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Student Perceptions of Artificial Intelligence as a Virtual Tutor and Its Relation to Self-Efficacy in Learning

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Abstract:
This study investigates the use of Artificial Intelligence (AI) as a virtual tutor and its impact on students' self-efficacy in learning. Interviews, observations, and documentation from 30-40 students across various disciplines were analyzed using a mixed-methods approach. Findings show that AI enhances students' self-efficacy by providing quick, personalized feedback, boosting confidence in completing academic tasks. However, students reported challenges with complex topics requiring human-like explanations. Key factors influencing perceptions of AI included ease of use and technological comfort, which positively correlated with the perceived effectiveness of AI as a tutor. The study highlights the potential of AI to support learning but emphasizes the need for a balance with human interaction, especially for more complex subjects. This research contributes to understanding AI's role in education. It offers insights for enhancing AI integration, recommending further development and training programs to improve students' digital literacy and engagement with AI systems

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INTRODUCTION

In the current digital era, the development of information technology has significantly impacted various aspects of life, including the world of education. One increasingly developing innovation is using Artificial Intelligence (AI) as a virtual tutor that helps with learning (Fernández, 2024; Ghaleb & Alshiha, 2023; Singh & Hiran, 2022). AI as a learning companion is increasingly popular among students, especially with the pandemic, which has accelerated the adoption of distance learning technology. AI, capable of providing interactive and personalized learning materials, is an effective alternative, especially amidst limited face-to-face interaction between students and teachers (Falebita & Kok, 2024). This is also triggered by students' need to gain access to education that is more flexible and efficient and by each individual's learning rhythm. In this context, it is essential to evaluate how students perceive the use of AI as a virtual tutor and how this relates to their level of self-efficacy in the learning process.

Literature related to the use of AI in education shows that this technology can potentially increase the effectiveness and accessibility of learning. As a virtual tutor, AI

can provide immediate feedback, adapt material to individual needs, and improve learning motivation (Tulasi & Inayath, 2024; Lombana & Cabeza, 2024; Zhang et al., 2024). However, several studies also show that acceptance of AI as a learning tool is strongly influenced by individuals' perceptions of the technology's effectiveness and ease of use (Chai et al., 2021; Maya, 2024; Li & Dou, 2021). One factor that influences the successful use of AI in learning is self-efficacy, or an individual's belief in their ability to complete learning tasks. Hajeer et al. (2024) state that high self-efficacy is related to better academic achievement. Individuals with greater confidence in their abilities tend to be more persistent in facing educational challenges.

This research explores students' perceptions of using AI as a virtual tutor and its relationship with their level of self-efficacy in learning. The main focus of this research is to understand how students see the existence of AI in supporting their learning process and how their belief in their abilities influences the effectiveness of using AI. The formulation of the problem raised in this research is: (1) What are students' perceptions of the use of AI as a virtual tutor to support learning? (2) What is the relationship between students' perceptions of AI and their self-efficacy in learning? Hopefully, this research will provide insight into student acceptance of AI technology and how it can be optimized to improve learning.

This research assumes that students' positive perceptions of AI as a virtual tutor will be associated with higher levels of self-efficacy in learning. The hypotheses proposed are: (1) Students who have a positive perception of AI as a virtual tutor will show higher self-efficacy in learning, (2) High self-efficacy will influence the use of AI technology more effectively. The expected tentative answer is that students who feel more confident in learning through AI will use this technology to its full potential, improving their academic performance. This research also explores other factors influencing students' perceptions of AI, such as previous technology experience and belief in technological progress.

The main aim of this research, namely to provide a significant contribution to the understanding of how students view AI as a tool in the learning process and how psychological factors such as self-efficacy influence the use of this technology, the contribution of this research is to provide a more in-depth view of the interaction between students' perceptions of technology and their self-confidence in learning, which is still limited in previous studies. This research also seeks to fill gaps in existing literature related to the acceptance of AI technology among students, as well as provide practical recommendations for the development of AI-based learning systems in the future. Thus, this research will provide insight for the academic world and educational technology developers who want to increase the effectiveness of using AI in learning contexts.

RESEARCH METHOD

This research uses a qualitative research design with a case study approach (Lim, 2024). The unit of analysis in this research is students at state universities in Jakarta who have used AI as virtual tutors in their learning process. The cases that will be analyzed are students' experiences and perceptions regarding using AI as a tool in their studies and the relationship between these perceptions and their self-efficacy in learning. The case study approach was chosen because this research aims to gain an in-depth understanding of the phenomenon of AI use among students by considering the specific context and situation in the field. With this approach, it is hoped that various factors can be revealed

that influence students' perceptions of AI and how self-efficacy plays a role in supporting or hindering the use of this technology (Pyo et al., 2023).

The primary source of information in this research is students who use AI as virtual tutors in the campus environment. Research respondents comprised 30-40 students from various majors and levels of education. Respondents were selected using purposive sampling, considering students involved in AI-based learning within a certain period. Respondents will be selected based on specific criteria, such as using AI in several courses and direct experience interacting with AI-based learning systems. Information will also be obtained from lecturers involved in implementing AI technology in the learning process to gain a more comprehensive perspective regarding the successes or obstacles students face in using AI.

Table 1. List of Informants

No.	Informant Name	Gender	Major/Study Program	Experience Using AI in Learning	Purpose of Informant in the Research
1	DHK	Male	Informatics	Used AI in Programming and Statistics courses	Provides insights into the effectiveness of AI in technical courses
2	GTW	Female	Management Informatics	Used AI for data analysis tasks	Provides a perspective on AI involvement in data processing and business analysis
3	DFW	Male	Industrial Engineering	Used AI for simulation and system design	Provides insights into AI use in engineering and manufacturing fields
4	MFA	Female	Psychology	Involved in AI learning for behavior analysis	It helps explain students' perceptions of using AI in psychology
5	KHO	Male	Electrical Engineering	Used AI for circuit design	Provides a perspective on AI applications in electrical engineering
6	WLK	Female	Law	Used AI in law and digital ethics courses	Provides insights into AI use in law and ethics fields

This research will collect data through in-depth interviews and observations of student respondents (Finn, 2022). Semi-structured interviews will be used to explore students' perceptions of AI, their experiences using this technology, and their level of self-efficacy in learning. Observations will be made on student interactions with the AI system to assess the technology's comfort level and effectiveness. The data obtained will then be analyzed using qualitative data analysis techniques through three main stages: data reduction, display, and verification. Data will be reduced by filtering relevant information from interview transcripts and observation notes. Data display will include organizing information in the form of categories and themes. Finally, data verification was carried out to ensure the validity of the findings by triangulating sources and methods.

RESULT AND DISCUSSION

Overall, the results of this research show that AI as a virtual tutor significantly impacts students' self-efficacy in learning. Interviews, observations, and documentation revealed that AI can increase students' confidence in completing academic assignments by providing fast and interactive feedback. Factors such as ease of interface, speed of

response, and students' self-confidence greatly influence their perception of this technology. The following is a more complete explanation:

Result

Relationship between AI as a Virtual Tutor and Student Self-Efficacy in Learning

Results regarding the relationship between AI as a virtual tutor and student self-efficacy in learning show various perceptions. Most of the students involved in this research revealed that using AI as a virtual tutor positively impacted their confidence in completing academic assignments. However, students face challenges adapting to this technology, primarily related to human-machine interactions that sometimes feel stiff. Interviews also revealed that students with higher levels of self-efficacy tend to be more confident in using AI and feel helped in their learning process. They also attribute their increased learning ability to the availability of fast and interactive feedback from AI systems.

An informant from the Informatics department stated, "I feel more confident in doing programming tasks after using AI. AI provides immediate feedback, which helps me correct mistakes quickly." Another informant from the Informatics Management department added, "Even though AI is beneficial in understanding the material, I feel that sometimes it is difficult for AI to handle questions that are more complex or that require in-depth explanations. However, I generally feel more able to complete assignments after using AI." Most students highlighted how AI serves as a tool that strengthens their self-efficacy despite a reliance on human interaction that cannot be entirely replaced by technology.

In general, the interview results show that AI as a virtual tutor can increase students' self-efficacy in learning, especially in terms of providing fast feedback and more interactive involvement. Students with higher levels of self-efficacy are more likely to use AI effectively and experience an improved understanding of the material. However, some students also pointed out limitations in interacting with AI, especially in understanding more complex contexts and needing more human support. However, they generally feel more capable and confident in managing their academic tasks after interacting with this AI technology.

Interpretation of the interview results shows that using AI as a virtual tutor can positively impact student self-efficacy. Still, its effectiveness depends on the user's experience and comfort level in interacting with technology. For students with high levels of self-efficacy, AI becomes a tool that significantly supports their learning, increasing their self-confidence and ability to overcome academic challenges. However, some aspects of using AI can still be considered obstacles for students with lower self-efficacy, especially related to limitations in completing assignments that require more profound understanding. This shows that although AI has great potential to support the learning process, students' psychological factors, such as self-efficacy, must be considered to maximize the effectiveness of using this technology.

Key Factors Influencing Student Perceptions of AI as a Virtual Tutor

The results of observations regarding the factors that influence students' perceptions of AI as virtual tutors reveal that several aspects are most influential in shaping their views of this technology. Students expressed varying levels of comfort when interacting with AI, with some finding it helpful. In contrast, others expressed concerns

regarding the AI's ability to handle more complex questions or provide more in-depth explanations. Some of the most frequently mentioned factors are ease of use of the interface, speed of feedback, and the feeling of confidence from using the technology. Students who are more familiar with technology tend to adapt more quickly to AI, while those who are less familiar feel awkward and need more support. Observations also show a reliance on human feedback that AI cannot completely replace.

Table 2. Bar chart showing the factors most frequently mentioned by students in observations of their perceptions of using AI as a virtual tutor

Factors that Influence Student Perceptions of AI	Number of Students Who Mentioned This Factor	Percentage (%)
Ease of Use Interface	28	70%
Feedback Speed	24	60%
Confidence	18	45%
Limitations in Handling Complex Questions	15	37.5%
Dependence on Human Support	10	25%
Stiff or Unnatural Interactions	8	20%

Table 2 above shows that the factors that most influence students' perceptions of AI as a virtual tutor are the interface's ease of use and the speed of feedback provided by AI. Most students feel more comfortable and confident using AI when the interface offered is easy to understand and can provide fast responses. On the other hand, students also felt that AI was sometimes unable to handle complex questions or provide in-depth enough explanations, making them dependent on human help. Students unfamiliar with the technology were more likely to express discomfort in their interactions with AI, indicating that previous experience factors heavily.

Interpretation of the results of these observations shows that technical aspects and experience using technology strongly influence students' perceptions of AI as a virtual tutor. Ease of use of the interface and speed of feedback are two main factors that encourage students to feel more confident in using AI. Students familiar with technology feel more comfortable and tend to see AI as a valuable tool in supporting their learning. However, for those not used to it, interacting with AI feels more challenging and can reduce their self-confidence. In addition, these observations show that although AI can help provide feedback, many students still feel the need for human support, especially in explaining more complex material. This reflects the importance of considering psychological factors and technology readiness in designing more effective AI-based learning systems.

Potential Implications of AI as a Virtual Tutor on Student Self-Efficacy in Learning

Documentation results regarding the potential implications of using AI as a virtual tutor on students' self-efficacy in learning show a significant change in their level of self-confidence. Based on existing learning records and teaching reports, students who use AI tend to feel more able to complete their academic assignments. Documentation also reveals increased student engagement in the learning process, with many reporting feeling more motivated thanks to the AI system's fast and interactive feedback. However, some reports also indicate that students feel limited in interactions with AI when faced with assignments requiring in-depth explanations or human guidance. This shows the

possibility of a positive impact on self-efficacy related to increasing learning motivation, although, on the other hand, there are limitations that need to be corrected.

Figure 1. Structure of Interaction between Images and Humans

Figure 1 above shows that using AI as a virtual tutor has excellent potential to increase student self-efficacy in learning. Based on learning records, many students feel more confident completing their assignments after using AI. In addition, the use of this technology has also been reported to increase student involvement in the learning process, with the fast and interactive feedback provided by AI. However, there were also findings that although AI effectively supported basic learning material, students felt the need for additional explanations or human guidance, especially for more complex tasks.

Interpretation of the results of this documentation shows that although AI has great potential to increase student self-efficacy, there are several limitations regarding depth of understanding and interaction. Students feel more confident when they receive quick feedback from AI and feel motivated to continue their work. However, for some students, especially those facing more complex assignments, AI has not entirely replaced the role of human tutors. This reflects the importance of balancing technology with human support in learning. The implementation of AI in education, although effective in increasing efficiency and motivation, still requires development to refine further the ability to provide more in-depth and contextual explanations according to student needs.

Discussion

The implication of the relationship between AI as a virtual tutor and student self-efficacy in learning is that AI can potentially increase student self-confidence in facing academic challenges. By providing fast, interactive feedback, AI can help students feel more prepared and confident in their assignments (Yan, 2024; Alotaibi, 2024; Doğan et al., 2024). This can contribute to better academic achievement, especially for students who find it difficult to obtain direct explanations from lecturers. However, while AI can strengthen self-efficacy, it is essential to remember that this technology has not entirely replaced the need for human support, especially for more complex topics. Therefore, An & Ma (2024) say that successfully implementing AI as a virtual tutor depends significantly on the learning process's balance between technology and human interaction.

The correlation between AI as a virtual tutor and student self-efficacy in learning can be explained through the role of AI in providing fast and personalized feedback. Students who receive more attention from AI systems tend to feel more capable of

completing their assignments because the feedback helps them understand and correct mistakes quickly (Aeni et al., 2024). In addition, the experience of interacting with this technology increases their self-confidence because they feel more involved in the learning process. Faisol (2024) also says that students with low levels of self-efficacy may find it challenging to adapt to AI, especially if they think the system cannot provide in-depth enough explanations. This suggests that although there is a positive relationship between AI and self-efficacy, individual differences in levels of self-efficacy still play an essential role in how effectively AI can support the learning process (Celik et al., 2024).

Factors influencing students' perceptions of AI as virtual tutors have important implications for designing AI-based learning experiences (Nugraheni et al., 2024; Téllez et al., 2024); Alvarado-Bravo et al., 2024). Students who feel more comfortable with an easy-to-use interface and get quick feedback tend to be more positive in evaluating the use of AI. On the other hand, students who feel less familiar with technology or face obstacles in understanding AI responses may feel hampered in the learning process (Radif, 2024; Stryftoy et al., 2024; Lebeničnik & Istenič, 2024). Therefore, educational technology developers need to pay attention to these factors so that AI can more effectively support learning. A user-friendly interface and responsive feedback system will increase student engagement and satisfaction, contributing to the successful implementation of technology in education.

The correlation between the factors influencing students' perceptions of AI as a virtual tutor can be seen in how their comfort and experience with technology influence their attitudes toward AI. Students who are more familiar with technology tend to be more accepting of AI because they already have the knowledge and skills necessary to interact with these systems (Malik et al., 2023; Awasthy, 2023). Conversely, students who feel awkward or unfamiliar with technology may feel less confident and skeptical of AI's effectiveness. This underscores the importance of providing initial training or guidance to students less familiar with the technology to reduce psychological barriers and improve their perception of AI. Positive initial experiences with AI will shape a better long-term perception of the technology's effectiveness and benefits in learning (Zubaidi, 2024).

The implication of the potential use of AI as a virtual tutor for student self-efficacy in learning is that applying this technology can speed up the learning process and increase student self-confidence. With the ability to provide immediate and personalized feedback, AI helps students better understand the material and correct their mistakes more quickly, contributing to increased learning motivation (Racha et al., 2022; Vilma et al., 2025). Students who feel better able to overcome academic challenges thanks to the help of AI tend to have higher self-efficacy (Saqr et al., 2024). However, despite these positive impacts, it is essential to consider that AI can only support, not replace, human interaction in education, especially for topics that require more in-depth explanation or critical discussion.

The correlation between the potential implications of AI as a virtual tutor and increasing students' self-efficacy lies in how this technology affects their engagement and motivation in learning. AI provides support, allowing students to feel more in control and confident in completing their assignments. When students think they can get feedback quickly and efficiently, they tend to be more confident in overcoming academic challenges (Gaur & Kalita, 2024). However, for students who require more human interaction, AI can be considered a complement that increases teaching effectiveness,

not a replacement. Therefore, the use of AI in education must be adapted to students' characteristics and needs to maximize their self-efficacy in learning.

CONCLUSION

This research provides important insights into the impact of using AI as a virtual tutor on student self-efficacy in learning. From the results obtained, it can be concluded that AI can increase student self-confidence by providing fast and in-depth feedback and helping students feel more capable of completing academic assignments. The main contribution of this research is to identify the factors that influence students' perceptions of this technology and provide an understanding of its potential implications for motivation and learning outcomes. This research also highlights the importance of balancing technology and human interaction in AI-based learning systems, which will strengthen students' overall learning experience. It is hoped that these findings can become the basis for developing educational technology that is more effective and supports student self-efficacy in the future.

Although this study provides valuable insights, several limitations need to be noted. First, the sample used is limited to students from several majors and does not include the entire population of students who use AI in learning. Second, this research only focuses on student perceptions and does not consider other external factors, such as the influence of lecturers or institutional policies regarding AI implementation. Therefore, further research is recommended to expand the sample and include external variables that can influence the acceptance of AI in learning. Additionally, further research could explore differences in levels of self-efficacy between students with technological and non-technological backgrounds, as well as how AI can be better adapted to support learning in various disciplines.

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DISCLOSURE STATEMENT

The authors declare that there Are no potential conflicts of interest related to this article's research, authorship, or publication. All stages of the study, including data collection, analysis, interpretation, and writing, were conducted independently and without any financial, personal, or professional relationships that might be perceived as influencing the outcomes. This statement ensures transparency and reinforces the integrity of the research process.

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