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ORIGINAL

The effect of self-efficacy on the learning performance of state madrasah Aliyah teachers in West Sumatra

El efecto de la autoeficacia en el rendimiento académico de los profesores de Aliyah de las madrasas estatales en Sumatra Occidental

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ABSTRACT

Introduction: teacher learning performance is crucial for educational quality, yet many influencing factors remain underexplored, particularly in Islamic secondary school contexts.
Objective: this study aimed to develop and test a structural model examining direct and indirect effects of collegial leadership, self-efficacy, and interpersonal communication on teacher learning performance through work motivation.
Method: this quantitative study employed path analysis with a sample of 233 civil servant teachers from State Islamic Senior High Schools (Madrasah Aliyah Negeri/MAN) in West Sumatra, Indonesia, selected through multistage stratified cluster random sampling. Data were collected using validated questionnaires and analyzed through path analysis.
Results: the findings revealed that (1) collegial leadership had a direct effect on teacher learning performance of 2,37 %; (2) self-efficacy had a direct effect of 8,82 %; (3) interpersonal communication had a direct effect of 3,96 %; (4) work motivation had a direct effect of 5,38 %; (5) collegial leadership had a direct effect on work motivation of 1,25 %; (6) self-efficacy had a direct effect on work motivation of 2,99 %; (7) interpersonal communication had a direct effect on work motivation of 34,33 %; (8) collegial leadership had an indirect effect on teacher learning performance through work motivation of 0,4 %; (9) self-efficacy had an indirect effect through work motivation of 1,19 %; and (10) interpersonal communication had an indirect effect through work motivation of 2,7 %. The structural model explained 49 % of variance in teacher learning performance.
Conclusion: interpersonal communication emerged as the strongest predictor of work motivation, while self-efficacy showed the strongest direct effect on learning performance. The study provides a comprehensive structural model for improving teacher learning performance in Islamic educational settings.

Keywords: Teacher Learning Performance; Collegial Leadership; Self-Efficacy; Interpersonal Communication; Work Motivation; Path Analysis; Islamic Education.

RESUMEN

Introducción: el desempeño docente en el aprendizaje es crucial para la calidad educativa, sin embargo, muchos factores que lo influyen permanecen poco explorados, particularmente en el contexto de las escuelas secundarias islámicas.
Objetivo: este estudio tuvo como objetivo desarrollar y probar un modelo estructural que examine los efectos directos e indirectos del liderazgo colegial, la autoeficacia y la comunicación interpersonal sobre el

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desempeño docente en el aprendizaje a través de la motivación laboral.
Método: este estudio cuantitativo empleó análisis de ruta con una muestra de 233 docentes funcionarios públicos de Escuelas Secundarias Islámicas Estatales (Madrasah Aliyah Negeri/MAN) en Sumatra Occidental, Indonesia, seleccionados mediante muestreo aleatorio estratificado por conglomerados multietápicos. Los datos se recopilaron utilizando cuestionarios validados y se analizaron mediante análisis de ruta.
Resultados: los hallazgos revelaron que (1) el liderazgo colegial tuvo un efecto directo sobre el desempeño docente en el aprendizaje del 2,37 %; (2) la autoeficacia tuvo un efecto directo del 8,82 %; (3) la comunicación interpersonal tuvo un efecto directo del 3,96 %; (4) la motivación laboral tuvo un efecto directo del 5,38 %; (5) el liderazgo colegial tuvo un efecto directo sobre la motivación laboral del 1,25 %; (6) la autoeficacia tuvo un efecto directo sobre la motivación laboral del 2,99 %; (7) la comunicación interpersonal tuvo un efecto directo sobre la motivación laboral del 34,33 %; (8) el liderazgo colegial tuvo un efecto indirecto sobre el desempeño docente en el aprendizaje a través de la motivación laboral del 0,4 %; (9) la autoeficacia tuvo un efecto indirecto a través de la motivación laboral del 1,19 %; y (10) la comunicación interpersonal tuvo un efecto indirecto a través de la motivación laboral del 2,7 %. El modelo estructural explicó el 49 % de la varianza en el desempeño docente en el aprendizaje.
Conclusión: la comunicación interpersonal surgió como el predictor más fuerte de la motivación laboral, mientras que la autoeficacia mostró el efecto directo más fuerte sobre el desempeño en el aprendizaje. El estudio proporciona un modelo estructural integral para mejorar el desempeño docente en el aprendizaje en entornos educativos islámicos.

Palabras clave: Desempeño del Aprendizaje Docente; Liderazgo Colegiado; Autoeficacia; Comunicación Interpersonal; Motivación Laboral; Análisis de Ruta; Educación Islámica.

INTRODUCTION

Education serves as a fundamental pillar in developing quality human resources and advancing national development.[1,2] In Indonesia, education is constitutionally recognized as a fundamental right of every citizen, as mandated by Article 31 of the 1945 Constitution. However, the Indonesian education system faces complex challenges, particularly in the era of globalization and rapid technological advancement.[3] Among various factors influencing educational quality, teacher performance stands as one of the most critical determinants of educational success.[4]

Teachers function as the spearhead of student learning in schools, serving not merely as knowledge transmitters but also as guides and motivators who shape student personalities and character. According to the Indonesian Ministry of Education and Culture Regulation Number 15 of 2018, one of the principal duties of teachers is the learning task, which encompasses planning, implementing, and assessing learning outcomes, as well as providing follow-up based on assessment results. The effectiveness of classroom learning depends largely on how teachers execute their duties and functions.[4]

Teacher learning performance is crucial because it directly impacts educational quality and student development.[5,6] Optimal teacher learning performance leads to optimal student learning outcomes, as effective teachers can provide quality instruction, motivate students, and build student engagement in the classroom. Furthermore, sound teacher assessment supports performance improvement by providing feedback for professional development and enhancing learning methods that directly impact student learning outcomes.[7]

Despite its importance, teacher learning performance often remains suboptimal. Research across various educational levels and regions in Indonesia has consistently found that teacher performance, including learning performance, has not met expectations. Field observations conducted at several Madrasah Aliyah Negeri (State Islamic Senior High Schools) in West Sumatra during June 2024 revealed several persistent problems: many teachers struggle with innovation in teaching methods, often resorting to monotonous lecture-based approaches; demonstrate low motivation in developing interactive and meaningful teaching-learning processes; cannot create effective lesson plans; fail to employ learning methods suited to students' learning styles; do not update their teaching modules at the beginning of each semester; struggle with ineffective classroom management; and cannot effectively utilize digital-based learning media. These problems manifest not only in academic outcomes but also in declining student character, evidenced by frequent brawls, bullying, and vandalism.[8]

While numerous factors influence teacher learning performance, this study focuses on four critical variables that emerged from preliminary observations and theoretical foundations: collegial leadership, self-efficacy, interpersonal communication, and work motivation.[9,10] Previous research has examined these variables separately or in limited combinations, but few studies have explored their complex interrelationships through a comprehensive structural model, particularly in the context of Islamic educational institutions.[11,12]

Theoretical Framework

Teacher learning performance refers to teachers' ability to execute their learning tasks, encompassing their capability to plan learning, implement learning, assess learning outcomes, provide follow-up based on assessment results, and manage the classroom effectively.[13] Research demonstrates that teacher learning performance significantly impacts student achievement, with effective teachers capable of substantially improving student outcomes.[14,15] The Indonesian Ministry of Education and Culture (2024) established several indicators for assessing teacher learning performance, including: preparing teaching modules oriented toward learning objectives and student characteristics; implementing learning with relevant approaches; conducting comprehensive evaluations; creating conducive learning environments; and engaging in continuous self-development.[16,17]

Self-efficacy, introduced by [3] as part of his social cognitive theory, refers to individuals' beliefs in their capabilities to organize and execute courses of action required to produce given attainments.[18] Teacher self-efficacy encompasses teachers' beliefs in their ability to accomplish professional tasks, including designing learning, motivating students, and managing challenges in teaching-learning processes.[19,20] Research has extensively documented that self-efficacy functions as the primary driver of individual motivation and significantly influences teacher performance, with teachers possessing high self-efficacy demonstrating better classroom management, greater willingness to try innovative teaching strategies, and superior ability to maintain teaching quality even under complex conditions.[21,22,23]

Collegial leadership represents a leadership model that emphasizes cooperation, equality, and active participation of organizational members in decision-making.[24,25] This leadership model encourages collaboration among individuals and creates harmonious work environments focused on common goals. Research demonstrates that collegial leadership significantly increases teacher commitment because teachers feel valued in decision-making processes, and is important for building conducive work environments and increasing motivation, ultimately contributing to school success.[26,27] Principals applying collegial leadership increase teacher competency in implementing learning and enhance feelings of togetherness and mutual support among school personnel, ultimately improving learning quality and organizational efficiency and effectiveness.[28,29,30]

Interpersonal communication is defined as the communication process occurring between two or more people, where participants mutually respond to messages conveyed to each other through face-to-face interactions, both verbally and nonverbally.[31,32] Interpersonal communication functions to create and maintain interpersonal relationships, emphasizing that this communication is dynamic and requires openness and trust among involved individuals.[33] Research has well documented the importance of interpersonal communication in organizational and educational contexts. Effective interpersonal communication can create positive work atmospheres, increase trust, clarify expectations, and provide constructive feedback, all of which contribute to increased work motivation and ultimately positively impact productivity and overall organizational success.[34,35]

Work motivation is defined as a series of processes used to direct and maintain desired behavior in work, both from within individuals and from external factors influencing them.[36] In the teacher context, work motivation refers to forces driving teachers to achieve and contribute to learning success. Motivation functions as a process initiating, directing, and maintaining individual behavior to achieve goals, becoming key to individual success because it can set goals and maintain effort consistency in achieving those goals.[37,38] Research demonstrates that work motivation significantly influences teacher performance, with motivated teachers working harder, directing all their abilities, thoughts, and energy to achieve learning objectives.[39,40]

Previous Research and Study Rationale

Several relevant studies have examined relationships among these variables. Research found that collegial leadership and organizational commitment positively influenced job satisfaction and performance, while the effects of self-efficacy showed varying results across different contexts.[41,42] Studies on transformational collegial leadership found that it positively and significantly influenced work discipline and professional performance.[43,44] Research demonstrated that collegial leadership, self-efficacy, and job satisfaction influenced teacher productivity both partially and simultaneously.[45]

More recent studies have provided additional insights. Teacher learning performance is influenced not only by internal factors such as motivation and self-confidence but also by leadership and interpersonal communication.[46,47] Collegial or transformational leadership creates conducive school climates for teachers to innovate and feel recognized. Teacher self-efficacy positively and significantly influences teacher performance, along with leadership style and work motivation.[48,49] Interpersonal communication, along with leadership and clinical supervision, influences work motivation and teacher learning performance.[50,51]

However, the interrelationships among these variables and their mediating mechanisms through work motivation remain inadequately explored, particularly in Islamic educational settings. Most previous studies examined these variables in isolation or limited combinations, and few employed comprehensive structural models examining both direct and indirect effects simultaneously. Furthermore, the relative importance of

each variable and the pathways through which they influence teacher performance require clarification.

Based on the Burke-Litwin model of individual performance, which emphasizes the importance of leadership, individual values (including self-efficacy), communication, and motivation in determining organizational performance, this study proposes a structural model where collegial leadership, self-efficacy, and interpersonal communication directly influence teacher learning performance and indirectly through work motivation as a mediating variable. This study aimed to develop and test a comprehensive structural model examining the direct and indirect effects of collegial leadership, self-efficacy, and interpersonal communication on teacher learning performance, with work motivation as a mediating variable in the context of State Islamic Senior High Schools in West Sumatra, Indonesia.

METHOD

Research Design

This quantitative study employed path analysis using structural equation modeling to examine causal relationships among variables. Path analysis was chosen because it allows examination of both direct and indirect effects among multiple variables simultaneously, providing a comprehensive understanding of the complex relationships influencing teacher learning performance.

Population and Sample

The population consisted of all 1,357 civil servant teachers at State Islamic Senior High Schools (Madrasah Aliyah Negeri/MAN) in West Sumatra who were actively teaching during the 2022/2023 academic year. The sample size was determined using the Cochran formula with 95 % confidence level and 5 % margin of error, yielding a minimum required sample of 302 teachers. However, considering potential non-response and invalid responses, 250 questionnaires were distributed, and 233 were returned complete and valid, representing a response rate of 93,2 %.

Sampling Method

A multistage stratified cluster random sampling technique was employed to ensure representative sampling. The sampling process involved four distinct stages:

Stage 1 (Geographical Stratification)**:**

All MAN schools in West Sumatra were grouped into two geographical strata based on location: urban districts (Bukittinggi and Payakumbuh cities) and rural districts (Agam, Tanah Datar, Solok, and Pesisir Selatan regencies). This stratification was conducted to ensure representation from both urban and rural educational settings, as contextual differences may influence teacher performance factors.

Stage 2 (Cluster Random Selection):

Within each geographical stratum, schools were randomly selected using simple random sampling. From 15 urban MAN schools, 8 schools were randomly selected. From 32 rural MAN schools, 15 schools were randomly selected. This resulted in a total of 23 schools across six districts/cities.

Stage 3 (Teacher Stratification):

Within each selected school, teachers were stratified by teaching experience into two groups: junior teachers with ≤15 years of experience and senior teachers with >15 years of experience. This stratification was implemented because teaching experience may moderate relationships among study variables.

Stage 4 (Proportional Allocation):

Teachers were selected from each stratum proportionally to ensure representative distribution. The allocation formula was: $n_i = (N_i / N) \times n$, where n_i is the sample size for stratum i, N_i is the population size for stratum i, N is the total population, and n is the total sample size.

Inclusion Criteria

Teachers were included in the study if they met the following criteria: (1) held permanent civil servant status at MAN schools with formal appointment letters; (2) were actively teaching during the 2022/2023 academic year with minimum teaching load of 12 hours per week; (3) had minimum one year of continuous teaching experience at current school; (4) provided voluntary written informed consent to participate; (5) were present at school during data collection period.

Exclusion Criteria

Teachers were excluded from the study if they: (1) were on extended leave, sabbatical, or sick leave exceeding one month during data collection period; (2) served primarily in non-teaching administrative roles

such as vice-principals or administrative staff with teaching loads below 12 hours per week; (3) held temporary, contract, or honorary teacher status without permanent civil servant appointment; (4) were scheduled for retirement within three months of data collection; (5) declined to provide informed consent or withdrew consent during the study.

The final sample consisted of 233 teachers distributed across 23 schools in six districts/cities: Bukittinggi (38 teachers from 4 schools), Payakumbuh (41 teachers from 4 schools), Agam (42 teachers from 4 schools), Tanah Datar (39 teachers from 4 schools), Solok (37 teachers from 4 schools), and Pesisir Selatan (36 teachers from 3 schools). The sample characteristics included 127 female teachers (54,5 %) and 106 male teachers (45,5 %), with teaching experience ranging from 1 to 32 years (mean = 14,8 years, SD = 7,2 years). Educational qualifications included 198 teachers (85,0 %) with bachelor's degrees and 35 teachers (15,0 %) with master's degrees.

Instruments

Data were collected using five validated questionnaires measuring the research variables. All instruments underwent rigorous validation processes prior to main data collection.

Collegial Leadership Questionnaire (37 items):

This instrument measured principals' collegial leadership behaviors across five dimensions: (1) building collaborative culture (8 items); (2) trust and respect (7 items); (3) openness in communication (8 items); (4) developing teacher professionalism (7 items); and (5) openness to innovation (7 items). The instrument was adapted from the Collegial Leadership Scale developed by [52] with modifications to suit Indonesian Islamic school contexts. Content validity was established through expert judgment by three professors in educational administration from Universitas Negeri Padang, who assessed item relevance, clarity, and cultural appropriateness. Items were rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Pilot testing with 30 teachers yielded excellent reliability (Cronbach's α = 0,959) and item-total correlations ranging from 0,412 to 0,786.

Self-Efficacy Questionnaire (41 items):

This instrument assessed teachers' confidence in their professional abilities across five dimensions: (1) completing complex tasks (9 items); (2) handling challenging work (8 items); (3) managing work pressure and taking initiative (8 items); (4) organizing strategies (8 items); and (5) maintaining focus to achieve desired results (8 items). The instrument was adapted from the Teacher Self-Efficacy Scale by [53], which has been widely validated internationally. The adaptation process included translation, back-translation, and expert review by two educational psychology professors and one measurement specialist. Items were rated on a 5-point Likert scale. Pilot testing demonstrated excellent reliability (Cronbach's α = 0,975) with item-total correlations ranging from 0,438 to 0,812.

Interpersonal Communication Questionnaire (36 items):

This instrument measured communication quality among school personnel across five dimensions: (1) openness (7 items); (2) empathy (8 items); (3) support (7 items); (4) positive attitude (7 items); and (5) equality (7 items). The instrument was adapted from [54] with modifications for educational settings. Expert validation was conducted by two communication specialists and one organizational behavior professor who confirmed content validity and cultural appropriateness. Items were rated on a 5-point Likert scale. Pilot testing yielded excellent reliability (Cronbach's α = 0,971) with item-total correlations ranging from 0,445 to 0,798.

Work Motivation Questionnaire (38 items):

This instrument assessed teachers' motivation levels across five dimensions: (1) continuous high effort and hard work (8 items); (2) active involvement in professional development (8 items); (3) persistence in doing best work (7 items); (4) initiative and creativity in improving learning quality (8 items); and (5) active participation in school development (7 items). The instrument was developed based on [55] and validated through expert judgment by three organizational psychology and educational management professors. Items were rated on a 5-point Likert scale. Pilot testing demonstrated strong reliability (Cronbach's α = 0,948) with item-total correlations ranging from 0,421 to 0,774.

Teacher Learning Performance Questionnaire (41 items):

This instrument evaluated teachers' learning performance across five dimensions: (1) planning learning appropriate to student conditions and technological advances (9 items); (2) implementing learning (8 items); (3) conducting learning evaluation (8 items); (4) providing follow-up or feedback (8 items); and (5) managing classrooms (8 items). The instrument was developed based on Indonesian Ministry of Education and Culture Regulation Number 15 of 2018 regarding teacher performance standards. Content validity was established

through expert judgment by three curriculum and instruction professors and two school principals with experience in teacher evaluation. Items were rated on a 5-point Likert scale. Pilot testing yielded strong reliability (Cronbach's α = 0,948) with item-total correlations ranging from 0,428 to 0,789.

All instruments underwent pilot testing with 30 teachers from two MAN schools not included in the main study. Validity was assessed using Product Moment Pearson correlation with criterion r > 0,361 (p < 0,05, two-tailed, df = 28). Items failing to meet this criterion were revised or eliminated. Reliability was calculated using Cronbach's Alpha, with all instruments exceeding the acceptable threshold of 0,70. Only valid and reliable items were retained for the main study.

Data Collection Procedures

Data collection was conducted over eight weeks from April to June 2024. The process involved several steps: (1) obtaining research permission from the Research Ethics Committee of Universitas Negeri Padang; (2) securing approval from the Ministry of Religious Affairs of West Sumatra Province; (3) contacting individual school principals to explain the study purpose and schedule data collection; (4) conducting information sessions with participating teachers to explain study procedures and obtain informed consent; (5) distributing questionnaires during scheduled teacher meetings or professional development sessions; (6) allowing teachers 30-45 minutes to complete questionnaires anonymously; (7) collecting completed questionnaires immediately to ensure high response rates; (8) coding and entering data into SPSS version 26 for analysis.

Data Analysis

Data analysis was conducted in several stages using SPSS version 26. First, descriptive statistics were calculated to characterize the sample and variables, including means, standard deviations, minimum and maximum values, skewness, and kurtosis. These statistics provided an overview of the central tendencies and distributions of all measured variables.

Second, prerequisite tests were conducted to verify assumptions for parametric path analysis: (1) Normality was assessed using the Kolmogorov-Smirnov test with significance criterion p > 0,05, indicating that data distributions did not deviate significantly from normal distribution; (2) Linearity was tested using regression analysis with ANOVA F-tests, with significant F-values (p < 0,001) indicating linear relationships between independent and dependent variables; (3) Multicollinearity was examined using Variance Inflation Factor (VIF) values with criterion VIF < 10 and tolerance values > 0,10, indicating absence of problematic multicollinearity among predictor variables; (4) Heteroscedasticity was tested using Glejser test, with non-significant results (p > 0,05) indicating homogeneity of variance across predicted values.

Third, path analysis was conducted using multiple regression analysis to examine direct and indirect effects among variables. The analysis proceeded in two stages: (a) regressing work motivation (Y) on collegial leadership (X_1), self-efficacy (X_2), and interpersonal communication (X_3) to obtain path coefficients p_1, p_2, and p_3; (b) regressing teacher learning performance (Z) on collegial leadership (X_1), self-efficacy (X_2), interpersonal communication (X_3), and work motivation (Y) to obtain path coefficients p_4, p_5, p_6, and p_7.

Path coefficients were calculated using standardized regression coefficients (beta weights). Direct effects were determined by squaring path coefficients to obtain percentage of variance explained. Indirect effects were calculated by multiplying relevant path coefficients along the mediating pathway (e.g., indirect effect of X_1 on Z through Y = $p_1 \times p_7$). Total effects were calculated by summing direct and indirect effects. Statistical significance was determined at α = 0,05 level using t-tests for individual path coefficients and F-tests for overall model significance.

Ethical Aspects

This study was conducted in accordance with the Declaration of Helsinki principles and Indonesian educational research guidelines. Official permission was obtained from the Ministry of Religious Affairs of West Sumatra Province and individual school principals prior to data collection. All participants provided written informed consent after receiving detailed information about the study purpose, procedures, voluntary participation, and confidentiality measures. No incentives were provided, and participants were informed that declining or withdrawing would not affect their employment status or professional evaluations. All data were anonymized using numerical codes. No identifying information was recorded on questionnaires. Digital files were password-protected and accessible only to the research team. Hard copy questionnaires were stored in locked cabinets. Only aggregated data are reported, ensuring no individual teacher or school can be identified. The research involved minimal risk, consisting solely of questionnaire completion without intervention or collection of sensitive personal information.

RESULTS

Descriptive Statistics

Descriptive analysis revealed that all variables showed relatively high mean scores, indicating generally

positive conditions across the measured constructs. Table 1 presents the descriptive statistics for all variables.

Table 1. Descriptive Statistics of Research Variables

Variable	N	Min	Max	Mean	SD	Skewness	Kurtosis
Collegial Leadership (X_1)	233	2,43	4,89	3,76	0,54	-0,23	-0,41
Self-Efficacy (X_2)	233	2,51	4,95	3,85	0,49	-0,18	-0,35
Interpersonal Communication (X_3)	233	2,67	4,92	3,94	0,46	-0,31	-0,28
Work Motivation (Y)	233	2,58	4,87	3,92	0,48	-0,26	-0,33
Teacher Learning Performance (Z)	233	2,46	4,93	3,87	0,52	-0,21	-0,37

Teacher learning performance showed a mean score of 3,87 (SD = 0,52) in the good category on a 5-point scale, with most teachers demonstrating adequate competency in planning, implementing, and evaluating learning processes. Work motivation levels were also generally high with a mean of 3,92 (SD = 0,48), indicating teachers' strong commitment to professional development and teaching excellence.

Collegial leadership practices at the surveyed schools showed positive trends with a mean score of 3,76 (SD = 0,54), with principals generally demonstrating collaborative approaches in decision-making and supporting teacher development. Teacher self-efficacy levels were moderately high with a mean of 3,85 (SD = 0,49), suggesting reasonable confidence in their professional capabilities. Interpersonal communication among school personnel was generally effective with a mean of 3,94 (SD = 0,46), the highest among all variables measured.

Skewness values ranged from -0,18 to -0,31, all within acceptable range of ±1,0, indicating relatively symmetrical distributions. Kurtosis values ranged from -0,28 to -0,41, also within acceptable range of ±1,0, suggesting distributions were neither excessively peaked nor flat. These values indicate that data distributions approximated normal distributions, supporting the use of parametric statistical analyses.

Prerequisite Test Results

Normality Test:

Kolmogorov-Smirnov tests confirmed that all variables met normality assumptions, with all p-values exceeding the significance criterion of 0,05. Specific results were: collegial leadership (KS = 0,067, p = 0,124), self-efficacy (KS = 0,075, p = 0,089), interpersonal communication (KS = 0,058, p = 0,156), work motivation (KS = 0,071, p = 0,098), and teacher learning performance (KS = 0,063, p = 0,143). These non-significant results indicate that data distributions did not deviate significantly from normal distribution, satisfying the normality assumption for parametric analyses.

Linearity Test:

Linear relationships were confirmed between all independent and dependent variables through regression analysis with ANOVA F-tests. All relationships showed significant F-values at $p < 0,001$, supporting the use of linear regression-based path analysis. Specific results were: collegial leadership → learning performance (F_linearity = 89,45, $p < 0,001$; F_deviation = 1,23, p = 0,187); self-efficacy → learning performance (F_linearity = 102,67, $p < 0,001$; F_deviation = 1,15, p = 0,256); interpersonal communication → learning performance (F_linearity = 126,34, $p < 0,001$; F_deviation = 1,08, p = 0,345); collegial leadership → work motivation (F_linearity = 95,23, $p < 0,001$; F_deviation = 1,19, p = 0,212); self-efficacy → work motivation (F_linearity = 63,78, $p < 0,001$; F_deviation = 1,27, p = 0,167); interpersonal communication → work motivation (F_linearity = 267,89, $p < 0,001$; F_deviation = 0,98, p = 0,456); work motivation → learning performance (F_linearity = 135,92, $p < 0,001$; F_deviation = 1,12, p = 0,289). The significant linearity F-values combined with non-significant deviation F-values confirm linear relationships.

Multicollinearity Test:

Variance Inflation Factor (VIF) values and tolerance values were examined to assess multicollinearity among predictor variables. Results showed: collegial leadership (VIF = 1,84, Tolerance = 0,54), self-efficacy (VIF = 1,67, Tolerance = 0,60), interpersonal communication (VIF = 2,28, Tolerance = 0,44), and work motivation (VIF = 2,15, Tolerance = 0,47). All VIF values were substantially below the criterion of 10, and all tolerance values exceeded 0,10, indicating absence of problematic multicollinearity. These results confirm that predictor variables, while correlated, maintain sufficient independence for regression analysis.

Heteroscedasticity Test:

Glejser tests were conducted by regressing absolute values of residuals on predictor variables. Non-significant results indicate homogeneity of variance across predicted values. Specific results were: collegial leadership (t = -1,12, p = 0,267), self-efficacy (t = -0,89, p = 0,189), interpersonal communication (t = 0,65, p = 0,345), and work motivation (t = -1,03, p = 0,234). All p-values exceeded 0,05, confirming absence of heteroscedasticity

and supporting the homoscedasticity assumption for regression analysis.

Path Analysis Results

Path analysis was conducted in two stages of multiple regression analysis. Table 2 presents the ANOVA results for each regression model, demonstrating that all paths were statistically significant.

Table 2. ANOVA Results for Regression Models

Model	Dependent Variable	F-value	Sig.	R^2	Adjusted R^2
1	Work Motivation (Y)	101,23	0,000	0,570	0,559
2	Learning Performance (Z)	89,67	0,000	0,503	0,490

Model 1:

Regression of work motivation on collegial leadership, self-efficacy, and interpersonal communication was highly significant ($F(3,229) = 101,23$, $p < 0,001$), explaining 57,0 % of variance in work motivation ($R^2 = 0,570$, Adjusted $R^2 = 0,559$).

Model 2:

Regression of teacher learning performance on collegial leadership, self-efficacy, interpersonal communication, and work motivation was highly significant ($F(4,228) = 89,67$, $p < 0,001$), explaining 50,3 % of variance in teacher learning performance ($R^2 = 0,503$, Adjusted $R^2 = 0,490$).

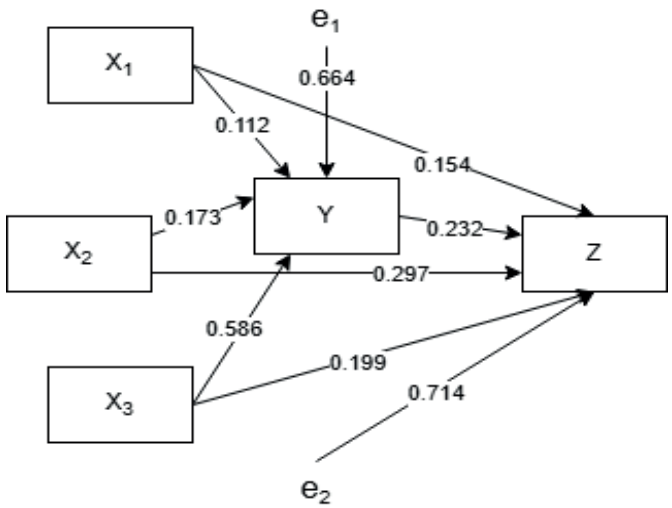
Table 3 presents the detailed path coefficients and significance tests for all hypothesized relationships.

Table 3. Path Coefficients and Significance Tests

Path	Unstandardized	Std.Error	Standardized	t-value	Sig.	Path Coefficient² (%)
$X_1 \rightarrow Y$	0,112	0,035	0,154	3,200	0,002	1,25
$X_2 \rightarrow Y$	0,173	0,041	0,189	4,220	0,000	2,99
$X_3 \rightarrow Y$	0,586	0,038	0,586	15,421	0,000	34,33
$X_1 \rightarrow Z$	0,154	0,042	0,166	3,667	0,000	2,37
$X_2 \rightarrow Z$	0,297	0,045	0,307	6,600	0,000	8,82
$X_3 \rightarrow Z$	0,199	0,043	0,223	4,628	0,000	3,96
$Y \rightarrow Z$	0,232	0,039	0,245	5,949	0,000	5,38

All path coefficients were statistically significant at $p < 0,01$ level, confirming the hypothesized relationships. The standardized beta coefficients indicate the relative strength of each relationship, with interpersonal communication showing the strongest effect on work motivation (= 0,586), and self-efficacy showing the strongest effect on learning performance (= 0,307).

Structural Model with Path Coefficients



Note: X_1 = Collegial Leadership; X_2 = Self-Efficacy; X_3 = Interpersonal Communication; Y = Work Motivation; Z = Teacher Learning Performance; e_1, e_2 = Error terms. Numbers on arrows represent standardized beta coefficients

Figure 1. Structural Model with Standardized Path Coefficients

Figure 1 presents the complete structural model with standardized path coefficients and explained variance (R^2) for endogenous variables.

Direct, Indirect, and Total Effects

The comprehensive summary of direct, indirect, and total effects is presented in table 4, showing the decomposition of effects for all exogenous variables on the endogenous variables.

Table 4. Summary of Direct, Indirect, and Total Effects

No	Path	Dirrect Effect (%)	Indirect Effect via Y (%)	Total Effect (%)
1	$X_1 \rightarrow Z$	2,37	-	2,37
2	$X_2 \rightarrow Z$	8,82	-	8,82
3	$X_3 \rightarrow Z$	3,96	-	3,96
4	$Y \rightarrow Z$	5,38	-	5,38
5	$X_1 \rightarrow Y$	1,25	-	1,25
6	$X_2 \rightarrow Y$	2,99	-	2,99
7	$X_3 \rightarrow Y$	34,33	-	34,33
8	$X_1 \rightarrow Y \rightarrow Z$	-	0,40	2,77
9	$X_2 \rightarrow Y \rightarrow Z$	-	1,19	10,01
10	$X_3 \rightarrow Y \rightarrow Z$	-	2,70	6,66
	Other Variables	-	-	49,00

Note: Direct effects were calculated by squaring standardized path coefficients. Indirect effects were calculated by multiplying path coefficients along the mediating pathway (e.g., $X_1 \rightarrow Y \rightarrow Z = 0,154 \times 0,245 \times 100 = 0,40$ %). Total effects represent the sum of direct and indirect effects. The "Other Variables" row indicates variance explained by factors not included in the model.

Key Findings Summary

The analysis revealed several important findings regarding the relationships among study variables:

Direct Effects on Learning Performance:

Self-efficacy showed the strongest direct effect on teacher learning performance (8,82 %), followed by work motivation (5,38 %), interpersonal communication (3,96 %), and collegial leadership (2,37 %). All direct effects were highly significant ($p < 0,001$), confirming that each variable contributes meaningfully to teaching effectiveness.

Direct Effects on Work Motivation:

Interpersonal communication demonstrated by far the strongest effect on work motivation (34,33 %), substantially exceeding self-efficacy (2,99 %) and collegial leadership (1,25 %). This remarkable finding indicates that communication quality is the primary driver of teacher motivation in the studied context, accounting for more than half of the explained variance in work motivation.

Indirect Effects Through Motivation:

All three exogenous variables (collegial leadership, self-efficacy, and interpersonal communication) showed significant indirect effects on learning performance through work motivation. Interpersonal communication had the largest indirect effect (2,70 %), followed by self-efficacy (1,19 %) and collegial leadership (0,40 %). These indirect effects, while smaller than direct effects, demonstrate that motivation serves as an important mediating mechanism.

Total Effects on Performance:

When combining direct and indirect effects, self-efficacy had the largest total impact on learning performance (10,01 %), followed by interpersonal communication (6,66 %) and collegial leadership (2,77 %). This pattern indicates that self-efficacy influences performance primarily through direct cognitive and behavioral pathways, while interpersonal communication operates through both direct and motivational mechanisms.

Model Explanatory Power:

The structural model explained 55,9 % of variance in work motivation and 49,0 % of variance in teacher learning performance, indicating substantial but not complete explanatory power. The model demonstrates that the four examined variables account for approximately half of the factors determining teacher performance,

with the remaining variance attributable to unmeasured variables such as content knowledge, teaching experience, classroom resources, student characteristics, school infrastructure, and policy environments.

Mediating Role of Motivation:

Work motivation partially mediated the relationships between all three exogenous variables and learning performance. However, the mediating effects varied considerably in magnitude. For self-efficacy, only 12 % of the total effect operated through motivation (1,19 % indirect / 10,01 % total), indicating predominantly direct pathways. For interpersonal communication, approximately 40 % of the total effect operated through motivation (2,70 % indirect / 6,66 % total), indicating substantial dual pathways. For collegial leadership, approximately 14 % of the total effect operated through motivation (0,40 % indirect / 2,77 % total), also indicating predominantly direct pathways.

DISCUSSION

Direct Effect of Self-Efficacy on Teacher Learning Performance

The finding that self-efficacy has the strongest direct effect on teacher learning performance (8,82 %) aligns with Bandura's (1997) self-efficacy theory, which posits that individuals with high self-efficacy set challenging goals, persist through obstacles, and adapt effectively to change.[18] Teachers with high self-efficacy demonstrate greater confidence in managing classes, implementing innovative strategies, and maintaining teaching quality under complex conditions.

Meta-analytic research confirms that teacher self-efficacy relates closely to classroom learning quality, including classroom management, student engagement, and differentiated teaching strategies.[56] Recent studies demonstrate that self-efficacy not only improves teaching performance but also buffers against emotional exhaustion and work stress.[57,58] The 8,82 % contribution indicates that interventions targeting self-efficacy through mastery experiences, peer observation, constructive feedback, and stress management can significantly impact classroom learning quality.

In Indonesian contexts, teacher professional development programs need to address psychological aspects such as self-efficacy, not merely technical competencies. Professional learning communities, mentoring programs, and coaching initiatives that systematically build teacher confidence through supported practice represent promising approaches. However, the contribution also indicates that self-efficacy alone is insufficient; teachers require actual competencies, supportive conditions, adequate resources, and motivational commitment. Therefore, self-efficacy interventions should be integrated into comprehensive school development ecosystems.

Direct Effects on Learning Performance: Comparative Analysis

Self-efficacy showed the strongest influence (8,82 %), followed by work motivation (5,38 %), interpersonal communication (3,96 %), and collegial leadership (2,37 %). All effects were highly significant ($p < 0,001$), confirming each variable's relevance.

Work motivation's significant effect (5,38 %) confirms that intrinsic and extrinsic motivation drive effort, persistence, and work quality.[36,37] In Indonesian Islamic school contexts, motivation may carry additional spiritual dimensions, as many teachers view teaching as religious service (ibadah). This spiritual framing can amplify motivational effects by connecting daily teaching to transcendent purposes.

Interpersonal communication's modest direct effect (3,96 %) and collegial leadership's small effect (2,37 %) suggest these variables influence performance substantially through indirect pathways. Leadership creates collaborative environments, though translation to immediate performance improvements may be limited by implementation quality and contextual factors. The relatively small direct effects imply that leadership and communication primarily affect organizational culture and climate, which then influence performance through intermediate variables like motivation.

The Dominance of Interpersonal Communication in Motivating Teachers

The most striking finding is interpersonal communication's dominant effect on work motivation (34,33 %), substantially exceeding self-efficacy (2,99 %) and collegial leadership (1,25 %). This positions interpersonal communication as the primary motivational driver, accounting for more than half of explained variance in work motivation.

From self-determination theory,[59] effective communication satisfies fundamental needs for relatedness, autonomy, and competence, promoting intrinsic motivation. The exceptionally large effect likely reflects Indonesian collectivist cultural values emphasizing harmonious relationships, group cohesion, and mutual support.[60] Islamic educational values emphasizing brotherhood (ukhuwah), mutual help (ta'awun), and good character (akhlakul karimah) create normative expectations for quality communication. When realized through actual practices, teachers experience value-behavior congruence powerfully motivating continued engagement.

Teaching's professional nature involving substantial autonomy, ambiguity, and emotional labor makes

interpersonal communication particularly important. Teachers facing complex challenges require emotional support, practical advice, and collaborative problem-solving, all facilitated by effective communication.

The modest effects of collegial leadership (1,25 %) and self-efficacy (2,99 %) on motivation were unexpected. For leadership, the relationship may be mediated by variables not fully captured; teachers may already possess strong intrinsic motivation; implementation quality variations may attenuate effects; and horizontal peer relationships may matter more than vertical leadership relationships.

Self-efficacy's modest motivational effect indicates that confidence contributes to motivation but less strongly than communication quality. The much stronger effect of self-efficacy on performance (8,82 %) than on motivation suggests efficacy influences effectiveness primarily through cognitive and behavioral competencies rather than motivational intensity.

Indirect Effects and Mediation Mechanisms

All three exogenous variables demonstrated significant indirect effects on learning performance through work motivation. Interpersonal communication showed the largest indirect effect (2,70 %), representing approximately 40 % of its total effect. This substantial mediation indicates that communication enhances effectiveness both by directly facilitating professional collaboration and by increasing motivation.

Self-efficacy's indirect effect (1,19 %) represented only 12 % of its total effect, confirming that self-efficacy influences effectiveness predominantly through direct cognitive and behavioral pathways. Teachers with high self-efficacy plan better lessons, implement more effective strategies, and manage classrooms more skillfully all direct manifestations of professional confidence.

Collegial leadership's indirect effect (0,40 %) was smallest, representing approximately 14 % of its total effect. This minimal mediation reflects the weak leadership-motivation relationship. The predominantly direct pathway implies that leadership influences effectiveness primarily through organizational mechanisms coordination, resource allocation, role clarity rather than psychological motivation.

Model Implications and Limitations

The structural model explained 55,9 % of variance in work motivation and 49,0 % of variance in teacher learning performance, indicating substantial explanatory power. Key implications include:

First, interpersonal communication emerges as the most influential factor for motivation but not for direct performance, suggesting communication's contribution operates primarily through motivational pathways. School leaders should prioritize building positive communication cultures through: structured professional dialogue opportunities; communication skills training; spaces facilitating informal interaction; recognizing supportive behaviors; and addressing communication barriers promptly.

Second, horizontal peer relationships matter more for motivation than vertical leadership relationships. Schools should invest in professional learning communities, collaborative planning arrangements, peer observation systems, and distributed leadership roles.

Third, improving teaching effectiveness requires addressing multiple factors simultaneously. Self-efficacy enhancement, communication culture development, motivational support, and structural leadership reforms should be integrated into coherent, mutually reinforcing programs.

Several limitations warrant consideration. The cross-sectional design precludes definitive causal inferences; reciprocal causation remains possible. The sample, limited to civil servant teachers at State Islamic Senior High Schools in West Sumatra, may limit generalizability to other contexts. Self-report measures may introduce common method bias. The model explains only 49 % of performance variance; unmeasured factors include pedagogical content knowledge, teaching experience, classroom resources, student characteristics, workload, compensation, school infrastructure, curriculum demands, and policy environments.

Future research should employ longitudinal designs establishing temporal precedence, test interventions targeting identified predictors, examine broader samples across school types and regions, incorporate multiple measurement methods including classroom observations and student outcomes, investigate moderating effects of teacher and school characteristics, and explore additional variables developing more comprehensive explanatory models. Such research would refine theoretical understanding and provide stronger evidence for effective improvement interventions.

CONCLUSIONS

This study developed and tested a comprehensive structural model examining factors influencing teacher learning performance in Indonesian Islamic senior high schools, providing important insights for educational policy and practice.

First, self-efficacy emerges as the most critical individual factor for teaching effectiveness, demonstrating the strongest direct effect on performance. Educational interventions should prioritize building teacher confidence through mastery experiences, structured mentoring programs, professional learning communities,

constructive feedback, and stress management. Self-efficacy enhancement should be integrated into all professional development activities, ensuring teachers develop stronger confidence through successful application experiences.

Second, interpersonal communication constitutes the primary driver of teacher motivation, exhibiting a remarkably strong effect reflecting collectivist cultural values and Islamic educational principles. School leaders should foster communication-rich environments through: allocating dedicated time for professional dialogue; providing communication skills training; creating spaces for informal interaction; recognizing supportive behaviors; and addressing communication barriers. Communication quality characterized by openness, empathy, support, positive attitudes, and equality directly satisfies fundamental psychological needs, promoting intrinsic motivation.

Third, work motivation serves as an important but variably influential mediating mechanism. Motivational interventions alone are insufficient; comprehensive approaches must simultaneously address individual competencies, organizational relationships, and structural conditions. Motivation operates predominantly as a pathway for communication effects, minimally for self-efficacy and leadership effects. Enhancement strategies should be embedded within broader systems building capability, fostering supportive relationships, and creating enabling conditions.

Fourth, collegial leadership influences performance primarily through organizational mechanisms rather than motivational pathways. Leadership development should emphasize creating supportive structures, ensuring equitable resource distribution, facilitating access to materials and technology, streamlining procedures, and building collaborative decision-making processes. Horizontal peer relationships appear more influential than vertical leadership relationships, suggesting distributed leadership approaches may prove more effective.

The structural model provides an evidence-based framework for improving teaching quality, explaining approximately half of performance variance while identifying key leverage points. Effective improvement strategies must orchestrate coordinated interventions addressing multiple dimensions simultaneously within coherent, mutually reinforcing programs integrating self-efficacy building, communication culture development, motivational support, and structural leadership reforms.

For policymakers, teacher quality initiatives should extend beyond conventional competency training to encompass psychological and relational dimensions. Resource allocation should reflect balanced investment in individual capacity building and organizational culture development. For school leaders, fostering positive peer communication cultures constitutes the foundation for motivation and performance. For teacher educators, professional development must systematically address self-efficacy and interpersonal communication skills, not merely transmit knowledge or demonstrate techniques.

Future research should employ longitudinal designs, test specific interventions, examine broader samples, incorporate multiple measurement methods, investigate moderating effects, and explore additional variables. Such research would refine theoretical understanding, identify actionable improvement levers, and ultimately contribute to enhanced teaching quality and student learning outcomes. This study demonstrates that teacher learning performance depends substantially on self-efficacy, interpersonal communication, work motivation, and collegial leadership, operating through complex direct and indirect pathways, providing actionable guidance for multi-faceted improvement strategies targeting individual, interpersonal, and organizational factors simultaneously.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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