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Analyzing the Impact of Artificial Intelligence on the Effectiveness of Lecturers' Teaching Skills

Melda Rumia Rosmery Simorangkir[1],
Universitas Kristen Indonesia
Risma Uly Manalu[2],
Universitas Kristen Indonesia
Edison Siregar[3],
Universitas Kristen Indonesia

ABSTRACT
This study analyzes how lecturers use Artificial Intelligence (AI) in teaching and its effect on teaching effectiveness. The research was conducted at the Christian University of Indonesia (UKI), reflecting the institution's commitment to quality and innovation in higher education. Using a quantitative approach with multiple linear regression, the study involved 52 purposively selected permanent lecturers from the Faculty of Teacher Training and Education and the Faculty of Vocational Studies, all holding at least the rank of Assistant Professor. Results show that AI usage and the level of AI integration, when combined, significantly affect lecturers' ability to teach using AI (R^2 = 0.759). However, individually, only the level of integration was statistically significant, while the frequency of AI use was not. These findings suggest the need for more structured and strategic AI integration to improve teaching skills. The study provides important implications for developing policies that enhance lecturers' technological competencies.

Address for Correspondence:
[1]meldasimorangkir82@gmail.com
[2]rismauly12@gmail.com
[3]edison72gar@yahoo.com

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INTRODUCTION

The use of Artificial Intelligence (AI) in education has seen rapid development and has become a central focus in recent years. AI technologies, including adaptive learning systems, are now recognized as major innovations in educational technology, with adoption expected within the next two to three years (Educause, 2018). A report by Educause experts (2019) projected a 43% increase in the use of AI in educational contexts between 2018 and 2022. Similarly, the 2019 Horizon Report for Higher Education forecasted an even more significant rise in AI applications for teaching and learning. According to Zawacki-Richter et al. (2019), while AI holds immense potential to support teaching and learning processes, its implementation in higher education also raises ethical challenges and new risks. On the one hand, AI enhances analytical capabilities in learning processes, but on the other, it requires large volumes of data, including sensitive information about students and staff, leading to concerns about privacy and data protection (Pedro et al., 2019).

In the current information society, higher education institutions are compelled to reform conventional educational approaches. AI is considered capable of significantly improving education quality at all levels by offering more personalized and efficient learning experiences (Crompton & Song, 2021). AI extends beyond robotics to include the ability to simulate human thinking and behavior through computer-based models (Ririh et al., 2020). A recent survey by Ipsos Global Advisor (2023) found that Indonesia ranks third globally in terms of concern over the future of jobs due to AI. Around 62% of Indonesian respondents expressed concern that AI could replace their jobs—far above the global average of 36%. Nevertheless, most Indonesians (79%) remain optimistic that AI will bring significant change to everyday life within the next three to five years. Additionally, AI is perceived to offer more time for task completion (72%) and broaden access to entertainment (71%). Data from We Are Social (January 2024) showed that 185 million Indonesians, or 66.5% of the national population, are connected to the internet—an increase of 1.5 million users compared to the previous year, reflecting a 0.8% growth. These facts demonstrate that Indonesia's digital ecosystem increasingly supports AI adoption, including in the education sector.

AI has become a major breakthrough of the Industrial Revolution 4.0, with its ability to simulate human cognitive processes and its application in robotic technologies. In this context, students must acquire knowledge and skills aligned with AI developments to remain competitive and adaptable in the global landscape. Therefore, it is crucial for higher education lecturers to integrate these elements into their teaching practices. Research into how lecturers utilize AI in their teaching processes is highly relevant, as it enhances understanding of AI's contribution and impact on educational quality. Amid the uncertainty of today's disruptive era, universities face multidimensional challenges that demand continuous transformation and innovation. This urgency aligns with the vision of Universitas Kristen Indonesia (UKI), which aspires to become a high-quality, independent, and innovative institution in carrying out the Tridharma of Higher Education. This commitment is reflected in the vision of the Faculty of Teacher Training and Education at UKI to excel in implementing the Tridharma independently and innovatively, and the vision of the Faculty of Vocational Studies at UKI to become a nationally and ASEAN-recognized vocational institution by 2028, upholding Christian values and the national culture rooted in Pancasila.

Theoretical Framework

1. Higher Education

According to Law No. 20 of 2003 on the National Education System (Sisdiknas), Article 1, paragraph 1, education is a deliberate and structured effort to create a learning environment and learning process that allows students to actively develop their potential—spiritually, intellectually, morally, and socially—to benefit themselves, their communities, and the nation. Higher education plays a critical role in implementing the Tridharma: teaching, research, and community service (Fadhli, 2020). Universities must be supported by a human resource team, especially lecturers, who are responsible for both academic and administrative tasks (Mardikaningsih & Darmawan, 2022).

Matei and Iwinska (2018) outlined several roles of higher education institutions: (1) contributing to national economic development; (2) strengthening democracy and political innovation; (3) participating in national development and reinforcing national identity; and (4) enhancing a country's position and reputation internationally. As educational institutions, universities play a vital role in developing human resources. The main future challenge is to improve quality by reinforcing several fundamental aspects (Khairuddin, 2019).

2. Artificial Intelligence (AI)

Recent developments in Virtual Reality (VR), Augmented Reality (AR), and Artificial Intelligence (AI) and their applications in education—such as the use of Oculus 3D Surgical Theaters in neurosurgery training—illustrate how AI is transforming various fields (Chassignol et al., 2018). AI has great potential to reshape human work patterns, social interaction, and global decision-making processes (Mahira et al., 2023). In higher education, AI is used to perform tasks that typically require human intelligence, including visual recognition, speech recognition, decision-making, and language translation (Weerasinghe & Mitrovic, 2011). Anih & (2020) emphasized the shift from "educational technology" to "learning technology," which encompasses the theory and practice of instructional design and development. AI now plays a crucial role in modern life, influencing nearly all fields and reshaping society in the era of advanced technologies (Farwati, 2023).

3. Artificial Intelligence in Education

Hwang (2014) noted that a key purpose of AI in education is to provide personalized learning support tailored to students' learning status, preferences, and individual characteristics. AI has garnered increasing attention from researchers in both computer science and education due to its rapid advancement (Hwang et al., 2020). AI-powered algorithms can analyze vast amounts of data to create customized learning pathways for each student (Safii & Amanda, 2023). AI can transform education systems by personalizing learning experiences, fostering student empowerment, and stimulating critical thinking (Yulianti et al., 2023), while also dynamically adjusting learning to individual needs (Liriwati, 2023). The use of AI in self-directed learning enables students to utilize informal digital learning platforms such as YouTube, Instagram, and ChatGPT (Restiawan & Ula, 2023), making it a powerful tool for educators to organize and analyze data, such as grading and assessment (Afrita, 2023).

METHOD

This study employed a quantitative approach, characterized by a structured, systematic, and detailed design from the research planning stage. The planning involved defining objectives, identifying the research subjects and objects, selecting samples, determining data sources, and specifying techniques for data collection and analysis. According to Sugiyono (2014), a population is defined as the entire generalization area consisting of objects or subjects that possess specific characteristics, selected by the researcher for study and from which conclusions are drawn. The population of this study comprised all permanent lecturers at Universitas Kristen Indonesia (UKI). The sample was selected using a non-probability sampling technique with a purposive sampling approach, which involves selecting respondents based on specific criteria. The criteria included permanent lecturers from the Faculty of Teacher Training and Education and the Faculty of Vocational Studies at UKI, with academic ranks ranging from Assistant Lecturer to Full Professor. Based on these criteria, a total of 52 lecturers were included as respondents. The data were analyzed using multiple linear regression analysis. This model was used to determine the relationship between the dependent variable and one or more independent variables, aiming to predict the average value of the dependent variable based on the given values of the independent variables.

RESULTS AND DISCUSSION

1. Linear Regression Analysis

Table 1. Linear Regression Results

Model Summary - Y

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	7.248
H_1	0.871	0.759	0.747	3.645

This study analyzed the influence of the Use of Artificial Intelligence (AI) (X1) and the Level of AI Integration (X2) on the Ability to Use AI Technology (Y) through linear regression analysis. The Model Summary results show a comparison between the null model (H_0) and the alternative model (H_1):

1) The null model (H_0) is the baseline model that does not include the independent variables (X1 and X2). The R^2 value of 0.000 indicates that this model is unable to explain the variance in the dependent variable (Y), which is the ability to use AI technology.
2) The alternative model (H_1) includes the independent variables X1 (Use of AI) and X2 (Level of AI Integration). The R value of 0.871 shows a very strong correlation between the independent and dependent variables. The R^2 value of 0.759 indicates that

approximately 75.9% of the variance in the ability to use AI technology (Y) can be explained by the combination of X1 and X2.

Overall, these findings emphasize that both the use of AI in teaching and its integration into the educational system play a crucial role in enhancing individuals' ability to operate and benefit from AI technology. The constructed linear regression model proves effective in predicting this ability, showing far better performance than the model without predictor variables. Therefore, strengthening AI utilization in teaching practices and increasing its curricular integration may serve as essential strategies in developing students' technological competencies in the digital era.

2. ANOVA Analysis

Table 2. ANOVA Results

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	1675.108	2	837.554	63.050	< .001
	Residual	531.357	40	13.284		
	Total	2206.465	42			

Note. The intercept model is omitted, as no meaningful information can be shown.

The ANOVA (Analysis of Variance) results indicate that the regression model involving two predictor variables, namely the Use of Artificial Intelligence (X1) and the Level of AI Integration (X2), has a significant effect on the dependent variable, namely the Ability to Use AI Technology (Y). This is shown by the F-value of 63.050 with a significance level of $p < .001$, suggesting that the regression model as a whole is significantly different from the intercept-only model. In other words, at least one of the predictor variables significantly contributes to explaining the variation in the dependent variable. The Sum of Squares for regression is 1675.108 with degrees of freedom (df) of 2, while the residual Sum of Squares is 531.357 with df = 40. The total variation in the data is 2206.465, divided between the variation explained by the regression model and the unexplained (residual) variation. The Mean Square for the regression (837.554) is substantially higher than the Residual Mean Square (13.284), indicating that the variation explained by the model is much greater than the unexplained variation. These results confirm that the regression model, which includes the two independent variables (X1 and X2), is significantly effective in predicting the Ability to Use AI Technology (Y), and is thus suitable for further analysis.

3. Coefficient Analysis

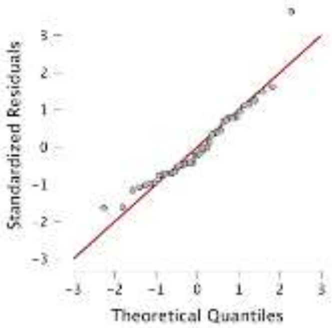
Table 3. Coefficient Results

Coefficients

							Collinearity Statistics	
Model		Unstandardized	Standard Error	Standardized	t	p	Tolerance	VIF
H_0	(Intercept)	27.581	1.105		24.953	< .001		
H_1	(Intercept)	6.062	2.032		2.984	0.005		
	X1	0.122	0.138	0.099	0.883	0.383	0.474	2.108
	X2	0.941	0.133	0.797	7.070	< .001	0.474	2.108

In multiple linear regression, the coefficient analysis is used to evaluate the contribution of each independent variable in predicting the dependent variable and to examine the relationship among the variables. The intercept for the null model (H_0) is 27.581 with a standard error of 1.105, a t-value of 24.953, and a p-value of < .001, indicating that the intercept is statistically significant. This reflects the predicted value of the dependent variable when all independent variables (X1 and X2) are zero. In the alternative model (H_1), the intercept is 6.062 with a standard error of 2.032, t-value of 2.984, and p-value of 0.005, which is also statistically significant, albeit smaller than in H_0. The coefficient for X1 (AI Use) is 0.122 with a p-value of 0.383 (> 0.05), indicating it is not a significant predictor of Y. Meanwhile, X2 (AI Integration) has a coefficient of 0.941, a t-value of 7.070, and a p-value < .001, confirming its significant influence on the ability to use AI in teaching. Tolerance values for both variables are 0.474, with VIF values of 2.108, suggesting no serious multicollinearity issues. Overall, while AI integration significantly predicts teaching competency, the frequency of AI use alone is not sufficient. This emphasizes the importance of a structured AI integration strategy in curriculum and pedagogy to improve teaching effectiveness.

4. Q-Q Plot Analysis



The normal Q-Q (quantile-quantile) plot is a diagnostic tool commonly used in linear regression analysis to assess whether the residuals (errors) of a model are normally distributed. In the context of this study, the regression model aims to predict lecturers' ability to use AI technology (Y) based on two predictors: extent of AI use (X1) and level of AI integration (X2). Assessing the normality of residuals is essential because it underpins the validity of many statistical inferences in linear regression, such as hypothesis testing, confidence intervals, and significance levels of regression coefficients. If the residuals are not normally distributed, the reliability of these statistical inferences becomes questionable.

The Q-Q plot works by comparing the standardized residuals from the model with the quantiles of a normal distribution. On this plot, the horizontal axis represents the theoretical quantiles expected under perfect normality, while the vertical axis shows the actual standardized residuals derived from the regression model. Ideally, if the residuals are normally distributed, the points should fall approximately along the reference (diagonal) line. In the presented plot, the data points generally align closely with the red diagonal line, particularly in the middle range, indicating that the central distribution of the residuals follows a normal pattern.

Although there are a few points that deviate slightly at the tails—especially one observation in the upper-right quadrant—these deviations appear mild and do not indicate a serious departure from normality. Such small departures at the extremes are not uncommon in real-world data and typically do not invalidate the overall model assumptions, unless they reflect a pattern of skewness or heavy-tailedness. In this case, the deviations appear random and isolated, suggesting that the residual distribution is approximately symmetric and free from extreme outliers that could bias the model estimation. Moreover, the linear trend observed in the Q-Q plot also indirectly supports the assumption of homoscedasticity, or constant variance of residuals across the range of fitted values. When residuals are normally distributed and evenly spread along the theoretical line, it suggests that the variance of the error terms remains stable, which is a key assumption of the Ordinary Least Squares (OLS) method. Violations of this assumption could otherwise lead to inefficient estimates and misleading hypothesis tests. Therefore, this Q-Q plot not only validates the normality assumption but also offers reassurance about the overall reliability of the model structure.

The satisfactory normality of residuals also allows researchers to trust the predictive power of the regression model. Since both predictors—extent of AI use and level of AI integration—are assumed to influence the dependent variable, confirming the validity of residual assumptions enables the researcher to interpret regression coefficients with greater confidence. For instance, a statistically significant positive coefficient for AI integration level would credibly suggest that higher integration correlates with improved ability to use AI tools in teaching. Without normally distributed residuals, such interpretations might lack empirical justification. In summary, the Q-Q plot presented offers visual confirmation that the residuals from the regression model are approximately normally distributed. This strengthens the diagnostic robustness of the regression model used to evaluate teaching capabilities in the AI context. With this key assumption upheld, the model is statistically valid for further analysis, including inferential testing, policy formulation, and academic publication. The visual diagnostic adds to the empirical trustworthiness of the findings and supports the claim that the predictors included are well-specified and meaningful within the context of AI-enhanced educational practices.

CONCLUSION

Based on the research conducted within the Faculty of Teacher Training and Education and the Faculty of Vocational Studies at Universitas Kristen Indonesia (UKI), it can be concluded that the use of Artificial Intelligence (AI) is significantly related to the effectiveness of teaching skills, particularly in terms of lecturers' ability to utilize AI technology in the learning process. The multiple linear regression model produced an R-value of 0.871 and an R^2 value of 0.759, indicating that 75.9% of the variance in AI-related teaching skills can be explained by the variables of AI use (X1) and AI integration (X2). This suggests that AI is not merely a support tool, but a strategic component in shaping and strengthening pedagogical competence in the digital era. However, regression coefficients show that only the AI integration variable (X2) has a statistically significant effect on teaching ability, with a coefficient of 0.941 and a p-value $< .001$. In contrast, the AI use variable (X1) does not show a statistically significant effect ($p = 0.383$), implying that the frequency or intensity of AI use alone is not enough to enhance teaching effectiveness. This finding highlights the need for AI to be pedagogically and structurally integrated into curriculum, learning strategies, and instructional design—rather than treated as a supplementary tool.

In essence, effective AI integration must be deliberate and educationally grounded to yield tangible improvements in teaching quality. This research provides strong evidence that teaching effectiveness at UKI can be significantly enhanced through deep integration of AI technologies into educational practices. Such findings align with national higher education transformation policies that call for comprehensive and systematic technological adaptation. Therefore, to develop adaptive and innovative faculty competencies, institutional support is required in the form of continuous training, technology-based curriculum development, and digital platforms that facilitate collaboration between pedagogy and AI. These findings are expected to serve as a strategic reference for faculty and university leaders in formulating quality improvement policies for lecturers in the context of 21st-century education.

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REFERENCE

Afrita, J. (2023). Peran Artificial Intelligence dalam Meningkatkan Efisiensi dan Efektifitas Sistem Pendidikan. COMSERVA: Jurnal Penelitian Dan Pengabdian Masyarakat, 2(12), 3181-3187. DOI: 10.59141/comserva.v2i12.731

Anih, E. (2020). Penerapan pembelajaran jarak jauh untuk meningkatkan pemahaman konsep matematis siswa SMP-IT Alamy Subang. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, *5*(2), 221-228. DOI: https://doi.org/10.23969/jp.v5i2.3534

Chassignol, M., Khoroshavin, A., Klimova, A., & Bilyatdinova, A. (2018). Artificial Intelligence trends in education: a narrative overview. *Procedia Computer Science*, *136*, 16-24. https://doi.org/10.1016/j.procs.2018.08.233

Crompton, H., & Song, D. (2021). *The potential of artificial intelligence in higher education. Revista virtual Universidad catolica del Norte,* 62. DOI: 10.35575/rvucn.n62a1

EDUCAUSE. (2018). *Horizon report: 2018 higher education edition. Retrieved from EDUCAUSE Learning Initiative and The New Media Consortium website*:https://library.educause.edu/~/media/files/library/2018/8/2018horizonreport.pdf

EDUCAUSE. (2019). *Horizon report: 2019 higher education edition. Retrieved from EDUCAUSE Learning Initiative and The New Media Consortium website*:https://library.educause.edu/-/media/files/library/2019/4/2019horizonreport.pdf

Fadhli, M. (2020). S*istem Penjaminan Mutu Internal Dan Ekstenal Pada* Lembaga Pendidikan Tinggi. Al-Tanzim: Jurnal Manajemen Pendidikan Islam, 4(2), 171-183. http://doi.org/10.33650/al-tanzim.v4i2. 1148

Farwati, M., Salsabila, I. T., Navira, K. R., & Sutabri, T. (2023). *Analisa Pengaruh Teknologi Artificial Intelligence (Ai) Dalam Kehidupan Sehari-Hari. JURSIMA,* 11(1), 39-45. DOI: https://doi.org/10.47024/js.v11i1.563

Hwang, G. J. *(2014).* Definition, framework and research issues of smart learning environments-a context-aware ubiquitous learning perspective. Smart Learning Environments*, 1, 1-14.*

Hwang, G. J., Xie, H., Wah, B. W., & Gašević, D. (2020). Vision, challenges, roles and research issues of Artificial Intelligence in Education. Computers and Education: Artificial Intelligence, *1, 100001.* https://doi.org/10.1016/j.caeai.2020.100001

Ipsos. (2023). Indonesia Ranks Third Globally in Concerns over Future Job Security – Ipsos' Global Advisor survey. Majority of Indonesians expect AI will be leading to the loss of their current jobs.

Khairuddin, K. (2019). *Program Peningkatan Kualitas Sumber Daya Pendidikan (Dosen) Bagi Perguruan Tinggi. Al-Afkar: Manajemen pendidikan Islam*, 7(1), 112-134. https://doi.org/10.32520/afkar.v7i1.222

Liriwati, F. Y. (2023). *Transformasi Kurikulum; Kecerdasan Buatan untuk Membangun Pendidikan yang Relevan di Masa Depan. IHSAN: Jurnal Pendidikan Islam*, 1(2), 62-71. https://doi.org/10.61104/ihsan.v1i2.61

Mahira, S. A., Sukoco, I., Barkah, C. S. A., & Novel, N. J. A. (2023). *Teknologi Artificial Intelligence Dalam Analisis Sentimen: Studi Pada Perusahaan Kata*. AI. Responsive, 6(2), 139-148. https://doi.org/10.24198/responsive.v6i2.48064

Mardikaningsih, R., & Darmawan, D. (2022). *Tinjauan Tentang Kualitas Kehidupan Kerja, Kompensasi, Komitmen Organisasi Dan Kontribusi Terhadap Kinerja Dosen. Jurnal Pendidikan dan Konseling (JPDK)*, 4(6), 6511-6521.

Matei, L., & Iwinska, J. (2018). Diverging paths? Institutional autonomy and academic freedom in the European Higher Education Area. European higher education area: The impact of past and future policies, 345-368. https://doi.org/10.1007/978-3-319-77407-7

Pedro, F., Subosa, M., Rivas, A., & Valverde, P. (2019). Artificial intelligence in education: Challenges and opportunities for sustainable development.

Restiawan, R., & Ula, D. M. (2023). *Peran Teknologi Artificial Intelligence (AI) Terhadap Perubahan Sosial Masyarakat. Triwikrama: Jurnal Ilmu Sosial,* 2(2), 148-156. DOI:10.59141/jist.v4i8.657

Safii, M., & Amanda, A. (2023). *Optimisasi Algoritma MOOSRA Pada Seleksi Penerima Beasiswa KIP Kuliah. Jurnal SAINTIKOM (Jurnal Sains Manajemen Informatika dan Komputer)*, 22(2), 555-561. https://doi.org/10.53513/jis.v22i2.9459

Weerasinghe, A., & Mitrovic, A. (2011). Facilitating adaptive tutorial dialogues in EER-tutor. In Artificial Intelligence in Education: 15th International Conference, AIED 2011, Auckland, New Zealand, June 28–July 2011 15 *(pp. 630-631). Springer Berlin Heidelberg.*

Yulianti, G., Bernardi, B., Permana, N., & Wijayanti, F. A. K. W. (2023). *Transformasi Pendidikan Indonesia: Menerapkan Potensi Kecerdasan Buatan (AI).* Journal of Information Systems and Management (JISMA), 2(6), 102-106. https://doi.org/10.4444/jisma.v2i6.1076

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