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Enhancing Academic Outcomes: The Role of AI-Driven Personalized Learning in Thai Higher Education

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ABSTRACT

This paper explores the transformative roles and potential of artificial intelligence (AI) in education, emphasizing its impact on teaching methodologies and learning experiences. The study employs semi-structured interviews and focus group with both faculty members and undergraduate students who have interacted with AI. Key findings indicate that AI technologies optimize personalized learning, increase student engagement, and improve academic performance. It should also be noted that respondents showed resistance and training gaps, and highlighted concerns for ethical issues and data privacy. Previous studies have highlighted AI's role in individualizing education, fostering critical thinking, and supporting adaptive learning platforms. However, concerns about over-reliance on AI underscore the necessity of balanced methodologies. The paper concludes that a strategic integration of AI with

traditional practices can enhance educational outcomes, necessitating ongoing evaluation of ethical implications and teacher roles in an increasingly automated landscape of education.

Keywords: AI in education, personalized learning, educational technology, AI integration

Introduction

AI in Education

Artificial intelligence (AI) technologies are transforming education by optimizing administrative tasks and enriching teaching methods. These advancements enable educators to focus on facilitating learning while offering tailored experiences that adapt to individual student needs (Chen & Qi, 2024). AI enhances engagement, particularly in language acquisition, by providing personalized feedback and immersive experiences (Bakhmat et al., 2022).

Liua et al. (2021) highlight how AI-driven data analysis informs instructional design and curriculum development, boosting learning outcomes. Jin et al. (2024) emphasize its role in improving higher education through better access to resources and fostering collaboration. Research in Thai universities further demonstrates that AI-oriented personalized strategies enhance autonomy and teacher development, though comprehensive evaluations of scalability remain limited (Chaipidech et al., 2022; Ingkavara et al., 2022).

Marmoah et al. (2024) argue that blending AI with traditional methods ensures adaptability to evolving educational paradigms while preserving proven techniques. This study aims to address research gaps by exploring effective integration of AI in Thai higher education, proposing strategies for faculty training, enhanced AI tools, and improved experiences for students and educators alike.

Despite these advances, previous studies have not sufficiently examined the comprehensive impact of AI-driven personalized learning and feedback systems specifically within Thai higher education contexts. Moreover, there is a lack of detailed strategies for effective faculty training, scalable AI tool implementation, and integration approaches that balance AI capabilities with traditional pedagogy. Addressing these gaps is essential to maximize AI's potential for enhancing student performance and teaching quality in Thai universities.

Research Question

What is the impact of AI in personalized learning and feedback systems on student performance in Thai universities?

Literature Review

Personalized Learning Algorithms

Personalized learning, powered by AI, tailors educational experiences to individual preferences and learning models. Maghsudi et al. (2021) emphasize its ability to create individualized content based on real-time feedback and data on student interactions, performance, and behavior. AI systems use techniques like natural language processing and reinforcement learning to refine personalized recommendations and assessments, enhancing learning outcomes (Murtaza et al., 2022; Sajja et al., 2024).

Higher education institutions increasingly adopt personalized AI algorithms to address diverse learner needs. For example, The University of Michigan's Smart Tutoring Systems track learner progress and adapt instruction accordingly, yielding improved results. Georgia State University also uses AI to guide students and reduce dropout rates among underrepresented populations (Yekollu et al., 2024).

In Thai universities, personalized AI offers benefits, such as enhanced learning outcomes and teacher development, but raises ethical concerns around data privacy and bias (Chaipidech et al., 2022; Waluyo & Kusumastuti, 2024; Wongwatkit et al., 2023). Transparency in algorithmic processes is essential to mitigate bias and ensure adherence to privacy regulations (Murtaza et al., 2022). Incorporating educator input can further tailor AI tools to diverse learning needs.

AI's Impacts on Student Engagement and Academic Performance

Number of research indicates that artificial intelligence technologies contribute positively to the involvement of students and to the academic support mechanisms. For instance, Xu (2024) highlights its ability to create personalized learning experiences. Vistorte et al. (2024) reveal that assessing emotions through AI promotes student engagement by addressing emotional needs, while Chiu et al. (2024) emphasize the role of educators in motivating students via AI chatbots. This demonstrates the importance of pairing technology with robust support systems to ensure student success.

In addition, Hooda et al. (2022) stress that personalized learning platforms guided by the AI improve the motivation and involvement of students adapting the contents to individual learning styles and preferences. In the same way, Zhang and Aslan (2021) state that AI can facilitate the ongoing feedback mechanisms, thus allowing students to trace their progress and receive personalized support that can lead to an improvement in academic performance.

Empirical tests further confirm the role of artificial intelligence in improving the understanding and conservation of information. García-Martínez et al. (2023) led a systematic review by revealing that students who used educational tools, based on artificial intelligence have shown significantly higher levels of understanding and conservation compared to their peers engaged in traditional learning environments. Mirdad et al. (2024) confirm these results, reporting that the interactive nature of artificial intelligence tools, combined with their adaptive learning characteristics. This suggests that technologies not only support the acquisition of knowledge, but also promote active commitment with content, leading to deeper learning results.

Educational tools like chatbots and performance forecast systems are becoming vital for academic success. Chen et al. (2023) state that chatbots provide academic assistance 24 hours a day, which can lead to decreased student anxiety and improved learning through instant feedback. Ouyang et al. (2023) elaborate on the efficiency of the systems that forecast performance, asserting that these tools enable educators to identify students in need and intervene proactively, thereby elevating overall academic achievement. The incorporation of these technologies indicates a movement towards a more data-oriented approach in educational systems.

While AI in education offers significant benefits, challenges, such as accessibility, equity, ethical concerns, and reliance, on automated systems persist. Issues like inadequate access and uneven resource distribution exacerbate disparities (Chiu et al., 2023; Dimitriadou & Lanitis, 2023), while data privacy and algorithmic bias raise ethical complications. Educators often hesitate to adopt AI due to fears of bias, and overreliance on AI tools may hinder critical thinking and foster superficial learning habits (Hooda et al., 2022; Kuleto et al., 2021). Balancing AI integration with traditional methods is crucial to ensure equitable and meaningful educational experiences.

Empirical research implies that demographic indicators may influence the results of AI applications, which add complications to the discussion on the impact of AI on educational outcomes. García-Martínez et al. (2023) and

Mirdad et al. (2024) observed that learners' background, such as age, socioeconomic status, and prior competence, has a considerable influence on their overall learning experience with AI tools. For instance, it is possible that learners from a lower socioeconomic background encounter increased learning curves due to lack of former exposure to technology, affecting academic performance. From an age perspective, younger learners were seen to adapt faster to AI learning tools than older groups.

These challenges necessitate research to clarify the relationship between AI integration and pedagogical efficiency. Zhang and Aslan (2021) emphasize creating ethical guidelines for educators, while Ouyang et al. (2023) advocate collaboration among researchers, educators, and policymakers to optimize AI usage and maintain pedagogical integrity. AI's duality as both a revolutionary tool and a challenge in education calls for continued research to address its complexities and enhance its benefits (Adígüzel et al., 2023; Chiu et al., 2023).

AI in Thai Universities

AI integration in Thai universities focuses on data analysis for optimizing teaching strategies and administrative functions (Nuankaew et al., 2023). Inverted learning applications are also prevalent. Khlaisang et al. (2019) found students engaging with AI-based systems showed deeper involvement and satisfaction in learning activities, with improved content retention and understanding. Generative AI tools, particularly in language learning, are shown to boost student engagement and motivation in English acquisition (Waluyo & Kusumastuti, 2024).

Jantakun et al. (2021) propose systematic AI integration via the AAI-He model, aligning tools with pedagogical goals and assessments to enhance outcomes. Effective technological leadership is vital for educators to adopt AI practices, as observed by Potjanajaruwit (2023), emphasizing leadership in advancing AI use in education.

Metaverse platforms powered by AI offer immersive learning experiences that enhance engagement and outcomes (Pyae et al., 2023). Regionally, policy frameworks for ICT in education, as studied by Machmud et al. (2021), highlight national strategies in Thailand and Southeast Asia, underscoring the importance of continuous updates to support AI-driven advancements.

Methodology

During this study, a qualitative research design was employed to explore the impact of artificial intelligence (AI) technologies on learning outcomes in Thai universities. The qualitative approach was selected to gain deeper insights on the observations and experiences of primary stakeholders—120 students and 50 faculty members—concerning AI's role in modernizing education from both teaching and learning perspectives. Fundamental ethical considerations were involved in the research, which include informed consent, confidentiality, and data security. The participants have been deidentified, as confidentiality is essential to protect participants' data.

Data Collection Methods

Data collection included semi-structured interviews, focus groups, and surveys, providing both qualitative and quantitative insights into AI's impact on education. Interviews are meant to capture detailed personal experiences (De Paoli, 2024), while focus groups can foster collaborative discussions (Lim, 2024). In addition, surveys can offer statistical data on broader opinions, enabling a comprehensive understanding through method triangulation (Chookaew et al., 2024).

Previous studies highlight the importance of qualitative approaches. Waluyo and Kusumastuti (2024) found AI-assisted learning tools enhance interactive experiences and student achievements. Khlaisang et al. (2019) emphasized educators' acceptance of AI relies on training and communication about its benefits and challenges. Songsiengchai et al. (2023) showed how AI improves language acquisition via adaptive feedback, while Nuankaew et al. (2023) stressed developing teachers' analytical skills for effective AI integration.

Personalized learning, promoted by AI, has significantly transformed the acquisition of language and the effectiveness of teaching in Thai higher education, particularly in English as a foreign language (EFL). Instruments such as chatbots and tools with AI and tools such as Chatgpt have shown promising to promote students' participation and improve learning results (Waluyo & Kusumastuti, 2024; Wibolyasarin et al., 2025). Songsiengchai (2025) highlights how these technologies facilitate learning experiences, which meet the individual needs of students. However, challenges such as different levels of digital literacy between students and educators persist (Pucharoen, 2024).

These findings underline the need to align qualitative research with strategies for AI integration in Thai universities, ensuring technology fosters individualized learning and improved outcomes.

Interviews

Semi-structured interviews were undertaken with two groups of participants:

Students: Interviews were conducted among a diverse sample of undergraduate and graduate students who had formerly engaged with AI learning tools, personalized learning algorithms, and automated feedback systems, aiming to explore the effects of AI tools on their engagement, motivation, academic performance, and overall learning experience.

Faculty: Members of faculty who utilized AI tools in their classrooms were interviewed to gain insight into their perspectives on the role of AI in the learning environment, its impact on teaching efficiency, and how these tools influenced student performance.

Focus Group

Focus group discussions were organized with students to explore collective insights into their experiences with AI technologies.

Sampling Strategy

Purposive sampling targeted a Thai university that had implemented AI technologies in learning activities. Participants were selected from various faculties using AI tools for personalized learning, automated feedback, and adaptive systems. The sample consisted of:

Students: A representative sample of students who had interacted with AI technologies in their coursework.

Faculty: Faculty members with experience in incorporating AI tools into their teaching practices.

Results and Discussion

The collected data was analyzed using thematic analysis to identify key themes, patterns, and insights from the interviews, focus groups, and documents. To ensure reliability and reduce bias, the data was independently coded and categorized into themes by an intercoder, following the six-step framework outlined by Braun and Clarke (2006). This approach was selected because it provides a systematic yet flexible method for identifying, analyzing,

and interpreting patterns within qualitative data, making it well-suited for exploring diverse perspectives from both students and faculty.

Quantitative Data

Tables 1 and 2 below summarize the data obtained from the survey. They show demographic data and the patterns of AI usage among students (n = 120) and faculty members (n = 50). The tables present an overview of age, gender, field of study, teaching experience, AI usage, and satisfaction levels.

Table 1

Student Demographics and AI Usage (n=120)

Age		**Gender**	
18–20 years	60%	Male	35%
21–23 years	40%	Female	65%
Year of Study		**Major**	
First Year	30%	Language	50%
Second Year	40%	IT	25%
Third Year	20%	Business and Economics	15%
Fourth Year	10%	Arts and Design	10%
Frequency of AI Tool Use		**Type of AI Tools Used**	
Daily	15%	AI-driven tutoring systems	45%
Weekly	40%	Learning management systems (LMS) with AI features	30%
Monthly	25%	AI-powered study apps	15%
Never	20%	AI-powered research tools	10%
Purpose of AI Tool Usage		**Satisfaction with AI Tools**	
Academic support	60%	Very satisfied	20%
Personalized learning	25%	Satisfied	50%
Time management	10%	Neutral	20%
Research	5%	Dissatisfied	10%
Impact of AI on Engagement			
Increased engagement		40%	
No change		35%	
Decreased engagement		25%	

As shown in Table 1, most students were aged 18-20 (60%), with a higher portion identifying as female (65%). Language majors constituted half

of the sample, and the frequency of AI usage was most often weekly (40%). The top two most common applications were AI-driven tutoring systems (45%) and LMS platforms with AI features (30%). Academic support appeared to be the most dominant purpose for use (60%). Moreover, 70% of the respondents reported satisfaction with AI tools, showing generally positive perceptions. The impact on engagement varied, with 40% reporting increased engagement and 25% noting a decline.

Table 2

Faculty Demographics and AI Usage (n=50)

Age		**Gender**	
30–40 years	25%	Male	35%
41–50 years	40%	Female	65%
51+ years	35%		
Years of Teaching Experience		**AI Training or Exposure**	
0–5 years	20%	No previous training	25%
6–10 years	35%	Basic exposure to AI	45%
11–15 years	25%	Advanced training on AI	30%
16+ years	20%		
Use of AI in Teaching		**Purpose of AI Tool Usage**	
Frequently	10%	Personalized learning for students	30%
Occasionally	40%	Automating administrative tasks	40%
Never	50%	Enhancing student engagement	20%
		Research and development	10%
Satisfaction with AI in Teaching			
Very satisfied		10%	
Satisfied		45%	
Neutral		35%	
Dissatisfied		10%	

Table 2 provides an overview of faculty demographics and how they integrated AI into their work. Most respondents were aged between 41 and 50, accounting for 40%. Gender distribution was also the same to that of the students, with 65% identifying as female. Most faculty members (45%) reported having a fundamental understanding of AI, 25% indicated they had received no prior training at all, and 30% had advanced training in the field. The survey also showed that AI was dominantly integrated for automating administrative tasks (40%), while also supporting personalized learning (30%). Interestingly, 50% of the faculty members claimed they had not

incorporated AI into their teaching practices. This may suggest a trend of reserved adoption. The levels of satisfaction were moderate, with 55% indicating satisfaction, while a significant portion of 35% maintained a neutral attitude.

A comparison of Tables 1 and 2 highlights various distinctions in the ways students and faculty members engage with AI tools. Students indicated that they used these resources more often, mainly for academic assistance and tailored learning experiences. In contrast, the use of AI by faculty was notably inconsistent, as half of the respondents indicated that they have never integrated AI into their teaching practices. In addition, students appeared to recognize a more immediate effect on their engagement, with 40% indicating an increase in participation, compared to the more reserved perspective held by faculty members. The findings may indicate that students are increasingly embracing AI as part of their learning, whereas faculty members appear to be more cautious in their adoption. This may be due to training gaps and the differing priorities placed on the use of AI.

The section below highlights statements from students and faculty, detailing their experiences and perceptions regarding AI in personalized learning and feedback systems across five themes.

Enhancing Personalized Learning

AI technologies were perceived as being highly efficient in offering personalized learning experiences. Students informed that AI tools, such as adaptive learning systems, customized learning materials to their individual needs so that they could progress at their own pace and increasing their understanding of topics they struggle with. For several respondents, the effectiveness of AI in tailoring learning content is remarkable, especially in personalization, adaptive evaluations and accessibility improvement. This is in line with research by Kolluru et al. (2018) which points to the role of adaptive learning systems in modifying educational experiences. Halkiopoulos and Gkintoni (2024) also claim that the leverage of AI optimizes personalized learning, in alignment with cognitive neuropsychological principles, thus securing equitable education.

> "AI truly helped me better understand difficult topics. The system adjusted the lessons to my pace, so I didn't feel left behind like in traditional classes."

> "I love how AI personalizes my learning experience. The adaptive quizzes help me focus on areas where I struggle the most."

> "It's like having a private tutor who knows exactly what I need to improve on."

Increased Student Engagement through AI

Many students found that AI tools, such as gamified learning apps and virtual assistants, kept them more engaged in their studies. These tools created interactive learning experiences that were more engaging than traditional methods. Research indicates that these technologies promote interactive learning, surpassing traditional educational methods (Limonova et al., 2023). This change illustrates the vital role of innovative tools in modern education.

> "I used to get bored with regular lectures, but with AI-driven apps, learning feels more interactive and fun."

> "The AI chatbot makes studying easier. Whenever I have a question, I get an instant response instead of waiting for the next class."

Faculty Resistance and Training Gaps

Faculty members express more concerns about their technical skills to integrate AI in teaching. Developing a comprehensive AI policy can address these challenges, delineate essential skills for effective educational practices (Chan, 2023). Despite the potential of AI to enhance educational practices, many instructors felt underprepared and overwhelmed by the complexity of the technology.

> "I see the benefits of AI in education, but honestly, I don't feel confident using it in my teaching."

> "There's a big gap between what AI can do and what teachers are trained to handle. We need better training to use these tools effectively."

> "Sometimes AI feels overwhelming. I wish there were clearer guidelines on how to integrate it into our curriculum."

Ethical Concerns and Data Privacy

The monitoring of personal data to evaluate academic performance raises questions about consent, security and potential misuse (Akgun & Greenhow, 2022). Ensuring transparency in AI applications is vital to

safeguard user data and maintain confidence within educational environments.

> "I worry about my personal data being used without my consent. Who has access to my learning history?"
>
> "AI is helpful, but I'm concerned about privacy. What if the system tracks more than just my academic progress?"

AI's Impact on Academic Performance

Some students and faculty members noticed improved academic performance due to AI's ability to provide targeted support and real-time feedback. Previous research shows that artificial intelligence systems can analyze learning models and customize educational content, leading to better involvement and understanding (Xu, 2024). This technology provides immediate feedback, allowing timely interventions that favor academic growth and resilience in students.

> "It helps pinpoint my weaknesses, so I know exactly what to work on before exams."
>
> "AI gives me instant feedback, which is great because I can make corrections right away instead of waiting for my teachers' comments."

The results underscore the significant impact of artificial intelligence (AI) on customized learning, student involvement, faculty adjustments, ethical concerns, and academic achievements. AI has significantly impacted education through personalized learning, adaptive platforms, and gamified tools that enhance student engagement and motivation. Instant feedback and tailored quizzes improve academic achievement and accessibility, with many students viewing AI as a personalized mentor. However, educators face challenges due to insufficient training and guidance, underscoring the need for professional development to maximize AI's potential in teaching. Ethical concerns like data security and transparency remain critical, requiring robust management to maintain trust in AI-driven systems.

AI integration has revolutionized education, offering personalized learning and boosting academic success (Frank, 2024; Kaswan et al., 2024). However, challenges such as data confidentiality, algorithmic biases, and psychological impacts persist (Hanson et al., 2024; Rafiq et al., 2025; Tapalova & Zhiyenbayeva, 2022). Balancing these benefits and issues is critical for advancing AI's role in academia.

Challenges and Future Directions

The process of AI implementation is undertaken in the face of difficulties, to name a few, insufficient infrastructure, the inadequate training for educators and concerns around the maintenance of academic integrity. With the rapid progression of information technology, further research is required on the cognitive and social interaction processes over different contexts to enhance learning and teaching practices in the evolving educational paradigm (Liu, 2021).

Insufficient technological foundation within many Thai universities is highlighted in literature as an important challenge. Many institutions struggle in the acquisition of tools and resources that support the implementation of educational applications promoted by AI (Thanyawatpornkul, 2024). Furthermore, many educators often lack the training required to use AI technologies efficiently in their classrooms. This inadequate training can result in resistance among faculty members who may feel intimidated by the changing educational systems, or simply insecure about how to integrate AI in their curricula (Buripakdi & Truong, 2024).

Recent research leads to the notion that the receptivity of AI tools among students, such as ChatGPT, is influenced by several factors, including perceived efficiency and user-friendliness (Shaengchart et al., 2023). However, there exist cognitive dissonance that may result from students faced with institutional resistance to the adoption of technology (Buripakdi & Truong, 2024). This indicates an urgent need for universities to align their pedagogical strategies with emerging preferences and expectations of technology-oriented learners.

Looking towards the future, trends in AI technology suggest a promising trajectory to improve educational results in Thailand. The potential for personalized learning environments promoted by AI could address the individual needs of students and learning styles. As AI continues to mature, the prospects of using intelligent tutoring systems, adaptive learning platforms and data analysis to improve students' participation and retention seem more viable (Thanyawatpornkul, 2024).

Limitations

This study was limited by its scope, focusing on a selected number of Thai universities. As a result, the findings may not be fully representative of all universities in Thailand, particularly those not yet implementing AI technologies. Being a qualitative study, a degree of subjectivity in interpreting

participants' responses was experienced. However, minimization of bias was ensured through the triangulation of data sources, including interviews, focus groups, and document analysis.

Personalized AI learning has been found to tremendously boost students 'performance in Thai universities through its acceptance of individual learning styles and patterns, encouraging greater commitment and motivation. However, its implementation is faced with challenges, including the constraints within its infrastructure and the resistance from traditional educational frameworks. Ethical concerns exist in terms of data confidentiality and the possibility of bias in AI algorithms, which may affect equitable education. It is recommended that future research centers around the development of robust frameworks and take strides towards ethical AI, the evaluation of long-term impacts on students' results and fair insurance for technological resources.

Although this study relied solely on interviews, several strategies were employed to enhance validity and reliability. An intercoder independently analyzed and categorized the data to ensure coding consistency. Representative participant quotations were included to provide transparency and allow readers to assess the interpretations. Furthermore, the use of a systematic thematic analysis framework (Braun & Clarke, 2006) and a clear audit trail of coding decisions enhanced the trustworthiness of the findings. While the absence of data triangulation is acknowledged as a limitation, the in-depth narratives gathered from diverse participants offer valuable insights into the impact of AI in Thai higher education.

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Appendix

Interview Questions

1. Can you describe how AI tools have influenced your learning experience or teaching practices?
2. In what ways do AI systems tailor learning content to your individual needs?
3. Have you experienced any situations where AI helped you better understand difficult topics? Could you explain?
4. How do AI tools, such as gamified apps or virtual assistants, affect your engagement in learning or teaching?
5. Compared to traditional learning methods, what aspects of AI make learning more interactive or enjoyable?
6. What challenges have you faced when using AI in teaching or learning?
7. How confident do you feel integrating AI into your classroom or study routines?
8. What kind of training or support would help you use AI tools more effectively?
9. How do you feel about the collection and use of personal data by AI systems in education?
10. What concerns do you have regarding privacy, consent, or the security of your information?
11. Have you noticed any changes in your academic performance or student outcomes due to AI tools? Please give examples.
12. How helpful is real-time feedback from AI for your learning or teaching?

13. Overall, how would you describe your experience with AI in education?
14. What do you think are the most significant benefits and challenges of using AI in your learning or teaching?
15. What recommendations would you give to improve AI integration in Thai universities?