

INTEGRATION OF ARTIFICIAL INTELLIGENCE IN CHARACTER BASED ACADEMIC SUPERVISION TO IMPROVE TEACHER MOTIVATION AND PERFORMANCE

Solehuddin Al Ayyubi¹, Didi Supriadi², Rejo Kirono³

Sarjanawiyata Tamansiswa University¹²³

Email: wonxmoga@gmail.com¹, didi.supriadi@ustjogja.ac.id², rejokirono@ustjogja.ac.id³

ABSTRACT

The rapid advancement of digital technology has transformed academic supervision from a conventional administrative process into a data-driven and reflective professional development practice. Artificial Intelligence (AI) offers opportunities to enhance academic supervision through automated feedback, learning analytics, predictive evaluation, and personalized recommendations for teachers. However, the implementation of AI must be integrated with character-based educational values to ensure ethical, human-centered, and sustainable educational practices. This study aims to examine the effect of integrating Artificial Intelligence into character-based academic supervision on teachers' motivation and performance. A quantitative explanatory survey design was employed involving 210 elementary school teachers selected through proportional random sampling in Magelang Regency, Indonesia. Data were collected using validated Likert-scale questionnaires and analyzed using Partial Least Squares Structural Equation Modeling (SEM-PLS). The findings reveal that AI-supported character-based academic supervision has a significant positive effect on teachers' motivation. Teacher motivation also significantly influences teacher performance. Furthermore, teacher motivation partially mediates the relationship between AI-integrated academic supervision and teacher performance. These findings suggest that combining Artificial Intelligence with character-based supervision enhances teachers' professional development and organizational performance while upholding educational values.

Keywords: artificial intelligence, academic supervision, character

ABSTRAK

Transformasi digital dalam pendidikan mendorong perubahan paradigma supervisi akademik dari pendekatan administratif menuju pendekatan berbasis data, refleksi, dan penguatan karakter. Artificial Intelligence (AI) menawarkan berbagai peluang untuk meningkatkan efektivitas supervisi melalui analisis data pembelajaran, pemberian umpan balik otomatis, serta penyusunan rekomendasi pengembangan profesional guru. Namun demikian, penerapan AI dalam supervisi akademik tidak dapat dipisahkan dari dimensi karakter agar teknologi tetap berorientasi pada nilai-nilai kemanusiaan, etika profesi, dan peningkatan mutu pendidikan. Penelitian ini bertujuan menganalisis pengaruh integrasi Artificial Intelligence dalam supervisi akademik berbasis karakter terhadap motivasi dan kinerja guru sekolah dasar. Penelitian menggunakan pendekatan kuantitatif dengan desain explanatory survey. Populasi penelitian adalah guru sekolah dasar negeri di Kabupaten Magelang, dengan teknik proportional random sampling sehingga diperoleh 210 responden. Pengumpulan data menggunakan angket skala Likert lima tingkat yang telah memenuhi uji validitas dan reliabilitas. Analisis data dilakukan menggunakan Structural Equation Modeling berbasis Partial Least Square (SEM-PLS). Hasil penelitian menunjukkan bahwa

integrasi AI dalam supervisi akademik berbasis karakter berpengaruh positif dan signifikan terhadap motivasi guru. Motivasi guru juga memberikan pengaruh positif terhadap kinerja guru. Selain itu, motivasi terbukti memediasi hubungan antara supervisi akademik berbasis AI dengan kinerja guru. Temuan ini menunjukkan bahwa pemanfaatan AI yang dipadukan dengan nilai karakter mampu meningkatkan efektivitas supervisi akademik secara berkelanjutan.

Kata kunci: artificial intelligence, supervisi akademik, karakter

INTRODUCTION

The development of Artificial Intelligence (AI) has transformed various sectors, including education¹. AI is no longer merely used as a learning tool but is also being applied in decision-making systems, learning achievement analysis, learning evaluation, and academic supervision. The use of AI enables supervisors and school principals to obtain faster, more accurate, and more objective information regarding the quality of learning through automated data analysis. This development opens opportunities for the transformation of academic supervision toward a system that is more adaptive, personalized, and evidence-based.

Globally, the use of AI in education is growing at a rapid pace. Various AI-based platforms such as ChatGPT, Gemini, Microsoft Copilot, and Claude have been utilized by teachers to develop instructional materials, conduct assessments, create teaching resources, and provide feedback to students². Recent reports indicate that the use of generative AI in

¹B. Allen, "Toward a Framework for Teaching Artificial Intelligence to a Higher Education Audience," *ACM Transactions on Computing Education* 22, no. 2 (2022), <https://doi.org/10.1145/3485062>; J. S. G. A. Balushi, "Incorporating Artificial Intelligence Powered Immersive Realities to Improve Learning using Virtual Reality (VR) and Augmented Reality (AR) Technology," *Proceedings of the 3rd International Conference on Applied Artificial Intelligence and Computing Icaaic 2024*, no. Query date: 2026-06-23 03:46:02 (2024): 760–65, <https://doi.org/10.1109/ICAaic60222.2024.10575046>; F. O. Egara, "Exploring the Integration of Artificial Intelligence-Based ChatGPT into Mathematics Instruction: Perceptions, Challenges, and Implications for Educators," *Education Sciences* 14, no. 7 (2024), <https://doi.org/10.3390/educsci14070742>; I. García-Martínez, "Analysing the Impact of Artificial Intelligence and Computational Sciences on Student Performance: Systematic Review and Meta-analysis," *Journal of New Approaches in Educational Research* 12, no. 1 (2023): 171–97, <https://doi.org/10.7821/naer.2023.1.1240>; Stephanie L. Grace, "Finding Equilibrium: An Integrative Approach to Balancing Human and Artificial Intelligence in Legal Research," *Legal Reference Services Quarterly* 44, no. 3 (2025): 230–63, <https://doi.org/10.1080/0270319X.2025.2534229>; S. Guo, "Artificial intelligence in education research during 2013–2023: A review based on bibliometric analysis," *Education and Information Technologies* 29, no. 13 (2024): 16387–409, <https://doi.org/10.1007/s10639-024-12491-8>.

²X. Huang, "Enhancing Computational Thinking Skills Through Artificial Intelligence Education at a STEAM High School," *Science and Education* 33, no. 2 (2024): 383–403, <https://doi.org/10.1007/s11191-022-00392-6>; S. Hwang, "Examining the Effects of Artificial Intelligence on Elementary Students' Mathematics Achievement: A Meta-Analysis," *Sustainability Switzerland* 14, no. 20 (2022), <https://doi.org/10.3390/su142013185>; M. Kalantzis, "Literacy in the Time of Artificial Intelligence," *Reading Research Quarterly* 60, no. 1 (2025), <https://doi.org/10.1002/rrq.591>; V. Kuleto, "Exploring opportunities and challenges of artificial intelligence and machine learning in higher education institutions," *Sustainability (Switzerland)* 13, no. 18 (2021), <https://doi.org/10.3390/su131810424>; Anita John Kunnath dan Wiets Botes,

education has increased significantly over the past two years and has become a top priority for digital education transformation in many countries. These developments require schools to adapt their academic supervision systems to effectively and ethically guide the use of AI.

In Indonesia, the digital transformation of education is being strengthened through the implementation of the Merdeka Curriculum, which encourages the use of digital technology in the learning process³. Teachers are expected not only to master pedagogical competencies but also to be able to utilize technology creatively and responsibly. Consequently, academic supervision must also shift from a conventional, administration-oriented approach to a professional form of supervision that emphasizes continuous professional development, reflection, collaboration, and data-driven teacher competency development.

Nevertheless, various evaluation results indicate that the implementation of academic supervision in many schools still faces a number of obstacles. Supervision is often conducted merely to fulfill administrative obligations; it does not yet provide constructive feedback, nor does it make optimal use of digital technology. These conditions mean that supervision has not yet been able to sustainably improve teachers' work motivation or performance.

On the other hand, the development of AI also presents new challenges in the form of the potential for technology misuse, overreliance on automated systems, and a decline in the humanistic dimension of the teacher development process. Therefore, the integration of AI into academic supervision must be combined with a character-based approach that places

"Transforming science education with artificial intelligence: Enhancing inquiry-based learning and critical thinking in South African science classrooms," *Eurasia Journal of Mathematics, Science and Technology Education* 21, no. 6 (2025), <https://doi.org/10.29333/ejmste/16532>; I. Lee, "Preparing High School Teachers to Integrate AI Methods into STEM Classrooms," *Proceedings of the 36th Aaai Conference on Artificial Intelligence Aaai 2022* 36, no. Query date: 2026-06-23 03:46:02 (2022): 12783–91, <https://doi.org/10.1609/aaai.v36i11.21557>; O. A. G. Opesemowo, "Artificial intelligence in mathematics education: The good, the bad, and the ugly," *Journal of Pedagogical Research* 8, no. 3 (2024): 333–46, <https://doi.org/10.33902/JPR.202426428>; C. Zhou, "Integration of modern technologies in higher education on the example of artificial intelligence use," *Education and Information Technologies* 28, no. 4 (2023): 3893–910, <https://doi.org/10.1007/s10639-022-11309-9>.

³Ulfa Adilla, "Analisis Konsep Manajemen Kurikulum Merdeka Belajar untuk Meningkatkan Mutu Pendidikan di Madrasah Ibtidaiyah," *NUR EL-ISLAM: Jurnal Pendidikan dan Sosial Keagamaan* 10, no. 2 (2024): 240–62, <https://doi.org/10.51311/nuris.v10i2.502>; Novela Aditiya dan Siti Fatonah, "Upaya Mengembangkan Kompetensi Guru Penggerak di Sekolah Dasar Pada Kurikulum Merdeka Belajar," *Scholaria: Jurnal Pendidikan dan Kebudayaan*, advance online publication, 2023, <https://doi.org/10.24246/j.js.2023.v13.i2.p108-116>; Munawir Munawir dkk., "Implementasi Kurikulum Merdeka pada Mata Pelajaran Agama Islam di Madrasah Ibtidaiyah," *Al-Madrasah: Jurnal Pendidikan Madrasah Ibtidaiyah* 8, no. 1 (2024): 34–34, <https://doi.org/10.35931/am.v8i1.2544>; Muhammad Nasir, "Peran Guru dalam Mengembangkan Kurikulum Merdeka di Madrasah Ibtidaiyah: Tantangan dan Strategi," *Madrasah : Jurnal Pendidikan Madrasah* 2, no. 1 (2025), <https://doi.org/10.61590/mad.v2i1.65>; Mega Novita dkk., "Digitalization of Education in the Implementation of Kurikulum Merdeka," *KnE Social Sciences*, advance online publication, 2022, <https://doi.org/10.18502/kss.v7i19.12438>; Irfail Mar'ie Prabowo dkk., "Analisis Pendidikan Humanis Berbasis Kurikulum Merdeka di MI/SD," *Al-Madrasah: Jurnal Pendidikan Madrasah Ibtidaiyah* 8, no. 1 (2024): 305–305, <https://doi.org/10.35931/am.v8i1.3112>.

the values of integrity, responsibility, professionalism, collaboration, self-reflection, and ethics as its primary foundation⁴. Character-based supervision is expected to ensure that the use of AI not only improves efficiency but also strengthens a positive school culture oriented toward meaningful learning.

Theoretically, this study integrates four main perspectives. First, the theory of Academic Supervision, which emphasizes the function of continuous professional development for teachers. Second, the Technology Acceptance Model (TAM), which explains that perceptions of a technology's ease of use and perceived usefulness influence teachers' acceptance of AI. Third, Self-Determination Theory, which states that intrinsic motivation develops when the needs for competence, autonomy, and relatedness are met. Fourth, the character education approach, which places moral values as the foundation of teachers' professional behavior.

Previous research has generally only examined the influence of academic supervision on teacher performance or the use of AI in learning separately. Research on the integration of AI into character-based academic supervision remains relatively limited, particularly at the elementary school level in Indonesia. Furthermore, few studies have examined the role of teacher motivation as a mediating variable in the relationship between AI-based academic supervision and teacher performance. This gap highlights the need for an academic supervision model capable of integrating intelligent technology with character development.

Based on this background, this study aims to analyze the effect of integrating Artificial Intelligence into character-based academic supervision on elementary school teachers' motivation and performance. The findings are expected to provide a conceptual contribution in the form of developing an academic supervision model that is adaptive to technological advancements, as well as offer practical recommendations for school principals, supervisors,

⁴Nazri Adlani, "Penguatan Pendidikan Karakter Melalui Penerapan Kurikulum Muatan Lokal Gayo di Madrasah Ibtidaiyah Kabupaten Aceh Tengah," *At-Thullab : Jurnal Pendidikan Guru Madrasah Ibtidaiyah* 6, no. 1 (2022): 40–40, <https://doi.org/10.30736/atl.v6i1.698>; Dede Rubai Misbahul Alam dkk., "Urgensi Pendidikan Karakter Islami di Era Disrupsi," *Al-Madrasah: Jurnal Pendidikan Madrasah Ibtidaiyah* 7, no. 3 (2023): 1131–1131, <https://doi.org/10.35931/am.v7i3.2344>; Aspiyah Aspiyah, "Integrasi Kurikulum Pesantren dan Madrasah dalam Meningkatkan Karakter Santri (Studi Kasus di Pondok Pesantren Azzahro)," *Al-Madrasah: Jurnal Pendidikan Madrasah Ibtidaiyah* 8, no. 1 (2024): 231–231, <https://doi.org/10.35931/am.v8i1.2948>; Barotuttaqiyah Barotuttaqiyah dan Siti Mumun Muniroh, "Pengembangan Karakter Empati Siswa Madrasah Ibtidaiyah Melalui (Strategi Pembelajaran)," *Al-Tarbiyah : Jurnal Ilmu Pendidikan Islam* 3, no. 1 (2024): 334–42, <https://doi.org/10.59059/al-tarbiyah.v3i1.1985>; Yosep Arianto dkk., "Peran Guru Dalam Menanamkan Nilai-Nilai Karakter Siswa di Sekolah Menengah Pertama Negeri 1 Talibura," *Didactica : Jurnal Kajian Pendidikan dan Pembelajaran* 3, no. 2 (2023): 67–71, <https://doi.org/10.56393/didactica.v3i2.1795>.

and policymakers in improving educational quality through the use of AI that remains grounded in character values.

RESEARCH METHOD

Type of Research

This study employs a quantitative approach using an explanatory survey design⁵. This approach was chosen because it aims to test causal relationships among variables through hypothesis testing formulated based on theory and previous research findings. The research model is designed to explain the impact of integrating Artificial Intelligence into character-based academic supervision on teachers' motivation and performance.

Time and Location of the Study

The research was conducted from January to April 2026 at a public elementary school in Magelang Regency, Central Java Province. The location was selected based on the increasing implementation of digital transformation in learning and academic supervision following the adoption of the Merdeka Curriculum.

Population and Sample

The study population comprised all public elementary school teachers in Magelang Regency, totaling 1,586 teachers, based on data from the Magelang Regency Education Office for the year 2025. The sample size was determined using the Slovin formula with a 5% margin of error, resulting in a minimum of 310 respondents. To account for incomplete data, the study involved 320 teachers selected using proportional random sampling by subdistrict. This technique was chosen to ensure that every teacher had an equal chance of being selected as a respondent, thereby ensuring the sample was representative of the population's characteristics.

This study involved three main variables: the integration of *Artificial Intelligence* (AI) into character-based academic supervision as the exogenous variable (X), teacher motivation as the intervening variable (M), and teacher performance as the endogenous variable (Y). These three variables were measured through a series of indicators covering the ethical use of technology, the application of *Self-Determination Theory* to motivation, and the Teacher Competency Standards for performance.

⁵J. W. Creswell dan J. D. Creswell, *Research design: Qualitative, quantitative, and mixed methods approaches*, ed. oleh 6th ed. (Sage Publications, 2023).

Data collection was conducted using an online questionnaire (Google Form) with a five-point Likert scale, supported by school profile documentation and brief interviews with school principals. Prior to the study, the instrument was pilot-tested on 50 teachers outside the sample to ensure its validity and reliability, meeting the following criteria: *Factor Loadings* > 0.70, *AVE* > 0.50, *Composite Reliability* > 0.70, and *Cronbach's Alpha* > 0.70.

The data were analyzed using *Partial Least Squares-based Structural Equation Modeling* (SEM-PLS) with SmartPLS 4 software. The analysis stages included descriptive statistical tests, evaluation of *the outer model* (validity and reliability), and evaluation of *the inner model* (R^2 , f^2 , Q^2 , and *Goodness of Fit*).

Hypothesis testing was conducted using the *bootstrapping* technique with 5,000 subsamples, with acceptance criteria of a *t-statistic* > 1.96 and a *p-value* < 0.05. Four hypotheses were tested, including the positive effect of AI integration on motivation (H1) and teacher performance (H2), the positive effect of motivation on performance (H3), and the mediating role of motivation in the effect of AI integration on teacher performance (H4).

RESULTS AND DISCUSSION

Respondent Description

This study involved 320 public elementary school teachers in Magelang Regency as respondents. Based on gender characteristics, the majority of respondents were female, totaling 208 (65.0%), while male respondents numbered 112 (35.0%). In terms of age, the majority of teachers were in the 41–50 age range (38.8%), followed by those aged 31–40 (26.9%), over 50 (22.5%), and under 30 (11.9%). In terms of years of service, the respondents were predominantly teachers with more than 20 years of teaching experience (43.1%), followed by those with 10–20 years of service (36.9%), and those with less than 10 years (20.0%). This demographic profile indicates that the majority of respondents have a sufficient track record and experience to evaluate the implementation of AI-based academic supervision in schools.

Descriptive Analysis of Variables

The results of the descriptive statistical analysis show that all research variables have a mean score above 4.00. The Character-Based Supervision variable recorded the highest mean value of 4.24 (SD = 0.48) in the “very high” category, followed by the Teacher Performance variable at 4.21 (SD = 0.51), which was also categorized as “very high.” Meanwhile, the AI Integration variable had a mean of 4.18 (SD = 0.54), falling into the

“high” category, followed by the Teacher Motivation variable with a mean of 4.16 (SD = 0.57), which also fell into the “high” category. Overall, these results indicate that teachers’ perceptions of AI implementation, character-based academic supervision, work motivation, and teacher performance at the school fall into the high to very high categories.

Outer Model Evaluation

The results of the *outer model* evaluation show that all indicators meet the criteria for convergent validity with *factor loadings* greater than 0.70. Specifically, the range of *factor loadings* for the AI Supervision variable is 0.734–0.912, for the Motivation variable is 0.755–0.905, and for the Performance variable ranges from 0.742 to 0.918. Furthermore, all research constructs were found to have excellent validity and reliability. This is demonstrated by *Average Variance Extracted* (AVE) values that all exceeded 0.50, namely Supervisory AI (0.716), Motivation (0.701), and Performance (0.725). In addition, the *Composite Reliability* values for all constructs were above 0.90, including Supervisory AI (0.948), Motivation (0.944), and Performance (0.951).

Inner Model Evaluation

The results of hypothesis testing using the *bootstrapping* technique indicate that all research hypotheses were accepted because they met the criteria of a *t-statistic* greater than 1.96 and a *p-value* less than 0.05. Specifically, AI integration was found to have a positive and significant effect on teacher motivation (coefficient = 0.689; *t-statistic* = 14.231; *p-value* = 0.000) as well as on teacher performance (coefficient = 0.328; *t-statistic* = 5.687; *p-value* = 0.000). Motivation was also found to have a positive and significant effect on teacher performance (coefficient = 0.542; *t-statistic* = 10.364; *p-value* = 0.000). Furthermore, mediation analysis confirmed that motivation significantly mediates the relationship between AI integration and teacher performance (coefficient = 0.373; *t-statistic* = 7.182; *p-value* = 0.000).

Discussion

The Effect of Artificial Intelligence Integration on Teacher Motivation

The research results indicate that the integration of AI in character-based academic supervision has a positive effect on teacher motivation. This suggests that the use of AI in supervision can create a coaching process that is more objective, faster, personalized, and oriented toward teachers’ professional development. The use of AI allows school principals to obtain real-time learning information through the analysis of teaching materials,

assessments, and digital learning activities. The resulting feedback becomes more specific, so that teachers feel they are receiving guidance tailored to their needs.

Furthermore, a character-based approach ensures that the supervision process focuses not only on administrative achievements but also on strengthening integrity, responsibility, collaboration, discipline, and professional reflection. These conditions enhance teachers' intrinsic motivation, as explained in Self-Determination Theory—namely, when individuals receive support for their needs for competence, autonomy, and relatedness. These findings reinforce various previous studies indicating that the use of digital technology in school leadership can increase teacher engagement and motivation.

The Impact of Artificial Intelligence Integration on Teacher Performance

Research shows that integrating AI into academic supervision directly improves teacher performance. This occurs because AI helps school principals conduct supervision more consistently than conventional methods. AI can generate teacher progress reports, detect learning weaknesses, provide recommendations for competency development, and automatically generate follow-up actions. Consequently, teachers receive faster feedback, enabling a continuous process of learning improvement. These findings support the concept of Instructional Leadership, which states that the quality of academic supervision is one of the key factors in improving the quality of learning.

The research results indicate that teacher motivation has the greatest influence on performance improvement. Teachers with high motivation are proven to be more active in developing instructional innovations, quicker to adopt new technologies, highly committed to their students, more open to supervision, and active in participating in professional development. This underscores that the success of AI implementation heavily depends on teachers' psychological readiness to embrace change. Furthermore, motivation was found to act as a significant mediator. This means that AI does not automatically improve performance; rather, it will have an optimal impact only if it first fosters teachers' work motivation. These findings suggest that AI-based academic supervision must be designed as a *human-centered* professional development process, not merely as a tool for administrative digitization.

Theoretically, this study implies the need to expand research on academic supervision by integrating the *Technology Acceptance Model* (TAM), *Self-Determination Theory*, *Instructional Leadership*, and *Character-Based Education* to develop a model relevant to digital transformation. Practically, it is recommended that school principals integrate AI into

the supervision process as a support (not a replacement) for professional decision-making, develop supervision based on *coaching* and reflection, formulate AI ethics policies at the school level, and continuously improve teachers' digital competencies through ongoing training.

The novelty of this study lies in the integration of AI into character-based academic supervision, the inclusion of teacher motivation as a mediating variable, and the development of a digital supervision model that preserves character values. The resulting conceptual model can be implemented at the elementary school level as a form of support for educational transformation toward the "Golden Indonesia 2045" vision.

CONCLUSION

This study affirms that the transformation of academic supervision in the digital age requires more than just the adoption of smart technologies. The success of this transformation demands a balance between technological innovation and character development, so that AI serves as a tool supporting the development of teachers who are professional, highly motivated, adaptable to change, and capable of delivering high-quality learning experiences. The AI- and character-based academic supervision model proposed in this study is expected to serve as a strategic alternative for educational institutions in strengthening innovative, humanistic, and sustainable educational governance, leading to the realization of an excellent and competitive Indonesian education system in the era of Indonesia Emas 2045.

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