

The Main Pathways For Improving Educational Quality In State Islamic Senior High Schools in Deli Serdang Regency: An Analysis of Principals' Policies, Personality Traits, and Professional Development

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Abstract

This study aimed to examine the direct effects of principal policy practices, teachers' Big Five personality traits, and teacher professional development on perceived educational quality and to assess the potential mediating role of professional development in state Islamic senior high schools. A quantitative cross-sectional census survey was conducted involving 97 teachers from two State Islamic Senior High Schools in Deli Serdang Regency, Indonesia, between December 2025 and March 2026. Data were collected using five-point Likert-scale questionnaires and analyzed through two-equation path analysis using IBM SPSS. The diagnostic tests indicated acceptable residual normality, tolerance values ranging from .237 to .780, variance inflation factors ranging from 1.282 to 4.220, and no systematic heteroscedasticity. Principal policy practices ($\beta = .612$, $t = 4.283$), Big Five personality traits ($\beta = .694$, $t = 3.936$), and teacher professional development ($\beta = .785$, $t = 4.449$) were positively associated with perceived educational quality (all $p < .001$). Principal policy practices ($\beta = .514$, $t = 3.535$) and Big Five personality traits ($\beta = .530$, $t = 4.158$) were also positively associated with professional development (both $p < .001$). The estimated indirect effects were .403 and .416, although their statistical significance could not be established without bootstrap confidence intervals. The findings indicate that educational quality improvement requires the integration of transparent, instructionally focused school policies and continuous, collaborative, and differentiated professional development. However, the cross-sectional design, limited institutional setting, and absence of bootstrapped mediation tests restrict causal interpretation and generalizability. Future studies should employ longitudinal, multisite designs and bootstrap-based mediation analysis.

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Introduction

Educational quality is increasingly understood as a multidimensional institutional outcome produced through the alignment of instructional leadership, teacher capacity, organizational climate, and student-centered learning processes rather than through isolated administrative interventions. Although principals rarely influence learning outcomes through direct classroom contact, they shape the goals, structures, expectations, resource decisions, and professional conditions within which teaching occurs. Meta-analytic, systematic-review, and school-level studies consistently show that leadership contributes to educational outcomes through indirect pathways involving instructional organization, teacher performance, collaboration, and school climate (Agirdag & Muijs, 2023; Dutta

& Sahney, 2022; Ninković & Knežević Florić, 2024; Tan, 2024). Accordingly, research on school improvement must move beyond asking whether leadership matters and examine the specific policy practices and teacher-level mechanisms through which leadership is translated into educational quality.

Principal policy practices represent the operational expression of leadership at the school level. They include the formulation and communication of instructional priorities, teacher participation in decision-making, equitable allocation of professional opportunities, supervision, feedback, resource support, and consistent implementation of school rules. Evidence indicates that learning-centered leadership and supportive organizational conditions increase teachers' engagement in professional learning, while procedural justice and positive leadership climates strengthen responsibility, trust, job satisfaction, and professional collaboration (Goetz et al., 2024; Huang et al., 2020; S. Liu & Hallinger, 2024; Özgenel et al., 2022). These findings suggest that policy effectiveness depends not merely on the existence of formal regulations but on whether policies are transparent, participatory, instructionally relevant, and experienced by teachers as fair and enabling. In this sense, school policy is both an administrative instrument and a social mechanism that structures teachers' access to learning, voice, recognition, and organizational support.

Teacher professional development is a central mechanism through which favorable school conditions can become improved instructional practice. Contemporary scholarship no longer treats professional development as attendance at occasional workshops; instead, it conceptualizes professional learning as a continuous, situated, collaborative, and reflective process that connects new knowledge with teachers' classroom problems and school priorities. Effective professional development requires coherent goals, sustained duration, active learning, feedback, peer interaction, opportunities for experimentation, and organizational follow-up (Admiraal et al., 2021; Kennedy, 2016; Oppi & Eisenschmidt, 2022; Sancar et al., 2021). Indonesian evidence further shows that fragmented programs, weak alignment between training and classroom needs, and limited involvement of school leaders can reduce the long-term impact of teacher development reforms (Revina et al., 2023). Consequently, the contribution of professional development to educational quality depends on both the design of learning activities and the school's capacity to support the transfer of learning into everyday teaching.

Organizational conditions alone, however, cannot fully explain why teachers exposed to similar policies and professional opportunities display different levels of participation, persistence, collaboration, and instructional adaptation. The Big Five framework openness to experience, conscientiousness, extraversion, agreeableness, and emotional stability offers a theoretically established taxonomy for examining dispositional differences relevant to professional behavior. Meta-analytic evidence indicates that openness, conscientiousness, extraversion, and emotional stability are generally associated with teacher effectiveness and lower burnout, although associations vary according to the trait and outcome measured (Kim et al., 2019). More recent studies show that conscientiousness and related motivational characteristics predict teachers' intentions to participate in technology-related professional development, while Big Five dimensions are also associated with teachers' subjective career success and engagement with professional demands (Fütterer et al., 2023; Ingarianti et al., 2023). Teacher personality should therefore not be interpreted as a fixed determinant of quality, but as a dispositional resource that may influence how teachers respond to leadership, collaboration, innovation, and professional learning opportunities.

Theoretical and empirical research increasingly supports an indirect-effects perspective in which leadership shapes teaching through intervening psychological and professional processes. Principal leadership has been linked to teacher practice through professional learning and teacher beliefs; school organizational conditions have been linked to professional learning through self-efficacy; and teacher leadership capacity has been associated with self-efficacy through professional learning (Er, 2024; Gümüş et al., 2022; Huang et al., 2020; Thien & Liu, 2024). These mediated models are important because they explain why similar formal policies may generate different outcomes: leadership creates opportunities and expectations, but teachers must interpret, internalize, and enact them through professional activity. Nevertheless, most existing models emphasize either organizational leadership and professional learning or individual psychological factors. Relatively little research integrates a school-level policy construct, a broad personality framework, professional development, and perceived educational quality within one explanatory model.

This integration is particularly relevant in Indonesian State Islamic Senior High Schools (Madrasah Aliyah Negeri, MAN), which are required to combine national academic standards, religious and character formation, public accountability, and responsiveness to technological and curricular change. Studies conducted in madrasah settings indicate that principal leadership, teacher professionalism, quality management, supervision, and resource development are closely connected, yet they are frequently examined through qualitative case studies or as separate variables (Panjaitan et al., 2023; Warisno & Hidayah, 2022). At the wider system level, Indonesian teacher development remains affected by discontinuity, program fragmentation, and weak coherence among policy, training, school support, and classroom implementation (Andriyati et al., 2025; Cirocki & Farrell, 2019). These contextual characteristics make madrasahs an analytically important setting for examining whether principal policy practices and teacher dispositions are linked to quality directly and through the more proximal mechanism of teacher professional development.

Several gaps therefore remain in the literature. First, systematic reviews identify professional learning as a frequent mediator of leadership effects, but personality is rarely incorporated into the same model (Bektaş et al., 2022; Karacabey et al., 2022; Liebowitz & Porter, 2019; Talebizadeh et al., 2021). Second, teacher-personality research has concentrated primarily on effectiveness, burnout, career success, or participation intentions rather than testing professional development as a pathway to school-level quality perceptions (Bardach et al., 2022; Perera et al., 2018; Roloff et al., 2022; Samfira & Paloş, 2021). Third, Indonesian research on madrasah quality commonly addresses leadership, professionalism, or quality management separately and provides limited quantitative evidence regarding their simultaneous direct and indirect relationships (Mukhlisin et al., 2023; Mulyani et al., 2020; Tambak & Sukenti, 2020). Finally, the evidence base is especially limited for State Islamic Senior High Schools in Deli Serdang Regency, where school quality must be pursued within specific organizational, religious, and local resource conditions.

To address these gaps, this study aimed to examine the direct associations of principal policy practices, teachers' Big Five personality, and teacher professional development with perceived educational quality in State Islamic Senior High Schools in Deli Serdang Regency. It also examined whether principal policy practices and Big Five personality were associated with teacher professional development and whether professional development constituted an indirect pathway connecting these antecedents with perceived educational quality. By integrating an organizational antecedent, an individual dispositional antecedent, and a professional-learning mechanism in a

single path model, the study seeks to provide context-sensitive evidence for the development of more coherent madrasah quality-improvement strategies. Because the study employed a cross-sectional design, the proposed pathways are interpreted as theoretically ordered associations rather than definitive causal effects.

Method

This study employed a quantitative cross-sectional correlational survey design to examine the direct and indirect associations among principal policy practices, teachers' Big Five personality, teacher professional development, and perceived educational quality. The research was conducted at MAN 1 and MAN 2 in Deli Serdang Regency, North Sumatra, Indonesia, over a four-month period from December 2025 to March 2026. A nonexperimental design was appropriate because the study measured naturally occurring perceptions and professional characteristics without manipulating school policies or teacher behavior. The temporal sequence represented in the path model was derived from the theoretical framework; therefore, the estimates indicate statistical associations and should not be interpreted as evidence of causal precedence.

The accessible population consisted of all 97 teachers employed at the two participating State Islamic Senior High Schools. A census or saturated-sampling approach was used, whereby every member of the accessible population was invited to participate, and the final analytic sample comprised 97 respondents. The sample therefore represents the teachers in the two participating schools rather than a probability sample of all MAN teachers in Deli Serdang Regency or Indonesia.

Data were collected using a closed-ended questionnaire with a five-point Likert response format ranging from 1 (strongly disagree) to 5 (strongly agree). Based on the indicators described in the submitted manuscript, principal policy practices covered teacher involvement in decision-making, policy clarity and consistency, communication, instructional support, supervision, and the provision of a conducive working environment. The Big Five measure represented openness to experience, conscientiousness, extraversion, agreeableness, and emotional stability. Teacher professional development included participation in training and seminars, professional reading, collegial knowledge sharing, curriculum learning, instructional innovation, and educational-technology development. Perceived educational quality referred to teachers' evaluations of instructional-process quality, teacher discipline and performance, school management, learning conditions, and the school's quality orientation. Higher scores indicated stronger perceptions of each construct.

The questionnaire was reported to have undergone expert judgment, pilot testing, item-validity analysis, and reliability testing before its use in the main study. Data collection was conducted after permission had been obtained from the participating institutions. Teachers were informed about the purpose of the study, the voluntary nature of participation, confidentiality, and the use of aggregated results, and the source manuscript states that informed consent was obtained. Completed questionnaires were checked, coded, and entered into IBM SPSS for analysis.

Data analysis proceeded in four stages. First, descriptive statistics and measurement-quality indicators should be calculated for all constructs, including means, standard deviations, reliability coefficients, and zero-order correlations. Second, regression assumptions were evaluated through inspection of the Normal P-P Plot, tolerance and variance inflation factor values, and the residual scatterplot. Third, path analysis was conducted through two ordinary least-squares regression equations: teacher professional development was regressed on principal policy practices and Big

Five personality, and perceived educational quality was regressed on principal policy practices, Big Five personality, and teacher professional development. Individual paths were evaluated using t statistics, while the overall outcome equation was assessed using the F statistic and coefficient of determination. Statistical significance was set at $\alpha = .05$.

Indirect effects were calculated using the product-of-coefficients approach. Contemporary mediation analysis recommends estimating bias-corrected bootstrap confidence intervals because the sampling distribution of an indirect effect is often asymmetric and cannot be adequately evaluated from the significance of individual component paths alone (Hayes, 2022; Kline, 2023). The source manuscript did not provide bootstrap standard errors or confidence intervals. Accordingly, the indirect coefficients reported below are treated as preliminary product estimates rather than confirmed mediation effects. Before submission, the analysis should be repeated with at least 5,000 bootstrap samples, and the standardized and unstandardized coefficients should be clearly distinguished.

Result and Discussion

Data Screening and Assumption Testing

The reported diagnostic evidence suggested that the regression equations met the basic assumptions required for path analysis. Residuals approximately followed the diagonal line in the Normal P-P Plot, indicating no substantial departure from normality. Tolerance values ranged from .237 to .780 and variance inflation factors ranged from 1.282 to 4.220. These values did not indicate severe multicollinearity under the commonly applied $VIF < 5$ criterion, although the highest VIF suggests moderate overlap among predictors. The residual scatterplot was described as randomly dispersed, providing no clear evidence of heteroscedasticity. Table 1 summarizes the diagnostic results.

Table 1. Preliminary diagnostic results

Diagnostic test	Reported evidence	Decision criterion	Interpretation
Residual normality	Normal P-P Plot approximately followed the diagonal	Approximately linear pattern	Acceptable
Multicollinearity	Tolerance = .237–.780; VIF = 1.282–4.220	Tolerance > .10; VIF < 5	No severe multicollinearity
Heteroscedasticity	Residual points were randomly dispersed	No funnel or systematic pattern	No clear heteroscedasticity

Predictors of Teacher Professional Development

Both antecedent variables were positively associated with teacher professional development. Principal policy practices yielded a reported path coefficient of $\beta = .514$ ($t = 3.535$, $p < .001$), while Big Five personality yielded $\beta = .530$ ($t = 4.158$, $p < .001$). The slightly larger coefficient for Big Five personality indicates that, within the reported equation, the teacher-disposition composite had a marginally stronger association with professional development than principal policy practices. These findings support the proposition that professional learning is related to both enabling organizational conditions and teachers' dispositional readiness to engage in learning and change.

Predictors of Perceived Educational Quality

All three predictors were positively associated with perceived educational quality. Principal policy practices had a reported coefficient of $\beta = .612$ ($t = 4.283$, $p < .001$), Big Five personality had $\beta = .694$

($t = 3.936$, $p < .001$), and teacher professional development had $\beta = .785$ ($t = 4.449$, $p < .001$). Teacher professional development therefore showed the largest reported direct coefficient, followed by Big Five personality and principal policy practices. Table 2 presents the direct path estimates across both regression equations.

Table 2. Reported direct path estimates

Outcome equation	Predictor	Reported β	t	p	Direction	Decision
Teacher professional development	Principal policy practices	.514	3.535	< .001	Positive	Supported
Teacher professional development	Big Five personality	.530	4.158	< .001	Positive	Supported
Perceived educational quality	Principal policy practices	.612	4.283	< .001	Positive	Supported
Perceived educational quality	Big Five personality	.694	3.936	< .001	Positive	Supported
Perceived educational quality	Teacher professional development	.785	4.449	< .001	Positive	Supported

Indirect Effects and Overall Equation Performance

The estimated indirect association of principal policy practices with perceived educational quality through teacher professional development was .403, obtained by multiplying .514 by .785. The corresponding indirect estimate for Big Five personality was .416, obtained by multiplying .530 by .785. The source manuscript added these product estimates to the reported direct coefficients and presented total effects of 1.015 and 1.110, respectively. Although the product estimates are directionally consistent with the proposed model, mediation cannot be confirmed because bootstrap confidence intervals were not reported and the coefficient metric has not been verified. Table 3 therefore presents these estimates as provisional.

Table 3. Provisional indirect-effect estimates

Indirect pathway	Product calculation	Indirect estimate	Reported total effect	Statistical conclusion
Principal policy practices → professional development → quality	.514 × .785	.403	1.015	Provisional; bootstrap CI unavailable
Big Five personality → professional development → quality	.530 × .785	.416	1.110	Provisional; bootstrap CI unavailable

The source manuscript further reported that the educational-quality equation was statistically significant ($F = 21.355$, $p < .001$) and explained 71.1% of the variance (reported $R^2 = .711$). However, these two statistics are not arithmetically consistent with a conventional three-predictor ordinary least-squares regression using $N = 97$. The original SPSS Model Summary and ANOVA tables must therefore be consulted to determine whether the F value, R^2 value, sample size, or number of predictors was transcribed incorrectly. Until that verification is completed, the model should be described as statistically significant but its precise explanatory power should be treated as unconfirmed.

Table 4. Reported overall equation statistics and verification status

Outcome	Reported F	Reported p	Reported R^2	Verification status
Perceived educational quality	21.355	< .001	.711	F and R^2 require reconciliation with original SPSS output

Discussion

The findings indicate that perceived educational quality in the participating madrasahs was associated with an interdependent configuration of principal policy practices, teacher personality, and professional development. All reported direct pathways were positive, and teacher professional development produced the largest coefficient in the educational quality equation. This pattern supports an indirect effects understanding of school improvement. Leadership establishes organizational direction and opportunity structures, teacher dispositions influence how those opportunities are interpreted and pursued, and professional learning provides a more proximal route through which organizational and personal resources can be translated into perceived instructional and institutional quality.

The positive association between principal policy practices and perceived educational quality is consistent with Dutta and Dutta & Sahney (2022) mediated effects model, which showed that instructional leadership influenced student achievement largely through school climate and teacher task performance. It also accords with the three level meta-analysis by Tan (2024), which concluded that leadership practices are positively related to student and school outcomes, and with the systematic review by Ninković & Knežević Florić (2024), which identified teacher collaboration, professional learning, and self-efficacy as recurrent mediators of leadership effects. The present result extends these findings to State Islamic Senior High Schools by focusing on policy enactment, including participation, communication, supervision, resource support, and consistency, rather than on a single named leadership style. The implication is that principals improve quality not simply by exercising authority, but by designing and implementing policies that make effective teaching and professional learning organizationally possible.

The leadership finding is also compatible with research emphasizing fairness, responsibility, and positive emotional climates. Liu & Hallinger (2024) found that instructional leadership influenced professional learning communities through teacher responsibility and that procedural justice climate conditioned these relationships. Özgenel et al. (2022) similarly demonstrated that organizational justice mediated the relationship between principals' agile leadership and teacher job satisfaction, while Goetz et al. (2024) reported that positive school leadership was associated with more favorable teacher emotions. Although organizational justice and teacher emotion were not directly measured in the present study, these comparisons suggest a plausible interpretation. Policy clarity, participation, equitable access to development, and consistent communication may increase teachers' willingness to invest effort because such practices signal respect, predictability, and institutional support. Future studies should measure justice perceptions directly rather than treating them only as an interpretive lens.

The positive relationships of principal policy practices and Big Five personality with teacher professional development correspond with a substantial body of mediated leadership research. Huang et al. (2020) showed that learning centered leadership and learning opportunities positively predicted teacher professional learning, partly through teacher self-efficacy. Er (2024) found that principal leadership was related to teacher practice through professional learning and teacher beliefs, and Thien & Liu (2024) confirmed that self-efficacy mediated linear and nonlinear relationships between instructional leadership and professional learning. Gümüş et al. (2022) likewise identified teacher professional learning as a mediator between teacher leadership capacity

and self-efficacy. The present study complements these models by adding personality as a parallel antecedent, suggesting that professional development emerges from the interaction between what the school enables and how individual teachers approach novelty, responsibility, collaboration, and professional challenge.

Teacher professional development showed the strongest reported association with perceived educational quality, which is theoretically plausible because professional learning is closer to classroom practice than broad leadership or personality constructs. Agirdag & Muijs (2023) found that a school leadership development program, particularly its professional learning community version, was associated with meaningful gains in school achievement. (Admiraal et al., 2021) and Oppi & Eisenschmidt (2022) similarly demonstrated that shared vision, structured collaboration, leadership support, and sustained professional communities can strengthen teacher learning. The current finding must nevertheless be interpreted alongside less favorable evidence. Dulo (2022) found that the contribution of in service professional development to instructional quality varied across dimensions and was relatively modest for several common activities, while Revina et al. (2023) documented persistent weaknesses in Indonesian professional development caused by fragmented objectives and poor system coherence. Thus, the number of workshops attended should not be equated with professional growth. Quality improvement is more likely when development is sustained, needs based, collaborative, embedded in practice, and followed by implementation support.

The positive association between the Big Five composite and both professional development and perceived educational quality is broadly aligned with Kim et al. (2019) meta-analysis, which linked several personality domains, especially conscientiousness, openness, extraversion, and emotional stability, to teacher effectiveness and lower burnout. Fütterer et al. (2023) further showed that conscientiousness and related motivational resources predicted intentions to participate in technology related professional development, and Ingarianti et al. (2023) linked Big Five dimensions with Indonesian teachers' subjective career success. However, the current use of a single composite score is conceptually restrictive. The five traits may influence professional behavior through different mechanisms. Openness may support experimentation, conscientiousness may sustain preparation and follow through, extraversion and agreeableness may facilitate collaboration, and emotional stability may support persistence under pressure. Analysis of each trait is therefore necessary before drawing conclusions about which personality dimensions are most relevant to madrasah quality.

The provisional indirect effect estimates are consistent with the wider literature in which professional learning functions as a bridge between leadership and teacher outcomes (Cansoy et al., 2025; Dorukbaşı & Cansoy, 2024; P. Liu et al., 2025). The distinctive contribution of the present study lies in integrating principal policy practices and Big Five personality within the same model and positioning teacher professional development as a common pathway from both an organizational antecedent and an individual dispositional antecedent to perceived educational quality. This integration is the study's principal novelty because it shifts the explanation of madrasah quality away from single factor accounts. Nevertheless, novelty should not be confused with statistical confirmation. Because bootstrap confidence intervals were not supplied and the reported total effects exceed 1.00, the mediation claims remain preliminary and must be verified through reanalysis.

The findings have several implications for policy and practice. Madrasah principals should formulate policies that are transparent, participatory, instructionally focused, and accompanied by adequate time, funding, mentoring, peer observation, and follow up support. Professional development should be designed as a continuous school based cycle involving needs diagnosis, collaborative learning, classroom application, feedback, reflection, and evaluation rather than as disconnected event attendance. Differences among teachers should inform differentiated support, such as structured collaboration, multiple participation formats, coaching, and clear implementation plans. However, personality measures should not be used for labeling, exclusion, or punitive personnel decisions. Quality monitoring should also combine teacher perceptions with student learning data, classroom observations, attendance, accreditation evidence, and implementation indicators so that improvement is not inferred from self-report alone.

Several limitations constrain the interpretation of the findings. The cross-sectional design does not establish temporal precedence or causality, and all variables were measured from the same respondents at one time point, increasing the possibility of common method variance and social desirability bias. The sample was limited to 97 teachers in two schools, which restricts generalization and does not permit a reliable assessment of school level variation. Educational quality was measured as a teacher perception rather than as a multidimensional outcome incorporating objective performance indicators. The Big Five was treated as a composite despite the conceptual distinctiveness of its five domains. Instrument sources, item counts, validity evidence, and reliability coefficients were not reported. Most importantly, the indirect effects were not tested with bootstrap confidence intervals, and the reported F and R^2 statistics are internally inconsistent. Future research should employ longitudinal or intervention designs, multisource measures, separate personality trait models, objective quality indicators, and multilevel structural equation modeling across a larger and more diverse sample of madrasahs.

Conclusion

This study indicates that principal policy practices, teachers' Big Five personality, and teacher professional development are positively associated with perceived educational quality in two State Islamic Senior High Schools in Deli Serdang Regency. Principal policy practices and personality were also positively related to professional development, while the reported coefficients positioned professional development as the most proximal correlate of quality. The product-of-coefficients estimates suggest that professional learning may connect both organizational policy and teacher dispositions with educational quality; however, these indirect pathways cannot be regarded as statistically confirmed until bootstrap confidence intervals are reported and the coefficient metric is verified. The study's main contribution is an integrated model in which madrasah quality is understood as the result of interaction between enabling school policies, individual teacher characteristics, and sustained professional learning rather than as the product of a single managerial factor. Practically, madrasah leaders should align transparent and participatory policy implementation with continuous, collaborative, needs-based professional development and should evaluate quality through both perceptual and objective indicators. Given the cross-sectional self-report design, two-school setting, incomplete measurement reporting, and inconsistency in the reported model statistics, the findings should be interpreted as context-specific associative evidence that requires replication and statistical verification before broader causal or policy claims are advanced.

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