Vifada Journal of Education , E-ISSN 3021-713X
This work is Licensed under a Creative Commons Attribution 4.0 International License

Principal Leadership, Teacher Competence, and Teacher Performance: Investigating the Moderating Effect of Artificial Intelligence (AI) Utilization at SMAN 1 Manyar

Muafiah [(1)] Noor Hudallah [(2)] Arief Yulianto [(3)] Suwito Eko Pramono [(4)] Sungkowo Edy Mulyono [(5)]*

[(1)] Administrasi Pendidikan and Universitas Negeri Semarang, semarang, jawa tengah & indonesia
[(2,3,4,5)] Administrasi Pendidikan and Universitas Negeri Semarang, semarang, jawa tengah & indonesia

Received: 2026, 05,03 **Accepted**: 2026, 05,17
Available online: 2026, 06, 17

*Corresponding author.
E-mail addresses: muafiah22@students.unnes.ac.id

KEYWORDS

Keywords:
Principal leadership; teacher competence; teacher performance; Artificial Intelligence; moderation; PLS-SEM

Conflict of Interest Statement:
The author(s) declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Copyright © 2026 EDU. All rights reserved.

ABSTRACT

This study aims to examine the effects of principal leadership and teacher competence on teacher performance, as well as the moderating role of Artificial Intelligence (AI) utilization at SMAN 1 Manyar Gresik. It hypothesizes that principal leadership and teacher competence positively influence teacher performance, while AI utilization strengthens these relationships. A quantitative correlational design was employed using Partial Least Squares Structural Equation Modeling (PLS-SEM) based on data collected from 65 teachers, supported by interviews to enrich contextual understanding. The results indicate that principal leadership significantly improves teacher competence (β = 0.477; p < 0.001), while teacher competence positively affects teacher performance (β = 0.280; p = 0.025). However, principal leadership does not directly influence teacher performance (β = -0.008; p = 0.955), and AI utilization has no significant direct effect (β = 0.217; p = 0.073). AI also fails to moderate the relationship between principal leadership and teacher performance but significantly and negatively moderates the relationship between teacher competence and teacher performance, suggesting an equalizer technology effect. These findings imply that improving teacher performance depends primarily on strengthening teacher competence through effective school leadership, while AI integration requires more strategic implementation. Future research should explore broader educational contexts and additional factors influencing AI adoption and teacher performance.

Introduction

Secondary education has a strategic role in preparing human resources who are adaptive, creative, and able to face social and technological changes. In the school context, teachers are the main actors who determine the quality of learning, while the principal is the driving force of the organization that directs work culture, academic supervision, collaboration, innovation, and professional development. Therefore, the improvement of teacher performance cannot be separated from the quality of the principal's leadership and the level of teacher competence as a professional educator.

The changes of the 21st century put schools in a different situation than in previous periods. Teachers are not only required to master the substance of subjects, pedagogy, and classroom management, but are also required to have digital readiness. Artificial Intelligence (AI) has begun to be used in education to help with the preparation of teaching tools, the development of learning media, evaluation, analysis of learning outcomes, reference search, and personalization of learning. In this context, AI is not simply understood as a technical tool, but rather as a factor that can influence the way teachers plan, implement, evaluate, and develop learning.

SMAN 1 Manyar Gresik is a public school that has relatively strong teacher resources, developed learning facilities, and an organizational character that is open to innovation. Based on thesis data, this school has 65 teachers, 23 education staff, 36 study groups, 36 classrooms, 8 laboratories, and 2 libraries. This condition makes SMAN 1 Manyar Gresik relevant as a research location regarding leadership relationships, teacher competence, the use of AI, and teacher performance.

The main problems studied are the lack of optimal teacher performance in learning innovation and technological adaptation, the variation in the role of school principals in encouraging the use of technology, and the use of AI that has not been fully integrated in the school management system. This research is important because it examines a model that places AI as a moderator variable, which is a variable that can strengthen or weaken the relationship between the principal's leadership and teachers' competence on teacher performance.

In particular, this article aims to analyze the influence of principal leadership on teacher competence, the influence of principal leadership on teacher performance, the influence of teacher competence on teacher performance, the influence of AI use on teacher performance, and the role of AI moderation on the relationship between principal leadership and teacher competence on teacher performance. Thus, this article is expected to contribute to the development of technology-based education management and become a practical input for schools in managing digital transformation responsibly.

Literature Review

Principal leadership

Principal's leadership is the principal's ability to influence, direct, mobilize, and empower school residents so that educational goals are effectively achieved. In education management, the principal not only acts as an administrator, but also as an educator, manager, supervisor, leader, innovator, motivator, and evaluator. Mulyasa (2007, 2013) emphasized that professional school principals play an important role in improving the quality of schools through managerial strengthening, academic supervision, and visionary leadership.

Transformational and instructional leadership theory provides an important foundation for understanding the influence of principals on teachers. Leithwood and Jantzi (2005) explain that transformational leadership can increase motivation, commitment, and organizational culture of schools. Robinson, Lloyd, and Rowe (2008) affirm that instructional leadership has a strong impact on learning outcomes because principals are involved in the development of instructional learning objectives, supervision, and evaluation. In this study, the leadership of school principals is understood through the indicators of educators, managers, supervisors, and motivators.

Teacher competence

Teacher competence is a set of knowledge, skills, values, and professional attitudes that enable teachers to carry out quality learning tasks. Law Number 14 of 2005 concerning Teachers and Lecturers places pedagogical, personality, social, and professional competencies as the foundation of professional teachers. The Directorate General of Teachers and Education Personnel (2023) also emphasized that teacher competencies must be developed in a sustainable manner to be in harmony with the needs of students and changes in the education system.

Pedagogic competence is related to the ability to understand the characteristics of students, design learning, carry out learning, and conduct assessments. Personality competence is related to the moral, emotional, and spiritual maturity of the teacher. Social competence related to the ability to build communication, collaboration, and professional relationships with school residents and the community. Professional competence is related to mastery of teaching materials, scientific structures, curriculum, and learning development strategies. In the final model of this study, the competency indicators used are pedagogic, personality, and social.

Teacher performance

Teacher performance shows the quality of achievement of teachers' duties in planning, implementing, evaluating, and developing learning. Performance is not only assessed from the completeness of administration, but also from the quality of learning interactions, the ability to create meaningful learning experiences, professional responsibility, and teachers' contributions to school goals. Mangkunegara (2017, 2020) views performance as the result of work both in terms of quality and quantity achieved by a person according to his or her responsibilities.

In this study, teacher performance was measured through four main indicators, namely learning planning, learning implementation, learning evaluation, and professional responsibility. The four indicators represent the entire work cycle of teachers, starting from the preparation of teaching tools to reflection and responsibility for improving the quality of learning.

Artificial Intelligence in education

Artificial Intelligence in education refers to the use of intelligent systems to help with the learning process, assessment, educational analytics, material personalization, and teacher administrative support. Luckin, Holmes, Griffiths, and Forcier (2016) explain that AI in Education aims to make educational, psychological, and social knowledge more explicit computationally. Chen, Chen, and Lin (2020) show that AI can improve the effectiveness of administration, teaching, and learning through adaptive systems, digital platforms, and data-driven tools.

While AI has great potential, its use in education must be based on ethical principles, academic validation, data security, and professional responsibility. Teachers need to view AI as a tool to expand work capacity, not as a substitute for pedagogic reasoning and human relationships in learning. In this study, the use of AI was measured through AI-based learning planning indicators, AI-based learning implementation, AI-based learning evaluation, and AI-based teacher professional development.

Conceptual framework and hypotheses

The conceptual framework of the study places the principal's leadership (X1) as an exogenous variable that affects teacher competence (X2) and teacher performance (Y). Teacher competence is also assumed to affect teacher performance. The use of AI (Z) was tested as a variable that has a direct influence on teacher performance as well as as a moderator in the relationship between X1 to Y and X2 to Y. Research hypotheses include: H1 the leadership of the principal has a positive effect on teacher competence; H2 the leadership of the principal has a positive effect on teacher performance; H3 teacher competence has a positive effect on teacher performance; H4 AI strengthens the influence of principals' leadership on teacher performance; and H5 AI strengthens the influence of teacher competence on teacher performance.

Research Design And Methodology

The study uses a correlational quantitative approach to objectively and systematically test the relationships between variables. The main analysis was conducted with Partial Least Squares Structural Equation Modeling (PLS-SEM) because the research model involves several latent constructs, direct relationships, indirect influences, and interaction constructs. The quantitative findings were enriched with interview data to provide contextual explanations of leadership practices, teacher competence, and the use of AI in schools.

The location of the research is SMAN 1 Manyar Gresik, East Java. The research population is all teachers who teach in the school. The thesis data showed that the number of teachers was 65 people, while the data analyzed in the research model amounted to 65 valid respondents. These differences show that almost the entire population was covered in the analysis so that the data picture is quite representative for the context of the school being studied.

Variables and measurement

The research variables included principal leadership (X1), teacher competence (X2), use of Artificial Intelligence (Z), and teacher performance (Y). The research instrument was developed in the form of a Likert scale questionnaire and tested through validity and reliability before being analyzed. In the initial stage, there are 93 items of statements. After the validity test, 87 items were declared valid and 6 items were issued. The final model of PLS-SEM uses indicators that have met the measurement eligibility.

Construct	Final indicators used in the model
Principal's Leadership (X1)	Educator, administrator, innovator
Teacher competence (X2)	Pedagogic, personality.
Utilization of AI (Z)	AI-based learning planning, AI-based learning implementation, AI-based learning evaluation, AI-based teacher professional development
Teacher performance (Y)	Learning implementation, learning evaluation, professional responsibility

Data analysis

Data analysis is carried out through several stages. First, descriptive statistics are used to illustrate the tendency of respondents' scores. Second, validity and reliability tests are carried out to ensure the feasibility of the instrument. Third, PLS-SEM is used to evaluate measurement models

and structural models. The measurement model was assessed through Cronbach's alpha, composite reliability, average variance extracted (AVE), Fornell-Larcker, HTMT, and VIF. The structural model was assessed through the path coefficient, R-square, adjusted R-square, f-square, Q-square, fit model, and bootstrapping results based on t-statistical and p-value. The main equations tested were the influence of X1, X2, Z, X1 x Z, and X2 x Z on Y, as well as the influence of X1 on X2.

Findings And Discussion

Findings ***Descriptive overview and instrument eligibility***

Based on the data from the research results, the total respondents analyzed were 65 teachers. Descriptively, the score of each variable shows a high tendency, with the mean item being greater than the standard deviation. These conditions show that the distribution of data is relatively controlled and the average value can be used to describe the general condition of respondents. The results of the validity test showed that most of the instrument items met the criteria, while invalid items were excluded from the analysis. The reliability of the instrument generally meets the minimum limit so that the instrument can be used to measure the construct of the study.

Measurement model

The test results of the measurement model show that the research construct has good internal reliability and convergent validity. Cronbach's alpha was above 0.70, composite reliability was above 0.70, and AVE was above 0.50. Thus, the principal's leadership construct, teacher competence, AI utilization, and teacher performance were declared adequate for further analysis.

Konstruk	Alpha	rho_a	rho_c	AVE	Interpretasi
X1	0,634	0,647	0,801	0,757	Reliabel dan valid konvergen
X2	0,599	0,605	0,832	0,844	Reliabel dan valid konvergen
Y	0,763	0,800	0,859	0,819	Reliabel dan valid konvergen
Z	0,842	0,875	0,892	0,822	Reliabel dan valid konvergen

The discriminant validity based on Fornell-Larcker shows that the square root of AVE is greater than the correlation between constructs in most relationships. The Fornell-Larcker diagonal value is 0.757 for X1, 0.844 for X2, 0.819 for Y, and 0.822 for Z. HTMT values between Z x X1 and other variables range from 0.293 to 0.526, while HTMT values between Z x X2 and other variables range from 0.281 to 0.608. All of these values are still below the limit of 0.90, so the interaction construct also meets the criteria for *discriminant validity*.

Structural model and explanatory power

The explanatory power of the model showed good results on the teacher's performance variables. The R-square value for teacher competence is 0.228 and the adjusted R-square value for Teacher Performance (Y) is 0.407 indicating that 40.7% variation in Teacher Performance can be explained by the variables of Principal Leadership (X1), Teacher Competence (X2), Artificial Intelligence (Z) Utilization, and moderation interactions contained in the research model. While the remaining 59.3% was influenced by other factors outside the research model

Variabel endogen	R-square	Adjusted R-square	Interpretasi
Teacher competence (X2)	0,228	0,215	Low to medium explanatory power
Teacher performance (Y)	0,407	0,357	Strong explainable power

Nilai f-square menunjukkan bahwa pengaruh kepemimpinan kepala sekolah terhadap kompetensi guru termasuk sedang (0,324). Pengaruh langsung kepemimpinan kepala sekolah terhadap kinerja guru termasuk kecil (0,062), begitu pula pengaruh kompetensi guru terhadap kinerja guru (0,040). Sebaliknya, pengaruh pemanfaatan AI terhadap kinerja guru termasuk besar (0,362), dan interaksi AI dengan kompetensi guru juga termasuk besar (0,400), meskipun arah interaksinya negatif.

Jalur	Koefisien jalur	f-square	Interpretasi efek
X1 -> X2	0,477	0,295	Medium
X1 -> Y	-0,008	0,000	No effect
X2 -> Y	0,280	0,082	Small
Z -> Y	0,217	0,058	Kecil
Z x X1 -> Y	-0,076	0,012	Very small
Z x X2 -> Y	-0,216	0,082	Small

Hypothesis testing

The results of bootstrapping showed that two direct relationships were significant at the 5% level, namely the principal's leadership on teacher competence and the use of AI on teacher performance. The other two direct relationships, namely the principal's leadership to teacher performance and teachers' competence to teacher performance, have a positive but not significant direction. The moderation test showed that AI was not significant in the relationship between the principal's leadership and teacher performance at the level of 5%, but had a positive value and was close to the significance at the level of 10%. Meanwhile, AI moderation on the relationship between teacher competence and teacher performance is significant but negative.

Koefisien Jalur		Sampel asli (O)	Rata-rata sampel (M)	Standar deviasi (STDEV)	T statistik O/STDEV	Nilai P (P values)	Ket
(H1)	Principal Leadership (X1) -> Teacher Competence (X2)	0,477	0,511	0,093	5,137	0,000	Proven
(H2)	Principal's Leadership(X1) -> Teacher Performance (Y)	-0,008	-0,013	0,141	0,056	0,955	Unproven
(H3)	Teacher Competency (X2) -> Teacher Performance (Y)	0,280	0,283	0,125	2,243	0,025	Proven
(H4)	Utilization of Artificial Intelligence (Z) x Principal's Leadership (X1) -> Teacher Performance (Y)	-0,076	-0,077	0,099	0,768	0,442	Unproven
(H5)	Utilization of Artificial Intelligence (Z) x Teacher Competence (X2) -> Teacher Performance (Y)	-0,216	-0,206	0,091	2,386	0,017	Proven

The results of the direct influence test showed that the relationship between Principal Leadership (X1) and Teacher Competence (X2) had a path coefficient value of 0.477, a T-statistical value of 5.137, and a P-value of 0.000. The value meets the significance criteria because the T-statistic is greater than 1.96 and the P-value is smaller than 0.05. Thus, **Hypothesis 1 (H1) is accepted**. Principal Leadership (X1) and Teacher Performance (Y) resulted in a path coefficient of -0.008, a T-statistic value of 0.056, and a P-value of 0.955. The value does not meet the significance criteria because the T-statistic is smaller than 1.96 and the P-value is greater than 0.05. Therefore, **Hypothesis 2 (H2) is rejected.** Teacher Competency (X2) and Teacher Performance (Y) have a path coefficient of 0.280, a T-statistic value of 2.243, and a P-value of 0.025. Since the T-statistic value is greater than 1.96 and the P-value is less than 0.05, **Hypothesis 3 (H3) is accepted**. The Effect of Moderation of the Utilization *of Artificial Intelligence* (Z) and Principal Leadership (X1) on Teacher Performance (Y) showed a path coefficient of -0.076, a T-statistic value of 0.768, and a P-value of 0.442. The value did not meet the significance criteria so **Hypothesis 5 (H5) was rejected.**Because the value of the coefficient of the moderation path is negative (-0.216), the moderation that occurs is **negative *moderation*.** This means that the higher the use of *Artificial Intelligence*, the influence of Teacher Competence on Teacher Performance tends to decrease

DISCUSSION

Principal leadership and teacher competence

The finding that the principal's leadership has a positive and significant effect on teacher competence confirms the importance of the principal's role as a driver of professional development. The value of the coefficient of 0.495 indicates a moderate positive influence. This means that the better the principal performs the leadership, supervision, managerial, and motivational functions, the better the teacher's competence. These results are consistent with the theory of educational leadership which emphasizes that school principals can improve teacher competence through coaching, evaluation, training, providing feedback, and creating a school culture that supports professional learning.

In the context of SMAN 1 Manyar Gresik, the principal has a great opportunity to develop teacher competence because the school has relatively good teacher resources and facilities. Effective leadership needs to be directed not only at administrative achievements, but also at real support for learning innovation, digital literacy, collaboration between teachers, and professional reflection.

Principal leadership and teacher performance

The results of the study show that the Principal's Leadership has a positive and significant effect on Teacher Competence at SMAN 1 Manyar, Gresik Regency. This is evidenced by the *path coefficient* value of 0.477, the T-statistic value of 5.137, and the P-value of 0.000. A *T-value* greater than 1.96 and a P-value smaller than 0.05 indicate that the first hypothesis is accepted. These findings show that based on the results of testing the measurement model (outer model), the Principal Leadership variable (X1) is formed by several main indicators, namely educators (0.752), administrators (0.718), and innovators (0.799). Among the three indicators, the innovator indicator has the highest outer loading value of 0.799, which shows that the ability of the principal to create innovation, encourage change, and develop an adaptive work culture is the most dominant aspect in shaping the leadership of the principal at SMAN 1 Manyar and the ability of teachers to translate the principal's direction into learning practices.

Conceptually, the results of this study are in line with the theory of educational leadership put forward by Mulyasa (2022) which states that school principals have seven main roles known as the EMASLIM concept (Educator, Manager, Administrator, Supervisor, Leader, Innovator, and Motivator). In this concept, the principal plays the role of an innovator who is responsible for creating updates in the school organization to improve the quality of education and teacher professionalism. Therefore, the better the principal carries out his innovator function, the greater the chance of improving teacher competence.

Teacher competence and teacher performance

The results of the study showed that the influence of teacher competence on teacher performance had a path coefficient of 0.280, a T-statistical value of 2.243, and a P-value of 0.025. Since the T-statistic value is greater than 1.96 and the P-value is less than 0.05, Hypothesis 3 (H3) is accepted. The results of this study show that the higher the competence that teachers have, the higher the performance produced. On the other hand, if the teacher's competence is low, the quality of carrying out professional duties as an educator also tends to decrease. These findings confirm that competence is a fundamental factor that determines the success of teachers in carrying out the learning process, evaluating learning, and carrying out their professional responsibilities.

Theoretically, the results of this study are in line with the competency theory put forward by Spencer Lyle M. and Spencer Signe M. (1993) which states that competence is a fundamental characteristic possessed by a person that directly affects the effectiveness and success of performance. Individuals who have high competence will be able to produce better performance than individuals who have low competence.

The findings of this study are also supported by the theory put forward by Robert L. Mathis and John H. Jackson (2017) which explains that competence is one of the main factors that affect individual performance. According to the theory, a person who has good knowledge, skills, and work attitude will be better able to complete tasks effectively and efficiently.

In the context of education, the results of this research are in line with the Law of the Republic of Indonesia Number 14 of 2005 concerning Teachers and Lecturers which emphasizes that teachers are required to have pedagogic, professional, social, and personality competencies as the main requirements in carrying out their professional duties. These competencies are the basis for teachers to produce optimal performance in the learning process.

The high HTMT value between teacher competence and teacher performance also indicates the proximity of the concept between the two constructs. Thus, in the next study, the competency and performance indicators need to be differentiated more sharply so that the influence of each can be read more clearly. Competence should be emphasized on professional capacity and readiness, while performance should be emphasized on evidence of work behavior and the results of teachers' assignments.

AI utilization and teacher performance

The results of the study show that the effect of the use of artificial intelligence on teacher performance produces a path coefficient of 0.217, a T-statistical value of 1.792, and a P-value of 0.073. The value has not met the significance criteria because the T-statistic value is less than 1.96 and the P-value is greater than 0.05. Thus, Hypothesis 4 (H4) is rejected, which means that the use of *artificial intelligence* has not had a significant effect on performance.

Based on the results of the outer model test, the variable of the use of *artificial intelligence* (Z) is formed by four indicators, namely:
AI-based planning (Z1) = 0.865
AI-based execution (Z2) = 0.885
AI-based evaluation (Z3) = 0.703
AI-based Professional Development (Z4) = 0.824
All indicators have an outer loading value above 0.70 so that they are declared valid. The indicator that has the largest contribution is the implementation of AI-based learning (Z2) with an outer loading value of 0.885.

These findings show that SMAN 1 Manyar teachers use AI more at the learning implementation stage, for example to find learning materials, create presentation media, prepare interactive teaching materials, produce educational images through AI, create practice questions, or obtain learning references quickly.

However, the dominance of the use of AI at the learning implementation stage has not been able to have a significant impact on improving overall teacher performance. This shows that the use of AI is still operational and has not been deeply integrated in the learning system and professional development of teachers.

Moderating role of AI

The results showed that the effect of moderation of the use of *artificial intelligence* on the relationship between Principal Leadership and Teacher Performance resulted in a path coefficient of -0.076, a T-statistic value of 0.768, and a P-value of 0.442. The value does not meet the significance criteria because the T-statistic value is less than 1.96 and the P-value is greater than 0.05. Thus, Hypothesis 5 (H5) is rejected,.

The most interesting finding is the moderation of AI in These results show that the high and low level of use of *artificial intelligence* by teachers does not provide a meaningful change in the relationship between principal leadership and teacher performance. In other words, the existence of AI is not able to strengthen or weaken the influence of the principal's leadership on teacher performance at SMAN 1 Manyar, Gresik Regency.

The results of previous research showed that: Principal's Leadership had a significant effect on Teacher Competence (β = 0.477; p = 0.000). The Principal's leadership had no significant effect on Teacher Performance (β = -0.008; p = 0.955). The use of AI had no significant effect on teacher performance (β = 0.217; p = 0.073). This condition explains why the effect of AI moderation is also not significant. Statistically, if the AI variable is not able to have a strong influence on teacher performance, then its ability to strengthen the relationship between the principal's leadership and teacher performance is also limited.

This finding is interesting because currently *artificial intelligence* is developing very rapidly and is beginning to be used in various aspects of education. However, the results of the study show that the technology has not been able to change the pattern of the relationship between the principal's leadership and teacher performance. The implication is that schools need to develop AI governance that puts teachers as the main actors. AI training should not only contain how to use the app, but also prompt literacy, information verification, data ethics, copyright, algorithmic bias, and AI integration strategies into learning. Thus, AI can be a tool that strengthens teacher professionalism, not replacing teachers' pedagogical considerations.

Conclusion

Based on the results of the SEM-PLS analysis that has been described in the previous chapter, six main conclusions can be drawn according to the hypothesis proposed in this study.

First, the Principal's Leadership has a positive and significant effect on Teacher Competence at SMAN 1 Manyar, Gresik Regency (path coefficient 0.477; T-statistic, 5,137; P-value 0.000). These findings confirm that the role of school principals, especially as innovators, is the main driver of improving teacher competence, both in terms of pedagogy and personality.

Second, the Principal's Leadership does not have a significant effect directly on Teacher Performance (path coefficient -0.008; T-statistic 0.056; P-value 0.955). The performance of teachers in this school is more determined by the professional responsibility and internal commitment of the teachers themselves, so that the influence of the principal on the performance of work is indirect, namely through improving teacher competence.

Third, Teacher Competence has a positive and significant influence on Teacher Performance (path coefficient 0.280; T-statistic 2.243; P value 0.025). The higher the teacher's competence, especially personality competence, the higher the performance produced in the implementation of learning, evaluation, and professional responsibility.

Fourth, the use of Artificial Intelligence has not had a significant effect on Teacher Performance (path coefficient 0.217; T-statistics, 1,792; P value 0.073). Although the direction of the relationship is positive, the use of AI in SMAN 1 Manyar is still operating at the stage of implementing learning and has not been strategically integrated so that it is not strong enough to affect the overall performance of teachers. Statistic-T 0.768; P value 0.442). This shows that the effectiveness of the principal's leadership is determined by interpersonal interaction, not the extent to which teachers utilize technology AI.

Fifth, the use of Artificial Intelligence has been shown to significantly moderate the relationship between Teacher Competence and Teacher Performance, but it is negative or weakened (path coefficient -0.216; T-statistic 2.386; P value 0.017). These findings show that the higher the utilization of AI, the smaller the role of each teacher's competency in determining their performance, as some professional tasks have been assisted by technology.

In general, it can be concluded that the improvement of teacher performance at SMAN 1 Manyar Gresik Regency is more determined by the competence of teachers formed through the leadership of the principal, while the use of AI currently plays a role as an equalizer technology that actually reduces the performance gap between teachers with high and low competence, not as a factor that directly improves performance or strengthens leadership Practical implications.

This research provides several theoretical contributions. First, the results of the study support the concept of EMASLIM from Mulyasa (2022) and Instructional Leadership from Hallinger (2011), which affirm that school principals play an important role in teacher capacity development, but expand the understanding that these influences are indirect on performance, but mediated by teacher competence.

Second, the findings about the insignificance of the direct influence of leadership on teacher performance reinforce the relevance of the theory of Professional Bureaucracy from Mintzberg (1983) in the context of school organizations that already have established management systems, where the professional autonomy of teachers is the main determinant of performance.

Third, this study enriches the study of the Technology Acceptance Model (Davis, 1989) and UTAUT (Venkatesh et al., 2003) by showing that at the initial adoption stage, the use of AI has not sufficiently affected performance directly because the perceived usefulness, user readiness, and facilitating conditions are not optimal.

Fourth, the findings of AI's negative moderation on the competency-performance relationship are a new contribution that expands the literature on technology moderation in educational SEM-PLS, which gives rise to the concept of "AI as an equalizer technology effect", which differs from the common assumption that AI always strengthens the relationship between competency and performance variables.

Fifth, these results also enrich the theory of Transformational Leadership (Bass & Avolio, 1994) by emphasizing that the dimensions of transformational leadership (idealized influence, inspirational motivation, intellectual stimulation, individualized consideration) remain human-centered and has not been replaced or moderated by AI technology.

References

Abdul Gafur. (2020). Kepemimpinan kepala sekolah: Strategi meningkatkan etos kerja guru pendidikan agama Islam. Nizamia Learning Center.

Bass, B. M., & Avolio, B. J. (1994). Improving organizational effectiveness through transformational leadership. Sage Publications.

Campbell, J. P. (2012). Behavior, performance, and effectiveness in the twenty-first century. In The Oxford handbook of organizational psychology (Vol. 1, pp. 159-194). Oxford University Press.

Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. IEEE Access, 8, 75264-75278. https://doi.org/10.1109/ACCESS.2020.2988510

Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches (4th ed.). Sage Publications.

Direktorat Jenderal Guru dan Tenaga Kependidikan. (2023). Panduan operasional model kompetensi guru. Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi.

Fullan, M. (2002). The change leader: Learning to do what matters most. Jossey-Bass.

Ghozali, I., & Latan, H. (2020). Partial least squares: Konsep, teknik dan aplikasi menggunakan SmartPLS 3.0. Badan Penerbit Universitas Diponegoro.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). Multivariate data analysis (8th ed.). Cengage Learning.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). A primer on partial least squares structural equation modeling (PLS-SEM) (3rd ed.). Sage Publications.

Hair, J., & Alamer, A. (2022). Partial least squares structural equation modeling (PLS-SEM) in second language and education research: Guidelines using an applied example. Research Methods in Applied Linguistics, 1(3). https://doi.org/10.1016/j.rmal.2022.100027

Henseler, J., Dijkstra, T. K., Sarstedt, M., Ringle, C. M., Diamantopoulos, A., & Straub, D. W. (2014). Common beliefs and reality about PLS. Journal of the Academy of Marketing Science, 42(2), 115-135.

Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial intelligence in education: Promises and implications for teaching and learning. Center for Curriculum Redesign.

Kartini, & Kristiawan. (2020). Pengaruh kepemimpinan kepala sekolah dan motivasi kerja terhadap kinerja guru. Jurnal Pendidikan Tambusai, 4(3), 2714-2720.

Kline, R. B. (2016). Principles and practice of structural equation modeling (4th ed.). Guilford Press.

Leithwood, K., & Jantzi, D. (2005). Transformational leadership. Leadership and Policy in Schools, 4(3), 177-199. https://doi.org/10.1080/15700760500244769

Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). Intelligence unleashed: An argument for AI in education. Pearson.

Mangkunegara, A. P. (2017). Manajemen sumber daya manusia perusahaan. Remaja Rosdakarya.

Mangkunegara, A. P. (2020). Evaluasi kinerja SDM. Refika Aditama.

Mulyasa, E. (2007). Menjadi kepala sekolah profesional. Remaja Rosdakarya.

Mulyasa, E. (2013). Kepala sekolah profesional: Meningkatkan mutu dan prestasi sekolah. Remaja Rosdakarya.

Robinson, V. M. J., Lloyd, C. A., & Rowe, K. J. (2008). The impact of leadership on student outcomes: An analysis of the differential effects of leadership types. Educational Administration Quarterly, 44(5), 635-674. https://doi.org/10.1177/0013161X08321509

Sugiyono. (2019). Metode penelitian kuantitatif, kualitatif, dan R&D (2nd ed.). Alfabeta.

Supardi. (2021). Pengaruh kepemimpinan kepala sekolah terhadap kinerja guru dalam meningkatkan mutu pendidikan. Jurnal Manajemen Pendidikan, 9(2), 115-126.

Undang-Undang Republik Indonesia Nomor 14 Tahun 2005 tentang Guru dan Dosen. (2005). Sekretariat Negara Republik Indonesia.

Zawacki-Richter, O., Marin, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education. International Journal of Educational Technology in Higher Education, 16(39), 1-27