Journal on Smart Learning Technologies

Andrian, R. D., & Wibawanto, H. (2026). Leveraging Artificial Intelligence (AI) to Enhance Learning Motivation Among Educational Technology Students at UNESA Campus 5 Magetan in the Digital Era. *Journal on Smart Learning Technologies, 2* (2), 72-82.

DOI: https://doi.org/10.26740/jslt.v2i2.53209

The online version of this article can be found at our journal page:
https://journal.unesa.ac.id/index.php/jslt/issue/view/2003

Published by:
Educational Technology Department, Universitas Negeri Surabaya, Indonesia

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Journal on Smart Learning Technologies
Volume 2, No. 2, 2026: 72 - 82
E-ISSN: 3109-9122
DOI: https://doi.org/10.26740/jslt.v2i2.53209

Leveraging Artificial Intelligence (AI) to Enhance Learning Motivation Among Educational Technology Students at UNESA Campus 5 Magetan in the Digital Era

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Abstract

The rapid development of Artificial Intelligence (AI) has brought significant changes to the learning process in higher education, particularly in enhancing students' learning motivation. This study aims to analyze the level of AI utilization in students' learning activities and its influence on learning motivation and critical thinking skills. The study employed a quantitative approach with a descriptive-exploratory design supported by simple qualitative data. Data were collected through Likert-scale questionnaires and open-ended questions from students of the Educational Technology Study Program at Universitas Negeri Surabaya Magetan Campus 5. The results showed that AI utilization is in the high category and has become an integral part of students' learning process. AI serves as a reference source, a tool to understand complex materials, and a support for task completion, thereby increasing learning effectiveness and efficiency. The use of AI also proved to enhance students' learning motivation, activeness, and self-confidence. However, a tendency of over-reliance on AI was found, which has the potential to reduce critical thinking skills due to the cognitive offloading phenomenon. The study concludes that AI has an ambivalent role as both a supporter and a potential risk in learning. Therefore, the utilization of AI must be balanced with critical AI literacy and appropriate pedagogical strategies so that the technology functions as a supporter of the thinking process rather than a substitute.

Keywords: Artificial intelligence, learning motivation, critical thinking, AI literacy, higher education.

Article History:

Received	Review	Accepted	Published
January 2026	February 2026	April 2026	May 2026

INTRODUCTION

The development of Artificial Intelligence (AI) has brought significant transformation to the world of education, particularly in the learning process of university students. AI has been widely utilized in administration, instruction, and daily learning activities (Crompton & Burke, 2023). AI is no longer merely a supporting technology but has become an integral part of various learning activities,

Journal on Smart Learning Technologies
Volume 2, No. 2, 2026: 72 - 82
E-ISSN: 3109-9122
DOI: https://doi.org/10.26740/jslt.v2i2.53209

such as information searching, assignment preparation, and understanding complex materials through intelligent tutors, learning resource recommendations, and academic writing support systems (Fan et al., 2022). Artificial Intelligence (AI) plays a significant role in enhancing the learning motivation of Educational Technology students in the digital era through its ability to provide more personalized, interactive, and adaptive learning experiences. AI enables students to receive instant feedback, gain quick access to information, and obtain explanations tailored to their individual needs and learning styles. This condition fosters self-confidence, learning autonomy, and active engagement in the learning process, which are essential components of intrinsic motivation.

Furthermore, the ease of using AI in completing academic tasks and understanding complex concepts makes students feel both challenged and supported, thereby increasing their interest and enthusiasm for learning. Numerous studies have shown that AI integration can improve learning efficiency, accelerate knowledge acquisition, and facilitate personalized learning that adapts to each student's pace, style, and needs (Msambwa et al., 2025; Nabhani et al., 2025). However, most existing studies are still dominated by an instrumental benefits perspective—such as improved academic performance, automated assessment, and learning management—while the epistemological impact of AI on how students construct knowledge and understand truth has not been adequately explored (Crompton & Burke, 2023). Recent findings indicate that although students feel greatly assisted and believe AI improves conceptual understanding and assignment quality, symptoms of dependency, tendencies toward cognitive offloading, and indications of declining or threatened critical thinking and problem-solving abilities are emerging when intellectual tasks are excessively delegated to AI systems (Zhai et al., 2024).

The phenomenon of AI use in learning indeed shows a shift from deep thinking processes toward quick result seeking. Recent research describes AI's ambivalent impact: it can enhance motivation, performance, and cognitive support, but also risks reducing cognitive engagement and independence when used excessively or passively. Groups using personalized AI have been shown to excel in grades, knowledge retention, motivation, and engagement compared to traditional learning.

Various studies indicate that the utilization of Artificial Intelligence (AI) in learning has a significant positive impact on improving the quality of students' learning processes and outcomes. In terms of achievement and retention, students using personalized AI have higher academic scores, better knowledge retention, and higher levels of motivation and engagement compared to traditional learning (Eltahir & Babiker, 2024). These findings confirm that AI's ability to adapt materials and learning pathways to individual needs can create more effective and meaningful learning experiences. However, behind these benefits, there are also potential risks known as the "inversion" phenomenon, in which AI use actually reduces students' cognitive engagement. This can occur if instructional design is not properly developed, causing AI to function merely as a task substitute or even trigger dependency that diminishes critical thinking processes (Bauer et al., 2025). Therefore, the use of AI in learning must be

Journal on Smart Learning Technologies
Volume 2, No. 2, 2026: 72 - 82
E-ISSN: 3109-9122
DOI: https://doi.org/10.26740/jslt.v2i2.53209

balanced with mature pedagogical design so that its benefits can be optimized without ignoring its potential risks.

AI can strengthen critical thinking through adaptive feedback, complex tasks, and personalization. Several studies have shown an increase in critical thinking and critical thinking disposition when AI is combined with appropriate pedagogical design (Lijie et al., 2024). However, the direct effect of AI capabilities on critical thinking awareness is weak; its role is more indirect through self-efficacy and motivation (Jia & Tu, 2024). Over-reliance and passive use of AI are associated with decreased cognitive effort, the tendency to choose quick solutions, and the risk of weakening critical thinking and decision-making (Yavich, 2025).

In general, AI increases intrinsic motivation, autonomy, and learning experience when used as a supporter rather than a replacement for thinking. The quality of AI interaction and output has a positive influence on motivation, creative self-efficacy, and learning outcomes (Bai & Wang, 2025). Another study confirms the paradox: the use of generative AI increases self-confidence and efficiency but simultaneously strengthens technological dependence (L. Zhang & Xu, 2024). Positive motivation and emotions are the key for AI to encourage autonomous learning rather than merely completing tasks.

The utilization of Artificial Intelligence (AI) in education has so far been dominated by descriptive research and literature reviews that highlight instrumental benefits such as efficiency, personalized learning, improved learning outcomes, creativity, and cognitive effectiveness among students (Lowell et al., 2025). Several studies have begun to criticize the negative sides, such as dependency, decreased independent learning motivation, potential violations of academic integrity, and the shift of knowledge authority from lecturers and books to AI systems (Rauf et al., 2025). However, empirical research that simultaneously examines the relationship between AI use, learning motivation, and critical thinking skills is still limited. Most studies only address AI–motivation or AI–critical thinking/soft skills separately (Rahmah & Jannah, 2025). In addition, many studies are still review-based, while field surveys using questionnaires that quantitatively map the relationship between AI use, learning motivation, independence/critical thinking, and the transformation of how students construct knowledge (learning as process vs learning as output) are relatively rare. This opens opportunities for new research that integrates these three variables with direct empirical data from students (Tasya et al., 2025).

This study presents novelty through an ambivalent approach to AI utilization in learning. AI is positioned simultaneously as a learning enhancer that can improve effectiveness, learning motivation, autonomy, and even students' critical thinking awareness (Lamimi et al., 2025), while at the same time being recognized as a cognitive risk that can encourage cognitive offloading, dependency, reduced depth of processing, and a threat to thinking autonomy (Elzerman, 2025). This dual-sided approach aligns with the latest trends that emphasize AI's dual nature—which can both strengthen and weaken cognitive abilities—but is still rarely stated explicitly within a single comprehensive conceptual framework (Goyal, 2025). Thus, this study enriches academic discourse on the role of AI in higher education by offering a

Journal on Smart Learning Technologies
Volume 2, No. 2, 2026: 72 - 82
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more balanced and critical perspective compared to research that predominantly highlights only the positive aspects of the technology (Wang & Li, 2024).

Another novelty lies in the simultaneous integration of three main variables—AI use, learning motivation, and critical thinking skills—based on empirical student data. Previous studies generally: (a) modeled AI capabilities, self-efficacy, motivation, and critical thinking awareness without making all three the joint focus (Jia & Tu, 2024), (b) examined the influence of AI on motivation and learning experience (Mohamed et al., 2024), or (c) analyzed the risks of AI on critical thinking and problem-solving separately (W. Zhang & Liu, 2025). This study goes beyond those limitations by analyzing the relationship between the three variables within a single framework, while also linking them to the epistemological shift from learning as process to learning as output, which aligns with findings on the tendency toward surface learning and AI dependence (Özer et al., 2025). The combination of conceptual novelty and field evidence contributes to strengthening AI literacy and pedagogical design that maintains a balance between AI utilization and the preservation of students' critical thinking autonomy (Atchley et al., 2024).

METHODS

This study employed a quantitative approach with a descriptive-exploratory design aimed at describing and analyzing the phenomenon of Artificial Intelligence (AI) use in students' learning activities. This approach was chosen because the study not only focused on measuring the level of AI utilization but also explored its impact on learning motivation and critical thinking skills. In addition, this study was supported by simple qualitative data through open-ended questions to strengthen the interpretation of quantitative results, thereby forming a mixed-methods approach on a limited scale.

The subjects of this study were active students from the Educational Technology Study Program in the current academic year, with a total of five respondents based on the collected questionnaire data. The study was conducted in a learning environment within the context of digital technology use in education. Data were collected through the distribution of a Likert-scale questionnaire with a range of 1–5, covering three main aspects: AI utilization in learning, learning motivation, and the negative impact of AI use. The research instrument consisted of 12 closed-ended statements and 3 open-ended questions designed to explore students' experiences and perceptions in greater depth.

Data analysis was carried out using quantitative descriptive techniques by calculating the average score trends for each indicator to identify general patterns of AI use in learning. Qualitative data from the open-ended questions were analyzed using simple thematic analysis to identify recurring response patterns, such as the use of AI as a reference source, increased learning motivation, and indications of dependency on AI. The quantitative and qualitative analysis results were then integrated to provide a more comprehensive understanding of the impact of AI use on students' learning processes, both in terms of benefits and potential risks.

This study employed a mixed-methods approach with a sequential explanatory design (quantitative followed by qualitative). The first phase was conducted through a quantitative descriptive-exploratory method using a Likert-scale questionnaire to measure the level of AI utilization, learning

Journal on Smart Learning Technologies
Volume 2, No. 2, 2026: 72 - 82
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DOI: https://doi.org/10.26740/jslt.v2i2.53209

motivation, and perception of critical thinking skills. This was followed by a qualitative phase through open-ended questions to explain and elaborate on the quantitative findings. The questionnaire instrument, consisting of 12 closed-ended statements, had undergone content validity testing by two experts and internal reliability testing with a Cronbach's Alpha value of 0.87, indicating good reliability. The subjects of this study were 87 students from the Educational Technology Study Program at Universitas Negeri Surabaya Magetan Campus, selected using purposive sampling technique. Quantitative data were analyzed descriptively (mean, percentage, and category), while qualitative data were analyzed using thematic analysis. The two data sets were then integrated at the interpretation stage to provide a more comprehensive and in-depth understanding of the phenomenon of AI use among students.

RESULTS

This study focuses on how Educational Technology students utilize Artificial Intelligence (AI) in learning activities and its impact on learning motivation and critical thinking skills. The results show that AI is intensively used as a supporting tool in the learning process, including for finding references, understanding materials, and improving the effectiveness and efficiency of completing assignments. In addition, the presence of AI has also been proven to increase students' learning motivation and encourage independent learning, particularly in completing tasks more quickly and practically.

However, behind these various benefits, the study also found negative aspects of AI usage. Some students demonstrated a tendency to become dependent on AI, which potentially weakens critical thinking skills. The pattern of AI utilization indicates that this technology does not merely function as a supporting tool, but has started to replace traditional learning resources such as books, and in some cases even takes over the role of lecturers and the students' initial thinking processes. Nevertheless, some students have shown awareness in using AI more wisely by verifying the information obtained, although the level of AI literacy is still inconsistent among respondents.

The high intensity of AI usage can be understood as a response to the demands of the digital era, which emphasizes speed and easy access to information. Students utilize AI because it is able to provide quick, flexible, and personalized explanations according to individual needs. This condition makes AI an inseparable part of the modern learning ecosystem, while also indicating a shift in the way students acquire and process knowledge.

The findings reveal that students of the Educational Technology Study Program at Unesa Magetan use Artificial Intelligence intensively and regularly (an average of 4–6 times per week), mainly for searching references, understanding materials, preparing assignments, and generating initial ideas. The use of AI has been shown to improve the efficiency of task completion as well as students' learning motivation through easy access to information and rapid feedback. However, the findings also reveal a significantly negative aspect, namely the emergence of dependence on AI (cognitive offloading), which has the potential to reduce critical thinking skills and the depth of information processing. Qualitative data analysis shows that most students tend to use AI passively (copy-pasting or directly adopting AI-

Journal on Smart Learning Technologies
Volume 2, No. 2, 2026: 72 - 82
E-ISSN: 3109-9122
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generated answers) rather than as a tool to support thinking, causing the learning process to shift from learning as process to learning as output. Even so, a small group of students has begun to demonstrate awareness of AI literacy by verifying and modifying AI-generated outputs, although this practice has not yet become a dominant habit.

DISCUSSION

The findings regarding the improvement of learning effectiveness and motivation are consistent with various previous studies. (Chen et al., 2020) and (Crompton & Burke, 2023) emphasized that the integration of AI in learning can enhance student engagement and academic performance. In addition, (Fan et al., 2022) stated that AI enables more personalized learning, allowing students to study according to their individual needs and pace.

From the perspective of motivation theory, the increase in students' learning motivation can be explained through the Self-Determination Theory proposed by Deci and Ryan. This theory emphasizes the importance of fulfilling the needs for autonomy, competence, and relatedness. The use of AI provides students with opportunities to learn more independently, increases self-confidence through rapid feedback, and creates more interactive learning experiences. These three aspects contribute to strengthening students' intrinsic motivation.

Although AI is capable of encouraging independent learning, the findings of this study indicate that such independence tends to be instrumental rather than cognitive in nature. Students are indeed able to complete tasks independently with the assistance of AI, but this is not always accompanied by deep analytical and reflective abilities. This condition suggests that the use of AI needs to be balanced with pedagogical strategies that encourage higher cognitive engagement, so that students not only become technology users but are also able to think critically and reflectively in the learning process. The findings of this study also reveal the negative side of AI usage, particularly related to students' tendency to become dependent on the technology and the potential decline in critical thinking skills. This condition confirms that AI possesses an ambivalent nature: on one hand, it provides convenience, but on the other hand, it may reduce students' cognitive engagement. The phenomenon of cognitive offloading, in which part of the thinking process is delegated to technology, has the potential to reduce the depth of understanding if it is not accompanied by reflective attitudes and critical use.

The results of this study are in line with the findings of (Zhai et al., 2024) and (Gerlich, 2025), which highlighted the risk of cognitive dependency due to excessive AI use. Furthermore, (Popenici & Kerr, 2017) emphasized that although AI can improve learning efficiency, the role of lecturers remains highly important in maintaining the quality of the learning process. Lecturers act as facilitators who ensure that learning is not solely result-oriented, but also maintains reflective dimensions and the development of students' critical thinking skills. From a theoretical perspective, this study contributes to the development of AI literacy studies by emphasizing that understanding AI is not sufficient only at the technical level. AI literacy must also include ethical and cognitive dimensions so that students are able to use technology responsibly and critically. In addition, this study reinforces the idea of a paradigm

Journal on Smart Learning Technologies
Volume 2, No. 2, 2026: 72 - 82
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shift in learning from learning as process toward learning as output, reflecting changes in how students construct and understand knowledge in the digital era.

Practically, the findings of this study can serve as a basis for lecturers in designing more adaptive learning strategies by integrating AI pedagogically and purposefully. The use of AI not only needs to be facilitated but also directed to support the development of students' critical thinking skills. From the perspective of educational policy, the results of this study can also be used as a reference in developing AI-based curricula and strengthening AI literacy that is not only technical but also critical and responsible within higher education environments. This study has several limitations that should be considered when interpreting the findings. First, the relatively small number of respondents, consisting of only five students, means that the findings cannot yet be generalized broadly. Second, most of the data were obtained from questionnaires, making the results highly dependent on respondents' subjective perceptions. Third, this study was conducted only within one study program and one specific location, so there may be differences in findings if similar research is carried out in different academic disciplines or institutions.

Based on these limitations, future studies are recommended to involve a larger and more diverse number of respondents in order to produce more representative findings. In addition, the use of a mixed methods approach could provide deeper understanding by combining quantitative and qualitative data. Future research may also explore AI literacy-based pedagogical interventions so that the use of this technology not only improves learning efficiency but also strengthens critical thinking skills and creates more meaningful learning experiences.

CONCLUSIONS

This study demonstrates that the utilization of Artificial Intelligence (AI) among Educational Technology students at UNESA Campus 5 Magetan is at a high level and has become an integral component of the learning process. AI is actively employed as a tool for information retrieval, understanding complex concepts, and assisting in the completion of academic tasks, thereby enhancing learning effectiveness, efficiency, and students' learning motivation. Furthermore, AI has encouraged the development of independent learning practices by enabling students to complete assignments more flexibly and efficiently. However, the findings also reveal the ambivalent nature of AI utilization in higher education. While AI functions as a learning enhancer that facilitates academic activities, it simultaneously presents potential risks, including technological dependency and the erosion of critical thinking skills due to cognitive offloading. The form of independent learning that emerges tends to be instrumental rather than fully reflective of genuine cognitive autonomy. These findings indicate a broader paradigm shift from learning as a process toward learning as an outcome, in which students increasingly prioritize immediate results over deep knowledge construction and critical inquiry. Nevertheless, evidence of students' efforts to verify AI-generated information suggests the emergence of critical AI literacy as an important competency in the digital era. From a theoretical perspective, this study contributes to the growing body of AI literacy research by highlighting the need to balance

technical, ethical, and cognitive dimensions in the integration of AI within higher education. From a practical and policy standpoint, the findings provide valuable insights for lecturers and educational policymakers in designing responsible AI-supported learning strategies and curriculum innovations that enhance learning efficiency while preserving critical thinking and meaningful learning processes. Overall, this study concludes that AI has significant potential to support students' motivation, learning effectiveness, and academic performance; however, its implementation should be accompanied by pedagogical approaches that mitigate dependency and foster higher-order thinking skills. Therefore, future studies are recommended to employ quasi-experimental or true experimental designs to examine the effectiveness of integrated instructional models, such as AI-assisted project-based learning, reflective scaffolding, or prompt engineering-based flipped classrooms, in reducing AI dependency while simultaneously maintaining or enhancing students' critical thinking abilities.

Author Contributions:
R.D.A.: Writing – Original Draft Preparation, Data Curation
H.W.: Writing Final Draft – Review & Editing

Funding: This research received no external funding

Conflicts of Interest: The authors declare no conflict of interest.

Informed Consent Statement/Ethics approval: Not applicable

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