

THE EFFECT OF ARTIFICIAL INTELLIGENCE USE ON STUDENT LEARNING MOTIVATION, MEDIATED BY SELF-REGULATED LEARNING

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ABSTRACT

The development of Artificial Intelligence (AI) in higher education has transformed students' learning patterns, particularly in terms of acquiring information, understanding course material, and completing academic assignments. This study aims to analyze the effect of Artificial Intelligence (AI) utilization on students' learning motivation, mediated by self-regulated learning (SRL). The study employs a mixed-methods approach with a convergent parallel design. Quantitative data were collected through a questionnaire survey, yielding 117 student responses, which were subsequently analyzed using PLS-SEM. Qualitative data were collected through semi-structured interviews and analyzed using thematic analysis. The results indicate that the use of AI has a significant positive effect on SRL but does not directly influence students' learning motivation. An interesting finding was that the use of AI actually has an indirect effect on learning motivation, mediated through SRL, indicating full mediation. The interview results also support the findings of the quantitative analysis, which simultaneously serve as the added value of this research. This study confirms that the effectiveness of using AI in learning is more determined by students' ability to manage the learning process in a reflective and purposeful manner

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INTRODUCTION

The transformation of education in the digital age is driving changes in learning systems toward models that are more flexible, interactive, and technology-based. Advances in digital technology are not only changing learning media but also influencing learning patterns, academic interactions, and the ways in which students acquire knowledge. One technology that is rapidly evolving in the world of education is OpenAI ChatGPT, a generative artificial intelligence platform widely used by students in their academic activities. The use of ChatGPT among students is increasing because it provides quick,

interactive responses and is easily accessible at any time (Ifani et al., 2024; Niyu et al., 2024). Students use ChatGPT to search for references, understand course material, develop writing ideas, translate academic texts, and even complete assignments. This phenomenon indicates that ChatGPT is becoming an integral part of the digital learning ecosystem in higher education.

The use of ChatGPT in learning is also closely linked to student motivation. Learning motivation is a psychological factor that determines students' engagement, perseverance, interest, and behavioral orientation in the learning process. Students with high motivation tend to be more active in attending classes, are able to sustain their learning efforts, and have a better academic orientation (Setiayadi et al., 2025; Yanti et al., 2026). Low learning motivation can lead to low academic participation, a lack of engagement in learning, and a decline in student learning outcomes (Agusnaya et al., 2023; Anderson, 2020a). Learning motivation is a crucial aspect of the successful implementation of digital technology in higher education settings because the use of technology will not yield optimal results without the students' own drive to learn.

The increasingly widespread use of ChatGPT has also raised various challenges in the learning process. The ease of obtaining instant answers can lead students to become overly reliant on technology, thereby reducing cognitive engagement and critical thinking skills (Ramadhan et al., 2025; Sonia & Immawati, 2025). Some students use ChatGPT solely to obtain quick answers without engaging in deep analysis and reflection. This situation has the potential to foster passive learning behaviors and diminish the quality of meaningful learning. Uncontrolled use of ChatGPT can also affect academic integrity because students can more easily automate tasks without fully understanding the material (Zaini et al., 2025). This phenomenon indicates that the effectiveness of ChatGPT use is influenced not only by the technology but also by students' ability to control and manage their learning process.

Students' ability to manage the learning process is explained through the concept of Self-Regulated Learning (SRL). SRL refers to an individual's ability to plan, monitor, control, and evaluate the learning process independently (Latipah, 2017; Mahrufah & Rijanto, 2024). Students with high SRL skills tend to be able to set learning goals, choose effective learning strategies, manage their time, and evaluate their academic progress independently (Hutajulu & Hasyim, 2025). SRL is a critical factor in the use of ChatGPT; students are expected to use technology strategically and responsibly. Students with good self-regulation will utilize ChatGPT as a tool for knowledge exploration, whereas students with low self-regulation tend to use the technology immediately without engaging in deep thinking.

The relationship between the use of ChatGPT and SRL reveals complex dynamics. ChatGPT can help students develop self-regulation by providing instant feedback, learning recommendations, and academic assistance that facilitate learning control. Excessive use of ChatGPT, however, can actually weaken self-regulation if students become overly reliant on technological assistance in completing academic tasks (Zulfaa & Wahidib, 2026). This suggests that SRL plays a crucial role in explaining the relationship between ChatGPT use and student learning motivation. Students who are able to manage their learning process independently tend to derive greater benefits from using ChatGPT compared to students with low self-regulation.

Previous research has examined the use of AI in higher education from various perspectives. (Tasya et al., 2025) found that the use of AI has a positive effect on student motivation. (Prayogi & Nasrullah, 2024) explain that AI not only functions as a technological tool but also transforms the way people acquire and use knowledge in the educational process. The Technology Acceptance Model (TAM) approach developed by (Davis & Davis, 2015) explains that technology adoption is influenced by perceived usefulness and perceived ease of use. Students tend to use ChatGPT if they perceive the technology as capable of effectively supporting academic activities and as easy to use. Previous research has largely focused on technology acceptance, digital literacy, and the general effectiveness of AI use without integrating self-regulated learning into the relationship between ChatGPT use and learning motivation.

Limitations of previous research indicate a research gap regarding the scarcity of studies examining the role of SRL as a mediating variable in the relationship between ChatGPT use and student learning motivation. In fact, self-regulation skills are a key factor in determining the effectiveness of technology use on students' learning processes in the digital age. Research on the use of ChatGPT in higher education is also still relatively new, thus requiring further empirical evidence, particularly in the context of students in Indonesia

METHOD

This study employs a mixed-methods approach with a convergent parallel design. This design was chosen because the study aims to integrate quantitative and qualitative data to gain a more comprehensive understanding of the impact of using OpenAI ChatGPT on students' learning motivation through self-regulated learning (SRL). In a convergent parallel design, quantitative and qualitative data collection is conducted simultaneously, analyzed separately, and then integrated during the interpretation of research results (Khabibullah et al., 2024; Setiawan & Jailani, 2025). This approach allows researchers to obtain the strength of statistical data as well as the depth of meaning from participants' experiences. (Rofiqoh & Bashith, 2023) explain that a mixed-methods approach is effective for understanding educational phenomena holistically because it is capable of combining objective and subjective dimensions within a single research framework.

Table 1. Research Design

Data Type	Data Collection Method	Research Subject	Analysis Method
Kuantitatif	Angket/kuisiонер	117 Student	PLS-SEM using SmartPLS
Kualitatif	Semi-structured interview	7 Student	Thematic analysis

Source: Researcher, 2026

Data in the quantitative phase were gathered through a questionnaire administered to 117 students of a State Islamic Religious University (PTKIN) in Malang who were active at the time. The sampling employed for this study is purposive sampling, which implies that the respondents were selected due to certain criteria. Respondent criteria included: (1) active undergraduate students, (2) having used ChatGPT in academic activities, and (3) using ChatGPT to support the learning process, such as understanding material, searching for references, preparing assignments, or solving academic problems. The purposive sampling technique was used because the study required specific respondent characteristics relevant to the research focus.

In-depth interviews were conducted with seven students who were chosen as research informants to collect qualitative data. The informants were from seven different disciplines: The Faculty of Tarbiyah and Teacher Training (FITK), the Faculty of Humanities, the Faculty of Economics, the Faculty of Sharia, the Faculty of Science and Technology, and the Faculty of Psychology. Informants were chosen through purposive sampling, on the basis of the intensity of ChatGPT use and their ability to describe their learning experiences in a reflective manner. Interviews were conducted to investigate students' experiences with using ChatGPT, the learning strategies they used, the types of self-regulation that had formed, and the effect of AI use on learning motivation.

The quantitative instrument was adapted from established theories and previous studies. The ChatGPT use variable was formulated following the Technology Acceptance Model (TAM) (Davis & Davis, 2015), as we included directly the perceived usefulness and perceived ease of use. The self-regulated learning factor was constructed on the basis of the concept of the Academic Self-Regulated Learning Questionnaire (ASLQ) by (Nambiar, 2022) that encompassed learning planning, learning monitoring, as well as self-evaluation. Variables of learning motivation are guided by the indicators of learning motivation from (Putu et al., 2020) which involved desire and will to succeed, drive and necessity to learn, future hopes and aspirations, rewards in learning, fun learning approaches, and a good learning environment and then modified to the context of learning with digital technology.

RESULT AND DISCUSSION

Result

The results of this study are reported with a mixed-methods presentation of quantitative and qualitative results. Quantitative analysis was performed to investigate the association between ChatGPT use, self-regulated learning (SRL), and student learning motivation with Partial Least Squares Structural Equation Modeling (PLS-SEM) method. The intention of this analysis is to uncover both direct and indirect associations among variables. Meanwhile, qualitative analysis was performed via semi-structured interviews to obtain a deeper contextual insight on students' experiences with OpenAI

ChatGPT in the process of learning. The combination of the two data sets is anticipated to shed further light on the evolving AI usage in stimulating student learning motivation in HE.

Quantitative Data

The quantitative results were tested by using the Partial Least Square Structural Equation Modeling (PLS-SEM) method with the support of SmartPLS software. In the analysis there are two predominant steps: the testing of the outer model and the inner model. The testing of the outer model aimed to assess the quality of the research instrument by means of construct validity and reliability assessment. The analysis was done through the outer loading, Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE). A construct is considered to fulfill validity and reliability criteria if it has an outer loading value of ≥ 0.50 , a CR of ≥ 0.70 , and an AVE value of ≥ 0.50 . The following table shows the results of the testing of the outer model in this study.

Table 2. Outer Model Test

Variable	Indicators and Outer Loadings	Cronbach's Alpha	CR	AVE
Use of AI	PA 1 (0.757)	0.889	0.866	0.519
	PA 2 (0.742)			
	PA 3 (0.739)			
	PA 4 (0.668)			
	PA 5 (0.571)			
	PA 6 (0.758)			
	PA 7 (0.730)			
	PA 8 (0.691)			
	PA 9 (0.676)			
	PA 10 (0.729)			
Self Regulated-Learning	SRL 1 (0.734)	0.860	0.891	0.507
	SRL 2 (0.739)			
	SRL 3 (0.576)			
	SRL 4 (0.720)			
	SRL 5 (0.556)			
	SRL 6 (0.768)			
	SRL 7 (0.616)			
	SRL 8 (0.736)			
	SRL 9 (0.729)			
Motivation to Learn	MB 1 (0.748)	0.814	0.866	0.519
	MB 2 (0.670)			
	MB 3 (0.753)			
	MB 4 (0.691)			
	MB 5 (0.630)			
	MB 6 (0.720)			
	MB 7 (0.633)			
	MB 8 (0.657)			

Source: Researcher's Data, 2026

The results of the construct validity test indicate that all indicators for the variables AI Use, Self-Regulated Learning, and Learning Motivation meet the validity criteria based on their outer loading values. All indicators had values above the minimum threshold of 0.50, thus being declared convergent valid. According to (Noviyanti, 2019), outer loading values ≥ 0.50 are acceptable in exploratory research, while values ≥ 0.70 are categorized as ideal because they indicate a strong

contribution of the indicators to the construct. The loading values for the AI Use variable range from 0.571 to 0.758, for the Self-Regulated Learning variable from 0.556 to 0.768, and for the Learning Motivation variable from 0.630 to 0.753. Although there are several indicators with moderate loading values, such as PA5 and SRL5, these indicators can still be retained because the construct still meets the criteria for reliability and AVE (Suhanta, 2022). The validity of the measurement model is also supported by composite reliability values above 0.70 for all variables. The Composite Reliability values for each variable range from 0.866 to 0.891, indicating strong internal consistency. This aligns with the recommendation by (Puspitasari, 2016), who states that a reliability value of ≥ 0.70 is sufficient for social science research. Furthermore, the Average Variance Extracted (AVE) values for all constructs have also exceeded the minimum threshold of 0.50, ranging from 0.507 to 0.519, indicating that more than half of the variance in the indicators can be explained by the constructs being measured (Sofyani & Survei, 2025). The data can then be further analyzed using the inner model to answer the research questions in this study.

Table 3. Inner Model

Path Analysis	Koefisien Path (β)	t-statistik	p-value
The Use of AI -> Learning Motivation	0.185	1.938	0.053
The Use of AI -> SRL	0.793	21.230	0.000
SRL-> Learning Motivation	0.717	8.418	0.000
The Use of AI -> SRL-> Learning Motivation	0.502	7.336	0.000

Source: Researcher's Data, 2026

The table above shows that the path analysis results indicate that the use of AI does not have a direct effect on learning motivation, as it has a coefficient of 0.185 with a p-value of 0.053, making it insignificant at the 5% level. The use of AI has a very strong and significant effect on Self-Regulated Learning with a coefficient of 0.793 (p-value 0.000). Self-Regulated Learning also has a significant effect on Learning Motivation with a coefficient of 0.717 (p-value 0.000). A mediation effect of 0.502 with a p-value of 0.000 indicates that the use of AI indirectly influences Learning Motivation through Self-Regulated Learning. This finding confirms that an increase in motivation only occurs when the use of AI is accompanied by good self-regulation skills.

Qualitative Data

In addition to conducting quantitative analysis using PLS-SEM, this study also conducted in-depth interviews with students to validate the statistical results and gain a more contextual understanding of ChatGPT's use in the learning process. The interview results were used to confirm the quantitative findings and identify students' experiences regarding learning motivation and self-regulated learning (SRL) in AI-based learning. Seven students from various faculties at UIN Malang were interviewed in depth to ensure alignment between the quantitative results and students' real-world experiences while using ChatGPT in academic activities. The interview results indicate that the use of ChatGPT is associated with three main aspects: enhanced learning comprehension, strengthened self-regulated learning, and the emergence of awareness regarding the wise use of AI. Most students stated that ChatGPT helped them understand difficult material through explanations that were simpler, more concise, and easier to understand compared to formal academic sources such as journals and books.

Students primarily use ChatGPT to find initial explanations of course material, create summaries, obtain additional references, and gain assistance in understanding the steps to complete academic assignments. The use of AI makes the learning process feel more flexible and efficient, as students can receive quick feedback tailored to their learning needs. Interview results indicate that these conditions contribute to increased motivation, self-confidence, and student interest in the learning process. Analysis of the interview results shows that students do not use ChatGPT passively. Most informants admitted to double-checking the AI's answers using journals, books, or course materials. This activity demonstrates a process of self-monitoring and self-evaluation, which is a crucial component of self-regulated learning. Students also began developing more independent learning strategies, such as taking notes, setting learning goals, summarizing course material, and evaluating their understanding after using ChatGPT.

The interview results also indicate that using ChatGPT helps students create a more engaging and less monotonous learning experience. Students feel more comfortable learning because they can obtain additional explanations without fear of

making mistakes or feeling embarrassed when asking questions. The use of AI also helps students reduce academic stress when facing difficult material or a heavy course load. However, some students acknowledge the potential for dependency on AI if it is used excessively. Students realize that uncontrolled use of ChatGPT can reduce independent thinking and make the learning process too instantaneous. Therefore, most students believe that AI should be used as a learning aid, not as a substitute for the academic thinking process.

Discussion

The results of the study indicate that the use of Artificial Intelligence (AI) does not have a significant direct effect on students' motivation to learn. Path analysis results show a coefficient value of 0.185 with a t-statistic of 1.938 and a p-value of 0.053. These values indicate that the relationship between the use of AI and learning motivation is above the significance threshold of 0.05, meaning the resulting direct effect is not yet statistically significant. This finding suggests that the use of AI in learning does not directly increase students' learning motivation. This research finding aligns with the study by (Sari et al., 2026), which found that students' learning motivation does not develop linearly through the use of AI. That study explains that the influence of AI on learning motivation is highly influenced by an individual's ability to utilize technology appropriately. Findings indicate that the use of AI in learning provides more practical benefits in the form of learning efficiency rather than an increase in students' intrinsic motivation (Sinaga et al., 2026; Wandini et al., 2025a) This suggests that AI tends to function as an academic aid rather than a primary factor shaping learning motivation.

The interview results show that most students use AI to help them understand difficult material, obtain additional explanations, find references, and complete academic assignments more quickly. Students believe that using AI makes the learning process more practical and flexible because information can be accessed anytime to meet their learning needs. However, some students admit that AI is sometimes used merely to get instant answers without engaging in deeper learning exploration. These findings explain why the use of AI has not yet directly boosted learning motivation, as students tend to use the technology for academic efficiency rather than to foster deeper engagement in learning.

The Self-Determination Theory perspective, developed by Edward L. Deci and Richard M. Ryan, explains that learning motivation is influenced by psychological needs such as competence, autonomy, and social relatedness (Manninen et al., 2022). The use of technology will only enhance motivation if it can optimally support these psychological needs. In this study, AI has not yet been fully capable of fostering students' intrinsic learning engagement because some students still use technology passively and are focused on instant task completion. This finding also supports the research by (Sahabuddin et al., 2025), which states that the use of AI without proper learning management can actually increase students' academic dependence.

Furthermore, the data indicate that the use of Artificial Intelligence has a very strong influence on students' self-regulated learning (SRL). The results of the path analysis show a coefficient value of 0.793 with a t-statistic of 21.230 and a p-value of 0.000. These values indicate that the use of AI significantly contributes to improving students' ability to manage their learning process independently. These findings demonstrate that AI assists students in planning their learning, monitoring their understanding of the material, managing learning strategies, and conducting self-assessment throughout the learning process. These findings align with the research by (Dinita et al., 2026), which showed that the use of AI in digital learning can enhance students' self-regulation abilities because students gain access to more flexible and personalized learning opportunities. Other studies also indicate that AI helps students achieve learning efficiency through the provision of rapid and adaptive feedback (Dewantara & Dewi, 2025; Dinita et al., 2026). The presence of AI makes it easier for students to obtain additional explanations when they encounter difficulties understanding the material, thereby enabling the monitoring and evaluation of learning to be conducted more effectively.

The interview results reinforce these findings. Most students explained that using AI helps them organize their learning process more systematically, especially when understanding material they find difficult. Students use AI to find additional explanations, obtain simpler examples, and help summarize key points from course material. Some students also admitted to double-checking AI answers through journals, books, or materials provided by instructors to ensure the accuracy of the information. This process demonstrates monitoring and evaluation activities, which are an important part of SRL.

These findings show that students do not rely entirely on AI but are beginning to utilize the technology as a tool to support their independent understanding, control, and evaluation of their learning process.

The results of the path analysis showed an indirect effect value of 0.502 with a t-statistic of 7.336 and a p-value of 0.000, indicating a significant mediating effect. This finding suggests that the use of AI does not directly increase learning motivation but exerts an influence through the enhancement of students' self-regulation abilities. This relationship pattern indicates that SRL acts as a psychological mechanism bridging the link between AI utilization and students' learning motivation. This finding reinforces previous research showing that the effectiveness of educational technology is highly influenced by students' readiness to manage their learning processes independently. Research by Davis and Davis (2015) using the Technology Acceptance Model explains that technology perceived as easy and beneficial will be used more effectively if users possess good behavioral readiness and learning strategies. In the context of this study, students with high self-regulation tend to be able to utilize AI more optimally compared to students who use AI passively. These findings indicate that the success of AI use in higher education is determined not only by technological sophistication but also by students' ability to utilize technology critically, reflectively, and purposefully.

Previous research has also shown that the use of AI in learning does not always have a positive impact on students. Several studies explain that excessive use of AI without proper learning management can lead students to become more reliant on instant answers, diminish critical thinking skills and creativity, and reduce interest in independent learning exploration (Meidiah et al., 2025; Nasution et al., 2025; Saragih et al., 2026). However, this does not fully occur if students are able to use AI wisely and continue to evaluate the information obtained. This means that students with strong self-regulated learning (SRL) skills tend to be able to utilize AI as a learning aid without reducing their engagement in the independent learning process.

The results of this study imply that the integration of Artificial Intelligence into higher education learning must be accompanied by the strengthening of students' SRL skills. Higher education institutions must not only provide access to AI technology but also develop learning experiences that foster critical thinking, self-reflection, and the management of independent learning strategies. Instructors should guide students in using AI as a tool to support academic exploration and reinforce conceptual understanding, rather than merely as a means of instantly completing assignments. In this way, the use of AI can support meaningful learning and more effectively enhance students' motivation to learn.

CONCLUSION

This study indicates that the use of Artificial Intelligence (AI) does not have a significant direct effect on students' learning motivation. Conversely, the use of AI has a positive and significant effect on self-regulated learning (SRL). SRL was also found to have a significant effect on students' learning motivation. The research results also indicate that SRL mediates the relationship between AI utilization and learning motivation, thus demonstrating a full mediation mechanism. These findings are supported by interview results showing that students use AI to help understand course material, seek additional explanations, create summaries, and verify the information they have obtained. The use of AI also encourages students to be more active in independently monitoring, evaluating, and managing their learning strategies. These findings confirm that the use of AI does not always have a negative impact on students' academic development. Its effectiveness depends on students' ability to manage their learning independently, reflectively, and purposefully. Thus, AI functions not only as a tool but also as a support for self-directed learning in higher education.

The findings of this study imply that the academic world cannot afford to ignore the use of AI in learning in this digital age. However, what needs to be emphasized at this time is how students can develop the ability to select and evaluate information sources from AI and exercise good self-control in using technology. Thus, educational institutions can design curricula that not only focus on how to use technology but are also aimed at strengthening independent learning. For future researchers, it is recommended to further explore variables related to digital literacy, which is predicted to be a factor that also plays a role in the successful use of AI in learning.

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