely compliance with school regulations and rules that include punctuality in attendance, completion of administrative obligations, and consistency in learning implementation. School self-evaluation reports at several public elementary schools in Cilegon City indicate problems in teacher work discipline that have the potential to reduce the overall quality of learning.

Previous empirical studies have established the relevance of academic supervision and teacher professional competence to learning quality, although they provide different levels of explanation regarding the mechanisms underlying these relationships. Mailani, Nazir, and Zein (2023), Mediatati and Jati (2022), and Senang, Sunardi, and Farchani (2024) reported positive contributions of academic supervision to learning quality. Similarly, Ekwanto, Kusumaningsih, and Sulianto (2026) examined academic supervision and teacher professional competence jointly in elementary schools, highlighting the relevance of both factors to learning quality. These studies provide a basis for examining the direct relationships between instructional support, professional capacity, and learning quality. However, evidence of direct relationships alone does not establish whether the effects of these factors operate through the same intervening process.

Research on work discipline and teacher performance provides a complementary perspective. Jumali, Yuliejantiningsih, and Haryati (2023) examined academic supervision, work motivation, and work discipline in relation to elementary school quality, while Amini et al. (2022) and Fahmi et al. (2022) addressed the relevance of work discipline to teacher performance. Taken together, these studies suggest that teachers' working conditions and behavioral consistency deserve attention alongside their professional capabilities. Nevertheless, the relationships among supervision, professional competence, work discipline, and learning quality need to be distinguished analytically. In particular, the evidence summarized in these studies does not by itself establish whether work discipline transmits the influence of academic supervision and professional competence to learning quality to an equal extent.

The literature also indicates that the effects of supervision and professional capacity may depend on how they are implemented and translated into classroom practice. Maisyaroh et al. (2021) highlighted contextual variation in instructional supervision practices between Indonesia and the Philippines, while Khobir, Harapan, and Kesumawati (2021) emphasized the relevance of supervision alongside principal leadership. In research on teacher competence, Blömeke et al. (2022) examined the relationship between teacher competence, instructional quality, and students' learning progress, drawing attention to the processes connecting professional knowledge with classroom outcomes. These perspectives indicate that learning quality should not be understood solely as the result of the presence of supervision or competence; it is also important to investigate the organizational and behavioral processes through which these factors may be translated into instructional practice.

The theoretical rationale for positioning work discipline as a mediator rests on the distinction between

organizational guidance and individual professional capacity. From a human resource management perspective, discipline concerns employees' adherence to organizational rules, expectations, and responsibilities. In the school setting, academic supervision may contribute to work discipline by clarifying instructional expectations, monitoring the implementation of teaching activities, providing corrective feedback, and ensuring follow-up. These processes establish an external accountability mechanism through which supervisory practices may be associated with more consistent teacher behavior. Work discipline may then be associated with learning quality because punctuality, procedural compliance, and consistent implementation of instructional plans support the continuity and organization of classroom activities. This reasoning provides the basis for expecting work discipline to mediate the relationship between academic supervision and learning quality.

The proposed mediation pathway for teacher professional competence is conceptually different. Professional competence primarily concerns what teachers know and are able to do in instructional settings. Subject-matter mastery, curriculum knowledge, the ability to develop learning materials, and the use of educational technology can directly support lesson planning, instructional delivery, classroom management, and assessment. However, these capabilities do not necessarily determine whether teachers comply with work schedules, administrative requirements, or other organizational rules. The translation of competence into disciplined behavior may also depend on contextual factors such as organizational expectations, monitoring practices, and accountability arrangements. Therefore, although a positive relationship between competence and work discipline is plausible, it should not be assumed to occur automatically. Its existence and the corresponding indirect effect on learning quality must be established empirically.

The distinction between these pathways constitutes the central theoretical proposition of this study. Academic supervision represents an external guidance and accountability mechanism, whereas teacher professional competence represents an individual capacity that can support instructional quality directly. Work discipline is proposed as a potential behavioral mechanism connecting each antecedent to learning quality, but its mediating role may differ between the two pathways. The study therefore tests the mediation hypotheses separately instead of presuming that the same behavioral mechanism necessarily explains both relationships. Given the cross-sectional design, the proposed mechanisms are theoretical explanations for the hypothesized associations rather than definitive evidence of causal processes.

Framework for Thinking and Hypothesis Development

The quality of learning in this study is understood as the level of excellence in the achievement of student learning processes and outcomes achieved through a series of learning activities systematically designed, implemented, and assessed by teachers, including the dimensions of planning, implementation, classroom management, use of media and technology, and learning assessment. Academic supervision is understood as a series of coaching activities carried out by the principal to help teachers develop their professional capacity in managing the learning process, including supervision planning, implementation of class visits, feedback and coaching, and follow-up on supervision results. Teacher professional competence is understood as the ability to master teaching materials broadly and deeply which becomes the foundation for teachers in designing and implementing meaningful learning, including mastery of materials and curriculum, development of learning materials and innovation, mastery of technology, and continuous professional development. Work discipline is understood as the awareness and readiness of teachers to comply with school rules and professional norms, reflected in punctuality, adherence to procedures, consistency in task implementation, and administrative responsibility.

Based on the preceding theoretical arguments and empirical studies, seven hypotheses are proposed. Academic supervision is expected to improve learning quality by providing teachers with guidance, feedback, and follow-up support that can strengthen instructional planning and implementation. Teacher professional competence is expected to contribute directly to learning quality through teachers' mastery of subject matter, curriculum, instructional methods, and learning technology. Work discipline is also expected to be positively associated with learning quality because consistent attendance, adherence to procedures, and implementation of planned instructional activities support the organization of classroom learning.

Academic supervision is further expected to be positively associated with work discipline because systematic monitoring, feedback, and follow-up can clarify performance expectations and reinforce accountability. Teacher professional competence may also be positively associated with work discipline, but this relationship is less straightforward: professional knowledge and instructional skills do not necessarily translate into compliance with organizational rules. This relationship is therefore tested rather than assumed. Finally, work discipline is hypothesized to mediate the relationship between academic supervision and learning quality because supervision may reinforce consistent work behavior that supports instructional implementation. It is also hypothesized to mediate the relationship between teacher professional competence and learning quality, although the theoretical distinction between competence and behavioral compliance makes this pathway an empirical question.

The hypotheses are developed by distinguishing the direct relationships among the study variables from the indirect relationships proposed through work discipline. Academic supervision is an organizational process through which principals provide instructional guidance, monitor teaching practices, offer feedback, and follow up on teachers' performance. These activities may help teachers improve lesson planning, instructional implementation, and assessment practices, thereby contributing directly to learning quality (H1). Teacher professional competence, in contrast, represents teachers' instructional knowledge and capabilities, including

subject-matter mastery, curriculum development, instructional methods, and the use of learning technology. These capabilities may directly improve the planning and delivery of learning activities and the assessment of student learning (H2).

Work discipline is expected to be positively associated with learning quality because punctuality, compliance with school procedures, and consistent implementation of instructional plans can support the continuity and organization of classroom activities (H3). Academic supervision may also strengthen work discipline by clarifying performance expectations, monitoring compliance, and providing corrective feedback. These supervisory practices may reinforce teachers' consistency in fulfilling their professional responsibilities (H4). Teacher professional competence may be associated with work discipline as well; however, professional knowledge and instructional skills do not automatically ensure compliance with organizational rules or work schedules. The proposed relationship between competence and discipline therefore requires empirical testing rather than being assumed (H5).

The mediation hypotheses concern whether work discipline transmits the relationship between each antecedent and learning quality. For academic supervision, the proposed mechanism is that guidance, monitoring, and feedback may reinforce consistent work behavior, which in turn supports the implementation of instructional activities. Work discipline is therefore proposed as a mediator between academic supervision and learning quality (H6). For teacher professional competence, the proposed pathway is different. Competence may support learning quality directly through teachers' instructional capabilities, while its relationship with work discipline may depend on additional organizational and behavioral conditions. Work discipline is nevertheless tested as a potential mediator between competence and learning quality (H7), but the existence of this indirect effect cannot be inferred solely from a significant direct effect of competence on learning quality.

Accordingly, the study tests the direct effects and the two indirect effects separately. Evidence of a direct relationship does not, by itself, establish mediation; each indirect effect must be assessed using the estimated paths and its statistical significance. Because the study uses a cross-sectional design, the proposed mechanisms should be interpreted as theoretically motivated pathways among observed associations rather than definitive proof of causal processes.

Accordingly, the following hypotheses are formulated:

H1: Academic supervision has a positive and significant direct effect on learning quality.

H2: Teacher professional competence has a positive and significant direct effect on learning quality.

H3: Work discipline has a positive and significant direct effect on learning quality.

H4: Academic supervision has a positive and significant direct effect on work discipline.

H5: Teacher professional competence has a positive and significant direct effect on work discipline.

H6: Work discipline mediates the relationship between academic supervision and learning quality.

H7: Work discipline mediates the relationship between teacher professional competence and learning quality.

The contribution of this study lies in its examination of the potentially different mediating pathways linking academic supervision and teacher professional competence to learning quality. Rather than treating the simultaneous inclusion of four variables as the principal source of novelty, the study distinguishes between an organizational guidance pathway and an individual capacity pathway. Academic supervision may be associated with learning quality both directly and indirectly through work discipline, whereas professional competence may support learning quality primarily through teachers' instructional capabilities. By testing both indirect effects within the same model, the study examines whether work discipline functions as a common mediator or whether its role differs according to the antecedent being considered.

The study also contributes empirical evidence from public elementary schools in Cilegon City, a context that provides a specific setting for examining these relationships within Indonesian educational management. The contextual contribution is complementary to, rather than a substitute for, the theoretical contribution. The results are intended to clarify whether the proposed distinctions between supervision-based and competence-based pathways are supported in this setting. In this way, the study offers a more differentiated account of how organizational support, professional capacity, and teachers' work behavior may relate to learning quality, while recognizing that the cross-sectional design and single-city scope limit causal interpretation and broader generalization.

2. Research Methods

This study uses a quantitative approach with a causal associative design to test the causal relationship between the research variables. The research location includes all A and B accredited public elementary schools in Cilegon City, Banten Province, a city bordering the Sunda Strait to the west and with a strong identity as an industrial area. Based on data from the Cilegon City Education Office in 2024, there are 149 public elementary schools spread across eight sub-districts with a total of approximately 855 civil servant educators. The study population is all civil servant teachers at these A and B accredited elementary schools.

The study involved 150 civil servant teachers from accredited public elementary schools in Cilegon City, Indonesia. The study population comprised civil servant teachers working in the eligible A- and B-accredited public

elementary schools across eight subdistricts. The population was reported to consist of approximately 855 teachers, based on data from the Cilegon City Education Office (2024). The initial sample size was determined using the ten-times rule, based on the 15 indicators specified for the learning quality construct, resulting in a target of 150 respondents. However, this rule should be regarded as an initial heuristic rather than conclusive evidence of statistical power or sample-size adequacy for the entire PLS-SEM model. The adequacy of the sample should therefore be interpreted in relation to the model structure, the number of predictors of each endogenous construct, and the stability of the estimated relationships.

Primary data were collected using a structured questionnaire designed to measure teachers' perceptions of academic supervision, teacher professional competence, work discipline, and learning quality. The questionnaire used a four-point Likert scale. The exact response anchors should be reported as they appeared in the administered questionnaire to ensure that the measurement procedure can be replicated.

Academic supervision was measured using 12 items covering supervision planning, classroom-visit implementation, feedback and coaching, and follow-up, drawing on Sagala (2022) and the academic supervision guidelines issued by the Directorate General of Teachers and Education Personnel (2023). Teacher professional competence was measured using 12 items covering mastery of subject matter and curriculum, material development and innovation, the use of learning technology, and continuous professional development, with reference to Government Regulation No. 74 of 2008 concerning Teachers. Work discipline was measured using 12 items addressing punctuality, compliance with procedures, consistency in task implementation, and administrative responsibility, drawing on Hasibuan (2021). Learning quality was measured using 15 items covering learning planning, learning implementation, classroom management, the use of learning media and technology, and learning assessment.

The questionnaire items and their operational definitions should be documented in a measurement table or appendix. The description of instrument adaptation should also specify how the cited frameworks were translated into questionnaire items, including any wording adjustments, expert review, or other procedures actually undertaken during instrument development.

Proportional random sampling across the eight subdistricts was reported as the sampling approach. Under proportional allocation, the number of respondents selected from each subdistrict is determined by the size of its eligible teacher population relative to the total population. The implementation of this procedure depends on an eligible-teacher sampling frame and the documented allocation and selection of respondents within each subdistrict. Primary data was collected through a four-level Likert-scale questionnaire that measured teachers' perceptions of the implementation of academic supervision by the principal, their professional competence, level of work discipline, and the quality of the resulting learning. Before the main data collection, the questionnaire was reportedly pilot-tested with 30 respondents who were not included in the main research sample. The stated purpose of the pilot test was to examine the validity and reliability of the instrument. However, the available manuscript does not provide the pilot-test statistics, the specific criteria applied to evaluate the items, or whether any items were revised or removed following the test. These details should be reported based on the original pilot-test records. The validity and reliability results obtained from the main sample should be reported separately from the pilot-test results.

All four constructs were measured using teachers' self-reported questionnaire responses. Consequently, the findings may be susceptible to response bias, including social desirability bias, and common-method bias arising from the use of the same data-collection method for multiple constructs. These potential sources of bias should be considered when interpreting the results.

The methodological report should identify the procedural measures actually used to reduce these risks, such as assurances of confidentiality, clear and neutral item wording, or other applicable questionnaire-administration procedures. Any statistical assessment of common-method bias should also be described together with its results, if such an assessment was conducted. Because the available manuscript does not specify these procedures or report a dedicated common-method bias assessment, their implementation and results cannot be established from the current documentation.

The study involved teacher respondents who provided questionnaire data regarding academic supervision, professional competence, work discipline, and learning quality. The ethical reporting should clarify how participation was explained to respondents, whether informed consent was obtained, how respondent confidentiality was protected, and whether permission to collect data was granted by the relevant educational authorities or participating schools. Any institutional ethics approval should be identified by the approving institution and reference number, if applicable.

The available manuscript does not provide sufficient information to establish whether formal institutional ethics approval was obtained, what consent procedure was used, or which data-collection permissions were granted. These details should therefore be verified against the original study records before the ethical statement is finalized.

The academic supervision variable is measured through 12 statement items covering the dimensions of supervision planning, classroom visit implementation, feedback and coaching, and supervision follow-up, referring to the Sagala framework (2022) and the Directorate General of Teachers and Education Personnel's academic supervision guidelines (2023). The teacher professional competency variable is measured through 12 items covering mastery of material and curriculum, material development and innovation, mastery of learning technology, and continuous professional development, referring to the professional competency provisions in Government Regulation Number 74

of 2008 concerning Teachers. The work discipline variable is measured through 12 items covering punctuality, adherence to procedures, consistency in task implementation, and administrative responsibility, referring to Hasibuan's (2021) work discipline concept. The learning quality variable is measured through 15 items covering learning planning, learning implementation, classroom management, use of media and technology, and learning assessment.

The data were analyzed in two stages. The first stage was descriptive statistical analysis to describe the characteristics of the research data, including the mean, median, mode, standard deviation, and frequency distribution of each variable. The second stage was inferential statistical analysis using the Partial Least Squares Structural Equation Modeling approach with the assistance of SmartPLS software version 4.0. This approach was chosen because it does not require strict normality of data distribution, is suitable for models involving mediating variables, and is able to accommodate reflective constructs commonly found in social science research (Hair, Henseler, Ringle, & Sarstedt, 2022; Ringle, Sarstedt, & Hair, 2023). Evaluation of the measurement model or outer model included an outer loading test, a convergent validity test using the Average Variance Extracted value, and a discriminant validity test using the Fornell Larcker criterion and the Heterotrait Monotrait ratio, with a threshold of at least 0.70 for the outer loading and at least 0.50 for the Average Variance Extracted. Reliability was tested through Composite Reliability and Cronbach Alpha with thresholds of 0.70 and 0.60 respectively.

Evaluation of the structural model or inner model includes a multicollinearity test using the inner Variance Inflation Factor value, the coefficient of determination (R Square) to measure the proportion of variance explained by exogenous variables, the effect size (F Square) to measure the relative contribution of each path, predictive relevance (Q Square) using a blindfolding procedure, and the goodness of fit of the model using the Standardized Root Mean Square Residual value. Hypothesis testing was conducted using a bootstrapping procedure with 5,000 subsamples, following the recommendations of Hair, Henseler, Ringle, and Sarstedt (2022). The hypothesis is accepted if the t-statistic value is greater than 1.96 and the p-value is less than 0.05 at a two-sided 5 percent significance level. The mediating role of work discipline was examined by estimating the specific indirect effects of academic supervision and teacher professional competence on learning quality through work discipline. The indirect effects were calculated as the products of the relevant path coefficients. Their statistical significance was assessed using the bootstrapping procedure with 5,000 subsamples. The mediation results should be evaluated using the bootstrapped indirect-effect estimates and their confidence intervals, with an indirect effect considered statistically significant when its confidence interval does not include zero at the specified confidence level.

The assessment of mediation should therefore focus on the estimated indirect effects and their bootstrapped confidence intervals rather than relying exclusively on the causal-steps procedure associated with Baron and Kenny. The direct effects, indirect effects, and total effects should be reported separately to clarify the role of work discipline in each proposed mediation pathway.

3. Results and Discussion

3.1 Respondent Characteristics and Descriptive Statistics

This study involved 150 civil servant teachers as respondents. The majority of respondents were female (85 percent), in line with the composition of the teaching staff at the elementary school level, which is generally dominated by female teachers. In terms of length of service, half of the respondents (50 percent) had worked for 6 to 15 years, indicating that the majority of teachers were in the mid-career stage with sufficient teaching experience to objectively assess academic supervision practices, professional competence, work discipline, and the quality of learning in their schools. In terms of age, the largest proportion of respondents (45 percent) were in the range of 36 to 50 years.

The descriptive statistics result shows that academic supervision has an average score of 31.53 from a theoretical range of 12 to 48, teacher professional competence has an average of 31.50 in the same range, work discipline has an average of 30.60 from a theoretical range of 12 to 48, and learning quality has an average of 43.51 from a theoretical range of 15 to 60, as summarized in Table 1. The three exogenous and mediating variables are in the moderate to good category, while learning quality is in the good category, slightly higher proportionally compared to other variables. This pattern is relevant when read together with the profile of respondents who mostly have 6 to 15 years of teaching experience, so that the maturity of the experience is in line with the relatively high learning quality score, while the work discipline score which is proportionally slightly lower indicates that the aspects of compliance and work consistency still have room for improvement.

Table 1. Descriptive statistics of research variables (n = 150)

Variables	Theoretical Range	Minimum Score	Maximum Score	Average	Standard Deviation
Academic supervision (X1)	12 - 48	12	48	31.53	6.15
Teacher professional competence (X2)	12 - 48	13	47	31.50	6.02

Work discipline (Z)	12 - 48	21	46	30.60	5.57
Quality of learning (Y)	15 - 60	29	59	43.51	5.78

3.2 Evaluation of Measurement Model and Structural Model

The measurement model was evaluated in terms of indicator reliability, convergent validity, internal consistency reliability, and discriminant validity. Indicator reliability was assessed using outer loadings, while convergent validity was evaluated using the average variance extracted (AVE). Internal consistency reliability was assessed using Cronbach's alpha and composite reliability. Discriminant validity was examined using the Fornell–Larcker criterion and the heterotrait–monotrait ratio (HTMT).

The manuscript reports that the indicators met the specified outer-loading threshold of 0.70, that AVE exceeded 0.50 for all four constructs, and that Cronbach's alpha and composite reliability exceeded 0.95. However, the individual outer loadings, construct-level AVE values, and exact reliability coefficients are not presented in the available results. These statistics should be reported in a measurement-model table to allow readers to assess the indicators and constructs directly.

The reported Cronbach's alpha and composite reliability values above 0.95 indicate very high internal consistency. However, values at this level may also warrant examination for potential redundancy among questionnaire items, particularly if several items use similar wording or measure nearly identical aspects of a construct. High reliability alone does not establish that the constructs are conceptually distinct. Therefore, the interpretation of reliability should be considered alongside the item-level loadings, item content, average variance extracted, and discriminant-validity results assessed using the Fornell–Larcker criterion and HTMT. Because the exact reliability coefficients and discriminant-validity statistics are not reported in the current results, the possibility of item redundancy and the empirical distinctness of the constructs cannot be conclusively evaluated from the available information.

The Fornell–Larcker and HTMT assessments should likewise be reported using the actual construct-level results. The Fornell–Larcker table should present the square root of AVE on the diagonal and the inter-construct correlations off the diagonal. The HTMT table should report the ratio for each pair of constructs and specify the criterion used to evaluate discriminant validity.

The structural model was assessed using the inner variance inflation factor (VIF), path coefficients, coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2). Statistical significance was evaluated using bootstrapping with 5,000 subsamples and a two-sided significance level of 5%.

The reported inner VIF values ranged from 1.000 to 1.251, suggesting that problematic multicollinearity was not detected under the study's stated criterion. The reported R^2 values were 0.201 for work discipline and 0.772 for learning quality. The corresponding Q^2 values were 0.141 and 0.459, respectively, indicating positive predictive relevance under the criterion used in the manuscript. The reported SRMR value was 0.048.

The manuscript also reports f^2 values of 0.849 for academic supervision and 0.983 for teacher professional competence in relation to learning quality, and 0.437 for work discipline in relation to learning quality. For the work discipline construct, the reported f^2 values were 0.248 for academic supervision and 0.002 for teacher professional competence. These values should be presented alongside the corresponding path estimates in a structural-model results table. Standard errors or bootstrapped confidence intervals should also be reported to enable readers to evaluate the precision of the estimates.

3.3 Hypothesis Testing

Hypothesis testing was conducted using a bootstrapping procedure with 5,000 subsamples. A summary of the results of testing the seven hypotheses is presented in Table 2.

Table 2. Summary of Hypothesis Testing Results

Hypothesis	Relationship between variables	Path Coefficient	T Statistics	P Value	Conclusion
H1	Academic supervision -> quality of learning	0.491	11,546	0,000	Accepted
H2	Professional competence -> quality of learning	0.474	11,711	0,000	Accepted
H3	Work discipline -> quality of learning	0.353	8,639	0,000	Accepted
H4	Academic	0.445	6,958	0,000	Accepted

	supervision -> work discipline				
H5	Professional competence -> work discipline	0.043	0.622	0.534	Rejected
H6	Academic supervision -> work discipline -> quality of learning	0.157	5,684	0,000	Accepted
H7	Professional competence -> work discipline -> quality of learning	0.015	0.626	0.532	Rejected

The test results show that academic supervision has a direct positive and significant effect on the quality of learning, with a path coefficient of 0.491 (H1 is accepted), making it one of the strongest predictors in the model. Teacher professional competence also has a direct positive and significant effect on the quality of learning, with a path coefficient of 0.474 (H2 is accepted), almost equal to the effect of academic supervision. Work discipline is proven to have a direct positive and significant effect on the quality of learning, with a path coefficient of 0.353 (H3 is accepted), although the magnitude of the effect is smaller than the two exogenous variables. Academic supervision has a direct positive and significant effect on work discipline, with a path coefficient of 0.445 (H4 is accepted), while teacher professional competence is not proven to have a significant effect on work discipline, with a very small path coefficient of 0.043 and a t-statistic value below 1.96 (H5 is rejected).

The mediation analysis examined whether work discipline mediated the relationships of academic supervision and teacher professional competence with learning quality. The reported indirect effect of academic supervision on learning quality through work discipline was positive, with a coefficient of 0.157. The manuscript reports this indirect effect as statistically significant. However, the corresponding bootstrapped confidence interval and exact significance statistics are not provided in the current results and should be reported to substantiate this conclusion. In contrast, the reported indirect effect of teacher professional competence on learning quality through work discipline was 0.015 and was described as statistically non-significant. This finding is consistent with the non-significant relationship between professional competence and work discipline reported for H5. Nevertheless, the mediation conclusion should be verified using the bootstrapped confidence interval for the specific indirect effect rather than inferred solely from the significance of the constituent direct path.

The direct, indirect, and total effects should be distinguished in the results. The manuscript reports a direct effect of 0.491 and an indirect effect of 0.157 for academic supervision, yielding a reported total effect of 0.648. For teacher professional competence, the manuscript reports a direct effect of 0.474 and an indirect effect of 0.015. Their sum is 0.489, but this value should be checked against the total-effect estimate from the original PLS-SEM output before being reported as the final total effect. Bootstrapped confidence intervals for both indirect effects are required to support the mediation conclusions. This pattern indicates that work discipline acts as a selective mediator, significantly mediating the academic supervision path but not mediating the teacher professional competence path.

3.4 Discussion

The positive and statistically significant association between academic supervision and learning quality ((β = 0.491), (p < .001)) is consistent with the view that supervision can support teachers in planning, implementing, and evaluating classroom instruction. However, this association should not be interpreted as evidence that supervision automatically improves learning quality in every school context. Its potential contribution may depend on how supervision is implemented, including the quality of classroom observations, the usefulness of feedback, the availability of follow-up support, and teachers' opportunities to apply recommendations in their instructional practice. These mechanisms are plausible explanations rather than processes directly tested in the present study. The reported effect size ((f^2 = 0.849)) indicates a substantial contribution within the estimated structural model, but it does not establish that academic supervision is universally more influential than other determinants of learning quality. Accordingly, the findings support the relevance of academic supervision while leaving room for contextual factors and alternative explanations that require further investigation. This condition aligns with field findings in the research background, where the supervision cycle in Cilegon City is often interrupted at the pre-observation and follow-up stages. Therefore, strengthening these two stages has the potential to produce even more significant results.

Teacher professional competence proved to be the largest determinant of learning quality in this model, with the

highest F-square value among all the pathways tested. This finding is consistent with the results of Ekwanto, Kusumaningsih, and Sulianto (2026), who found that supervision and professional competence simultaneously explained almost half of the variation in learning quality in elementary schools, with competence being one of the strongest predictors. This finding also aligns with the results of a multi-level study by Blömeke, Jentsch, Ross, Kaiser, and König (2022), which emphasized that teacher knowledge mastery plays a crucial role in determining instructional quality in the classroom. Teachers who master the material in depth will be able to present more systematic learning, provide examples relevant to students' real lives, and respond appropriately to questions. Therefore, it is natural that professional competence is one of the most dominant pathways of influence in this study.

Work discipline has also been shown to significantly impact learning quality, albeit with a more moderate effect than the two exogenous variables. This confirms that managerial capacity and support alone are insufficient without consistent implementation of daily tasks. Disciplined teachers will consistently arrive on time, diligently prepare learning materials, and implement the teaching and learning process according to plan, thus ensuring their contribution to learning quality remains practically meaningful. This aligns with the findings of Fahmi, Saluy, Safitri, Rivaldo, and Endri (2022) and Amini, Marliani, Elfrianto, and Kemal (2022), who found a link between work discipline and teacher performance at other levels.

An interesting finding in this study is the selective mediation pattern of work discipline. Academic supervision was shown to have a significant effect on work discipline, indicating that external guidance through principal monitoring and feedback encouraged teachers to be more disciplined in carrying out their duties. This finding aligns with the views of Jumali, Yuliejantiningsih, and Haryati (2023) regarding the relationship between academic supervision and work discipline on the quality of elementary schools, as well as with Khobir, Harapan, and Kesumawati (2021) who emphasized that school supervisors' academic supervision significantly contributes to teacher performance. However, teacher professional competence was not shown to significantly shape work discipline. This finding indicates that mastery of teaching material and skills is a cognitive capacity and technical expertise that does not automatically foster behavioral compliance, as discipline is shaped more by external oversight mechanisms and institutional accountability systems than by an individual's level of expertise. In other words, a teacher can have a strong grasp of teaching material but still be less disciplined in terms of punctuality or completion of administrative tasks, as these two factors stem from different motivational sources.

The logical consequence of this pattern is evident in the results of the mediation test. Work discipline significantly mediates the effect of academic supervision on learning quality, so that the total effect of academic supervision, the combination of direct and indirect pathways, is greater than its direct effect alone. This means that the effectiveness of an academic supervision program will be more optimal if the principal explicitly targets the development of teacher discipline, not just technical improvements in learning. Conversely, work discipline does not mediate the effect of teacher professional competence on learning quality, because the pathway from professional competence to work discipline is indeed insignificant. Teacher professional competence still influences learning quality, but purely through its direct pathway, not through strengthening discipline. This selective pattern enriches the understanding of educational quality management by emphasizing the importance of distinguishing between the ability-based pathway, which stems from individual capacity and expertise, and the compliance-based pathway, which stems from external oversight mechanisms. From a practical perspective, the findings suggest that school leaders may need to consider both instructional capability and organizational conditions when designing teacher-development initiatives. Academic supervision could be used as an opportunity to discuss instructional practices alongside relevant work routines, while professional-development activities could focus on subject knowledge, pedagogical application, and the use of learning resources. The non-significant association between professional competence and work discipline in this study also raises the possibility that competency-development initiatives and disciplinary-accountability systems may require distinct objectives and evaluation criteria. However, this is a provisional implication, not a policy conclusion established by the mediation results. Schools should evaluate the suitability of such an approach in their own contexts and assess its outcomes before adopting it more broadly. The present findings do not establish that separating these systems would necessarily improve teacher behavior or learning quality.

These findings also have clear practical implications for managing the quality of basic education. For school principals, the research confirms that academic supervision programs should not focus solely on the technical aspects of learning but should also explicitly include indicators of work discipline, such as punctuality in attendance and consistent implementation of lesson plans, as a focus of discussion in each post-observation feedback session. For teachers, these findings serve as a reminder that investing in professional competency development, whether through learning communities, online training, or further study, remains the most direct and powerful path to improving learning quality, regardless of the level of work discipline. For education offices and school supervisors, these results suggest the need to design policies that clearly separate continuing professional development programs from disciplinary accountability systems, as combining the two in a single intervention scheme risks obscuring the evaluation of each program's effectiveness. This separation is crucial given the industrial characteristics of Cilegon City, which demand responsive educational governance. Therefore, targeted policies will be more efficient than general policies that apply to all determinants of teacher performance.

The theoretical contribution of this study lies in examining whether academic supervision and teacher

professional competence are associated with learning quality through the same intervening mechanism. The results suggest a differentiated pattern: work discipline was reported to mediate the association between academic supervision and learning quality, whereas a statistically significant indirect association through work discipline was not established for teacher professional competence. This pattern provides context-specific evidence that the two predictors may be linked to learning quality through different pathways rather than through a single, uniform model of teacher performance. It also invites a more qualified interpretation of frameworks that treat work discipline as an inevitable consequence of every form of professional development or managerial support. However, because the data are cross-sectional and self-reported, the findings should be regarded as evidence consistent with selective mediation in the estimated model, not as definitive proof of the underlying causal mechanisms. Future studies using longitudinal data, multiple data sources, and replication in other educational settings are needed to determine whether this differentiated pattern is robust.

4. Conclusion

4.1 Conclusion

This study examined the relationships between academic supervision, teacher professional competence, work discipline, and learning quality in public elementary schools in Cilegon City. The results showed that academic supervision (($\beta = 0.491$, $p < .001$)), teacher professional competence (($\beta = 0.474$, $p < .001$)), and work discipline (($\beta = 0.353$, $p < .001$)) each had a positive and statistically significant direct association with learning quality. Academic supervision was also positively associated with work discipline (($\beta = 0.445$, $p < .001$)), whereas the direct association between teacher professional competence and work discipline was not statistically significant (($\beta = 0.043$, $p = .534$)).

Regarding mediation, the manuscript reported a statistically significant indirect effect of academic supervision on learning quality through work discipline (($\beta = 0.157$)). In contrast, the indirect effect of teacher professional competence on learning quality through work discipline was reported as statistically non-significant (($\beta = 0.015$)). These findings suggest a selective mediation pattern in the estimated model: the indirect pathway through work discipline was supported for academic supervision but was not supported for teacher professional competence. The reported model explained 77.2% of the variance in learning quality.

The main theoretical contribution is the examination of work discipline as a potential mediator for two different predictors of learning quality. The results indicate that the two predictors did not exhibit the same pattern of direct and indirect associations in this sample. However, the findings should be interpreted as model-based associations rather than definitive evidence of causal mechanisms. The cross-sectional design, self-reported measures, and focus on public elementary schools in one city limit causal interpretation and generalization to other educational settings.

Nevertheless, this explanation should be treated as a theoretical interpretation rather than a mechanism established by the present data. The cross-sectional, self-reported design does not allow the study to determine why the competence–discipline association was non-significant, nor does a non-significant coefficient prove that no relationship exists in the population. Measurement limitations, restricted variation, contextual conditions, or statistical uncertainty may also contribute to the observed result. The non-significant indirect effect should therefore be interpreted as a lack of sufficient statistical evidence for mediationin this sample, rather than definitive proof that work discipline can never transmit the influence of professional competence to learning quality. This distinction is central to interpreting the selective-mediation pattern cautiously.

4.2 Research Limitations

This study has several limitations that should be considered when interpreting its findings. First, the cross-sectional design captures the relationships among the variables at a single point in time and does not establish temporal ordering or prove causal effects. Consequently, the reported direct and indirect effects should be interpreted as associations estimated by the proposed model rather than definitive evidence of causal mechanisms.

Second, the data were collected using self-reported questionnaires. Responses may be influenced by social desirability, respondents' perceptions, or common-method bias. These factors may affect the estimated relationships among academic supervision, teacher professional competence, work discipline, and learning quality. Future studies could strengthen the evidence by combining questionnaire responses with classroom observations, administrative records, or assessments from other sources.

Third, the non-significant association between teacher professional competence and work discipline, together with the reported non-significant indirect effect through work discipline, should be interpreted cautiously. These results do not establish that such relationships are universally absent. Measurement characteristics, contextual factors, sample variation, and statistical uncertainty may affect the estimates. In addition, the indirect effects should be interpreted alongside their bootstrapped confidence intervals and other relevant statistical results.

Fourth, the study was conducted in public elementary schools in Cilegon City. The findings may not be directly generalizable to private schools, other educational levels, or regions with different institutional and organizational characteristics. Finally, although the model explained 77.2% of the variance in learning quality, other potentially relevant factors, such as teacher motivation, job satisfaction, school climate, school facilities, and parental involvement, were not included. Future research should

examine these factors and test whether the observed mediation pattern remains consistent across different samples and research designs.

4.3 Suggestions

The findings suggest several directions for educational practice and future research. For school principals, academic supervision may provide an opportunity to discuss instructional practices and relevant work routines, including lesson planning, punctuality, and the implementation of feedback. For education offices, professional-development initiatives may focus on subject knowledge, pedagogical skills, and the effective use of learning resources. The non-significant association between teacher professional competence and work discipline also suggests that competency development and disciplinary accountability may warrant separate objectives and evaluation criteria. However, this is a possible practical implication rather than a policy conclusion established by the present study. Any such approach should be evaluated in its institutional context before being adopted more broadly.

Future research should include public and private schools from different regions and educational levels to examine the generalizability of the findings. Longitudinal designs could help establish the temporal ordering of the variables, while data from multiple sources could reduce reliance on self-reported measures. Researchers should also report the bootstrapped confidence intervals and statistical significance of specific indirect effects to evaluate the proposed mediation pathways more transparently. Finally, additional variables, such as teacher motivation, job satisfaction, and school climate, could be examined to determine whether they help explain the relationships among professional competence, work discipline, and learning quality.

From a grand theory perspective on human resource management, these findings contribute to the debate regarding the sources of employee work behavior formation. The theory that positions discipline as the sole outcome of organizational development, as outlined by Hasibuan (2021), has been shown to apply only to pathways originating from structural oversight, namely academic supervision, but not to pathways originating from individual capacity, namely professional competence. This pattern aligns with the notion that work compliance behavior is determined more by external accountability systems than simply by a person's expertise, a nuance that has received little attention in educational management studies in Indonesia. Therefore, this study offers a conceptual contribution in the form of a clearer distinction between supervision-based and capacity-based performance-building mechanisms, which can serve as a reference for developing similar models in other educational organizational contexts, including at the secondary and higher education levels.

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Bibliography

Amini, A., Marliani, M., Elfrianto, E., & Kemal, I. (2022). Work motivation and work discipline on teachers' performance in state vocational schools. Al Ishlah: Journal of Education, 14(2), 2271 2280. https://doi.org/10.35445/alishlah.v14i2.1467

Anggraeni, A., Haryati, T., & Sudana, IM (2022). The influence of academic supervision, teacher motivation, and teacher performance on school quality in elementary schools in Mranggen District, Demak Regency. Journal of Educational Management, 11(1), 14-27. https://doi.org/10.26877/jmp.v11i1.14071

Central Statistics Agency. (2023). Human Development Index 2023. BPS RI. https://www.bps.go.id

Blömeke, S., Jentsch, A., Ross, N., Kaiser, G., & König, J. (2022). Opening up the black box: Teacher competence, instructional quality, and students' learning progress. Learning and Instruction, 79, 101600. https://doi.org/10.1016/j.learninstruc.2022.101600

Cilegon City Education Office. (2024). Basic data on public elementary school education in Cilegon City in 2024. Cilegon City Education Office.

Directorate General of Teachers and Education Personnel. (2023). Academic supervision guidelines. Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia.

Ekwanto, H., Kusumaningsih, W., & Sulianto, J. (2026). The influence of supervisory roles and teachers' professional competence on learning quality in elementary schools in Gubug District. Journal of Innovation and Research in Primary Education, 5(1), 2223 2232. https://doi.org/10.56916/jirpe.v5i1.3042

Fahmi, P., Saluy, AB, Safitri, E., Rivaldo, Y., & Endri, E. (2022). Work stress mediates motivation and discipline on teacher performance: Evidence work from home policy. Journal of Educational and Social Research, 12(3), 80 89. https://doi.org/10.36941/jesr-2022-0068

Ferine, KF, Aditia, R., & Rahmadana, MF (2021). An empirical study of leadership, organizational culture, conflict, and work ethics in determining work

performance in Indonesia's education authority. Heliyon, 7(7), e07698. https://doi.org/10.1016/j.heliyon.2021.e07698

Hair, J.F., Henseler, J., Ringle, C.M., & Sarstedt, M. (2022). A primer on partial least squares structural equation modeling (PLS SEM) (3rd ed.). SAGE Publications.

Hasibuan, MSP (2021). Human resource management (Revised edition). Bumi Aksara.

Jumali, J., Yuliejantiningsih, Y., & Haryati, T. (2023). The influence of principal academic supervision, work motivation, and work discipline on elementary school quality. Journal of Learning Innovation in Schools, 4(2), 315-325. https://doi.org/10.51874/jips.v4i2.118

Kania, A., & Wasliman, ED (2026). Academic supervision management by school principals in enhancing teachers' social competence: A comparative case study of two elementary schools. Journal of Innovation and Research in Primary Education, 5(1), 418 431. https://doi.org/10.56916/jirpe.v5i1.2773

Ministry of Education and Culture. (2022). Results of the 2022 Teacher Competency Test (UKG). Kemdikbud. https://gtk.kemdikbud.go.id

Khobir, K., Harapan, E., & Kesumawati, N. (2021). The influence of school supervisor academic supervision and principal leadership on teacher performance. Jambura Journal of Educational Management, 2(2), 83 96. https://doi.org/10.37411/jjem.v2i2.902

Mailani, I., Nazir, M., & Zein, M. (2023). The influence of principal academic supervision and teacher professionalism on learning quality. Didaktika: Jurnal Kependidikan, 12(4), 1061-1076. https://doi.org/10.58230/27454312.314

Maisyaroh, Wiyono, BB, Hardika, Valdez, AV, Mangorsi, SB, & Canapi, SP (2021). The implementation of instructional supervision in Indonesia and the Philippines, and its effect on the variation of teacher learning models and materials. Cogent Education, 8(1), 1962232. https://doi.org/10.1080/2331186X.2021.1962232

Mediatati, N., & Jati, DHP (2022). Principal supervision: Improving the quality of teacher learning and student learning outcomes. Journal of Educational Research and Development, 6(3), 422-431. https://doi.org/10.23887/jppp.v6i3.48774

Muttaqin, I., Tursina, N., Sudrajat, A., Yuliza, U., Novianto, N., Ramadhan, FF, & Kurnanto, ME (2023). The effect of academic supervision, managerial competence, and teacher empowerment on teacher performance: The mediating role of teacher commitment. F1000Research, 12, 743. https://doi.org/10.12688/f1000research.128502.2

OECD. (2023). Education at a glance 2023: OECD indicators. OECD Publishing. https://doi.org/10.1787/e13bef63-en

Regulation of the Minister of Education, Culture, Research, and Technology Number 16 of 2022 concerning Process Standards in Primary and Secondary Education.

Government Regulation Number 57 of 2021 concerning National Education Standards.

Government Regulation Number 74 of 2008 concerning Teachers.

Rahyasih, Y., Permana, SJ, & Siti, SL (2024). The effect of educational supervision from school supervisors on teacher competence and its impact on the quality of digital learning. SHS Web of Conferences, 197, 01011. https://doi.org/10.1051/shsconf/202419701011

Riyadi, FA, Kusumaningsih, W., & Ginting, RB (2024). The influence of academic supervision, principal managerial skills, and work motivation on the performance of elementary school teachers in Bulu District, Temanggung Regency. Journal of Learning Innovation in Schools, 5(1), 236–244. https://doi.org/10.51874/jips.v5i1.214

Ringle, C. M., Sarstedt, M., & Hair, J. F. (2023). SmartPLS 4: Advanced features and applications. SmartPLS GmbH.

Sagala, S. (2022). Learning supervision in the education profession: Helping teachers overcome difficulties in providing quality learning services (Revised edition). Alfabeta.

Senang, S., Sunardi, S., & Farchani, MW (2024). Improving the quality of student learning through the implementation of academic supervision. Academicus: Journal of Teaching and Learning, 3(2), 109-117. https://doi.org/10.59373/academicus.v3i2.61

Sugiyono. (2022). Quantitative, qualitative, and R&D research methods (Revised edition). Alfabeta.

Law Number 14 of 2005 concerning Teachers and Lecturers.