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Generative artificial intelligence in higher education: Educational and psychological perspectives

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***Abstract*---**Generative artificial intelligence (GenAI) has rapidly emerged as a transformative technology in higher education, creating new opportunities for educational innovation while raising important psychological concerns. This study aims to synthesize current evidence on the educational and psychological perspectives of GenAI in higher education. A qualitative literature review approach was employed using secondary data collected from peer-reviewed journal articles, systematic reviews, conference proceedings, academic books, and official reports, with priority given to publications indexed in Scopus and Web of Science. The reviewed literature was analyzed using qualitative thematic analysis to identify major themes related to educational innovation, AI literacy, self-regulated learning, learning motivation, academic engagement, psychological well-being, critical thinking, technology dependence, and ethical issues. The findings indicate that GenAI enhances personalized learning, learning motivation, academic engagement, self-regulated learning, and learning effectiveness while supporting more flexible and learner-centered educational environments. However, the review also highlights psychological and educational challenges, including excessive dependence on AI, reduced critical thinking, academic integrity concerns, technology-related anxiety, and ethical issues associated with AI-assisted learning. The study further emphasizes that AI literacy and responsible pedagogical integration are essential for maximizing the educational benefits of GenAI while minimizing its psychological risks. The findings provide theoretical insights and

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practical implications for universities seeking to integrate generative AI into higher education in ways that are educationally effective, ethically responsible, and supportive of students' psychological development.

***Keywords*---**generative artificial intelligence, higher education, educational perspectives, educational psychology, AI literacy, self-regulated learning.

1. Introduction

Generative artificial intelligence (GenAI) has emerged as one of the most influential technological innovations in contemporary education, fundamentally transforming how knowledge is created, accessed, and applied. Unlike traditional artificial intelligence systems that primarily perform predictive or analytical functions, generative AI is capable of producing human-like text, images, programming code, and other forms of content through advanced large language models such as ChatGPT. The rapid development of these technologies has accelerated digital transformation in higher education by providing intelligent learning support, personalized feedback, adaptive instruction, and interactive learning experiences (Holmes et al., 2019; Kasneci et al., 2023). Consequently, universities worldwide are increasingly integrating generative AI into teaching, learning, assessment, and academic support services.

The adoption of generative AI has significantly expanded educational opportunities in higher education. AI-powered applications enable students to receive immediate explanations, generate learning materials, summarize complex information, and obtain personalized guidance that supports independent learning. Recent reviews indicate that generative AI facilitates learner-centered education by improving accessibility, flexibility, and academic efficiency while allowing instructors to redesign teaching practices toward more personalized learning environments (Crompton & Burke, 2023; Lo, 2023). Similarly, Baidoo-Anu & Ansah (2023) argued that ChatGPT and related technologies have considerable potential to improve teaching effectiveness, encourage collaborative learning, and support lifelong learning through intelligent educational assistance.

One of the most important contributions of generative AI lies in its capacity to promote students' self-regulated learning. AI systems provide immediate feedback, adaptive recommendations, personalized learning pathways, and continuous academic support that enable students to monitor their learning progress and make informed learning decisions. Recent studies suggest that AI literacy and self-regulated learning have become increasingly interconnected, as students must develop the ability to evaluate AI-generated information critically while maintaining independent thinking and learning autonomy (Anders, 2025; Qi et al., 2025). Furthermore, AI-supported learning environments have been found to strengthen learning motivation, improve writing performance, and facilitate reflective learning when students actively regulate their interactions with AI technologies (Jin et al., 2025; Sun et al., 2023).

Alongside these educational benefits, generative AI has also attracted increasing attention from educational psychology because of its influence on students' cognitive, emotional, and behavioral development. Personalized AI support may enhance academic engagement, self-efficacy, confidence, and learning satisfaction by reducing learning barriers and providing timely assistance during complex academic tasks (Kasneci et al., 2023; Huang et al., 2025). Meta-analytic evidence further suggests that AI-assisted learning can positively influence academic achievement, motivation, and self-regulation when integrated appropriately into instructional design (Guan et al., 2024; Zhu et al., 2025). These findings indicate that generative AI is not merely an instructional technology but also an important psychological factor influencing students' learning experiences.

Despite these advantages, the widespread adoption of generative AI has generated substantial educational and psychological concerns. Excessive reliance on AI-generated content may weaken students' critical thinking, creativity, and independent problem-solving abilities if AI is used as a substitute rather than a supplement for learning (Dwivedi et al., 2023; Walter, 2024). Ethical issues concerning academic integrity, plagiarism, algorithmic bias, misinformation, and data privacy have also become increasingly important challenges for higher education institutions (Tlili et al., 2023; López-Pérez et al., 2011). Furthermore, recent research has identified psychological risks associated with AI use, including technology dependence, academic anxiety, digital fatigue, loneliness, and uncertainty regarding students' future professional competence in AI-driven societies (Crawford, 2024; Klimova & Pikhart, 2025). Students' perceptions and acceptance of generative AI likewise vary according to their digital competence, learning needs, and previous experiences with AI technologies (Durgungoz et al., 2025; Faraon et al., 2025; Moradi, 2025).

Although research on generative AI in higher education has expanded rapidly, existing studies remain fragmented across multiple disciplines. Some investigations primarily examine technological adoption and educational innovation, whereas others focus on learning outcomes, AI literacy, self-regulated learning, or students' psychological well-being. Comparatively fewer studies provide an integrated perspective that simultaneously examines both the educational opportunities and the psychological implications of generative AI within higher education. Consequently, there remains a need for a comprehensive synthesis that connects these two perspectives and identifies how educational practices and psychological factors interact in AI-supported learning environments.

2. Theoretical Framework

2.1. Generative Artificial Intelligence in Higher Education

Generative artificial intelligence (GenAI) refers to a new generation of AI systems capable of creating original content, including text, images, computer code, audio, and multimedia materials, based on large-scale data training and advanced language models. Unlike traditional AI applications that primarily classify, predict, or automate routine tasks, generative AI actively supports knowledge construction, problem solving, and human-computer interaction. The emergence of tools such as ChatGPT has significantly expanded the educational applications

of AI by providing personalized tutoring, intelligent feedback, academic writing support, content generation, and interactive learning experiences (Holmes et al., 2019; Kasneci et al., 2023).

Higher education institutions have rapidly adopted generative AI to enhance teaching effectiveness, improve learning accessibility, and support student-centered education. AI-powered systems facilitate adaptive learning, automate administrative tasks, provide immediate responses to students' questions, and enable personalized instructional pathways that accommodate diverse learning needs (Crompton & Burke, 2023; McCrudden et al., 2019). A systematic review conducted by Zawacki-Richter et al. (2019) further demonstrated that AI has become an important driver of educational innovation by supporting learning analytics, intelligent tutoring systems, assessment, and institutional decision-making. Consequently, generative AI is increasingly recognized as an essential component of digital transformation in higher education.

2.2. Educational Perspectives on Generative Artificial Intelligence

From an educational perspective, generative AI contributes to learning by promoting active knowledge construction, personalized instruction, and flexible access to educational resources. AI-supported learning environments enable students to receive immediate explanations, generate learning materials, summarize complex concepts, and practice problem solving independently. Such capabilities improve learning efficiency while encouraging greater learner autonomy and participation throughout the educational process (Lo, 2023).

Recent studies have increasingly emphasized the relationship between generative AI and self-regulated learning. Self-regulated learning refers to students' ability to plan, monitor, evaluate, and control their own learning activities. Generative AI provides continuous feedback, personalized recommendations, and adaptive learning support that strengthen learners' capacity to regulate their learning effectively (Anders, 2025). Similarly, Qi et al. (2025) argued that appropriately designed AI-supported learning activities encourage reflection, metacognitive monitoring, and autonomous learning. Research has also shown that AI literacy plays an essential role in helping students evaluate AI-generated information critically, use AI responsibly, and integrate AI into academic learning without sacrificing independent thinking (Walter, 2024; Wang et al., 2025).

Generative AI also contributes to academic engagement and learning motivation. AI-assisted educational tools increase students' participation by creating interactive learning experiences and providing individualized support tailored to different learning styles. Reviews conducted by Huang et al. (2025) and Guan et al. (2024) indicate that AI-assisted learning positively influences students' motivation, engagement, language learning performance, and learning satisfaction, particularly when AI is integrated as a complementary educational resource rather than a replacement for classroom instruction.

2.3. Psychological Perspectives on Generative Artificial Intelligence

Educational psychology suggests that learning technologies influence not only academic achievement but also learners' cognitive, emotional, motivational, and behavioral development. Within AI-supported learning environments, students

continuously interact with intelligent systems that shape their confidence, emotions, decision making, and learning behaviors. Consequently, understanding the psychological implications of generative AI has become increasingly important for higher education research.

Existing literature identifies several positive psychological outcomes associated with AI-assisted learning. Personalized feedback, adaptive instruction, and immediate learning support contribute to higher levels of self-efficacy, academic confidence, learning motivation, and psychological well-being (Kasneci et al., 2023). Students who perceive AI as a supportive learning partner often report greater confidence in solving academic problems and stronger engagement with learning activities (Durgungoz et al., 2025). Furthermore, recent evidence suggests that AI can reduce cognitive overload by organizing learning resources efficiently and providing timely assistance, thereby improving students' learning satisfaction and emotional adaptation (Klimova & Pikhart, 2025).

However, generative AI also presents important psychological challenges. Excessive dependence on AI-generated responses may reduce critical thinking, creativity, and independent reasoning if students rely on AI without sufficient cognitive engagement (Dwivedi et al., 2023). Concerns regarding academic integrity, misinformation, algorithmic bias, and data privacy may also increase uncertainty and psychological pressure among university students (Tlili et al., 2023). Crawford (2024) further warned that excessive substitution of human interaction with AI may contribute to feelings of loneliness and reduced social connectedness in higher education. These findings indicate that the psychological effects of AI are multidimensional and depend largely on students' patterns of AI use as well as institutional educational practices.

2.4. Conceptual Framework

Based on the reviewed literature, this study adopts an integrated conceptual framework that combines educational and psychological perspectives on generative AI in higher education. The framework assumes that generative AI functions as an educational innovation that influences students through multiple interconnected learning processes.

From the educational perspective, AI applications support personalized learning, AI literacy, self-regulated learning, academic engagement, collaborative learning, and learning effectiveness. From the psychological perspective, AI influences learning motivation, self-efficacy, critical thinking, cognitive engagement, psychological well-being, academic anxiety, technology dependence, and ethical decision-making. These educational and psychological dimensions interact continuously and collectively determine students' learning experiences and educational outcomes.

Accordingly, this documentary study synthesizes existing evidence to examine how generative AI simultaneously creates educational opportunities and psychological challenges for university students.

3. Methodology

This study employed a qualitative literature review approach to examine the educational and psychological perspectives of generative artificial intelligence (GenAI) in higher education. Secondary data were collected from peer-reviewed journal articles, systematic reviews, conference proceedings, academic books, and official reports, with priority given to publications indexed in Scopus and Web of Science.

Relevant studies were identified through searches of major academic databases using keywords such as "generative artificial intelligence," "ChatGPT," "higher education," "AI literacy," "self-regulated learning," "student engagement," "psychological well-being," "critical thinking," and "learning outcomes." The review primarily focused on publications published between 2019 and the present to capture the rapid development of generative AI research in higher education.

The selected studies were screened according to their relevance, methodological quality, and contribution to understanding the educational and psychological dimensions of GenAI in higher education. The data were analyzed using qualitative thematic analysis to identify recurring patterns related to educational innovation, AI literacy, learning motivation, self-regulated learning, academic engagement, psychological well-being, critical thinking, technology dependence, and ethical issues. Finally, the findings were synthesized into major thematic categories to provide an integrated understanding of the opportunities, challenges, and educational implications of generative AI in higher education.

4. Findings

Educational Contributions of Generative AI in Higher Education

The reviewed studies consistently demonstrate that generative artificial intelligence has become an important educational innovation in higher education. Applications such as ChatGPT, intelligent tutoring systems, and AI-assisted learning platforms support personalized instruction, immediate feedback, content generation, and adaptive learning pathways. These features allow students to access learning resources more efficiently while promoting flexible and learner-centered educational environments (Holmes et al., 2019; Crompton & Burke, 2023).

Several studies further indicate that generative AI strengthens students' learning motivation, academic engagement, and independent learning by providing timely academic support and encouraging active participation in learning activities (Lo, 2023; Jo, 2024). AI also assists instructors in designing learning materials, facilitating formative assessment, and improving teaching efficiency.

Table 1
Educational contributions of generative AI in higher education

Educational aspect	Major contribution	Representative studies
Personalized learning	Adaptive instruction based on learner needs	Holmes et al. (2019); Crompton & Burke (2023)
Learning motivation	Increases students' interest and participation	Lo (2023); Huang et al. (2025)
Teaching support	Assists lesson preparation and assessment	Jo (2024); Baidoo-Anu & Ansah (2023)
Learning effectiveness	Improves access to learning resources and feedback	Zhu et al. (2025)
Educational innovation	Supports learner-centered education	Zawacki-Richter et al. (2019)

Generative AI and Students' Self-Regulated Learning

One of the strongest themes emerging from the reviewed literature concerns the relationship between generative AI and self-regulated learning. AI enables students to plan, monitor, evaluate, and adjust their own learning by providing personalized recommendations, instant feedback, and adaptive instructional support. Consequently, students become more autonomous and reflective during the learning process (Anders, 2025).

Research also suggests that AI literacy has become a prerequisite for effective AI-assisted learning. Students need sufficient knowledge to critically evaluate AI-generated information, formulate appropriate prompts, and integrate AI into academic learning responsibly (Walter, 2024). Several studies identify self-regulated learning as an important mediator between AI use and academic achievement (Qi et al., 2025; Jin et al., 2025).

Table 2
AI literacy and self-regulated learning

Theme	Main findings	Representative studies
AI literacy	Enables responsible and critical AI use	Walter (2024); Wang et al. (2025)
Self-regulated learning	Improves planning, monitoring, and reflection	Anders (2025); Qi et al. (2025)
Learning autonomy	Encourages independent learning	Sun et al. (2023)
Academic performance	Better learning outcomes through AI support	Jin et al. (2025); Zhu et al. (2025)

Psychological Perspectives on Generative AI

The literature demonstrates that generative AI influences multiple psychological dimensions of students' learning experiences. Positive outcomes include improved self-efficacy, confidence, learning satisfaction, and psychological well-being

resulting from personalized support and immediate feedback (Kasneci et al., 2023; Klimova & Pikhart, 2025). Students often perceive AI as an accessible learning companion that facilitates problem solving and reduces academic frustration (Durgungoz et al., 2025).

However, psychological risks are also frequently reported. Excessive reliance on AI may reduce critical thinking, creativity, and independent reasoning. Ethical concerns regarding plagiarism, misinformation, academic integrity, and technology dependence have become increasingly prominent. Some studies additionally report academic anxiety, loneliness, and uncertainty about future professional competence associated with extensive AI use (Dwivedi et al., 2023; Crawford, 2024).

Table 3. Psychological perspectives on generative AI

Psychological dimension	Positive implications	Potential challenges
Learning motivation	Higher engagement	Reduced intrinsic motivation if overused
Self-efficacy	Greater academic confidence	Dependence on AI assistance
Critical thinking	Supports idea generation	Reduced analytical reasoning
Psychological well-being	Lower learning stress through personalized support	Academic anxiety and digital fatigue
Academic integrity	Supports learning efficiency	Plagiarism and unethical AI use

Emerging Trends and Future Educational Directions

Across the reviewed studies, several emerging trends can be identified. First, AI literacy is becoming a core competency for university students. Second, universities are gradually shifting from technology-centered implementation toward human-centered AI integration that emphasizes ethical use, critical thinking, and responsible learning. Third, educational research increasingly combines educational technology with educational psychology to understand better students' cognitive, motivational, and emotional responses to AI-assisted learning.

5. Discussion

The findings of this review demonstrate that generative artificial intelligence has become more than a technological innovation in higher education. It represents a transformative educational resource that reshapes teaching practices, learning processes, and students' psychological experiences. The reviewed studies consistently indicate that GenAI enhances personalized learning, motivation to learn, self-regulated learning, and academic engagement, while creating new opportunities to develop AI literacy and independent learning skills. These findings support the growing consensus that AI should be integrated into higher

education as a pedagogical tool that complements, rather than replaces, human teaching and learning (Holmes et al., 2019; Crompton & Burke, 2023).

A prominent finding of this review is the close relationship between AI literacy and self-regulated learning. Students who possess stronger AI literacy are more capable of evaluating AI-generated information critically, constructing effective prompts, and using AI responsibly to support their learning. Consequently, AI literacy should no longer be viewed solely as a technological competency but as an educational competency closely associated with critical thinking, autonomous learning, and lifelong learning. This perspective is consistent with recent studies emphasizing that effective AI integration requires students to actively regulate their learning rather than rely passively on AI-generated content (Anders, 2025; Walter, 2024; Qi et al., 2025).

From a psychological perspective, the review confirms that the effects of generative AI are multidimensional. Personalized feedback and adaptive learning environments contribute positively to students' confidence, motivation, engagement, and psychological well-being. At the same time, excessive dependence on AI may weaken critical thinking, reduce cognitive engagement, and increase concerns related to academic integrity, technology dependence, and academic anxiety. These contrasting findings suggest that the educational value of generative AI depends largely on pedagogical design, institutional guidance, and students' patterns of AI use rather than on the technology itself (Dwivedi et al., 2023; Klimova & Pikhart, 2025).

These findings have important implications for higher education in Vietnam, where digital transformation has become a strategic priority for universities. The rapid adoption of generative AI tools such as ChatGPT, Microsoft Copilot, Gemini, and other intelligent learning platforms has created valuable opportunities for improving teaching quality, supporting independent learning, and expanding access to educational resources. However, many Vietnamese universities are still in the early stages of developing institutional policies and pedagogical frameworks for AI integration. Consequently, differences in digital competence among lecturers and students, inconsistent AI practices across disciplines, and limited guidance on ethical AI use may reduce the educational effectiveness of these technologies.

To maximize the educational benefits of generative AI, Vietnamese universities should place greater emphasis on AI literacy as a core graduate competency. AI literacy should be integrated into curricula across disciplines to help students understand the capabilities and limitations of AI, evaluate AI-generated information critically, formulate effective prompts, and apply AI ethically in academic work. At the same time, lecturers should receive continuous professional development to redesign teaching strategies, learning activities, and assessment methods that encourage inquiry, critical thinking, collaboration, and responsible AI use rather than simple content generation.

The findings also suggest that assessment practices in Vietnamese higher education require further innovation. Traditional assessment methods that primarily emphasize memorization and reproduction of knowledge are

increasingly vulnerable to inappropriate AI use. Universities should gradually adopt authentic assessment approaches, including project-based learning, case analysis, reflective writing, presentations, portfolios, and collaborative problem-solving tasks. Such approaches are more likely to evaluate students' higher-order thinking, creativity, and independent learning while reducing excessive reliance on AI-generated outputs.

Furthermore, psychological support should become an integral component of AI implementation strategies. Universities should recognize that students may experience technology-related anxiety, uncertainty, or excessive dependence during the transition toward AI-supported learning environments. Academic advising, digital well-being programs, and clear ethical guidelines can help students develop healthy learning habits and use AI confidently without undermining their intellectual autonomy. In this regard, educational innovation should be accompanied by equal attention to students' psychological development and well-being.

Although this review provides a comprehensive synthesis of current research, it is limited by its reliance on published literature rather than primary empirical data. Most existing studies have been conducted in technologically advanced educational systems, while empirical evidence from Vietnam and other developing countries remains relatively limited. Future research should therefore investigate Vietnamese students' educational experiences, AI literacy, psychological adaptation, and learning outcomes across different academic disciplines using quantitative, qualitative, or mixed-method approaches. Such studies would provide context-specific evidence to inform educational policies and institutional practices for the responsible integration of generative AI in Vietnamese higher education.

6. Conclusion

Generative artificial intelligence is transforming higher education by reshaping teaching practices, learning processes, and students' educational experiences. This review demonstrates that GenAI provides substantial educational benefits through personalized learning, adaptive feedback, AI literacy development, self-regulated learning, and enhanced academic engagement. These advantages contribute to more learner-centered educational environments and support students in developing greater autonomy and learning effectiveness.

At the same time, the review highlights that the integration of GenAI also presents important psychological and educational challenges. Excessive reliance on AI may weaken critical thinking and independent learning, while concerns regarding academic integrity, technology dependence, psychological well-being, and ethical AI use require careful attention from higher education institutions. These findings suggest that the educational value of GenAI depends not only on technological advancement but also on appropriate pedagogical design, responsible AI literacy, and effective institutional governance.

For universities, particularly in the context of digital transformation in Vietnam, GenAI should be integrated through comprehensive strategies that combine

technological innovation with educational quality and psychological support. Developing AI literacy, redesigning teaching and assessment practices, promoting ethical AI use, and strengthening students' critical thinking and self-regulated learning should become key priorities for higher education.

Although this study provides a comprehensive synthesis of recent literature, it is limited by its reliance on documentary evidence. Future research should conduct empirical studies across different disciplines and educational contexts to examine how generative AI influences students' learning behaviors, psychological development, and academic performance. Such evidence will contribute to the sustainable, ethical, and human-centered integration of generative AI in higher education.

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