THE EFFECT OF THE USE OF AI, LEARNING CREATIVITY, AND SELF-EFFICACY ON STUDENT LEARNING INNOVATION
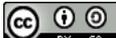
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ABSTRACT

This study aims to examine the effect of artificial intelligence (AI) utilization, learning creativity, and self-efficacy on students' learning innovation. A quantitative approach with a causal associative research design was employed. Data were collected through a survey involving 157 university students selected using purposive random sampling. The research instrument was a Likert-scale questionnaire that had been tested for validity and reliability. Data analysis was conducted using multiple linear regression with the assistance of SPSS software. The results indicate that AI utilization, learning creativity, and self-efficacy have a positive and significant effect on students' learning innovation, both partially and simultaneously. Among the three independent variables, self-efficacy demonstrates the most dominant influence on learning innovation. These findings suggest that learning innovation is not only driven by technological advancement but also strongly influenced by students' psychological readiness and creative capacity. This study contributes to the integration of technological, psychological, and pedagogical perspectives in understanding learning innovation in higher education within the context of digital transformation.

ABSTRAK

Penelitian ini bertujuan untuk menganalisis pengaruh pemanfaatan artificial intelligence (AI), kreativitas belajar, dan efikasi diri terhadap inovasi belajar mahasiswa. Penelitian ini menggunakan pendekatan kuantitatif dengan jenis penelitian asosiatif kausal. Pengumpulan data dilakukan melalui survei terhadap 157 mahasiswa yang dipilih menggunakan teknik purposive random sampling. Instrumen penelitian berupa angket skala likert yang telah di uji validitas dan reliabilitasnya. Analisis data menggunakan regresi linear berganda dengan bantuan program SPSS. Hasil penelitian menunjukkan bahwa pemanfaatan AI, kreativitas belajar, dan efikasi diri memiliki pengaruh positif dan signifikan terhadap inovasi belajar mahasiswa, baik secara parsial maupun simultan. Diantara ketiga variabel tersebut, Efikasi diri memiliki pengaruh paling dominan terhadap inovasi pembelajaran dibandingkan variabel lainnya. Temuan ini menunjukkan bahwa inovasi pembelajaran tidak hanya didorong oleh kemajuan teknologi, tetapi juga sangat dipengaruhi oleh kesiapan psikologis dan kapasitas kreatif siswa. Studi ini berkontribusi pada integrasi perspektif teknologi, psikologi, dan pedagogi dalam memahami inovasi pembelajaran di pendidikan tinggi dalam konteks transformasi digital.

Kata Kunci: *Artificial Intelligence, Kreativitas Belajar, Efikasi Diri, Iinovasi Belajar*

PENDAHULUAN

The development of digital technology in the era of the Industrial Revolution 4.0 to Society 5.0 has brought major transformations in various fields of life, including the higher education sector. The emergence of artificial intelligence (AI) technology is one of the most significant innovations that not only changes the way humans work, but also the way humans learn and acquire knowledge (Paschen et al., 2020;Verganti et al., 2020). In the context of education, AI is used to support personalization of learning, provide adaptive learning recommendations, and assist students in completing various academic tasks more efficiently and effectively (Widodo et al., 2024). AI has great potential in improving the quality of learning through intelligent systems that are able to understand student learning behavior patterns (Zawacki-Richter & Latchem, 2018; Kamil et al., 2025) .

The rapid development of AI technology has also encouraged the presence of various applications that are widely used in the academic world, such as ChatGPT, Grammarly, Quillbot, virtual learning assistants, and AI-based Learning Management Systems (LMS) (Farneste & Bicjutko, 2025;Malik & Chaudhary, 2025). The application provides ease of obtaining information, improving analytical skills, and accelerating the process of completing academic assignments (Farneste & Bicjutko, 2025). The integration of AI in higher education currently includes various aspects, including adaptive learning, evaluation automation, learning analytics, and assistance in research (Hermawan et al., 2024). The presence of such technology not only increases learning efficiency, but also expands access to previously elusive sources of knowledge.

However, the rapid use of AI is inseparable from challenges and concerns. On the one hand, AI provides various advantages such as increased efficiency, speed, and accuracy in learning (Ahmed et al., 2023). On the other hand, excessive use can negatively impact the quality of students' learning processes. Several studies reveal the risk of decreased critical thinking skills, reduced creativity, increased plagiarism, dependence on automated systems, and disruption of affective aspects in education (Joshi et al., 2021). This indicates that the use of AI must be balanced with digital literacy skills and the development of students' independent learning creativity so that the technology really supports the improvement of the quality of learning innovation (Panjabi et al., 2024).

In the context of higher education, students are intellectual and professional candidates who are required to be able to adapt to rapid technological changes (L. M. Sihombing, 2020). Therefore, learning innovation is an important competency that must be possessed to remain relevant and competitive (Baidoo & Ansah, 2023). Learning innovation includes the ability to create new strategies, approaches, or techniques in understanding, managing, and applying knowledge (Harahap et al., 2023). Students who have innovative abilities tend to be more active in the learning process, more daring to try new things, and have better problem-solving skills.

Student learning innovations are influenced by various internal and external factors. Two internal factors that play an important role are creativity, learning, and self-efficacy. Learning creativity encourages students to come up with new ideas, methods, or approaches in the learning process (H. W. Sihombing et al., 2024). Creative students usually don't stick to conventional methods, but try to explore more effective alternative ways (Muntamah & Nawangsari, 2022). Meanwhile, self-efficacy is a person's belief in his ability to complete certain tasks. According to Bandura's theory, self-efficacy affects a person's motivation, perseverance, and ability to face challenges (Rustika, 2022). Students with high self-efficacy tend to be more confident in learning new things, including the use of AI technology in learning.

Although the potential for the use of AI in increasing learning innovation is quite large, there are still research gaps that need to be studied more deeply. Some previous research has focused only on students' perceptions of AI, the impact of AI on academic achievement, or the ethical risks of using AI in education (Juniarti & Sulastika, 2025). Studies that explore the simultaneous relationship between the use of AI, learning creativity, self-efficacy, and student learning innovation are still limited (Abdullah, 2019). In addition, research on the integration of AI in the context of higher education in Indonesia has not been widely conducted, so a more comprehensive study is needed to understand these dynamics in the developing educational environment (Lathifah et al., 2024).

Based on these research gaps, this study aims to empirically analyze how the use of AI, learning creativity, and self-efficacy affect student learning innovation. This research not only makes a theoretical contribution to the development of educational science, but also has practical implications for higher education institutions in designing effective learning strategies in the digital era. Therefore, this research is expected to be able to contribute to enriching the research literature and offer new insights in the development of learning innovations in the era of artificial intelligence.

RESEARCH METHODS

This study uses a quantitative approach with the type of associative research**.** The quantitative approach is used because this study aims to objectively examine the relationship and influence between variables using numerical data (Luckin & Holmes, 2016;Afriani et al., 2025). Meanwhile, associative research was used to determine the influence of independent variables **(**The use of AI, learning creativity, and self-efficacy) on bound variables **(**Student learning innovation), both partially and simultaneously.

This research was conducted using a survey method, where data was collected through the distribution of questionnaires to students as respondents. The data source was taken from one hundred and fifty-seven active students of the Islamic Education Management study program at the State Islamic University Maulana Malik Ibrahim Malang, while the respondents who were selected had met the criteria, namely still active in the study period, had used technology during the study period, and were willing to become respondents by filling out the relevant questionnaire.

This research model consists of three independent variables and one dependent variable with the following operational definition: Utilization of AI (X1): defined as the extent to which students use various AI-based applications and systems (such as ChatGPT, Copilot, Grammarly, Quizizz AI, etc.) effectively in academic activities, both for knowledge exploration, exercises, and scientific paper development.Learning Creativity (X2): The ability of students to think originally, flexibly, and innovatively in finding effective learning solutions and strategies, which is measured by the extent to which students show new ideas, the courage to experiment, the ability to think, and the willingness to find unique solutions in the learning process. Self-Efficacy (X3): Students' confidence in their ability to organize and carry out the necessary learning actions to achieve optimal results. Learning Innovation (Y1): The ability of students to create and implement new ideas, methods, or strategies in the learning process.

The research instrument was in the form of a closed questionnaire with a five-level Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = strongly agree, 5 = strongly disagree) which measured four variables, namely the use of AI, learning creativity, self-efficacy, and learning innovation. The data analysis technique is carried out through the following stages: The

validity test is performed by looking at the r calculation and r tables; Reliability test using Cronbach's Alpha; Classical assumption test using multicollinearity and heteroscedasticity tests; Multiple linear regression analysis; Test hypotheses using t-test (partial) and F-test. Data analysis is carried out with the help of statistical software SPSS version 25.

RESULTS AND DISCUSSION
Results

Based on the results of the validity test, all statement items in the variables of AI Utilization (X1), Learning Creativity (X2), Doro Efficacy (X3), and Learning Innovation (Y1) had a calculated r value greater than the table r (0.156) and a significance value < 0.05. This indicates that all statement items are valid and capable of measuring constructs precisely as can be seen in the following table.

Table 1. Validity test results

Variable	Indicator	r Count	r Table	Significance	a	Remarks
Utilization of AI (X1)	X1.1	0,626	0,156	0,000	0,05	Valid
	X.1.2	0,559	0,156	0,000	0,05	Valid
	X1.3	0,631	0,156	0,000	0,05	Valid
	X1.4	0,595	0,156	0,000	0,05	Valid
	X1.5	0,780	0,156	0,000	0,05	Valid
	X1.6	0,713	0,156	0,000	0,05	Valid
	X1.7	1	0,156	0,000	0,05	Valid
Learning Creativity (X2)	X2.1	0,489	0,156	0,000	0,05	Valid
	X2.2	0,411	0,156	0,000	0,05	Valid
	X2.3	0,590	0,156	0,000	0,05	Valid
	X2.4	0,613	0,156	0,000	0,05	Valid
	X2.5	0,572	0,156	0,000	0,05	Valid
	X2.6	1	0,156	0,000	0,05	Valid
Self-Efficacy (X3)	X3.1	0,460	0,156	0,000	0,05	Valid
	X3.2	0,382	0,156	0,000	0,05	Valid
	X3.3	0,345	0,156	0,000	0,05	Valid
	X3.4	0,545	0,156	0,000	0,05	Valid
	X3.5	0,511	0,156	0,000	0,05	Valid
	X3.6	1	0,156	0,000	0,05	Valid
Learning Innovation (Y)	Y.1	0,721	0,156	0,000	0,05	Valid
	Y.2	0,554	0,156	0,000	0,05	Valid
	Y.3	0,761	0,156	0,000	0,05	Valid
	Y.4	0,640	0,156	0,000	0,05	Valid
	Y.5	0,801	0,156	0,000	0,05	Valid
	Y.6	1	0,156	0,000	0,05	Valid

Furthermore, the results of the reliability test showed that all variables had a Cronbach's Alpha value of > 0.060, with the highest values in the variables Utilization of AI (0.923) and

Learning Innovation (0.909) presented in the following table.

Table 2. Reliability test results

Variable	Cronbach's Alpha	Standard	Remarks
Utilization of AI (X1)	0,923	0,60	Reliable
Learning Creativity (X2)	0,849	0,60	Reliable
Self-Efficacy (X3)	0,778	0,60	Reliable
Learning Innovation (Y)	0,909	0,60	Reliable

Thus, research instruments are declared reliable, consistent, and feasible to be used in the collection of advanced research data. In the classical assumption test, there are multicollinearity and heteroscedasticity tests used by the researcher. The results of the multicollinearity test showed that the Tolerance value was >0.10 and VIF < 10 for all independent variables. This indicates that there is no too strong relationship between the free variables, so the regression model is free from the problem of multicollinearity. This is in accordance with the following result image.

Figure 1. Multicollegiate test results

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	,717	1,311		,547	,585		
	X1	,306	,044	,402	6,991	,000	,608	1,644
	X2	,309	,073	,309	4,227	,000	,376	2,660
	X3	,312	,101	,248	3,102	,002	,315	3,174

a. Dependent Variable: Y1

Meanwhile, the heteroscedasticity test showed that the significance value of each variable was above the limit of 0.05 so that it could be concluded that there were no symptoms of heteroscedasticity in the regression model. This is in accordance with the following result image.

Figure 2. Heteroscedasticity test results

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	VIF
1	(Constant)	3,513	,807		4,352	,000		
	X1	,073	,027	,267	2,695	,008	,608	1,644
	X2	-,042	,045	-,118	-,933	,352	,376	2,660
	X3	-,127	,062	-,283	-2,051	,042	,315	3,174

a. Dependent Variable: Abs_RES

The multiple linear regression equation is determined by the following table.

Table 3. Multiple linear regression equation

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error
1	(Constant)	0,717	1,311
	X1	0,306	,044
	X2	0,309	,073
	X3	0,312	,101

Based on the results of multiple linear regression analysis, the following equations are obtained: $Y = 0.0717 + 0.306X1 + 0.309X2\ 0.312X3$

The equation can be interpreted as follows:

constant (0.717)

The constant value of 0.717 indicates that when the use of AI, learning creativity, and self-efficacy is at constant or zero, the level of student learning innovation is at a base value of 0.717. This indicates that learning innovation still has a basis even without the influence of these three variables.

the effect of the use of AI (X1) on learning innovation (Y1)

The regression coefficient of 0.306 with a significance value of 0.000 shows that the use of AI has a positive and significant effect on student learning innovation. This means that every increase in the use of AI by one unit will increase student learning innovation by 0.306 with the same number of other variables. This indicates that the appropriate use of AI is able to encourage students to develop more innovative ways of learning.

The Influence of Learning Creativity (X2) on Learning Innovation (Y1)

The learning creativity regression coefficient of 0.309 with a significance value of 0.000 shows that learning creativity has a positive and significant influence on student learning innovation. The higher the students' learning creativity, the higher the innovation they display in the learning process.

The effect of Self-Efficacy (X3) on Learning Innovation (Y1)

The self-efficacy coefficient was 0.312 which was the highest value among independent

variables. This shows that self-efficacy has the most dominant influence on student learning innovation. Students with high levels of self-confidence tend to be more daring to try bar8 learning methods, utilize technology, and develop innovative ideas. The results of the F test showed a significance value of < 0.05 which means that the simultaneous use of AI, learning creativity, and self-efficacy have a significant influence on student learning innovation. This is according to the following figure.

Figure 3. Test results F

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1732,824	3	577,608	114,937	,000^b
	Residual	763,868	152	5,025		
	Total	2496,692	155			

a. Dependent Variable: Y1

b. Predictors: (Constant), X3, X1, X2

From the figure 3, it is known that the value of F calculation = 114.937 and f of the table = 2.664. Since F counts > F table, H1 is accepted. This confirms that the regression model used is feasible and significant to explain dependent variables. This means that the use of AI, learning creativity, and self-efficacy simultaneously have a significant effect on learning innovation.

Figure 4. Results of the t-test (partial)

Coefficients^a

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	VIF
1	(Constant)	,717	1,311		,547	,585		
	X1	,306	,044	,402	6,991	,000	,608	1,644
	X2	,309	,073	,309	4,227	,000	,376	2,660
	X3	,312	,101	,248	3,102	,002	,315	3,174

a. Dependent Variable: Y1

From the 4 figures, it can be seen that the results of the t-test are:
AI utilization (X1), t count = 6.991 > t table = 1.975
Learning creativity (X2), t count = 4.227 > t table = 1.975
Self efficacy (X3), t calculation = 3.102 > t table = 1.975

The results of the t-test (partial) showed that the significance of the variables of AI utilization, learning creativity, and self-efficacy < 0.05 respectively. Thus, partially the three independent variables have a significant effect on student learning innovation.

Discussion

The results of the study show that the use of artificial intelligence (AI) has a positive and significant effect on student learning innovation. These findings indicate that the use of AI in academic activities is able to encourage students to develop more varied, adaptive, and efficient learning strategies (Maulana & Paryontri, 2023). AI provides ease of access to information, helps solve problems, and supports personalized learning according to individual student needs (Hermawan et al., 2024). This finding is in line with Luckin's view that AI in education functions as a cognitive partner that can expand students' thinking skills and creativity (Luckin & Holmes, 2016). In addition, Razilu emphasized that the use of

pedagogically integrated AI is able to improve the quality of learning and encourage learning innovation in higher education (Razilu, 2025).

Learning creativity has a positive and significant effect on student learning innovation. This shows that students who have the ability to think creatively tend to be better able to develop new learning methods, integrate various learning resources, and produce original ideas in the academic process (Ahmed et al., 2023). These findings reinforce the theory of constructivism which emphasizes that meaningful learning occurs when students actively build knowledge through exploration and creativity (Lathifah et al., 2024). Creativity allows students to not only receive information, but also to process, modify, and apply it in new contexts. Muntamah and Nawangsari's research also confirms that learning creativity is the main foundation of innovation, because innovation is basically born from the ability of individuals to see problems from different perspectives (Muntamah & Nawangsari, 2022). Thus, learning creativity is an important prerequisite for the emergence of learning innovations in the digital era.

Self-efficacy has the most dominant influence on student learning innovation compared to other variables. Students who have high confidence in their abilities tend to be more courageous to try new learning approaches, utilize technology, and take intellectual resources in the learning process (Baidoo-Anu & Ansah, 2023). These findings are in line with the Social Cognitive Theory put forward by Bandura, which states that self-efficacy affects the way individuals think, act, and motivate themselves (Abdullah, 2019). Individuals with high self-efficacy will view challenges as opportunities to grow, not as threats. Empirical research by Maulana and Paryontri also shows that self-efficacy plays an important role in encouraging students' active involvement in innovative learning (Maulana & Paryontri, 2023).

Simultaneously, the use of AI, learning creativity, and self-efficacy has been proven to have a significant effect on student learning innovation. This shows that learning innovation is the result of the interaction between technology (AI) factors and internal student factors (Creativity and self-efficacy) (Widodo et al., 2024). This result strengthens the view of Juniarti and Sulastika who stated that technology-based learning transformation will only be effective if supported by the psychological and cognitive readiness of students (Juniarti & Sulastika, 2025). Technology without creativity and self-efficacy has the potential to become a passive tool that does not produce meaningful innovation (Maulana & Paryontri, 2023) . Thus, universities need to develop learning policies that not only focus on the provision of AI technology, but also on fostering students' learning creativity and self-efficacy through an active, reflective, and project-based learning approach.

CONCLUSION

This study reveals that the use of artificial intelligence (AI), learning creativity, and self-efficacy have a positive and significant effect on student learning innovation, both partially and simultaneously. Self-efficacy is the most dominant factor in encouraging learning innovation, followed by learning creativity and the use of AI. These findings show that learning innovation is not only determined by technological advancements, but also highly dependent on students' psychological readiness and creative abilities. The implication is that universities need to integrate the use of AI pedagogically with learning strategies that are able to strengthen students' learning creativity and self-efficacy. The next research is suggested to use a more diverse approach and add other variables to enrich the study of learning innovations in the era of artificial intelligence.

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