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AI in Education: Transforming Student Engagement for the Digital Age

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Abstract: This research explores the transformative role of Artificial Intelligence (AI) in enhancing student engagement in higher education, specifically focusing on Educational Technology students at Yogyakarta State University, Indonesia. Through a descriptive quantitative approach, the study investigates how AI integration affects learning motivation, implementation patterns, and overall educational experiences in the digital era. A purposive sample of 25 fourth-semester students completed a structured questionnaire to assess their knowledge, usage patterns, and perceptions of AI in learning. Results revealed a high level of AI awareness (96%) and experience (100%) among students, though only 64% reported regular implementation in academic activities. Student perceptions were overwhelmingly positive, with 96% acknowledging AI's effective impact on learning, 92% reporting significant learning support, and 88% expressing intention to continue using AI in future studies. Despite these positive outcomes, the motivational aspect of AI received a comparatively lower rating (68%), suggesting areas for improvement. The study identifies AI's potential to create personalized, adaptive, and interactive learning environments while addressing concerns about over-reliance and ethical considerations. This research contributes to understanding how AI can be optimally integrated into higher education to enhance student engagement while maintaining fundamental educational values. The findings suggest that AI serves not as a replacement for educators but as a powerful complementary tool that transforms the educational landscape in the digital age.

Keywords: Artificial intelligence; Digital learning; Educational technology; Higher education; Learning motivation; Student engagement.

Introduction

Digitalization technology is currently accelerating and involves various fields, such as banking, retail, urban, energy, transportation, education, publishing, media and health. Digitalization also has a good impact on the education sector (Mahya & Setiawan, 2024). The field of education has always been heavily influenced by rapid technological developments (Wale, 2024) One of the most transformative innovations is the emergence of Artificial Intelligence (AI), also known as artificial intelligence, which has significantly changed the learning landscape. Artificial Intelligence technology enables organizations to support and improve knowledge management practices (Kharisma et al., 2023).

In general, the term "intelligence" remains a useful concept for understanding machines' ability to reason and solve problems, although we need to develop new conceptual frameworks, given the progress that has been made in this area in recent years. AI representation refers to the process of organizing known information. AI is growing along with the increasing integration of concepts in computer science (Prananta et al., 2023). The existence of AI helps in the learning process that can expand and simplify literature searches (Verawati et al.,

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2025). The rapid and significant development of artificial intelligence (AI) is shaping new habits, people are now utilizing AI to simplify daily human activities (Sugiharto et al., 2023).

The development of Artificial Intelligence (AI) technology, new opportunities are opening up in various aspects of daily life, such as information technology, health, and education. The rise of AI does not occur in isolation from rapid and broader technological advances, whether in frontline operations such as contact centers, or management (Puspitasari et al., 2023). Moreover Recent developments in the field of machine learning have given birth to generative AI - an advanced technology capable of creating various digital contents involving various technologies such as chatbots, augmented reality (AR), virtual reality (VR), and various other technologies (Baidoo-anu & Ansah, 2023). These technologies open up new opportunities for learning, and as the use of generative AI becomes more widespread, especially in education, students' ability to evaluate and edit AI-generated content will become a crucial skill in the future (Radtke & Rummel, 2025). As AI-based applications promise personalized learning experiences by generating adaptive content tailored to individual learners' needs (Creely & Blannin, 2023).

As AI develops and improves, we can expect more innovative applications that will positively affect the future of education and research for the better. education and research for the better. This is corroborated by the opinion that AI has the computational ability to provide human-like responses (Goralski & Tan, 2022) Halim & Prasetyo, 2012). (Tan, 2022; Halim & Prasetyo, 2018). Furthermore, according to Pokrivcakova (2019), artificial intelligence in the education sector focuses on helping educators and supporting on helping educators and supporting the learning process to develop knowledge and skills.

In Asia and Europe, from the perspective of students, AI has grown beyond its role as a conventional learning support tool (Ou et al., 2021). However, this explanation tends to ignore the fact that when it comes to technology in education, it is not yet fully utilized in learning (Kim et al., 2022). We must be *fair to* say that in today's increasingly competitive era, there are still educational institutions that have not implemented AI technology in teaching and learning activities (Yassir & Saharuna, 2024). Survey results show a significant gap in the use of learning technologies in various cou (Fraillon et al. 2019). Only a minority of teachers, less than 50% of respondents, reported intensive use of technology in the learning process. Examples of sharp differences in practice are seen between teachers in South Korea and Denmark who have integrated. technology into their daily teaching routines, in contrast to countries in Germany and Italy who tend to show resistance to the extensive use of technology (Abdellatif et al., 2022).

On the other hand, the K-12 case in the United States clearly shows the benefits of using AI. These AI systems can increase the capacity of the K-12 education system and support social and cognitive development. More specifically, AI applications can support teaching in classrooms with diverse abilities; while personalized learning systems provide detailed feedback and relieve them from excessive workload (Chen et al., 2020).

The rapid development of the times requires all fields including education to adapt in solving problems (Wairisal et al., 2023). AI offers innovative solutions in improving student engagement through more personalized, adaptive and interactive learning. Previous research shows that AI used in learning makes learning more manageable, manageable, collaborative, and authentic (Rusdiawan et al., 2024). Furthermore, Kasneci et al. (2023), stated that AI has potential because it offers various capabilities that can improve the learning and teaching experience for individuals.

The application of AI still poses ethical challenges (Ramoz Saravia & Salazar Rodríguez, 2024). Artificial intelligence developed by AI can produce responses that are almost indistinguishable from humans (Asmiddin et al., 2023). This raises serious concerns of potentially leading to massive dissemination of false information, manipulation of public opinion, and an increase in cases of digital fraud.

The advent of Artificial Intelligence has certainly had a significant impact. Its development presents great opportunities and challenges for learners. Artificial intelligence (AI) has changed the way we learn and teach in education (Sahara et al., 2023). Too high an intensity of AI use can also result in reduced learner participation in activities that involve human connection and collaborative learning. This can hinder the development of the creative and emotional aspects needed for the future. Artificial intelligence can assist in optimization, decision support, and services that make it easier for policymakers to improve their performance (Yusriadi et al., 2023). With the rapid integration of artificial intelligence (AI) in life and work, students need to build confidence in interacting with AI technologies. They must be able to understand, learn, and optimally utilize AI applications as needed (Bewersdorff et al., 2024).

Based on the results of previous research by ElSayary (2024); Okulu & Muslu (2024); Uzumcu & Acilmis (2024) found that it is important to incorporate strategies that illustrate how AI can enhance teaching, learning, critical thinking, and creativity that can equip students in navigating the complex digital environment that is currently filled with AI technologies.

Because it is very likely that students' ability to interact and learn with AI technologies will be

influenced by how well the technologies are applied in practice. Research conducted by Kadiyono & Pardosi (2023) said information and communication technology can make it easier for us to learn and get the information we need from anywhere, anytime, and from anyone. In the world of education, the development of information technology began to have a positive impact because the development of information technology in the world of education began to experience significant changes.

Adolescence is a very crucial stage for motivating students in universities, and research and practice in AI-implemented learning is crucial (Ronsumbre et al., 2023). Education must be able to utilize technology for teaching and learning and evaluation (Abba et al., 2020) Herman et al., 2022). Therefore, this study aims to analyze the various factors that can influence students' engagement in using AI, especially in learning in this digital era.

Method

Research Approach

This research Using a descriptive quantitative approach to evaluate the effectiveness of AI in improving student learning engagement. Descriptive quantitative research is a basic method for explaining a phenomenon based on numerical data collected and analyzed in statistical form (Taherdoost, 2022).

Figure 1. Descriptive quantitative research flow

This study began with problem identification, looking at the low student engagement in learning and the potential use of AI. After that, the research objective was set to assess the effectiveness of AI in increasing learning engagement. This study collected data by surveying using questionnaires and analyzing data from AI systems used in learning. Once the data is collected it is analyzed and then interpreted to understand the extent to which AI contributes to improving student engagement. The flow of objectives in this study is shown in Figure 1.

Population and Sample

The population in this study included all students of the Educational Technology Study Program at the Faculty of Education and Psychology, Yogyakarta State University. The research sample was taken purposively, namely 4th semester students in the 2023/2024 academic year, totaling 25 people. The selection of this sample was based on the consideration that 4th semester students have had sufficient academic experience and an adequate level of interaction with AI-based learning technology, so they are expected to provide relevant and representative data in assessing learning engagement using artificial intelligence (AI).

Data Collection Method

Data was collected through a closed questionnaire for "Yes" and "No" statements instead, this questionnaire was used to measure the level of student learning engagement towards the use of AI. In addition, the questionnaire will also evaluate how interventions using AI and data analytics have contributed to student engagement including factors such as motivation and implementation (Kurniawanto et al., 2024).

Table 1. Aspects of Observation

Category		Aspects of Observation
Yes	No	Do you know about AI?
Yes	No	Have you ever used AI
Yes	No	I often use AI in Learning
Yes	No	AI plays an important role in improving my learning
Yes	No	Do you think AI has an effective impact in helping the learning process
Yes	No	Using AI can increase my motivation to learn
Yes	No	I feel helped by using AI in the learning procces
Yes	No	AI has an important role in increasing my learning motivation
Yes	No	After using AI I get inspiration in learning
Yes	No	In the future, I will continue to use AI in my studies

Limitations of the Study

This study has several limitations that need to be considered. First, the limited sample size of 25 4th semester students of the Educational Technology Study Program at Yogyakarta State University limits the generalization of the results of this study to a wider population. Second, the descriptive quantitative approach used only provides a surface overview without exploring the reasons and context behind the respondents' answers. The research instrument in the form of a closed questionnaire with the answers "Yes" or "No" also limits the opportunity for respondents to provide more in-depth opinions.

Documentation involves collecting information directly from the research site, such as relevant books, rules, activity logs, photographs and statistics related to the study (Sugiyono, 2010). In the context of this study, documentation was conducted with the aim of analyzing the Role of AI with the aim of knowing students' engagement in learning. The researcher

utilized google forms to compile descriptive statistics and visualize the data through tables and graphs.

Result and Discussion

This study explores the role of AI (artificial intelligence) for undergraduate students of Educational Technology Study Program at Yogyakarta State University. In this study, the sample consisted of 25 students from the Education Technology undergraduate class. Each student filled out a questionnaire aimed at collecting data on the role of artificial intelligence in learning engagement. Descriptive statistical analysis method was used to provide an overall picture of the data collected on each variable studied.

The instrument used to determine the impact of AI's role in increasing student learning motivation is a questionnaire consisting of 10 questions. Each question has two answer options, namely "Yes" and "No". The purpose of the study is to determine the effect of AI on student learning engagement, assuming that artificial intelligence can increase student learning engagement and interest. This research is expected to provide new insights into the role of AI in learning and how technology can be used to improve student learning engagement.

Based on the results of the research on the use of AI in learning, a significant adoption pattern among students was found. The data shows that almost all respondents (96%) have basic knowledge of AI, with only one student stating that they are not familiar with this technology. A more interesting finding is the 100% experience level of AI usage, indicating that all respondents have interacted with AI technology in their learning context.

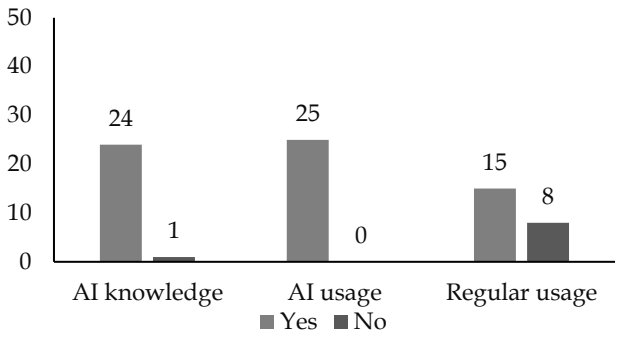

Figure 2. AI implementation in learning

However, there is a disparity between usage experience and routine implementation of AI in learning. Of the total respondents, 64% of students reported regular use of AI in their academic activities, while the other 36% have not made AI a part of their learning routine. This gap indicates the potential for development in terms of integrating AI into the daily learning process.

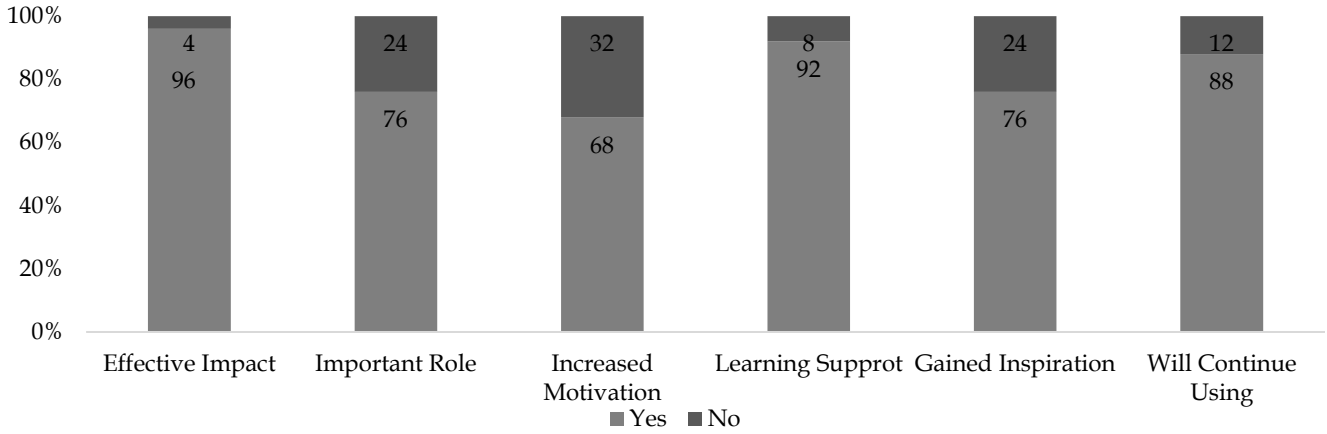

Figure 3. student perceptions for AI

This adoption pattern reflects a positive trend in the acceptance of AI technologies in the academic environment. The high levels of knowledge and usage experience indicate that students have overcome the initial barriers to adoption of new technologies. However, the lower percentage of regular use hints at the need for strategies to optimize AI utilization in the context of continuous learning. This finding is in line with previous research which shows that awareness and experience with educational technology do not always correlate directly with the level of its regular implementation.

On the other hand, the analysis of student perceptions of AI showed very positive results in various aspects of its implementation in learning. The data revealed that the effective impact of AI reached the highest percentage of 96%, indicating that almost all respondents felt the real benefits of using AI in their learning process. This is reinforced by the high level of learning support at 92%, which illustrates that AI has

successfully positioned itself as a significant learning tool.

In terms of sustainability, 88% of respondents expressed their willingness to continue using AI in their learning activities, reflecting a high level of satisfaction with the benefits gained. Meanwhile, AI is rated as Important Role and Gained Inspiration with the same percentage of 76%, showing the positive contribution of AI in the development of learning process.

Interestingly, although the Increased Motivation aspect received the lowest percentage of 68%, this figure still shows that more than two-thirds of respondents recognized the role of AI in increasing their learning motivation. This finding indicates that although AI is effective as a learning tool, there is still room for development in terms of improving the motivational aspects of using AI in learning.

The correlation between the high perceived effectiveness (96%) and learning support (92%) with the intention of continued use (88%) indicates that students not only recognize the benefits of AI but are also committed to integrating it in their long-term learning process. This confirms the potential of AI as an integral component in the digital transformation of higher education, while underscoring the importance of developing more effective implementation strategies to optimize the motivational aspects of AI use in learning.

Overall, the results of this study indicate that AI has a significant role in increasing the learning engagement of 4th semester students of Educational Technology of Yogyakarta State University.

Research conducted by Zhang & Aslan (2021) AI has presented a breakthrough in educational innovation through various technologies and features that support the learning process. The integration of technology in education enables the use of interactive media, such as movies, animations, and simulations, which enhance learning and make it easier to understand (Wijayanti et al., 2024). Through AIEd, learners can enjoy a more interactive, personalized, and effective learning experience with the support of adaptive learning environments that increase engagement and learning outcomes. Recent research also shows that students' participation and performance in completing tasks increase when AI-based systems not only consider cognitive aspects, but also their affective states (Chen et al., 2020).

The use of AI in higher education is massive. Students often use it to help them find references and complete assignments. Many AI platforms are available on the internet, many of which are free and easy to use. Some examples of Artificial Intelligence (AI) that are often used by students include Chat-GPT, Canva, Slidesgo, Capcut, Grammarly, Paraphrase, Google Meet, Zoom, and many other applications (Arly et al., 2023)

While AI offers increased efficiency in education, concerns have been raised about its potential to replace teachers in the name of cost efficiency. However, a more optimistic perspective sees AI as a support tool that allows teachers to focus on more complex aspects of learning and in-depth interactions with students, rather than a total replacement for the role of educators (Bates et al., 2020). This is reaffirmed in the research Chen et al. (2020) that further research is needed to understand the impact and potential of AI in education more comprehensively referring to the need to conduct a more in-depth and systematic analysis of the influential research literature in the field of AI in education (AlEd). While there have been many articles on AlEd, there has not been a systematic analysis that specifically focuses on the influential AlEd research literature.

Educational Technology students should avoid over-reliance on AI by continuing to search for information manually and developing critical thinking skills. They need to understand how AI works and be prepared for technical problems that may occur. Students should also understand the ethics of using AI, avoid misuse, and follow existing guidelines and regulations. Because the use of the latest technology in learning not only creates a relevant learning environment, but also trains students in improving interesting AI technology skills to succeed in an ever-evolving era (Lestari, 2024).

For example, research Wei (2023) investigated the impact of artificial intelligence (AI)-intervened language instruction on achievement, motivation, and self-regulation of learning in the context of university students. The results showed that students who received AI instruction achieved significantly higher achievement in grammar, vocabulary, reading comprehension, and writing skills compared to those who received conventional instruction. This research shows that AI-powered language instruction is significantly more effective than conventional methods.

Artificial intelligence (AI) has been shown to significantly increase learning motivation among college students. Studies show that AI-mediated learning environments provide a personalized and engaging experience, which is a key factor in increasing student engagement (Jin et al., 2023).

Conclusion

Artificial Intelligence (AI) technology has brought significant transformation in the world of education, especially in the context of learning at the tertiary level. Research conducted on Educational Technology students at Yogyakarta State University shows that AI has become an integral part of their learning process.

The majority of students not only have a basic understanding of AI, but have also integrated it into their academic routine. The results revealed a very positive perception of the role of AI in learning. Students perceive tangible benefits from using AI, especially in terms of learning effectiveness and academic support. They view AI as a tool that helps improve their understanding of the material and provides inspiration in the learning process. For educational institutions, the findings emphasize the need to develop a comprehensive AI integration framework that balances technological innovation with pedagogical principles. For educators, AI can be a complementary tool that allows them to focus on high-level aspects of teaching. For students, a balanced approach to AI use is needed-utilizing its benefits while maintaining critical thinking skills and understanding ethical considerations in its use. This research shows that AI represents not just a technological tool, but a transformative force in education that, when implemented wisely, can significantly improve student engagement and learning outcomes while maintaining the essential human element in the educational experience.

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The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

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