


ARTIFICIAL INTELLIGENCE IN ENHANCING LEARNING MOTIVATION AND SELF-DIRECTED LEARNING AMONG PRE-SERVICE TEACHERS: A SYSTEMATIC REVIEW

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ABSTRACT

This study aims to analyse the use of Artificial Intelligence (AI) in improving student teacher motivation and learning independence with a Systematic Literature Review (SLR) approach. The study followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines with data sources from the Scopus database for the period 2019–2024. The process of article selection was done through the phases of identification, screening, testing of feasibility and selection of final article. This process resulted in 32 articles being retrieved that met the inclusion criteria and were analysed using thematic analysis techniques. Results of this research indicate that the use of AI, especially generative artificial intelligence such as ChatGPT, learning chatbots, and intelligent tutoring systems, could improve student learning motivation through more flexible, interactive, and personalised learning. In addition, AI also enables enhanced self-directed learning through easy access to information, self-management of the learning process, and the development of problem-solving skills. This study contributes to the growing body of research on the implementation of AI in higher education and specifically the digital learning transformation for student teachers in the era of modern education.

Keywords: Artificial intelligence, Learning motivation, Learning independence, Pre-service teachers, Systematic literature review

ABSTRAK

Penelitian ini bertujuan untuk menganalisis pemanfaatan *Artificial Intelligence* (AI) dalam meningkatkan motivasi dan kemandirian belajar mahasiswa calon guru melalui pendekatan *Systematic Literature Review* (SLR). Penelitian menggunakan pedoman *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) dengan sumber data berasal dari database Scopus pada rentang tahun 2019–2024. Proses seleksi artikel dilakukan melalui tahap identifikasi, penyaringan, uji kelayakan, dan penetapan artikel akhir. Berdasarkan proses tersebut, diperoleh 32 artikel yang memenuhi kriteria inklusi dan dianalisis menggunakan

teknik *thematic analysis*. Hasil penelitian menunjukkan bahwa pemanfaatan AI, khususnya *generative artificial intelligence* seperti ChatGPT, *learning chatbot*, dan *intelligent tutoring system*, mampu meningkatkan motivasi belajar mahasiswa melalui pembelajaran yang lebih fleksibel, interaktif, dan personal. Selain itu, AI juga mendukung peningkatan *self-directed learning* melalui kemudahan akses informasi, pengelolaan pembelajaran mandiri, serta pengembangan kemampuan pemecahan masalah. Penelitian ini memberikan kontribusi dalam memperkaya kajian mengenai implementasi AI pada pendidikan tinggi, khususnya dalam mendukung transformasi pembelajaran digital bagi mahasiswa calon guru di era pendidikan modern.

Kata kunci: Artificial intelligence, Motivasi belajar, Kemandirian belajar, Mahasiswa calon guru, Systematic literature review

INTRODUCTION

The introduction of digital technology has had a significant impact on the field of education, especially the way in which teaching and learning are carried out in university settings. The term "artificial intelligence" (AI) refers to a technology that has experienced significant expansion in recent years (Bajaj & Sharma, 2018). Learning chatbots, intelligent tutoring systems, adaptive learning systems, and generative artificial intelligence like ChatGPT are just some of the advancements that have been made possible by artificial intelligence (AI) in the field of education. It is becoming increasingly common for students to make use of these technologies in order to provide faster access to information, improve the efficiency of their learning, and enhance independent learning. As a result of the fact that students are not only expected to study academic content, but they are also expected to be prepared for the transformation of education that is based on digital technology, the development of artificial intelligence is crucial in the context of higher education for potential teachers.

The use of artificial intelligence in education is regarded to have the potential to produce a learning environment that is more adaptable, interactive, and focused on the student (Liu et al., 2023). Students are able to receive immediate feedback, study the content in a manner that is tailored to their own needs, and learn at their own pace while using AI. Due to the fact that the learning process becomes more engaging and responsive to the requirements of the user, this has the potential to boost the motivation of students. Additionally, artificial intelligence assists students in the development of abilities for self-directed learning by making it simple for them to access digital learning resources and giving technological support for them to learn more independently. Prospective student teachers are essential members of the teaching workforce of the future who will play a direct role in the incorporation of educational technology into various educational environments (Green et al., 2018). Therefore, the capacity to incorporate artificial intelligence into the learning process is an essential skill for students to possess in this day and age of digital technology. The use of artificial intelligence (AI) supports the development of creativity, problem-solving skills, and digital literacy, all of which are vital for modern education. AI also assists students in understanding the materials they are learning.

AI has been demonstrated to have a favourable impact on student motivation and learning independence, according to research that were conducted in the past. Previous research has demonstrated that the implementation of artificial intelligence can improve the level of engagement among students, make it possible to retrieve material, and contribute to the efficiency of digital learning (Hidayat et al., 2025). Additionally, it is believed that artificial intelligence technology has the potential to assist students in studying in a more flexible manner by providing learning that can be accessible at any time and from any location. Nevertheless, a number of studies have discovered that the utilisation of artificial intelligence (AI) presents a number of obstacles. These challenges include a dependence on technology, a reduction in

critical thinking abilities, and academic ethical concerns concerning plagiarism and the originality of student submissions.

The prospective student teachers (pre-service teachers) are crucial as future educators who will directly engage in the application of learning technology inside educational environments. The capacity to employ AI in the educational process is a crucial skill for education students in the digital age. Numerous prior research have demonstrated the beneficial impact of AI on student motivation and autonomy in learning (Cantú-Ortiz et al., 2020). Previous research has demonstrated that the utilisation of AI can enhance student engagement, facilitate information retrieval, and improve the efficacy of digital learning (Chai et al., 2025). Furthermore, it is posited that AI technology can facilitate more flexible learning for students by providing access to educational resources at any time and from any location. Nonetheless, other studies have highlighted the disadvantages associated with AI, including technology reliance, diminished critical thinking abilities, and ethical concerns over plagiarism and the originality of student assignments (Halagatti et al., 2023).

Previous study has focused primarily on the implementation of artificial intelligence technology in its whole, without taking into account the peculiarities of student educators, who have varying learning requirements and difficulties. To further understand how artificial intelligence can be used to assist the motivation and independence of learning of student educators, additional research that is more in-depth is required. On the basis of this backdrop, the purpose of this study is to conduct a Systematic Literature Review (SLR) in order to investigate the application of artificial intelligence in the process of enhancing the motivation of student educators and the independence of learning. An overview of the growth of artificial intelligence research in higher education, the application of AI forms in student educator learning, and the obstacles of integrating AI to help the learning process in an era of digital transformation are all expected to be provided by the research.

LITERATURE REVIEW

Artificial Intelligence in Higher Education

The subject of computer science known as artificial intelligence (AI) is concerned with the development of computer systems that are capable of performing activities that are traditionally associated with human intellect (Chng et al., 2023). These tasks include the ability to comprehend language, analyse information, solve problems, and make decisions by themselves. Artificial intelligence is a technology that is widely used in education to back up digital learning processes. The evolution of artificial intelligence in the field of education is being influenced by the increased desire for learning that is flexible, adaptable, and technology-based. It is not enough for artificial intelligence in education to simply automate learning systems; it must also improve the overall quality of the educational experiences that students have. Intelligent tutoring systems, adaptive learning, educational chatbots, virtual assistants, and generative artificial intelligence are some of the technologies that fall under the umbrella of artificial intelligence in higher education (Maity, 2019). The purpose of these technologies is to facilitate the learning process by recommending content, offering automatic feedback, and facilitating learning that is driven by data (Musyaffi et al., 2024). Because the system is able to modify the learning process in accordance with the requirements of the user, artificial intelligence is considered to be capable of facilitating the development of more adaptive learning in contemporary learning approaches. The Technology acceptability Model (TAM) posits that technology acceptability is determined by perceived ease of use and perceived advantages (Wu et al., 2023). In higher education, students are more receptive to utilising AI when the technology enhances effective and efficient learning. The constructivism idea posits that learning becomes more significant when students actively engage in the construction of

knowledge through exploration and interaction with their learning environment. The existence of AI enables pupils to investigate and acquire knowledge more autonomously.

Student Learning Motivation

Learning motivation is a psychological factor that is very influential to determine the success of the learning process (Amzat et al., 2017). Learning motivation can be stimulated by intrinsic and extrinsic factors. Intrinsic motivation is driven by the individual's own interest and needs to learn, while extrinsic motivation is influenced by external factors such as the learning environment, rewards, and the use of learning media. Learning motivation in digital learning is closely related to the quality of student interaction with the media and technology used. According to Self-Determination Theory (SDT), motivation to learn is developed when people experience autonomy, competence and relatedness in the learning process (Zhou et al., 2022). AI technology in learning has the potential for supporting these three aspects through flexible, responsive and adaptive learning responding to student needs. Secondly, ARCS Motivation Model theory of Keller highlights four main elements that influence motivation for learning, which are attention, relevance, confidence and satisfaction (Brunner et al., 2010). In the context of AI, students can receive the attention and interest in learning through interactive and personalised learning experiences. AI also helps build student confidence, providing learning support and immediate feedback to make them feel more capable of understanding the learning material.

Student Learning Independence

The ability of an individual to manage their own learning process by planning, implementing, and assessing their own learning is what we mean when we talk about self-directed learning opportunities (Maisyaroh et al., 2024). When it comes to higher education, the concept of independent learning is extremely significant because it is expected of students that they would take responsibility for their own academic progress. Learners that are very independent are more likely to actively seek out learning resources, establish learning strategies, and independently evaluate the outcomes of their learning. According to the Self-Regulated Learning theory, independent learners are empowered with the ability to control their own motivation, behaviour, and learning processes in order to achieve certain academic objectives (Brenner, 2022). The fact that students have easy access to a wide array of digital learning tools makes this ability even more significant in the context of technology-based learning. By providing individuals with information, suggestions for material, and learning support that they can access in a flexible manner, artificial intelligence can assist individuals in studying on their own. On the other hand, in order to employ AI in education, one must also be prepared with digital literacy. Literacy in the digital realm encompasses not only the ability to utilise technology, but also the ability to analyse information, the knowledge of the ethics of utilising technology, and the ability to use technology in a responsible manner. Therefore, the development of artificial intelligence in higher education needs to be balanced with the building of digital capabilities. This is necessary in order to ensure that students are able to use technology as a learning support tool without losing their ability to intellectually think critically or their academic originality.

METHOD

The purpose of this research is to conduct a Systematic Literature Review (SLR) in order to investigate the application of Artificial Intelligence (AI) in higher education with the goal of enhancing independent learning and motivation among students. Following the rules established by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses

(PRISMA), the study implementation process is carried out in steps consisting of identification, screening, eligibility testing, and selection of final articles (studies that are included) (Onofre et al., 2021). The PRISMA criteria are utilised in order to guarantee that the process of selecting articles is methodical, open to interpretation, and well-organized. The data source of the research is from the Scopus database. The reason for choosing this database is because of its high prestige and the availability of international recognised scientific articles related to the research topic. To get an overview of the latest developments related to the use of AI in higher education, the articles used were published in 2019-2024. Searches for articles were conducted using a combination of keywords including “Artificial Intelligence,” “AI in Education,” “ChatGPT,” “learning motivation,” “self-directed learning,” and “higher education.” Those keywords were combined with the Boolean operators (AND and OR) to generate articles related to the research focus. All articles retrieved were exported and screened in stages.

As shown in Figure 1, 186 articles were retrieved from the Scopus database in the identification stage. Then a check for duplication was done and 24 duplicate articles were identified and excluded. Following this process, 162 articles were screened based on their titles and abstracts. The selection process excluded articles not related to the research topic, such as research outside the context of higher education and articles that did not address student motivation and learning independence. At the screening stage, 61 articles were obtained and went to full-text review. The eligibility stage was determined by the comprehensive content of the articles, which were reviewed in accordance with the established inclusion and exclusion criteria. The inclusion criteria for this study were as follows: (1) articles published in Scopus-indexed international journals; (2) research on student learning motivation or learning independence; (3) articles that are available in complete text; and (4) articles that discuss the use of AI in higher education. Conversely, the analysis excluded articles that were in the form of proceedings, editorials, book chapters, or articles that lacked a defined research methodology. The evaluation results indicated that 29 articles were excluded, while 32 articles that met the criteria were subsequently analysed. Thematic analysis techniques were employed to analyse the data collected from the selected articles. The research findings were grouped into several main themes, including the type of AI technology used, the impact of AI on student learning motivation, the impact of AI on self-directed learning, and the challenges of implementing AI in higher education.

PRISMA FLOW DIAGRAM – STUDY SELECTION PROCESS

The Utilization of Artificial Intelligence in Improving Student Motivation and Self-Directed Learning: Systematic Literature Review

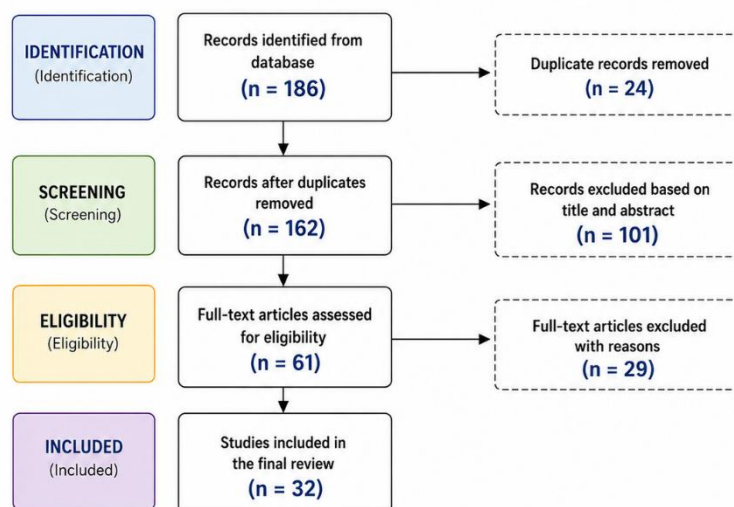


Figure 1. Summary of Study Selection

RESULTS AND DISCUSSION

Artificial Intelligence Research Trends in Higher Education

The article selection process, adhering to the PRISMA methodology, yielded 32 publications that satisfied the inclusion criteria for subsequent analysis. All articles were obtained from the Scopus database and published between 2019 and 2024. The data indicates a substantial rise in studies concerning the application of Artificial Intelligence (AI) in higher education in recent years. The rise in publication volume indicates that AI has emerged as a significant subject in the digital learning transformation inside higher education. The analysis of publication year distribution indicates that the advancement of research on AI in education has accelerated since 2022. This is propelled by the rise in the use of generative AI technologies such as ChatGPT, Gemini, and other AI-driven learning systems. These technologies are being utilised to facilitate academic tasks, encompassing the learning process, information retrieval, assignment completion, and the provision of automated learning feedback.

The synthesis results also show that most studies use a quantitative approach to measure the impact of AI on various aspects of student learning. The most common research is on learning motivation, self-directed learning, student engagement and the effectiveness of digital learning. In addition, several studies use experimental methods to confirm the effectiveness of AI to enhance the quality of learning in higher education. ChatGPT and generative AI are the most researched AI technologies by type of technology used compared to other technologies (see Figure 2). This is because generative AI can provide fast responses, can provide interactive explanations of material and can support more personalised learning. Besides generative AI, some studies also point to intelligent tutoring systems, chatbot learning, adaptive learning systems and virtual assistants in student learning. The results of this research show that the development of AI has changed the learning process in higher education significantly. AI has not only become a medium of learning support, but also begun to serve as a learning assistant, helping students to achieve more flexible, interactive and independent learning experience in the digital era.

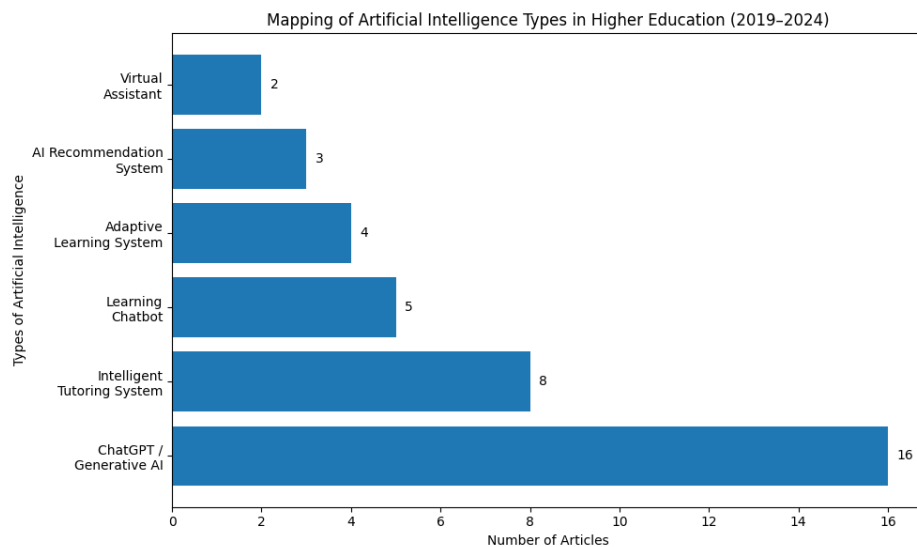


Figure 2. Mapping Types of Artificial Intelligence in Higher Education 2019–2024

Learning Motivation among Pre-Service Teachers through Artificial Intelligence

Based on the analysis of 32 selected articles, it is found that the application of Artificial Intelligence (AI) has a positive impact on student learning motivation in higher education. Most of the studies suggest that the use of AI in the presentation of more interactive, adaptive and

responsive materials to the user needs can increase student engagement in the learning process. The presence of AI technology in learning makes learning more flexible, making students more interested in actively participating in the learning process. . According to the synthesis of the articles, the types of AI most used to increase student learning motivation are ChatGPT and generative artificial intelligence. These technologies also serve as learning assistants to help students understand learning materials, find academic references, answer questions and give quick feedback. The instant feedback of AI makes it easier for students to access academic support anytime without having to wait for lecturers to explain. This indirectly raises the interest of students in learning because the learning process becomes more practical and efficient.

Additionally, a number of have shown that AI can help to create a more personalised learning experience. AI can tailor learning content to suit the needs, skills and learning speed of each student. Students can have access to materials at their own level of understanding with an adaptive learning system and students can feel more comfortable and confident in their learning. This situation adds to the student's intrinsic motivation since learning is not uniform and monotonous anymore. Other studies have shown that the use of AI-based chatbots can enhance students' confidence in the learning process. Students feel less afraid of making mistakes and are more comfortable asking questions to an AI system than they are asking directly in class. AI technology offers a freer learning environment and stimulates independent exploration of knowledge. Moreover, AI provides students with more explanations of complex learning content, motivating them to be more active in information search and academic tasks.

The application of artificial intelligence in education, on the other hand, has the potential to enhance the efficiency of the learning processes that students engage in. It has been said in a number of papers that artificial intelligence can assist students in reducing the amount of time they spend searching for learning resources, preparing assignments, and comprehending certain learning ideas. Students are more motivated to learn as a result of the ease with which they can acquire information, which is a result of the reduction in obstacles to learning resources. By providing students with simulations, visualisations, and recommendations on relevant learning materials, artificial intelligence also makes it possible for students to enjoy a more dynamic learning environment. Numerous studies, on the other hand, have shown that an excessive dependence on artificial intelligence might have a detrimental effect on the motivation of students to learn. It is possible that pupils' ability to think critically and creatively in order to solve academic challenges autonomously will be hindered if they are dependent on artificial intelligence. Additionally, the convenience that artificial intelligence offers may cause some students to be less engaged in their hunt for additional learning resources. As a result, the application of artificial intelligence in education ought to be tempered by oversight, academic ethics, and the possession of sufficient digital literacy abilities.

Artificial Intelligence in Supporting Self-Directed Learning among Pre-Service Teachers

The analysis of the chosen publications indicates that Artificial Intelligence (AI) significantly enhances the self-directed learning of prospective instructors. According to most research, the implementation of AI facilitates independent learning for students by providing quick access to material, flexible learning options, and rapid, ongoing academic assistance. Students can tailor their personalised learning experiences to their specific requirements and talents using AI, without relying on lecturers as the primary source of education.

The articles' synthesis shows that the most popular AI technology for assisting education students' autonomous study is generative AI, such ChatGPT. This technology is used to arrange ideas, comprehend learning concepts, find academic references, and even assist with

finishing tasks. Students claim that AI makes learning more flexible based on their individual requirements and makes it easier to obtain more explanations of difficult material. Additional research revealed that the application of AI aids students in understanding how to take charge of their own education. Students are better able to set learning objectives, organise their study time, and assess the results of their education. AI assists students in receiving recommendations for educational resources based on their academic requirements. Learning becomes a more concentrated and efficient process. This situation shows that AI is not just a technological aid but also a tool to help pupils study on their own.

Other studies indicate that the use of intelligent tutoring systems and adaptive learning systems can help students to gradually understand the learning materials according to their respective capabilities. This technology provides a more customised and flexible learning experience, allowing students to learn at their own pace. The flexibility allows students to learn more independently without the constraints of time and space of formal learning. Other articles discuss how AI helps education students improve problem-solving and academic decision-making skills. Students who use AI in their learning are more proactive in seeking solutions to academic difficulties. AI helps students to find alternative answers, conceptual explanations and suggestions for relevant learning resources. It inspires students to explore more and more in the learning materials on their own.

AI helps students learn independently and gives education students access to a wider range of learning resources more easily. Several studies have shown that students use AI to search for scientific articles, compile presentation materials, create learning media, and develop creative learning ideas. Easy access to various digital learning resources makes students more active to expand their horizons and knowledge beyond the material provided by the lecturers. The results of article synthesis show that AI also helps students improve learning efficiency. Students can get the information faster, which means less time spent to look for the references and understand the material. Many studies have explained that AI makes it easier for students to accomplish academic assignments since the technology helps to provide clearer explanations and directions. This convenience makes students more confident to do independent learning process. When it comes to education, the use of artificial intelligence also assists pupils in improving their adaptability to the advancements in digital technology. The use of technology in the classroom helps students become more used to it, which in turn makes them more prepared to deal with the issues that modern education presents. This is extremely important since students who are currently enrolled in education programmes are the future teachers who will be directly involved in the implementation of learning technology in schools and other educational institutions.

However, several studies have shown that there are also problems in using AI to support student learning independence. Overreliance on AI can result in technological dependency and reduce the level of student involvement in developing critical thinking and creativity. Some students are prone to use AI to get answers immediately without deep analysis and exploration of knowledge. The quality of the learning process can be affected by this situation if the use of AI is not accompanied by adequate controls. Furthermore, a lot of articles have pointed out the risks of misuse of AI in academic activities, such as plagiarism and lack of originality in student assignments. AI's ability to generate text and answers automatically may dissuade students from independently developing ideas. Thus, the use of AI in higher education should be accompanied by the strengthening of academic ethics so that students will be able to responsibly use technology.

The study indicates that the efficacy of AI in facilitating independent learning is contingent upon students' digital literacy competencies. Students possessing advanced technological abilities and digital literacy are more likely to utilise AI effectively compared to

those with restricted digital proficiency. Moreover, the assistance of educators and academic institutions is a crucial factor in facilitating the efficient integration of AI in students' autonomous learning. Numerous studies have validated the crucial function of educators in directing the utilisation of AI to enhance learning objectives. Instructors serve not just as providers of educational resources but also as facilitators for students' effective utilisation of AI. Universities should provide training and rules on AI usage to ensure students comprehend the limitations and ethical considerations of technology in academic endeavours.

Discussion

The results show that AI has emerged as a essential part of the transformation of learning in higher education especially in providing more flexible, interactive, and student-centered learning processes. The use of AI like ChatGPT, learning chatbots and intelligent tutoring systems helps students get a more personalised learning experience, thus increasing student engagement in the learning process. This is consistent with previous research which indicates that AI can increase students' motivation to learn through providing rapid feedback and adaptive learning (Zawacki-Richter et al., 2019). AI in education can enhance the effectiveness of learning interactions because students can receive direct learning support tailored to their needs.

Other studies state that the use of generative AI such as ChatGPT makes it easier for students to understand the learning materials, making the learning process more interesting and not monotonous (Maity, 2019). Subsequently is also demonstrated that artificial intelligence has the potential to produce a more adaptable learning experience, as seen by the enhanced learning motivation of education students in this study. Students are able to access educational resources whenever and wherever they like, without being constrained by time or location constraints. This lends credence to the idea of personalised learning, which places an emphasis on the significance of adapting educational experiences to the specific requirements and capabilities of each individual learner. Flexible learning is essential in the context of higher education for students who are interested in becoming teachers. This is due to the fact that students are expected to not only comprehend theoretical concepts, but also cultivate their creative abilities and adaptability to contemporary educational technology.

The research also indicates that AI can improve students' learning independence besides improving students' learning motivation. This is in line with previous research that has shown that AI can help students develop self-directed learning skills by providing them with easy access to information and support for independent learning. Broadbent and Poon (2015) research's indicates that students who are provided with digital learning technology are more likely to have the ability to control their learning process autonomously, covering aspects like setting learning objectives, managing time, and assessing learning results. The use of AI in this study is also another indication of change in the learning patterns of prospective teacher students. Students are no longer solely relying on lecturers as the main source of learning but are starting to actively seek information and explore material on their own with the help of AI technology. This is consistent with the learner-centered learning theory that positions learners as active subjects in the learning process (Mora et al., 2020). AI allows students to use a more independent and personalised learning experience based on their specific academic needs.

Nonetheless, the research indicates that the implementation of AI in education presents numerous hurdles. The primary concern is students' dependence on AI technology for completing academic tasks. This finding aligns with prior research indicating that excessive reliance on AI may impede students' critical thinking and creativity. Certain students exploit the convenience of AI and depend on technology for rapid responses, rather than engaging in comprehensive material analysis. Furthermore, some prior studies have emphasised ethical

concerns in academia with the use of AI, including plagiarism and diminished originality in student submissions (Adha et al., 2024; Zembylas, 2023). This study likewise observed same findings, particularly for the utilisation of generative AI capable of autonomously producing text. This condition signifies that the integration of AI in higher education must be accompanied by the enhancement of academic ethics and digital literacy, enabling students to utilise technology judiciously and responsibly.

This research also shows that the effectiveness of AI use depends on digital literacy skills of students. Students with good technological skills are more capable of using AI in an optimal way than students with little digital technology. This result supports previous research stating that digital competence is a key factor in the successful implementation of learning technology in higher education (Cantú-Ortiz et al., 2020). The present study demonstrates the great potential of AI to support student teachers' motivation and learning independence. AI can enable more flexible, personalised and interactive learning, making students more active in the learning process. However, the use of AI still needs supervision, strengthening digital literacy and academic ethics so that the technology can be optimally used to support the quality of learning in higher education.

CONCLUSION AND RECOMMENDATION

Artificial intelligence (AI) considerably increases the motivation and learning independence of prospective teacher students, according to the findings of a comprehensive literature assessment of 32 articles indexed in Scopus between 2019 and 2024. More adaptable, interactive, and student-centered learning can result from the use of AI technologies, particularly generative AI like ChatGPT, learning chatbots, and intelligent tutoring systems. AI facilitates independent learning through tailored learning experiences, increases the speed at which students can access information, and improves their comprehension of course materials. AI increases students' enthusiasm to learn and helps them acquire self-directed learning skills, like organising their learning process, finding resources on their own, and finding more creative solutions to academic challenges. The study's findings demonstrate that the advancement of AI has become a significant factor in the change of higher education, particularly for aspiring teachers, necessitating students' preparedness as future instructors in the digital age.

This research's conclusions include both theoretical and practical significance for advancing AI studies in higher education. This research theoretically endorses the concept of contemporary education, wherein digital technology significantly enhances student motivation and autonomy in learning. The findings contribute to the literature on AI implementation for student instructors, which remains very sparse relative to studies in other domains. The results of this study suggest that colleges and educators should embrace AI as a more inventive and adaptive medium for learning support in response to technology advancements. Utilising AI can enhance the efficacy of the learning environment, augment student engagement, and foster autonomous learning. Nonetheless, the implementation of AI must enhance digital literacy, uphold academic ethics, and oversee technology usage to avert dependency or misuse in academic endeavours. Universities must offer training on AI utilisation and ethical standards for digital technologies in education, enabling students to employ AI judiciously and ethically.

However, while this study provides a comprehensive review of the application of AI to improve student teacher motivation and learning independence, it has several limitations. The articles used in the study are only from the Scopus database, so there is a possibility that relevant research from other databases has not been included. Also, this study used Systematic Literature Review approach and the results is based on the finding of previous published research studies. Future research is recommended to diversify data sources by incorporating

data from various international and national databases and integrating the SLR method with empirical research to achieve a more profound understanding of the effectiveness of AI use in learning. Future research can also develop studies on the effect of AI on critical thinking skills, creativity, digital readiness of student teachers, and the ethics of AI use in education. Therefore, the development of AI research in student teachers is expected to make a broader contribution to the improvement of the quality of learning in the digital transformation era.

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