THE ROLE OF AI IN ENHANCING PERSONALISED LEARNING, AUTOMATED ASSESSMENT, INTELLIGENT TUTORING, AND STUDENT ENGAGEMENT

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ABSTRACT

This study investigates the impact of artificial intelligence (AI) on personalized learning, automated assessment and feedback, intelligent tutoring systems, and student engagement in online learning environments. The research focuses on fourth-year English major students at a university in the Mekong Delta region, utilizing a mixed-methods approach with both quantitative and qualitative data collection. A questionnaire was administered to 155 participants to gather quantitative insights into their perceptions of AI tools in enhancing learning experiences, while semi-structured interviews provided qualitative data to explore students' experiences in more depth. The findings reveal that AI-driven tools significantly improve personalized learning by adapting content to individual needs, provide timely and effective feedback, enhance tutoring support, and boost student engagement through interactive and gamified elements. The study contributes to the growing body of literature on AI in education, highlighting its potential to transform learning outcomes and student experiences in higher education.

Keywords: Artificial Intelligence, online learning, personalized learning, automated assessment, intelligent tutoring systems, student engagement.

INTRODUCTION

Artificial Intelligence (AI) has transformed conventional teaching approaches especially in online classes through its integration into education systems. Educational tools enhanced by artificial intelligence have become popular because they offer individualized learning experiences and immediate feedback mechanisms as well as smart tutoring capabilities and engaging interactive features according to Chen et al. (2023), Hwang et al. (2021). These technologies provide effective answers to improve learning results for students and optimize educational processes while boosting academic achievement. AI technology offers multiple benefits but addresses concerns about limited contextual understanding and lack of human-like empathy together with requirements for balanced human-AI interactions (Johnson et al., 2021; Nguyen & Tran, 2023).

AI-driven personalization has emerged as a central concept in educational research because it enables customized learning materials and experiences for students according to their personal requirements. Research shows AI systems adapt instructional materials according to students' current abilities and learning milestones resulting in improved engagement (Chen et al., 2023). The current limitations in AI's capacity to understand context and individual student preferences call for additional research in this area (Hwang et al., 2021).

AI contributes significantly to educational settings through its capacity to deliver feedback systems without human input.

Students who use real-time feedback systems can identify their mistakes immediately after which they maintain their learning momentum according to research by Li & Wang (2022). The immediate feedback produced by AI displays clarity yet fails to provide the detailed analysis human instructors deliver especially when assessing difficult or subjective material (Nguyen & Tran, 2023).

Intelligent Tutoring Systems (ITS) play a vital role in supporting self-directed learning according to current educational trends. ITS provides students with one-on-one tutoring support whenever they need it which proves especially helpful for grasping tricky subjects (Xu et al., 2022). Students gave positive feedback about AI tutoring systems but reported that these systems fall short in emotional intelligence and adaptability when compared to human teachers which affects their ability to build strong educational connections (Johnson et al., 2021).

AI technologies enhance student engagement through gamification features and interactive learning environments and collaborative tools. Research shows that educational systems which incorporate badge rewards and point systems and challenge activities increase student motivation while decreasing learning monotony according to Garcia et al. (2023). AI-supported collaboration tools enable effective group work between students so they can interact with classmates while exchanging knowledge across different perspectives. Some students continue to choose face-to-face discussions because AI systems fail to replace the deep conversations that occur during in-person meetings according to Kim & Lee (2020).

This study aims to explore how AI tools impact students' experiences in personalized learning, automated assessment, intelligent tutoring, and engagement within an online learning environment. By focusing on a sample of fourth-year English major students from a university in the Mekong Delta region, the research will provide insights into how AI-based tools are perceived by students in non-Western, higher education contexts. The results will contribute to the ongoing dialogue about the future of AI in education, particularly with regard to its practical applications and potential for improving student learning outcomes in diverse academic settings.

LITERATURE REVIEW

Artificial Intelligence (AI) and Online Learning

Artificial Intelligence (AI)

Artificial intelligence or AI can be defined as an intelligence that is duplicated in a machine that is capable of thinking, learning and solving problems on its own. AI includes many subfields such as machine learning, natural language processing, computer vision, and robotics among others (Russell & Norvig, 2016). The aim of AI is to develop systems that are capable of performing tasks that require human intelligence, including decision making, pattern recognition and language understanding.

Core Concepts in AI

Machine Learning (ML): ML is a subset of AI that enables systems to learn from data and improve over time. Algorithms in ML are categorized into supervised learning, unsupervised learning, and reinforcement learning, with applications in predictive modeling, classification, and optimization (Goodfellow et al., 2016).

Natural Language Processing (NLP): NLP allows machines to understand and generate human language. It powers technologies such as chatbots, sentiment analysis, and language translation, with advancements like GPT-3 pushing the boundaries of text generation and comprehension (Vaswani et al., 2017).

Data Analytics: AI-driven data analytics involves processing large datasets to uncover patterns and insights, supporting applications such as predictive analytics and personalized learning systems (Chen et al., 2012). This allows AI to make informed decisions based on historical data.

Computer Vision: Computer vision enables machines to interpret visual information, including tasks such as facial recognition, image classification, and autonomous navigation. Techniques like deep learning have significantly improved performance in visual recognition (Krizhevsky et al., 2012).

Robotics: AI in robotics combines sensing, decision-making, and action to enable autonomous machines, from industrial robots to autonomous vehicles and medical devices (Siciliano & Khatib, 2016).

Brief History and Evolution of AI Technologies

The development of artificial intelligence has occurred over sixty years through significant progress which impacted multiple sectors. The origin of artificial intelligence as a concept can be traced back to the Turing Machine developed by Alan Turing in 1936 because it established the basic principles of computational theory and machine intelligence. Formal work on artificial intelligence began during the mid-20th century specifically in the 1950s and 1960s when researchers focused on problem-solving methods and symbolic artificial intelligence which used symbol manipulation to achieve human-level operations (Kaul et al., 2020).

AI development progressed through distinct phases. The period from the 1950s to the 1970s introduced fundamental algorithms and machine learning theories which led to medical applications for diagnostic purposes and patient healthcare delivery (Kaul et al., 2020). The artificial neural networks (ANNs) began their dominance in the 1980s by using brain function models to achieve more complex learning systems (Park & Park, 2018).

Advances in AI took place during the 1990s and early 2000s because of growing computational capabilities alongside extensive datasets which boosted supervised learning development (Jiang et al., 2022). Deep learning advancements during the 2010s led to substantial improvements in both image recognition systems and natural language processing while driving industry-wide adoption especially within healthcare sectors (Kilinc, 2024; Zare, 2024; Najjar, 2023).

AI has entered sectors including architecture and finance and transportation while generating ethical questions about job displacement and privacy risks and difficulties in decision processes (M. Matter, 2024; Zhu et al., 2023). Artificial general intelligence (AGI) continues to be a focus of deep research and discussion regarding its development potential and implementation difficulties (Topsakal, 2024).

Online Learning

Online learning is an educational approach in which students engage with instructional resources and communicate with educators and fellow learners via the internet. It utilizes diverse technologies including e-learning platforms, virtual classrooms, and digital resources to provide lectures, assignments, and evaluations remotely. E-learning platforms such as Moodle, Blackboard, and Canvas facilitate course hosting and offer tools for communication, content dissemination, and assessment. Virtual classrooms enable synchronous contact, allowing learners and teachers to engage in live sessions, whereas asynchronous learning permits students to access materials and complete assignments at their convenience (Allen & Seaman, 2017). Digital resources, such as movies, books, and interactive modules, augment the learning experience by offering varied formats that accommodate unique learning styles.

The growth of online education has been extraordinary in recent years, especially following the COVID-19 epidemic. The extensive shutdown of schools, universities, and training facilities rendered online learning the predominant form of education worldwide. The epidemic expedited the integration of digital tools, compelling institutions to swiftly shift to remote learning. A UNESCO research (2020) indicated that over 1.6 billion pupils globally were impacted by school closures, resulting in a significant increase in online education. Consequently, both conventional and unconventional educational institutions augmented their online provisions, and novel platforms surfaced to satisfy the growing need for flexible and accessible education. This transition has initiated a sustained trend towards hybrid models, integrating online learning with in-person education, hence providing more flexibility and accessibility (Dhawan, 2020).

Theoretical Framework

Constructivism in Online Environments

Constructivism posits that learners actively construct their own understanding and knowledge of the world through experiences and reflecting on those experiences. In online environments, this theory emphasizes the importance of interactive and collaborative learning experiences, where students engage in discussions and problem-solving activities (Chiromo, 2024; Yeravdekar, 2022). For instance, online entrepreneurship education can be designed to encourage students to construct their knowledge through peer interactions and real-world applications, thereby enhancing their understanding of entrepreneurial processes (Chiromo,

2024). The digital medium allows for diverse forms of engagement, such as forums and collaborative projects, which are essential for constructivist learning (Kuznetsova, 2021).

Connectivism and Networked Learning

Connectivism, a theory formulated by George Siemens, posits that learning transpires through networks and connections, especially in the digital era characterized by an abundance of continually developing information. This approach emphasizes the significance of social networks and technology in enhancing learning (Kameneva, 2020). Connectivism in online education promotes learners to explore and employ diverse digital resources and platforms for collaborative knowledge construction. The focus on networking and the capacity to acquire knowledge from varied sources corresponds effectively with the attributes of online learning environments, where students can engage with peers, experts, and global resources (Kameneva, 2020).

Adaptive Learning Theories

Adaptive learning theories emphasize customizing educational experiences to address the specific requirements of learners. In digital education, adaptive learning technologies employ data analytics and algorithms to modify curriculum and exams according to a student's performance and learning speed (Bajpai et al., 2019; Datta, 2024). This tailored methodology increases engagement and promotes educational results by guaranteeing that students have the appropriate degree of challenge and assistance (Bajpai et al., 2019). AI-driven platforms can assess student interactions and deliver personalized learning pathways that adjust in real-time, enhancing the learning experience (Datta, 2024).

Cognitive Load Theory in AI-Assisted Learning

Cognitive load theory asserts that learners possess a finite capacity for information processing, and instructional design should seek to optimize this cognitive load to improve learning outcomes. In AI-assisted learning environments, artificial intelligence can alleviate cognitive load by delivering customized content that aligns with the learner's existing knowledge and proficiency (Fox et al., 2018). AI systems can deconstruct intricate knowledge into digestible segments and display it in a manner that reduces unnecessary cognitive burden, enabling students to concentrate on fundamental learning activities (Fox et al., 2018).

Personalized Learning Frameworks

Personalized learning frameworks leverage AI to create customized educational experiences that cater to individual student needs, preferences, and learning styles. These frameworks utilize data analytics to assess student performance and engagement, enabling educators to design targeted interventions and resources (Bajpai et al., 2019; Fox et al., 2018). The integration of personalized learning approaches in digital education has been shown to improve student motivation and achievement, as learners receive support that aligns with their unique learning trajectories (Bajpai et al., 2019; Fox et al., 2018).

Social Learning in AI-Enhanced Environments

Social learning theories emphasize the importance of social interaction and collaboration in the learning process. In AI-enhanced environments, AI tools can facilitate social learning by promoting communication and collaboration among students (Fox et al., 2018; Kameneva, 2020). For example, AI-driven platforms can support group projects, discussions, and peer feedback, fostering a sense of community and shared learning experiences (Fox et al., 2018). This social aspect is crucial in online education, where students may otherwise feel isolated, and it enhances engagement and motivation (Fox et al., 2018; Kameneva, 2020).

In conclusion, the theoretical framework for digital education encompasses various learning theories, including constructivism, connectivism, and adaptive learning theories, which inform the design and implementation of online learning experiences. Additionally, the integration of AI in pedagogical models,

such as cognitive load theory, personalized learning frameworks, and social learning, enhances the effectiveness and engagement of digital education.

AI's Impact on Online Learning

Personalization of Learning

Adaptive learning systems supported by artificial intelligence modify instructional content delivery functions according to student progress and learning requirements through algorithms that process behavioral and performance data to guarantee individualization as mentioned in Baker (2016). The use of personalized learning approaches enhances student engagement because it provides learning materials according to their current abilities and individual learning techniques which results in improved achievements according to Chen & Xie (2019) and Nguyen & Nguyen (2020). Research evidence indicates that students derive higher satisfaction from learning environments which offer personalized support and clarity because of tailored approaches. Through real-time data analysis student information helps AI systems modify educational content according to their current understanding and learning pace as explained by Murtaza et al., (2022) and Jian (2023). Personalized learning effectiveness strongly relies on three key elements which include student motivation and previous knowledge together with their learning behaviors according to both Ma et al., (2023) and Li (2023). By comprehending these traits AI can improve its customization approaches to develop more supportive learning environments according to Ma et al., (2023). Wang (2024) along with Al-Shabandar et al., (2020) agree that AI-powered platforms which monitor student engagement patterns allow educators to provide specific support for better learning results.

Automated Assessment and Feedback

Online educational practices benefit from the implementation of automated assessment and feedback systems because they produce improved learning results and better educational experiences. The use of AI-powered assessments gives immediate and individualized feedback which helps to decrease teachers' work while maintaining the level of student support according to Ding and Chew (2019), Filius et al. (2018), Pereira et al. (2021), and Pishchukhina and Allen (2021). The principal benefit of automated feedback remains its immediate availability which enables students to identify and fix their understanding issues promptly and thus enhances their engagement (Gamage et al., 2019). Online quizzes that provide immediate feedback increase educational interactions between teachers and students thus enhancing the learning process (Gamage et al., 2019). These systems use performance data to give individualized feedback meeting particular learning requirements according to Filius et al. (2018) and Pereira et al. (2021). The formative assessment aspect of automated evaluation supports teaching and learning through continuous feedback (Pishchukhina & Allen, 2021). Frequent assessments with immediate responses help in the identification of student's problems and in the development of growth mindset through the process of learning (Hashimi et al., 2022).

Intelligent Tutoring Systems

Intelligent Tutoring Systems (ITS) signify a notable progression in educational technology, utilizing artificial intelligence to deliver customized instruction and feedback to students. These systems are engineered to replicate personalized tutoring experiences, adjusting to the specific requirements of students and providing prompt, customized feedback to their inquiries and performance (Laaziri et al., 2018; Bradac & Kostolanyova, 2016). The primary functions of ITS encompass evaluating student understanding, supplying instructional material, and offering feedback that is both prompt and pertinent (Laaziri et al., 2018; Pappas & Drigas, 2016).

One of the primary benefits of ITS is their ability to offer automated feedback, which has been shown to enhance learning outcomes. Research indicates that automated feedback systems can significantly improve students' writing skills by providing real-time corrections and suggestions (Herda, 2024; Kellogg et al., 2010). Such systems analyze student submissions for grammatical accuracy, coherence, and structure, allowing learners to understand their mistakes and learn from them effectively (Li et al., 2015; Cotos, 2011). The positive reception of automated feedback by students further underscores its potential to foster a more engaging learning environment (Leppanen et al., 2022).

Furthermore, ITS can enhance the cultivation of cognitive and metacognitive abilities in learners. These systems facilitate self-regulation in students' learning processes through organized feedback and supervision (Al-Othman, 2024). Automated feedback can prompt students to evaluate their writing skills and modify their methods according to the input, thus fostering enhanced learning and comprehension (Al-Othman, 2024; Cotos, 2011). This supports the idea that effective feedback must not only rectify mistakes but also assist students in enhancing their learning processes (Zamprogno et al., 2020).

Enhancing Student Engagement

As the higher education environment transforms student engagement practices in online learning have emerged as a fundamental concern for both educational professionals and academic institutions. To enhance student engagement multiple strategies and frameworks have been proposed because engagement drives better academic results and student satisfaction Redmond et al. (2018); Choi & Brochu (2020). The most successful approach involves creating interactive participatory learning approaches which drive student participation. Research shows that students who actively participate in learning activities achieve better topic understanding and stronger motivational levels (Li, 2024). Student participation benefits from digital tools and technologies. Educational digital games within the curriculum show improved student engagement because they provide dynamic and captivating learning environments (Li, 2024). These games make learning enjoyable while simultaneously developing students' critical thinking and problem-solving skills (Camilleri, 2023). When instructors incorporate gamification elements into their courses it results in elevated student participation and commitment to their coursework (Camilleri, 2023).

Girdzijauskiene et al.'s findings support this approach because they demonstrate digital learning tools are essential for creating engaging educational experiences (Girdzijauskiene et al., 2022). Online course design elements directly affect the level of student participation. Online courses contain critical elements for student engagement according to Tualaulelei et al. who identified areas called "pedagogical touchpoints" (Tualaulelei et al., 2021). Through understanding these touchpoints instructors can create opportunities for student interaction which leads to engagement and motivation. Students' different needs can be addressed through flexible authentic learning activities recommended by Stone and O'Shea for creating an inclusive environment that stimulates learning (Stone & O'Shea, 2019). The development of supportive learning communities represents a crucial factor that enhances student engagement. The engagement levels of students benefit significantly from peer support and collaborative activities among them according to Choi and Brochu (2020) and Kahu and Nelson (2017). When institutions establish opportunities for student interaction through collaborative projects and experience sharing, they create a sense of community which leads to improved student retention and success (Kahu & Nelson, 2017). Student involvement in governance and leadership roles of their educational institutions leads to their personal empowerment while boosting their institutional commitment (Vanderlelie, 2019).

Benefits of AI in Online Learning

The integration of artificial intelligence (AI) in online learning presents a range of benefits that significantly enhance the educational experience for both students and educators. These benefits can be categorized into three main areas: improved learning outcomes, efficiency and scalability, and support for diverse learners.

Improved Learning Outcomes

AI technologies facilitate personalized learning experiences that cater to individual student needs. By analyzing data on student performance, learning styles, and preferences, AI systems can tailor educational content and instructional strategies to optimize learning outcomes Yu & Yu (2023); Moussa, 2024). This personalized approach has been shown to enhance student engagement and motivation, leading to better academic performance (Thomas, 2024). For instance, AI-driven tools can provide immediate feedback on assignments, allowing students to identify and correct mistakes in real-time, which is crucial for effective learning (Rakya, 2023). Furthermore, studies indicate that AI can significantly improve writing skills among learners, particularly in English as a Foreign Language (EFL) contexts, by offering targeted assistance and resources (Moussa, 2024).

Efficiency and Scalability

AI integration streamlines various administrative tasks within educational institutions, enhancing operational efficiency. Automated grading systems, for example, can quickly evaluate student submissions, providing timely feedback while reducing the workload for educators (Nasir, 2024). This efficiency allows teachers to focus more on instructional quality and student interaction, rather than on administrative duties (Nasir, 2024). Additionally, AI systems can scale educational resources to accommodate a larger number of students without compromising the quality of instruction. This scalability is particularly beneficial in online learning environments, where institutions can reach diverse student populations across geographical boundaries (Kanont, 2024).

Support for Diverse Learners

AI technologies play a crucial role in supporting diverse learners, including those with disabilities or special educational needs. AI-assisted tools can provide personalized assistance tailored to the unique challenges faced by these students, enabling them to achieve their learning goals (Barua et al., 2022; Mpu, 2024). For example, AI can facilitate adaptive learning experiences that adjust to the pace and style of individual learners, ensuring that all students receive the support they need to succeed (Thomas, 2024; Mpu, 2024). Moreover, AI can help bridge the digital divide by providing equitable access to educational resources, particularly for students from disadvantaged backgrounds (Kanont, 2024; Mpu, 2024). This inclusivity is essential for fostering an equitable learning environment where every student has the opportunity to thrive.

In conclusion, the integration of AI in online learning offers substantial benefits, including improved learning outcomes, enhanced efficiency and scalability, and robust support for diverse learners. However, it is essential to address the challenges associated with AI implementation, such as data privacy concerns and the potential for exacerbating existing inequalities, to fully realize these benefits in educational settings.

Challenges of AI in Online Learning

Integration Complexities

The incorporation of AI into current educational systems can be intricate and resource-demanding. Educational institutions frequently encounter challenges in integrating AI technologies with their existing systems and instructional methodologies. Alasmari and Alkhamees (2022); Alshehri (2023). This intricacy may result in inconsistent implementation and disparate levels of efficacy among various courses and programs. The absence of clear rules for the integration of AI tools may lead to uncertainty among educators and students concerning their application and advantages (Theelen & Breukelen, 2022). Theelen and Breukelen assert that a systematic methodology for the pedagogical design of e-learning is crucial for the efficient integration of AI tools into the educational process (Theelen & Breukelen, 2022).

Over-Reliance on Technology

A significant challenge associated with AI integration is the potential for students to develop an over-reliance on technology. Studies have shown that while AI tools can enhance learning, they may also lead to decreased self-efficacy and confidence among learners (Tuilan, 2023). For instance, students may become dependent on AI-driven tools for language learning, which can hinder their ability to engage in independent learning and critical thinking (Tuilan, 2023). This over-reliance can diminish the development of essential skills, as students may lean on technology for answers rather than actively engaging with the material (Lee et al., 2021).

Human Interaction Reduction

The transition to AI-enhanced online learning settings may result in diminished human interaction, which is essential for optimal learning. The absence of in-person communication may lead to feelings of isolation among students, adversely affecting their motivation and engagement (AlSaqqaf & Hu, 2021; Baxter &

Hainey, 2022). Although AI can enhance engagement via chatbots and virtual assistants, it cannot entirely emulate the subtleties of human communication or the emotional support offered by teachers and peers (Baxter & Hainey, 2022). Baxter and Hainey emphasize that sustaining student involvement in online environments poses a considerable problem, especially when conventional modes of contact are reduced (Baxter & Hainey, 2022).

Assessment Authenticity

Concerns about the veracity of evaluations in AI-enhanced online learning settings are widespread. The application of AI in grading and evaluation prompts inquiries on the precision and equity of automated assessments (Martin et al., 2020). Furthermore, there exists a possibility that students may utilize AI technologies to engage in academic dishonesty or generate work that fails to authentically represent their comprehension and skills (Martin et al., 2020). Maintaining the integrity of assessments is essential for upholding educational standards and promoting a culture of honesty and accountability among students (Martin et al., 2020).

Learning Style Adaptation

Adapting AI technologies to accommodate diverse learning styles presents another challenge. While AI can provide personalized learning experiences, it may not effectively address the unique preferences and needs of all students (Aydin, 2024). For instance, some learners may thrive in collaborative environments, while others may prefer independent study. The challenge lies in designing AI systems that can dynamically adjust to these varying learning styles without compromising the quality of education (Aydin, 2024). As noted by Zhou, the integration of AI in education requires careful consideration of how these technologies can support diverse learning preferences (Aydin, 2024).

In conclusion, while the integration of AI in online learning offers numerous benefits, it also presents significant challenges that must be addressed to ensure effective implementation. Educational institutions need to develop comprehensive strategies to navigate these challenges, focusing on maintaining human interaction, ensuring assessment authenticity, and accommodating diverse learning styles to create a more inclusive and effective learning environment.

METHOD

Research Design

This study investigates the impact of artificial intelligence (AI) on personalized learning, automated assessment and feedback, intelligent tutoring systems, and student engagement in online learning environments. It involves 155 fourth-year English major students from a university in the Mekong Delta region, offering a specific regional context. Data collection methods include questionnaires and semi-structured interviews, focusing on students' perceptions of AI-driven tools and platforms in enhancing their learning experiences.

Participants

The study involves 155 fourth-year English major students from a university in the Mekong Delta region. These participants were selected to provide insights into their perceptions of artificial intelligence (AI) in online learning environments. The demographic details are summarized in the table below

Table 1. Demographics of the participants

Demographic Variable	Category	No. of Participants	Percentage (%)
Gender	Male	50	30.3
	Female	105	69.7
Age	22 years	140	90.3
	Over 22 years	15	9.7
Technology Access	Owns a personal device	145	93.5
	Shared device	10	6.5
Online Learning Experience	1-2 years	110	70.9
	Over 2 years	45	29.1

Instrumentation

The questionnaire was the primary data collection tool, consisting of four key clusters: Personalization of Learning, Automated Assessment and Feedback, Intelligent Tutoring Systems, and Student Engagement (as shown in Table 2). Each statement was rated on a Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5). This scale allowed for the measurement of the participants' agreement with various aspects of AI integration into their learning experiences. The questionnaire aimed to assess students' attitudes toward AI's role in enhancing learning personalization, the effectiveness of automated feedback systems, the perceived benefits of intelligent tutoring systems, and the overall impact of AI on student engagement in online education.

Table 2. Description of the questionnaire

Clusters	No. of items	Sample	Source
Personalization of Learning	12	I find the personalized learning paths provided by AI to be engaging and motivating.	Smith et al. (2021) Johnson & Brown (2020)
Automated Assessment and Feedback	08	The feedback I receive from automated systems is clear and helps me improve my learning.	Garcia & Lopez (2022) Chen et al. (2021)
Intelligent Tutoring Systems	08	AI tutors respond promptly to my inquiries and provide detailed explanations of concepts I do not understand.	Lee et al. (2020) Nguyen et al. (2021)
Student Engagement	11	AI-powered platforms motivate me to participate in discussions and group activities more actively.	Thompson et al. (2022) Kim & Park (2021)

Note. The table does not include all items. Instead, only one item from each cluster is presented as a reference.

Data Collection

Data for this study was collected over a two-month period from October to November 2023 using two primary methods: questionnaires and semi-structured interviews. The questionnaire was distributed to 155 fourth-year English major students from a university in the Mekong Delta region. The questionnaire gathered quantitative data on students' perceptions of AI's impact on personalized learning, automated assessment and feedback, intelligent tutoring systems, and student engagement in online learning environments (lasted 3 weeks). A combination of Likert-scale questions (ranging from "Strongly Disagree" to "Strongly Agree") was used to measure participants' attitudes toward various AI tools.

In addition to the questionnaire, semi-structured interviews were conducted with a subset of 20 fourth-year participants over a three-week period in December 2023. These interviews aimed to capture qualitative insights into students' experiences with AI in their learning environments. The semi-structured format allowed participants the flexibility to share their thoughts in-depth, while ensuring key areas related to AI's impact on learning are explored. The interviews were conducted either face-to-face or online, depending on the participants' availability and preferences.

Data Analysis

The data collected from the questionnaire was analyzed using descriptive statistics and inferential statistics. Descriptive statistics, such as means, and standard deviations, summarized the overall trends and patterns in students' responses across the various clusters related to AI's impact. For the qualitative data obtained from the semi-structured interviews, thematic analysis was used. Responses were transcribed and coded to identify recurring themes and patterns related to students' experiences with AI-powered tools in their learning process. Key themes such as personalized learning, automated feedback, intelligent tutoring systems, and student engagement were analyzed to explore students' overall attitudes and experiences with AI in their academic work. The qualitative data complemented the quantitative findings, providing a deeper understanding of how AI tools are perceived and used by fourth-year students in online learning environments.

RESULTS

Personalization of Learning

The results of the questionnaire on the personalization of learning through AI were gathered from 155 fourth-year English major students, providing valuable insights into their perceptions of AI-driven learning tools. The data was analyzed for mean scores and standard deviations across 12 statements related to AI-powered personalized learning.

Table 3. Descriptive Statistics for Students' Perceptions of AI in Personalized Learning

Statements	N	Mean	Std. Deviation
1. AI-powered adaptive learning systems adjust the content according to my progress and needs.	155	4.08	.75
2. AI-based systems tailor the learning experience to my individual strengths and weaknesses.	155	4.10	.73
3. I find the personalized learning paths provided by AI to be engaging and motivating.	155	4.18	.67
4. AI adjusts the difficulty level of content based on my performance and learning speed	155	4.12	.73
5. AI-based personalized learning systems make it easier for me to stay on track in my studies.	155	4.17	.69
6. The feedback I receive from AI systems helps me understand where I need improvement in my learning	155	4.03	.70
7. AI-powered systems help me focus on areas where I need the most improvement.	155	3.97	.66
8. Personalized learning through AI helps me achieve better learning outcomes compared to traditional methods.	155	3.95	.67
9. The use of AI has increased my motivation to complete assignments and tasks.	155	3.97	.80
10. AI provides content that aligns with my current knowledge and skill level.	155	3.92	.83
11. AI adapts to my learning preferences and gives me content in a way that suits my learning style.	155	3.90	.80
12. I feel more supported and understood because of the personalized learning experiences AI provides.	155	3.83	.76

The overall trend in the responses indicates a positive perception of AI-powered adaptive learning systems. The highest mean score was observed for the statement, "I find the personalized learning paths provided by AI to be engaging and motivating" (M = 4.18, SD = 0.67). This suggests that students strongly agree that personalized learning through AI is both engaging and motivating. Similarly, participants also indicated a favorable view toward the ability of AI to tailor content to individual needs, with a mean score of 4.10 (SD = 0.73) for the statement, "AI-based systems tailor the learning experience to my individual strengths and weaknesses."

Respondents rated the statement "AI-powered adaptive learning systems adjust the content according to my progress and needs" quite positively (M = 4.08, SD = 0.75), indicating that AI systems are perceived to adapt effectively to their learning needs. Another statement, "AI adjusts the difficulty level of content based on my performance and learning speed", received a mean score of 4.12 (SD = 0.73), reinforcing the idea that AI systems are effective in modifying content difficulty to match the learner's pace. Additionally, students agreed that AI-based personalized learning systems help them stay on track in their studies (M = 4.17, SD = 0.69).

The feedback provided by AI systems was generally seen as useful. The statement, "The feedback I receive from AI systems helps me understand where I need improvement in my learning", scored a mean of 4.03 (SD = 0.70), suggesting that students find AI feedback beneficial for identifying areas of improvement. Furthermore, students acknowledged that AI systems help focus on areas that need improvement, with a mean score of 3.97 (SD = 0.66).

AI's impact on student motivation was also explored. The statement, "The use of AI has increased my motivation to complete assignments and tasks", had a mean score of 3.97 (SD = 0.80), indicating a moderate to strong agreement that AI enhances motivation. Regarding learning outcomes, students were generally positive about AI's contribution to their academic performance. The statement, "Personalized learning through AI helps me achieve better learning outcomes compared to traditional methods", had a mean score of 3.95 (SD = 0.67), suggesting that students believe AI-based learning is more effective than conventional methods.

AI's ability to adapt to students' individual learning preferences was also evaluated. The statement, "AI adapts to my learning preferences and gives me content in a way that suits my learning style", received a mean score of 3.90 (SD = 0.80), indicating that students find AI systems capable of addressing their diverse learning styles. However, the mean score for the statement, "I feel more supported and understood because of the personalized learning experiences AI provides" was 3.83 (SD = 0.76), which suggests a slightly lower level of agreement but still indicates a sense of support and understanding due to AI-driven personalization.

The research reveals that fourth-year English major students see AI-driven personalized learning tools favorably, especially regarding content adaption, feedback, motivation, and support. Although the opinion about AI's support for varied learning preferences was somewhat lukewarm, students predominantly perceived AI as a beneficial addition to their educational experience. The findings underscore the considerable capacity of AI to improve individualized learning in virtual educational environments.

Automated Assessment and Feedback

Table 4 presents the descriptive statistics for students' perceptions of automated assessment and feedback in online learning environments. The data reveals that, overall, the participants view automated assessment and feedback systems positively.

Table 4. Descriptive Statistics for Students' Perceptions of Automated Assessment and Feedback

Statements	N	Mean	Std. Deviation
13. Automated assessments help me understand my strengths and weaknesses in real-time.	155	3.97	.66
14. The feedback I receive from automated systems is clear and helps me improve my learning.	155	3.87	.81
15. Timely feedback from automated systems helps me stay on track in my studies.	155	3.86	.71
16 Automated feedback has helped me identify and correct misconceptions quickly.	155	3.99	.84
17. Automated assessments are effective tools for improving my understanding of course material.	155	3.90	.71
18. The feedback I receive from automated assessments is specific to my needs and learning goals.	155	4.05	.73
19. The instant feedback provided by AI systems motivates me to perform better in assignments and tests.	155	3.89	.72
20. Automated assessments reduce the time I wait for feedback compared to traditional methods.	155	3.94	.71

The statement "Automated assessments help me understand my strengths and weaknesses in real-time" received a mean score of 3.97 (SD = 0.66), indicating a generally favorable perception of the real-time insights provided by AI-powered assessments. Similarly, the feedback's clarity and its ability to aid learning improvements were acknowledged, with the statement "The feedback I receive from automated systems is clear and helps me improve my learning" reporting a mean score of 3.87 (SD = 0.81).

Timely feedback is a critical component of the AI systems, as reflected in the statement "Timely feedback from automated systems helps me stay on track in my studies," which garnered a mean score of 3.86 (SD = 0.71). The ability of automated feedback to address misconceptions quickly was also highlighted, with a mean score of 3.99 (SD = 0.84) for the statement "Automated feedback has helped me identify and correct misconceptions quickly." Furthermore, students agreed that automated assessments were effective tools for enhancing their understanding of the course material, reflected by a mean score of 3.90 (SD = 0.71).

In terms of personalized feedback, the statement "The feedback I receive from automated assessments is specific to my needs and learning goals" received a mean score of 4.05 (SD = 0.73), showing that students appreciate how tailored the feedback can be to their individual learning paths. The instant feedback provided by AI systems also contributed to improved motivation, as evidenced by a mean score of 3.89 (SD = 0.72) for the statement "The instant feedback provided by AI systems motivates me to perform better in assignments and tests." Lastly, the effectiveness of automated assessments in reducing feedback delays was affirmed, with the statement "Automated assessments reduce the time I wait for feedback compared to traditional methods" scoring a mean of 3.94 (SD = 0.71).

These findings indicate that students are generally satisfied with the efficiency, timeliness, and customisation provided by automated assessment and feedback systems, recognizing its importance in improving learning outcomes.

Intelligent Tutoring Systems

Table 5 presents the descriptive statistics for students' perceptions of Intelligent Tutoring Systems (ITS) in online learning environments. The responses indicate that students generally perceive AI-powered tutoring systems as a valuable educational tool.

Table 5. Descriptive Statistics for Students' Perceptions of Intelligent Tutoring Systems

Statements	N	Mean	Std. Deviation
21. AI-powered tutors provide personalized help and guidance based on my learning needs.	155	4.06	.71
22. AI tutors respond promptly to my inquiries and provide detailed explanations of concepts I do not understand.	155	4.04	.78
23. Intelligent Tutoring Systems (ITS) are better at providing tailored support compared to traditional learning methods.	155	4.31	.47
24. The feedback from AI tutors helps me improve my writing and communication skills.	155	4.15	.79
25. I trust AI tutors to guide me through complex course material in an effective manner.	155	4.24	.54
26. AI tutors have improved my academic performance by providing personalized support.	155	3.98	.72
27. The use of AI tutors has made me more independent in my learning.	155	3.95	.60
28. I find the use of AI tutoring systems more engaging than traditional educational tools.	155	3.96	.60

The statement "AI-powered tutors provide personalized help and guidance based on my learning needs" received a mean score of 4.06 (SD = 0.71), suggesting that students appreciate the tailored assistance offered by AI tutors.

Students also noted that AI tutors respond promptly to inquiries and offer detailed explanations of concepts they find difficult, with the statement "AI tutors respond promptly to my inquiries and provide detailed explanations of concepts I do not understand" scoring a mean of 4.04 (SD = 0.78). This indicates a positive perception of the responsiveness and effectiveness of AI tutors in addressing student needs.

The statement "Intelligent Tutoring Systems (ITS) are better at providing tailored support compared to traditional learning methods" received a high mean score of 4.31 (SD = 0.47), reflecting students' strong belief in the superiority of AI tutors over conventional methods in providing personalized support.

In terms of academic development, the statement "The feedback from AI tutors helps me improve my writing and communication skills" reported a mean score of 4.15 (SD = 0.79), highlighting the value students place on the feedback received from AI tutors. Trust in AI tutors was also evident, with the statement "I trust AI tutors to guide me through complex course material in an effective manner" receiving a mean score of 4.24 (SD = 0.54), demonstrating a high level of confidence in the tutoring system's ability to assist with complex content.

AI tutors were also perceived to have a positive impact on academic performance, as reflected in the statement "AI tutors have improved my academic performance by providing personalized support," which garnered a mean score of 3.98 (SD = 0.72). Furthermore, the use of AI tutors was found to foster greater independence in learning, with the statement "The use of AI tutors has made me more independent in my learning" receiving a mean score of 3.95 (SD = 0.60).

Lastly, students found AI tutoring systems to be engaging, as evidenced by the statement "I find the use of AI tutoring systems more engaging than traditional educational tools," which received a mean score of 3.96 (SD = 0.60).

These results suggest that students view Intelligent Tutoring Systems as an effective, engaging, and trusted method for providing personalized learning support, leading to improved academic outcomes and greater learning independence.

Student Engagement

Table 6 presents the descriptive statistics for students' perceptions of student engagement in AI-enhanced learning environments. The data indicate that students generally view AI tools as a positive influence on their engagement with learning activities.

Table 6. Descriptive Statistics for Students' Perceptions of Student Engagement

Statements	N	Mean	Std. Deviation
29. AI-based interactive tools make learning more engaging and fun.	155	3.93	.88
30. The use of AI in my courses has increased my participation and interest in learning activities.	155	3.75	.91
31. AI-driven learning environments keep me actively involved in my studies.	155	3.98	.71
32. The AI tools in my courses help me stay motivated and excited about learning.	155	3.86	.66
33 I feel more connected with my classmates and instructors due to AI-driven communication tools.	155	4.03	.42
34. AI tools help me collaborate with other students in meaningful ways.	155	3.86	.70
35. The use of gamification in AI systems makes learning more interesting and helps me engage better with course content.	155	3.97	.78
36. AI-powered platforms motivate me to participate in discussions and group activities more actively.	155	3.90	.66
37. AI systems facilitate interactive learning experiences that hold my attention better than traditional methods.	155	4.00	.58
38. AI-driven gamified systems make learning more enjoyable and reduce boredom.	155	3.86	.67
39. AI platforms provide me with learning activities that match my interest and encourage me to engage in class discussions.	155	3.85	.63

The statement "AI-based interactive tools make learning more engaging and fun" received a mean score of 3.93 (SD = 0.88), indicating that students find AI-driven interactive tools engaging. The statement "The use of AI in my courses has increased my participation and interest in learning activities" had a mean of 3.75 (SD = 0.91), showing a moderate impact of AI on students' participation and interest in learning.

Regarding active involvement, the statement "AI-driven learning environments keep me actively involved in my studies" received a mean of 3.98 (SD = 0.71), highlighting that students feel more engaged in their studies due to AI-driven tools. The statement "The AI tools in my courses help me stay motivated and excited about learning" scored a mean of 3.86 (SD = 0.66), indicating that AI tools are effective in maintaining student motivation.

The use of AI-driven communication tools positively influences students' sense of connection with peers and instructors, as reflected in the statement "I feel more connected with my classmates and instructors due to AI-driven communication tools," which had the highest mean score in this cluster (4.03, SD = 0.42). This suggests that AI tools enhance communication and collaboration.

In terms of collaborative learning, the statement "AI tools help me collaborate with other students in meaningful ways" received a mean of 3.86 (SD = 0.70), indicating that AI supports student collaboration. Additionally, the incorporation of gamification in AI systems was seen as engaging, as shown by the statement "The use of gamification in AI systems makes learning more interesting and helps me engage better with course content," which had a mean of 3.97 (SD = 0.78).

AI platforms also motivate students to participate more actively in discussions and group activities, with the statement "AI-powered platforms motivate me to participate in discussions and group activities more actively" receiving a mean of 3.90 (SD = 0.66). Furthermore, the statement "AI systems facilitate interactive learning experiences that hold my attention better than traditional methods" achieved a mean of 4.00 (SD = 0.58), emphasizing the effectiveness of AI in keeping students engaged.

Finally, the use of AI-driven gamified systems was reported to make learning more enjoyable and reduce boredom, as reflected in the statement "AI-driven gamified systems make learning more enjoyable and reduce boredom" with a mean of 3.86 (SD = 0.67). Students also noted that AI platforms offer learning activities that align with their interests, as indicated by the statement "AI platforms provide me with learning activities that match my interest and encourage me to engage in class discussions," which had a mean of 3.85 (SD = 0.63).

The findings indicate that AI technologies dramatically improve student engagement by increasing motivation, involvement, collaboration, and overall satisfaction of learning experiences.

Responses from Semi-Structured Interviews

Personalized Learning

Many students highlighted the benefits of AI in developing personalized learning experiences. They adored how AI technologies tailored content, pace, and difficulty to their unique development and tastes. For example, one student commented:

> *"The AI platform adjusts to my learning speed. It gives me content that is just challenging enough to keep me engaged but not so hard that I feel frustrated. It feels like the system knows me personally." (Student 2)*
>
> *"It's helpful that AI identifies my weak areas and creates a study plan that focuses on them. It saves me time and effort." (Student 4)*

Another student shared how personalized learning paths helped them focus on their weaknesses:

> *"The AI points out the areas where I need to improve the most, which makes my study sessions more productive and focused." (Student 7)*
>
> *"AI makes studying more enjoyable because it aligns the content with what I already know, but I wish it could adapt better to my preferences." (Student 10)*

However, a few participants mentioned that the personalization was not always accurate, and they sometimes had to manually override the system's recommendations to suit their actual needs.

> *"Sometimes, the AI recommends topics that I've already mastered, and I have to skip them manually to focus on areas where I actually need improvement." (Student 6)*

Students praised the ability of AI to design learning experiences tailored to their individual needs through customizable content and pacing and difficulty levels. Most students like the fact that it can help them pinpoint their weaknesses and improve the effectiveness of their study time management. But some of them pointed out that the system's recommendations were not always accurate, meaning that they had to make manual adjustments. This highlights the potential of AI-driven personalization while also highlighting the necessity of further development to increase the adaptability and precision of the technology.

Automated Feedback

Automated feedback emerged as a major benefit for students, particularly in terms of its immediacy and clarity. Participants highlighted how receiving real-time feedback allowed them to correct errors and misconceptions promptly. One student noted:

> *"The feedback I get is immediate, which helps me learn from my mistakes right away rather than waiting days for a teacher's response. It's like having an instant coach guiding me at every step." (Student 3)*
>
> *"I like how fast AI provides feedback; I can fix my mistakes immediately rather than waiting for days for my professor's response." (Student 5)*

Some students mentioned that automated systems provided detailed, structured feedback that helped them improve specific skills, such as writing or grammar. However, a recurring concern was that automated feedback sometimes lacked the depth and nuance of explanations provided by human instructors. As one participant explained:

> *"While the AI feedback is helpful, it often feels a bit mechanical. It doesn't explain the context as a teacher would, which sometimes leaves me with unanswered questions." (Student 11)*
>
> *"While the automated feedback is helpful, it often feels generic. I miss the depth that human instructors provide." (Student 12)*

The responses highlight the advantages of automated feedback systems, particularly their speed and detailed explanations. Students find the immediacy of feedback instrumental in correcting mistakes and staying on track. However, some feel the feedback lacks the depth and nuance provided by human instructors, pointing to a gap in the AI's ability to cater to more complex or subjective areas of assessment.

> *"While the AI feedback is useful for quick corrections, it doesn't provide the in-depth explanations that my professor would. Sometimes, I still have questions after reading it." (Student 1)*
>
> *"The AI can tell me what's wrong, but it doesn't explain why in a way that helps me fully understand the concept. A human teacher would give more context." (Student 7)*

Students appreciated the immediate and clear feedback from automated systems which they could use to correct their mistakes and improve certain skills such as writing and grammar. But some of them considered the feedback as general and without the detailed explanation that they could get from a human. Although AI offers structured responses, it cannot provide the nuanced understanding that makes the gap between efficiency and comprehensive understanding.

Intelligent Tutoring Systems (ITS)

The majority of respondents spoke positively about the use of AI-powered intelligent tutoring systems. Students appreciated the availability of AI tutors that could assist them anytime, providing detailed explanations and breaking down complex concepts. One participant stated:

> *"The AI tutor has been a game changer for me. It explains things step by step, and I can revisit the explanations whenever I want. It's like having a personal teacher who is always available." (Student 20)*
>
> *"It feels like having a private tutor available 24/7, which is particularly useful for difficult topics." (Student 18)*

Another student emphasized the confidence boost provided by ITS:

> *"Using the AI tutor has made me feel more independent and confident in handling difficult subjects. I don't have to rely as much on asking my professors for help." (Student 14)*
>
> *"Using the AI tutor keeps me more independent in my learning, as I don't need to rely on my professors as much." (Student 15)*

However, some participants expressed that the interactions with AI tutors could feel impersonal. They noted that while AI tutors were efficient, they missed the empathy and adaptability that human instructors bring to the learning process.

> *"The AI tutor explains things well, but it feels robotic. There's no real conversation or encouragement like I get from my professor." (Student 13)*

Students liked the fact that AI-powered ITSes are accessible and can give them detailed explanations, which will help them learn independently. However, some of them pointed out that although AI tutors are efficient, they cannot replace human teacher's empathy and adaptability, which is more important to engage students in and encourage them to learn more.

Student Engagement

Student engagement was another prominent theme, with many participants praising the interactive features of AI tools. Students reported that gamified learning environments and collaborative AI platforms kept them motivated and interested in their studies. One respondent shared:

> *"The gamification elements, like earning points or badges, make learning enjoyable and less monotonous. It encourages me to keep going even when the material is challenging." (Student 16)*
>
> *"AI tools make learning fun, especially with gamification features like badges and points. It keeps me motivated." (Student 8)*

Another student appreciated the collaborative features of AI platforms:

> *"The AI tools allow me to work with my classmates on projects and assignments in a way that feels seamless. It's a great way to stay connected and learn from each other." (Student 5)*
>
> *"The collaborative tools help me connect with my classmates and learn from their perspectives during projects." (Student 17)*

Despite these benefits, a few students expressed concerns about over-reliance on AI tools for engagement. They suggested that while AI tools made learning fun, they still valued human interactions and group discussions to develop deeper connections with peers and instructors.

> *"AI tools make learning more interactive, but I sometimes feel isolated. I miss discussing ideas with classmates in person." (Student 3)*

"While AI makes studying fun, I still prefer face-to-face discussions with my professors and classmates. It helps me understand concepts more deeply." (Student 2)

Students can enhance their learning with AI through two major ways: gamification and collaborative features which make learning more enjoyable and interactive. A number of students raised an issue about an over-reliance on AI, highlighting that human interaction and discussion has an important role to play in understanding and developing meaningful relationships with peers and instructors.

DISCUSSION

The findings of this study provide important insights into the utilization of AI-powered technologies in online learning environments, particularly among fourth-year English major students. The findings show AI's usefulness in personalizing learning, offering automatic feedback, assisting students through intelligent tutoring tools, and increasing engagement. These findings are consistent with and extend previous studies, while also emphasizing areas for improvement in AI-driven teaching.

Online education advanced by AI technology produces substantial effects on educational experiences for fourth-year English major students. The research conducted by Chen et al. in 2023 together with Hwang et al. in 2021 confirms how AI improves personalized learning delivery automated feedback intelligent tutoring and student engagement but this study extends previous work by revealing important barriers within AI-driven teaching that require additional investigation.

AI-powered adaptive learning systems differentiate content according to student achievement levels along with their current abilities and knowledge gaps. Adaptive learning systems demonstrate improved student motivation and engagement according to Chen et al.'s research (Chen et al., 2023). AI systems struggle to perfectly match content with student preferences. Hwang et al.'s (2021) studies demonstrate similar findings about AI's restricted contextual comprehension through recommendations for adaptable personalization solutions. The timely and systematic direction provided by AI-generated feedback has earned universal recognition for its efficiency (Li & Wang, 2022). Students benefited from immediate review corrections which helped them sustain their academic advancement according to their experiences. The research by Nguyen & Tran (2023) supports previous observations that AI feedback fails to provide sufficient depth especially when assessing demanding or subjective assignments. The research demonstrates a significant shortcoming of AI systems to deliver detailed explanatory information which human instructors provide consistently.

Intelligent Tutoring Systems (ITS) provide essential support for independent learning through their availability to help students decompose challenging concepts 24/7 as demonstrated by Xu et al. (2022). Student responses from this study showed that AI tutors provided increased independence in learning. The absence of human-like empathy and adaptability continues to be a widespread concern which supports Johnson et al.'s (2021) proposal that emotional intelligence should be incorporated into AI-driven instruction to create comprehensive learning experiences.

Educational gamification alongside interactive AI features enhances student engagement through dynamic and enjoyable learning experiences as reported by Garcia et al. (2023). The research results back up previous discoveries because AI interactive components led students to demonstrate elevated motivational levels. Though advantages exist with current virtual education modes students continue to strongly prefer direct human interaction. Prior research (Kim & Lee, 2020) shares these concerns by advocating for blended learning frameworks that pair AI technology with its operational advantages against human interaction depth.

By contextualizing these findings within the broader literature, this study underscores AI's strengths in education while identifying areas that require refinement. Addressing these limitations could lead to more effective AI-driven learning environments that balance technological innovation with human-centered teaching approaches.

CONCLUSION

This study examined the influence of AI-powered technologies on fourth-year English major students' learning experiences in online environments, concentrating on four key clusters: personalized learning, automated evaluation and feedback, intelligent tutoring systems, and student engagement. The findings demonstrated that AI makes a substantial contribution to improving personalization, giving timely and specific feedback, developing academic independence, and promoting engagement through interactive and game-based experiences. The findings are consistent with earlier research emphasizing AI's transformative potential in education, notably in personalizing learning to individual requirements and promoting students' academic advancement.

Qualitative insights from semi-structured interviews supplemented the quantitative findings by offering light on students' perspectives of AI as a supportive and motivating tool. Students valued the adaptability of AI systems, the clarity of automated feedback, and the accessibility of intelligent tutoring systems, which allowed them to learn at their own pace and handle their specific issues. However, concerns were raised regarding a lack of human connection and an overreliance on AI tools, highlighting areas for development in the integration of these technology into educational processes.

Overall, the study emphasizes the importance of using a balanced strategy that blends AI's strengths with traditional teaching approaches in order to optimize its benefits. These findings add to the increasing corpus of research on AI in education and offer significant insights for educators, policymakers, and developers looking to improve the use of AI technology in higher education. Future research could look into the long-term effects of artificial intelligence on learning outcomes, as well as its applicability in a variety of academic subjects and student groups.

Limitations

This study has some limitations that should be noted. The sample size was limited to 155 fourth-year English major students from a single university in the Mekong Delta region, which may limit the findings' applicability to other populations, fields, or settings. Data collection depended on self-reported measures obtained via questionnaires and semi-structured interviews, which are susceptible to biases such as social desirability and recall mistakes, potentially influencing the trustworthiness of the results. Furthermore, the study focused on students' immediate perceptions rather than investigating long-term implications on academic performance or career preparedness, leaving the long-term ramifications of AI technologies untested. Furthermore, the study focused on four clusters—personalized learning, automated assessment and feedback, intelligent tutoring systems, and student engagement—without looking into other crucial issues including ethical considerations, data protection, and technical hurdles. These constraints necessitate additional study with more diverse samples, longitudinal designs, and broader investigative scopes to gain a more thorough knowledge of AI's function in education.

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