

## The Effect of Principals' Academic Supervision, Teachers' Work Motivation, and Teachers' Digital Literacy on the Performance of Junior High School Teachers in Lubuk Baja Subdistrict Batam City

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### ABSTRACT

Teacher performance is a critical determinant of educational quality but remains influenced by the quality of academic supervision, work motivation, and digital literacy. A quantitative causal-associative design was applied to a sample of 134 teachers determined by the Isaac-Michael table. Data were collected via a four-point Likert questionnaire and analyzed using multiple linear regression after verifying normality, linearity, multicollinearity, and heteroscedasticity assumptions. The F-test confirmed a very significant simultaneous effect ( $F = 819.493$ ;  $p < 0.001$ ). The coefficient of determination ( $R^2 = 0.950$ ) indicated that 95% of the variance in teacher performance was explained by the model, with the remaining 5% due to other factors. Work motivation and digital literacy are the primary determinants of teacher performance; academic supervision should be redesigned to be more reflective, collaborative, and coaching-based. These findings enrich educational research and offer a data-driven basis for local governments in crafting sustainable teacher capacity-building initiatives.

## INTRODUCTION

Education is the principal foundation for building the quality of human resources and determining a nation's competitiveness in the global era. In this frame, the role of teachers as the main implementers of the teaching-learning process in schools is highly strategic because teacher quality directly affects the quality of national education (Purba, 2025; Saleh, 2023). Optimizing teacher performance is not only a mandate of Law Number 14 of 2005 concerning Teachers and Lecturers, but also an urgent need amid technological change and increasingly complex social demands (Purba, 2025). Nevertheless, the phenomena of weak implementation of principals' academic supervision, low teacher work motivation, and sub-optimal teacher digital literacy are still often found in many schools, including junior high schools in Lubuk Baja Subdistrict, Batam City (Saleh, 2023; Saidah, 2018). These three issues reflect weaknesses in educational quality management systems and institutional readiness to respond to the need for digitally based educational innovation (Saleh, 2023). Therefore, understanding the factors that influence teacher performance is essential for designing improvement strategies for secondary education that are relevant to contemporary demands.

Principals' academic supervision is essentially directed at developing teachers' professionalism in a reflective, collaborative manner and oriented toward strengthening pedagogical competence rather than merely administrative compliance (Saidah, 2018; Saleh, 2023; Aisyahrani et al., 2023). In practice, however, supervision in many schools remains trapped in formality and thus has yet to make a significant contribution to improving teacher performance (Ramlang et al., 2022). Limited training for principals in applying coaching and mentoring models further complicates the effectiveness of supervision, even though these approaches have been proven to encourage positive changes in teachers' instructional behavior (Aisyahrani et al., 2023). Several studies affirm that academic supervision carried out systematically, structurally, and continuously can raise instructional quality through constructive feedback and consistent monitoring of teacher performance (Rosmini et al., 2024; Sumual et al., 2025). Even so, many principals have not maximized their role in ongoing teacher development, so optimizing the supervisory function remains an important need to strengthen overall educational quality.

In addition to academic supervision, teachers' work motivation is a key factor that strongly determines performance quality and productivity in school settings (Saidah, 2018; Saleh, 2023; Bahri, 2025). Highly motivated teachers tend to display creativity, enthusiasm, and strong commitment to their professional duties—from classroom management and development of teaching materials to building positive relationships with students (Mohune et al., 2023). Declines in motivation are still frequently observed in some schools, triggered by a lack of appreciation, excessive workloads, and leadership patterns that are not yet optimally supportive (Bahri, 2025). This phenomenon reinforces the findings of Warni and Basya (2024) that both intrinsic and extrinsic motivation play important roles in promoting productivity and the quality of classroom learning. Thus, strategies to improve educational quality cannot focus only on structural aspects; they must also pay serious attention to strengthening teachers' work

motivation at both psychological and institutional levels as part of sustainable human resource development.

In the digital era, teachers' digital literacy has become an essential competence to support contextual learning and adaptation to technological developments (Agustiarmi et al., 2022; Nugroho & Hidayati, 2023; Fauzi et al., 2022). Unfortunately, observations and prior studies show that the digital literacy level of junior high school teachers in various regions, including Lubuk Baja, is still sub-optimal—due both to limited training and to resistance to adopting technology in instruction (Sulistyarini & Fatonah, 2022). Teachers with high digital literacy tend to be more innovative in using online learning platforms and educational applications, thereby improving interaction quality and learning effectiveness (Agustiarmi et al., 2022). However, most teachers are still only able to use basic technologies such as projectors or online meeting applications, without developing more creative and sustainable digital integration (Nugroho & Hidayati, 2023; Fauzi et al., 2022). Consequently, strengthening teachers' digital literacy must be a priority so that education can adapt responsively to global challenges and the demands of twenty-first-century learning.

Research on the simultaneous influence of principals' academic supervision, teachers' work motivation, and teachers' digital literacy on teacher performance is crucial as a basis for data-driven policy formulation in secondary education (Rosmini et al., 2024; Warni & Basya, 2024; Mohune et al., 2023). Previous studies emphasize the importance of need-based supervision as part of school-management reform; however, integrated interventions that combine work-motivation enhancement and digital-literacy training within a single predictive model of teacher performance remain rarely examined (Agustiarmi et al., 2022; Nugroho & Hidayati, 2023). This has resulted in a weak empirical basis for determining comprehensive strategies to improve education quality in the digital era (Sumual et al., 2025; Amelia et al., 2024). This study is expected to provide a complete picture of the relative and simultaneous contributions of principals' academic supervision, work motivation, and teachers' digital literacy, which can serve as a cornerstone for designing school-based interventions to strengthen teacher professionalism and performance on an ongoing basis.

Although many studies have discussed the partial effects of academic supervision, work motivation, and digital literacy on teacher performance, studies integrating these three variables in a single simultaneous analysis in the context of secondary education—particularly junior high schools in Lubuk Baja Subdistrict, Batam City—remain very limited (Ramlang et al., 2022; Warni & Basya, 2024; Fauzi et al., 2022). Ramlang et al. (2022) highlight that effective supervision improves teacher discipline, whereas Warni and Basya (2024) emphasize that work motivation is important for shaping work ethic and professionalism. Furthermore, Fauzi et al. (2022) and Nugroho and Hidayati (2023) show a positive correlation between mastery of digital technology and the quality of digital-based lesson planning. However, the collective contribution of supervision, motivation, and digital literacy to junior high school teachers' performance remains an area of research that has seldom been explored empirically and comprehensively. Therefore, this study is highly relevant to

closing this research gap and presenting new empirical data that can underpin innovative education policies.

Based on preliminary observations at one private junior high school in Lubuk Baja Subdistrict, the researcher found that the implementation of principals' academic supervision still tended to focus on administrative control and curriculum compliance, while pedagogical guidance efforts had not been optimal (Observation, 2025). Teachers' work motivation was generally quite high—especially among experienced teachers with strong commitment—yet some other teachers reported limited opportunities for self-development and recognition for their achievements (Interview with Principal, 2025). In terms of digital literacy, most teachers were familiar with basic technologies, but few were able to maximize creative digital integration in instruction (Observation, 2025). This condition indicates that to comprehensively improve teacher performance, an integrated strategy is required—covering the renewal of academic supervision, the strengthening of work motivation, and the acceleration of teachers' digital literacy in accordance with real needs in schools (Saleh, 2023; Saidah, 2018; Bahri, 2025). Accordingly, this study is important for presenting contextual solutions to reinforce instructional quality at the junior-high level, particularly in Lubuk Baja Subdistrict of Batam City.

## **METHODS**

### **Type and Research Design**

This study employed a quantitative approach with a causal-associative design to test the effects of Academic Supervision ( $X_1$ ), Work Motivation ( $X_2$ ), and Digital Literacy ( $X_3$ ) on Teacher Performance ( $Y$ ). This design was chosen because it allows analysis of cause-effect relationships among variables through a multiple linear regression model.

### **Location and Time of the Study**

The study was conducted at 13 public and private junior high schools in Lubuk Baja Subdistrict, Batam City, Riau Islands Province. Data collection took place from February to July 2025, aligned with the academic calendar and ensuring all schools were represented.

### **Population and Sample**

The population comprised 205 junior high school teachers working in the subdistrict. Sample size was determined using the Isaac & Michael table at a 5% significance level, yielding 134 respondents. Sampling was random—without school-level proportional allocation—yet all schools were covered, thereby maintaining representativeness.

### **Research Variables**

- 1)  $Y$  (Junior High School Teacher Performance) – effectiveness in planning, implementation, evaluation, classroom management, communication, and professional development.
- 2)  $X_1$  (Principals' Academic Supervision) – planning, implementation, evaluation & feedback, and follow-up of supervision.
- 3)  $X_2$  (Teachers' Work Motivation) – intrinsic and extrinsic motivation driving professional performance.

4)  $X_3$  (Teachers' Digital Literacy) – access, use, and utilization of technology in instruction.

### **Data Collection Techniques and Instruments**

Techniques: Data were collected using closed-ended questionnaires designed for all variables.

Instruments: Four sets of questionnaires were prepared – each for  $X_1$ ,  $X_2$ ,  $X_3$ , and  $Y$  – based on selected theoretical indicators. A four-point Likert scale was used: Always (4), Often (3), Sometimes (2), Never (1). Item blueprints were derived from the theories of Sergiovanni, Deci & Ryan, and the Minister of National Education Regulation No. 16/2007 to ensure construct alignment. Content validity was consulted with experts in educational management; internal reliability was tested using Cronbach's  $\alpha$  (all variables  $> 0.70$ ; results attached in the thesis appendix).

### **Data Collection Procedures**

The researcher obtained principals' consent, socialized the study objectives, and then distributed questionnaires to selected teachers. Responses were completed online via Google Forms to reduce entry errors and accelerate tabulation. All responses were verified and then downloaded into SPSS format for analysis.

### **Data Analysis Techniques**

1) Descriptive Statistics: Computing minimum, maximum, mean, and standard deviation for each variable.

2) Assumption Tests: Normality (Kolmogorov-Smirnov), linearity (Deviation from Linearity), multicollinearity (VIF & Tolerance), and heteroscedasticity (Glejser) to ensure model feasibility.

3) Multiple Linear Regression: The model  $\hat{Y} = a + b_1X_1 + b_2X_2 + b_3X_3$  estimated the simultaneous effects of the three predictors. Partial significance was tested using the t-test, while collective effects were tested with the F-test at  $\alpha = 0.05$ . The coefficient of determination ( $R^2$ ) was reported as an indicator of the contributions of the independent variables to teacher performance. Analyses were performed using SPSS Statistics 25.

## **RESULTS**

### **Descriptive Statistics of Variables**

Academic Supervision ( $X_1$ ) recorded a minimum score of 16, a maximum of 64, a total of 7,764, a mean of 57.94, and a standard deviation (SD) of 8.94. Work Motivation ( $X_2$ ) had the highest mean of 60.28 with a total of 8,078 and SD of 8.96. Digital Literacy ( $X_3$ ) had a mean of 57.66, a total of 7,726, and SD of 8.34. Teacher Performance ( $Y$ ) showed a mean of 60.00, a total of 8,040, and SD of 9.23. All mean values were in the high category, indicating consistently positive respondent perceptions of each construct.

### **Model Assumption Tests**

All data met the normality (Kolmogorov-Smirnov  $> 0.05$ ), linearity ( $p > 0.05$ ), heteroscedasticity (Glejser  $> 0.05$ ), and multicollinearity (VIF  $< 2.00$ ; Tolerance  $> 0.50$ ) requirements. These prerequisites ensure that the regression coefficients can be estimated without bias and interpreted substantively.

### Partial Effects of Independent Variables

The t-tests showed different effect strengths. Academic Supervision did not significantly affect performance ( $B = -0.004$ ;  $t = -0.094$ ;  $p = 0.925$ ), suggesting that supervision patterns that are largely administrative have not been sufficient to raise teacher performance and therefore require a reformulation. Conversely, Work Motivation yielded the largest positive coefficient ( $B = 0.782$ ;  $t = 16.500$ ;  $p < 0.001$ ), underscoring that intrinsic-extrinsic drives are the main determinants of professionalism. Digital Literacy also had a positive effect ( $B = 0.265$ ;  $t = 5.358$ ;  $p < 0.001$ ), indicating that mastery of technology promotes instructional effectiveness and classroom administrative efficiency.

### Simultaneous Effects and Model Contribution

The F-test confirmed that Academic Supervision, Work Motivation, and Digital Literacy collectively affected Teacher Performance very significantly ( $F = 819.493$ ;  $p < 0.001$ ). The multiple correlation coefficient was  $R = 0.975$  with  $R^2 = 0.950$ , indicating that 95% of the variance in performance can be explained by the model, leaving 5% for other factors. Adjusted  $R^2 = 0.949$  shows model stability after adjusting for the number of predictors, while a prediction error of 2.09 indicates high estimation accuracy. These results highlight the urgency of an integrated strategy: reflective supervision, motivation-strengthening through fair recognition systems and career pathways, and continuous digital-literacy training so that teacher performance is measurable and sustainable in Lubuk Baja – realizing innovative learning relevant to twenty-first-century challenges.

## DISCUSSION

This study indicates that the performance of junior high school teachers in Lubuk Baja Subdistrict of Batam City is generally high, as reflected by a mean of 60.00 with a total score of 8,040 and SD of 9.23 (see Table 4.1). This finding supports Indartiningsih (2023) and Robutti et al. (2016), who argue that teacher performance is determined by the integration of professionalism indicators, including effective planning, implementation, assessment of learning, and classroom management (Indartiningsih, 2023; Robutti et al., 2016; Aykan & Yıldırım, 2021). The mean value of 57.94 for academic supervision shows positive teacher perceptions of supervision in schools, although its effectiveness needs closer examination (Saidah, 2018; Saleh, 2023; Ramlang et al., 2022). This aligns with Saleh (2023), who emphasizes that the principal's role as supervisor tends to be administrative rather than fully reflective and collaborative. Accordingly, strengthening the role of academic supervision is required to ensure continued improvement in teacher performance amid a dynamic educational landscape.

The research further confirms that teachers' work motivation occupies a strategic position in shaping performance quality, as evidenced by the highest mean of 60.28 with a total score of 8,078 and SD of 8.96 (Bahri, 2025; Mohune et al., 2023; Warni & Basya, 2024). This reinforces findings by Tindan et al. (2022) and Lase et al. (2024) that motivation – both intrinsic and extrinsic – significantly affects productivity and teachers' engagement in the learning process (Tindan et al., 2022; Lase et al., 2024; Mulyani et al., 2022). Highly motivated teachers tend to demonstrate creativity, enthusiasm, and commitment across tasks from planning to evaluation (Warni & Basya, 2024). Therefore, human-resource

development strategies in schools should focus on enhancing teacher motivation through fair rewards and sustained opportunities for professional growth to cultivate a work environment conducive to continuous performance improvement.

In addition, the data show that teachers' digital literacy achieved a high mean of 57.66 with a total score of 7,726 and SD of 8.34 (Agustiarmi et al., 2022; Nugroho & Hidayati, 2023; Fauzi et al., 2022). This is consistent with observations indicating that most teachers already use basic digital technologies in instruction, although innovative integration remains limited (Sulistyarini & Fatonah, 2022; Agustiarmi et al., 2022). Studies by Fauzi et al. (2022) and Nugroho & Hidayati (2023) also reveal that strong digital literacy improves the effectiveness and efficiency of teaching and learning processes in schools (Fauzi et al., 2022; Nugroho & Hidayati, 2023; Sulistyarini & Fatonah, 2022). Consequently, schools need to continue developing adaptive, contextual training programs so all teachers can keep pace with educational technologies and raise overall instructional quality.

Inferential statistics in this study show that not all independent variables had significant partial effects, as indicated by the t-test for principals' academic supervision with  $t = -0.094$  and significance of 0.925 ( $p > 0.05$ ) (Saleh, 2023; Saidah, 2018; Ramlang et al., 2022). This finding implies that supervision that is administrative, formal, and not grounded in reflective coaching has not yet succeeded in improving teacher performance optimally (Rosmini et al., 2024; Sumual et al., 2025; Aisyahrani et al., 2023). Therefore, principals should innovate supervisory patterns by prioritizing clinical, collaborative approaches based on teachers' real needs (Saleh, 2023; Saidah, 2018; Ramlang et al., 2022). Such a paradigm shift would enable supervision to serve as a catalyst for adaptive and innovative teaching, thereby exerting a tangible impact on education quality at the school level.

Conversely, teachers' work motivation proved to have the strongest effect on performance, with a regression coefficient of 0.782,  $t = 16.500$ , and significance of 0.000 ( $p < 0.05$ ) (Warni & Basya, 2024; Bahri, 2025; Mohune et al., 2023). This corroborates the view of Tindan et al. (2022) and Lase et al. (2024) that motivation is a determinant of professionalism and instructional quality (Tindan et al., 2022; Lase et al., 2024; Mulyani et al., 2022). Motivated teachers are more responsive to curricular change, more innovative in preparing teaching materials, and better able to build positive relationships with students (Warni & Basya, 2024; Bahri, 2025; Mohune et al., 2023). These results underscore the need for school policies that foster motivation through recognition, career development, and supportive environments to achieve sustainable performance improvements in today's educational context.

Beyond motivation, teachers' digital literacy also made a significant contribution to performance, with a regression coefficient of 0.265,  $t = 5.358$ , and significance of 0.000 ( $p < 0.05$ ) (Agustiarmi et al., 2022; Nugroho & Hidayati, 2023; Fauzi et al., 2022). Improved digital literacy enables teachers to leverage technology to enrich instructional methods, enhance interaction, and streamline classroom administration (Sulistyarini & Fatonah, 2022; Agustiarmi et al., 2022; Fauzi et al., 2022). This aligns with the perspectives of Sulistyarini & Fatonah

(2022) and Nugroho & Hidayati (2023) on the importance of digital competence for navigating educational transformation (Nugroho & Hidayati, 2023; Sulistyarini & Fatonah, 2022; Agustiarini et al., 2022). Hence, digital-literacy training must be prioritized within teacher professional-development policies to support contextual, creative, and adaptive learning in every school.

Multiple regression analysis demonstrated that the three independent variables—principals' academic supervision, teachers' work motivation, and teachers' digital literacy—jointly had a highly significant effect on teacher performance, with  $F = 819.493$  and significance of  $0.000$  ( $p < 0.05$ ) (Rosmini et al., 2024; Warni & Basya, 2024; Mohune et al., 2023). The coefficient of determination ( $R^2$ ) of  $0.950$  shows that 95% of performance variance is explained by these variables, while the remainder is due to external factors not analyzed in this study (Sumual et al., 2025; Amelia et al., 2024; Fauzi et al., 2022). These findings stress the importance of synergy among supervision, motivation, and digital literacy within strategies for improving secondary education quality (Rosmini et al., 2024; Warni & Basya, 2024; Mohune et al., 2023). Therefore, teacher-professional-development policies should be integrated rather than fragmented in order to achieve optimal results amid globalization and digitalization.

The simultaneous influence of academic supervision, work motivation, and digital literacy indicates interactions that shape optimal professionalism (Saleh, 2023; Saidah, 2018; Ramlang et al., 2022). Effective supervision increases teachers' motivation by providing constructive feedback and continuous mentoring so that teachers feel supported and encouraged to innovate (Rosmini et al., 2024; Sumual et al., 2025; Aisyahrani et al., 2023). Meanwhile, motivated teachers with sufficient digital literacy are able to use technology to develop adaptive, engaging instructional methods (Fauzi et al., 2022; Nugroho & Hidayati, 2023; Sulistyarini & Fatonah, 2022). Integration of these aspects should be a primary focus of human-resource management in education to cultivate excellent, competitive teacher performance.

Although academic supervision did not show a significant partial effect, the principal's role in shaping a supportive work climate remains crucial (Saleh, 2023; Saidah, 2018; Ramlang et al., 2022). Administrative supervision without reflective coaching tends to be ineffective in promoting professionalism (Rosmini et al., 2024). Principals should adopt clinical supervision that emphasizes the development of pedagogical competence through dialogue, coaching, and mentoring (Aisyahrani et al., 2023; Sumual et al., 2025). This approach can transform school work culture to be more collaborative and innovative, ultimately elevating motivation and the use of digital literacy in classroom practice.

Given that work motivation is the most dominant predictor of performance, there is an urgent need for effective strategies to sustain and enhance it (Bahri, 2025; Warni & Basya, 2024; Mohune et al., 2023). Reward systems, career-development opportunities, and a supportive work environment can serve as key pillars for strengthening intrinsic and extrinsic motivation (Tindan et al., 2022; Lase et al., 2024). High motivation influences not only instructional quality but also teachers' participation in innovation and ongoing professional

development (Mulyani et al., 2022). School policies should therefore be responsive to teachers' psychological and professional needs so that performance is maintained and developed in line with today's educational dynamics.

Enhancing teachers' digital literacy is likewise integral to strengthening adaptive and innovative performance (Agustiarmi et al., 2022; Fauzi et al., 2022; Nugroho & Hidayati, 2023). Adequate digital literacy allows teachers to utilize diverse educational technologies, enrich methods, and improve interactions with students (Sulistyarini & Fatonah, 2022). This study confirms that continuous training and adequate digital infrastructure must be policy priorities to ensure that all teachers can meet the challenges of digitalization optimally (Fauzi et al., 2022; Nugroho & Hidayati, 2023; Agustiarmi et al., 2022). Thus, digital literacy is not merely a technical skill but a strategic foundation for improving the quality of future education.

Overall, the results show that improving the performance of junior high school teachers in Lubuk Baja Subdistrict of Batam City requires the integration of three main factors: more humanistic and reflective academic supervision, strong work motivation, and adequate digital literacy (Saleh, 2023; Warni & Basya, 2024; Fauzi et al., 2022). Academic supervision needs to be transformed from an administrative model into teacher-development efforts through coaching and mentoring (Aisyahrani et al., 2023; Rosmini et al., 2024; Sumual et al., 2025). Because motivation is the principal driver, it should be reinforced through fair reward systems, opportunities for self-development, and a supportive work environment (Bahri, 2025; Tindan et al., 2022; Mulyani et al., 2022). Meanwhile, digital literacy is an inseparable foundation for addressing twenty-first-century instructional challenges through effective and innovative use of technology (Nugroho & Hidayati, 2023; Sulistyarini & Fatonah, 2022; Fauzi et al., 2022). The policy implication is the need for integrated programs that combine these three aspects to produce sustainable education quality aligned with current needs.

## CONCLUSIONS

Based on the data analysis and discussion, four main conclusions are drawn. First, principals' academic supervision does not have a significant partial effect on the performance of junior high school teachers in Lubuk Baja Subdistrict of Batam City, with  $t = -0.094$  and significance of 0.925 ( $p > 0.05$ ). This indicates that administrative, less-reflective supervision has not optimally improved teacher performance. Second, teachers' work motivation has a positive and significant effect on performance, with  $t = 16.500$  and significance of 0.000 ( $p < 0.05$ ), showing that motivation is the dominant factor driving professionalism and productivity. Third, teachers' digital literacy also has a significant positive effect on performance, with  $t = 5.358$  and significance of 0.000 ( $p < 0.05$ ), underscoring the importance of technological mastery in supporting instructional effectiveness. Fourth, the three variables have a significant simultaneous effect on performance, with  $F = 819.493$  and significance of 0.000 ( $p < 0.05$ ). The coefficient of determination ( $R^2$ ) of 0.950 reveals that 95% of the variation in teacher performance can be explained by the combination of academic supervision, work motivation, and digital literacy, with the remaining 5%

influenced by other factors outside the study model. Therefore, efforts to improve performance should focus on strengthening motivation and digital literacy while redesigning supervision to be more adaptive and participatory.

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