Innovation in the use of AI in teaching undergraduate students

Barameeboon Sangchan

College of Politics and Government Suan Sunandha Rajabhat University

*Corresponding author

E-Mail: Barameeboon.sa@ssru.ac.th

Abstract

This qualitative research aimed to examine the impact of AI on undergraduate teaching and learning processes and to examine the impact of AI on adapting teaching and learning for undergraduate students. Data collection was conducted using interviews, document analysis, and in-depth interviews with 17 key informants. A purposive, triangulated approach was used to analyze data, interpret it, and draw inductive conclusions. The results revealed that artificial intelligence (AI) significantly impacts the development of undergraduate teaching and learning processes, enabling more flexibility and responsiveness to learners' needs. AI helps instructors understand student behavior and potential, enabling effective personalized teaching. At the same time, it transforms instructors' roles into facilitators rather than content transmitters. However, the use of AI must be guided by ethical principles and the conscious use of technology to ensure sustainable learning and truly empower students in the 21st century.

Keywords: effect , innovation , Use of AI , Teaching and learning procedure

1. Introduction

Currently, undergraduate education is a process of building a foundation of knowledge and skills for students, preparing them to become thought leaders and decision-makers, a crucial foundation for future national development. This is especially true in an era of rapid global change and relentless technological advancement. Therefore, education must adapt to the new context of the digital society. One key innovation currently playing a key role is "artificial intelligence" (AI), which enhances the efficiency of teaching and learning processes by creating diverse learning experiences, promoting personalized learning, and providing accurate and rapid assessment (Holmes et al., 2021). This is particularly true at the undergraduate level, where in-depth analysis and critical thinking are emphasized. AI applications can help students better understand complex content through interactive learning media and activities (Zawacki-Richter et al., 2019). Although AI applications in education in Thailand are still in their infancy, they represent an important approach to improving the quality of education to keep pace with global change. However, there are still obstacles in terms of personnel and resources availability, such as teachers' lack of knowledge on AI use or programs that are not appropriate for specific content areas, which can hinder the effectiveness of AI use (Chai & Li, 2020). Therefore, research and development of innovative AI applications in teaching and learning is crucial to foster students' analytical, critical thinking, and reasoned discussion skills, as well as support universities in designing curricula that are truly responsive to the digital age. Especially in universities that focus on developing students' potential and readiness for societal changes,

the use of AI is an important approach to enhance the quality of education and learning, making it more efficient, modern, and aligned with the needs of the future world.

1.1 Research Objective

1) To study the impact of AI use on the teaching and learning process of undergraduate students.

2) To study the impact of AI use on adapting teaching and learning to suit undergraduate students.

2. Literature review

Concepts on the application of artificial intelligence in education management

Ge & Hu (2020) Explaining the importance of applying artificial intelligence in advanced education and teaching, he stated that in a big data environment, the application of artificial intelligence technology will revolutionize the traditional knowledge system, blurring the boundaries between general and professional education disciplines and enabling the continuous diversity of educational content. Furthermore, the use of an artificial intelligence learning platform allows the recording of individual learning behaviors, including interests and learning levels of learners. The system will then calculate the appropriate learning content, methods, and schedules for each individual (Zawacki-Richter et al., 2019).

Akgun & Greenhow (2022) It explains how artificial intelligence can be a powerful tool in teaching and learning in groups with different abilities. For example, personalized learning systems can help students by providing immediate feedback, identifying where they are lacking and suggesting additional content. Automated grading systems can ease teachers' burdens by not only checking answers for correctness or inaccuracy, but also suggesting improvements and rewriting. Facial recognition, which detects facial expressions, can indicate decreased concentration, confusion, and misunderstandings. Knowledgeable teachers can intervene, correct moods, and improve motivation. Predictive analytics can inform teachers about changes in student grades or data, identify any risks to student success or failure, and assist them (Holmes et al., 2021).

Khosravi et al. (2023) It explains that AI technology has the ability to support learners, teachers, and educational institutions. For learners, AI can help tailor learning experiences to their strengths and weaknesses. For teachers, AI can act as a teaching assistant, helping organize classes, grade, and answer student questions. For educational institutions, AI can be used to recruit students and identify support for students at risk of dropping out or struggling in their courses (Luckin et al., 2016).

Preparing for the use of artificial intelligence in education

Ming Liu et al. (2023) In response to the emergence of Generative AI tools, the United Nations Educational, Scientific and Cultural Organization (UNESCO) issued a statement on May 26, 2023, announcing efforts to develop policy guidelines for the use of Generative AI in education and research. UNESCO also aims to develop an AI competency framework for learners and teachers in the classroom. Since then, UNESCO has urged ministries of education worldwide to build capacity, in collaboration with relevant government regulators, particularly those responsible for technology, to develop effective governance strategies. Given the pervasive influence of Generative AI on education, the collaboration of all education

stakeholders is essential, as the impacts of GAI cannot be avoided. Instead of trying to avoid them, stakeholders should focus on strategic planning and implementation of restructuring practices to implement safeguards that promote the responsible integration of GAI in education (Holmes et al., 2022; Selwyn, 2023).

Artificial intelligence tools applied in education management

Holmes & Tuomi (2022) It has been explained that not all AI-assisted technologies are designed for learners, but are being repurposed for learning. Examples of AI-assisted technologies include collaboration toolkits, including Google Docs and Sheets, along with similar offerings from organizations like Tencent. Social networking platforms like WhatsApp and WeChat, and content-sharing platforms like YouTube and TikTok, are also increasingly being used to support learners in various ways. There are many other AI-assisted technologies being repurposed for education.

3. Methodology

This qualitative research used an interview form with a sample of 17 people. Qualitative data were analyzed by triangulating the data validity by examining three data sources: time, place, and people. After collecting data from observations, recordings, and interviews, the researchers analyzed the data by organizing the data according to the content related to AI innovation in teaching for undergraduate students. The summarized and interpreted research results were then compiled into tangible study results or visible phenomena. The results were summarized by writing a descriptive description.

4. Results

The impact of AI use on the teaching process of undergraduate students

The researcher's interviews concluded that the impact of artificial intelligence (AI) on undergraduate teaching and learning has significantly transformed students' learning styles, particularly in terms of faster and more convenient access to information. Students can now research and synthesize knowledge from diverse sources through automated systems, enabling personalized learning that effectively responds to individual interests and strengths. Furthermore, AI facilitates in-depth data analysis and helps students better understand complex content. The researcher stated that AI use has also shifted the role of instructors from knowledge transmitters to facilitators or advisors, fostering students' critical thinking and greater responsibility for their own learning. However, the researcher found that widespread AI use may lead to over-reliance on technology, leading some students to lack critical thinking skills. This may also lead to ethical issues, such as plagiarism or the use of AI without developing practical skills. Furthermore, it highlights the digital divide between students with and without access to modern technology. The researcher recommends that educational institutions establish ethical guidelines for the use of AI and integrate it appropriately into teaching and learning to enhance 21st-century learning competencies in creativity, problem-solving, and effective academic communication. In conclusion, the researcher views AI as both a "tool" and a "catalyst" for the transformation of higher education teaching and learning. It should be used wisely and responsibly so that this technology can become a positive force for sustainable student development.

The impact of AI on tailoring teaching to undergraduate students

The researchers concluded from the interviews that the impact of artificial intelligence (AI) on tailoring instruction to undergraduate students has been significant, with AI playing a key role in transforming learning approaches to be more flexible and relevant to learners' needs. The researchers stated that AI allows instructors to analyze individual student learning behaviors via digital data, such as learning speed, content comprehension, and learning activity response patterns. This allows for more appropriate and personalized instruction for each student. Furthermore, AI enables adaptive learning systems that can offer content and exercises tailored to each student's ability level in real time. The researchers believe that AI adoption reduces the burden on instructors in assessment, allowing them to focus more on developing analytical thinking capabilities and providing in-depth counseling. However, the researchers emphasize that AI use must be designed ethically and humanely in learning. Automation should not be the sole judge of learners' potential. Furthermore, the availability of technological infrastructure and instructors' knowledge in effectively using AI tools must also be considered. The researchers further stated that training instructors to understand how to use AI to support learning is essential, as technology integration is most effective when instructors have the skills to use the tools appropriately and creatively. Finally, the researchers believe that balanced use of AI leads to high-quality learning and reduces the gap between learners with different abilities. And encouraging students to take on a more independent role as learners by optimizing teaching with AI will become an important approach for modern universities aiming for sustainable educational development in the future.

5. Conclusion

A comparison of the two sections on the impact of artificial intelligence (AI) on teaching and learning processes and the adaptation of teaching and learning to suit undergraduate students reveals that both approaches share a key point: they view AI as a key tool for transforming the higher education system, making it more modern and efficient. Regarding its impact on teaching and learning processes, the researchers point out that AI contributes to enhancing learning efficiency, accessing information, and creating a learning environment that fosters students' analytical thinking. This also shifts the role of instructors to facilitators rather than directly transferring knowledge. Meanwhile, the section on adapting teaching and learning to suit students emphasizes that AI enables instructors to gain a detailed understanding of each student's behavior and potential, enabling them to better design personalized learning activities. Both sections reflect the application of technology to support learner-centered learning approaches, but differ in their focus. While teaching and learning processes focus on "transforming the overall teaching system," adaptation focuses on "using data to develop individualized learning." The researchers believe that AI use must be guided by an ethical framework and an awareness of the human role, as excessive reliance on technology can lead to students lacking analytical thinking skills and academic ethics. Furthermore, preparation of infrastructure and development of teachers to be competent in AI technology are also required, ensuring its use as a tool to effectively enhance student potential. In summary, both approaches demonstrate that AI is a key factor in transforming undergraduate education into a more flexible, modern, and responsive system that better addresses student diversity. This will also act as a driving force for educational institutions to move towards sustainable, innovative learning in the future. This is consistent with the research by Zhang, Y., & Aslan, A. (2023), " Artificial intelligence in education: Opportunities, challenges, and policy implications." and

the research by Thongmak, M. (2023), Adoption of artificial intelligence in higher education: A conceptual framework and implications for teaching and learning. This is consistent with the research of Kanratchakarn Lert-Amornsak on The Development of An AI-Based Learning Support System To Enhance Analytical Thinking And Problem-Solving Skills In Undergraduate Students At SSRU, Faculty Of Education.

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