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AI TOOL USE BY STUDENTS IN VIETNAMESE UNIVERSITIES: DRIVERS AND EFFECTS ON ACADEMIC PERFORMANCE

Nguyen Tien Dung^{1*}, Pham Thi Bich Duyen¹, Tran Minh Tu Nhi², Le Huong Tra²,
Nguyen Quoc Bao², Phan Huynh Thanh Ngan², and Nguyen Sanh Loi²

¹Department of Finance-Banking & Business Administration, Quy Nhon University, Vietnam

²Student, Department of Finance-Banking & Business Administration,
Quy Nhon University, Vietnam

*Corresponding author, Email: nguyentindung@qnu.edu.vn

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Abstract

In the context of the increasingly widespread application of Artificial Intelligence (AI) tools, particularly generative AI (GenAI) models, in higher education, most current studies have mainly focused on the factors influencing the intention to use AI. However, empirical research examining students' actual AI tool use and its direct impact on academic performance remains relatively limited. This study investigates the effects of facilitating conditions and perceived playfulness on students' actual AI tool use, while simultaneously assessing the direct influence of AI tool use on academic performance. Data were collected from 522 university students in Vietnam and analyzed using partial least squares structural equation modeling (PLS-SEM). The findings reveal that both facilitating conditions and perceived playfulness exert positive effects on AI tool use, which in turn has a significant positive impact on academic performance. The study contributes theoretically by shifting the analytical focus from behavioral intention to actual usage behavior, integrating both environmental and intrinsic factors, and providing empirical evidence on the mechanisms through which AI influences students' academic performance in the context of higher education in Vietnam.

Keywords: academic performance, AI tool use, facilitating conditions, higher education, perceived playfulness.

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VIỆC SỬ DỤNG CÔNG CỤ TRÍ TUỆ NHÂN TẠO CỦA SINH VIÊN TẠI CÁC TRƯỜNG ĐẠI HỌC Ở VIỆT NAM: CÁC YẾU TỐ TÁC ĐỘNG VÀ ẢNH HƯỞNG ĐẾN KẾT QUẢ HỌC TẬP

**Nguyễn Tiến Dũng^{1*}, Phạm Thị Bích Duyên¹, Trần Minh Tú Nhi², Lê Hương Trà²,
Nguyễn Quốc Bảo², Phan Huỳnh Thanh Ngân² và Nguyễn Sanh Lợi²**

¹Khoa Tài chính – Ngân hàng & Quản trị kinh doanh, Trường Đại học Quy Nhơn, Việt Nam

²Sinh viên, Khoa Tài chính – Ngân hàng & Quản trị kinh doanh,
Trường Đại học Quy Nhơn, Việt Nam

*Tác giả liên hệ, Email: nguyentientrung@qnu.edu.vn

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Tóm tắt

Trong bối cảnh các công cụ Trí tuệ nhân tạo (AI), đặc biệt là các mô hình AI tạo sinh (GenAI), ngày càng được ứng dụng rộng rãi trong giáo dục đại học, phần lớn các nghiên cứu hiện nay chủ yếu tập trung vào các nhân tố ảnh hưởng đến ý định sử dụng AI. Tuy nhiên, các nghiên cứu xem xét hành vi sử dụng AI trong thực tế của sinh viên và tác động trực tiếp của hành vi này đến kết quả học tập vẫn còn hạn chế. Nghiên cứu này phân tích tác động của Điều kiện hỗ trợ và Cảm nhận thú vị đến việc sử dụng AI trong thực tế, đồng thời đánh giá ảnh hưởng trực tiếp của việc sử dụng AI đến kết quả học tập của sinh viên. Dữ liệu được thu thập từ 522 sinh viên tại các trường đại học ở Việt Nam và được phân tích bằng mô hình phương trình cấu trúc riêng phần (PLS-SEM). Kết quả cho thấy Điều kiện hỗ trợ và Cảm nhận thú vị đều tác động tích cực đến việc sử dụng AI, qua đó hành vi này ảnh hưởng tích cực đến kết quả học tập. Nghiên cứu đóng góp về mặt lý thuyết bằng cách chuyển trọng tâm từ ý định sang hành vi sử dụng thực tế, tích hợp các yếu tố môi trường và yếu tố nội tại, đồng thời cung cấp bằng chứng thực nghiệm về cơ chế tác động của AI đến kết quả học tập của sinh viên trong bối cảnh giáo dục đại học tại Việt Nam.

Từ khóa: cảm nhận thú vị, điều kiện hỗ trợ, giáo dục đại học, kết quả học tập, việc sử dụng AI.

1. Introduction

Artificial Intelligence (AI), particularly generative AI (GenAI), is changing how knowledge is accessed, processed, and created (García-Martínez et al., 2023). Large language models such as ChatGPT, Gemini, and Claude have enabled extensive learning support capabilities, including context-aware information provision, problem-solving guidance, idea generation, and creativity enhancement (Crawford et al., 2023). In higher education, these developments affect both students' learning practices and universities' efforts to develop human capital for the knowledge-based economy. Recent reports by the United Nations Educational, Scientific and Cultural Organization emphasize that AI is not merely a supportive learning tool but also a key force reshaping teaching practices, learning strategies, and emerging models of educational governance (Wayne et al., 2023). Leading universities worldwide, such as Stanford University and the University of Michigan, have actively integrated AI into their educational ecosystems to enhance academic quality, support decision-making processes, and personalize students' learning experiences (Legatt, 2025).

Existing evidence links the use of AI in learning to stronger motivation, improved self-regulated learning, better learning pathways, and more effective task completion (Ouyang et al., 2022; Wang et al., 2024). AI tools such as ChatGPT are capable of delivering rapid feedback, clear explanations, and creative content support, thereby exerting a positive impact on students' academic performance (Jo, 2024). In Vietnam, AI integration in higher education has also accelerated, as evidenced by the implementation of intelligent learning platforms, learning analytics systems, and AI-assisted teaching tools at several universities, including Vietnam National University Ho Chi Minh City, FPT University, and Phenikaa University. Vietnamese students are generally characterized by rapid technology adoption and high engagement with digital platforms. However, disparities in access to technological infrastructure, differences in institutional support, and the evolving academic policies governing AI use in higher education may create distinct conditions influencing AI tool use behaviors. Therefore, examining AI use within the Vietnamese higher education context is particularly important. Despite the rapid expansion of GenAI since 2023, limited research has examined what drives students' actual AI tool use and how such use relates to academic performance, especially in Vietnam.

Recent studies based on the Unified Theory of Acceptance and Use of Technology (UTAUT) have mainly examined students' intentions to use AI rather than their actual use (Dahri et al., 2024; Parveen et al., 2024; Venkatesh et al., 2003). Prior research has consistently demonstrated a substantial gap between intention and behavior, as users may hold positive intentions but fail to sustain or effectively enact technology use in practice (Valle et al., 2024). In addition, antecedents of AI tool use have often been examined in a fragmented manner. While environmental factors such as social influence and, in particular, perceived levels of technical and instructional support (facilitating conditions), along with user-related factors—including AI self-efficacy, AI guilt, technostress, performance expectancy, perceived ease of use, perceived usefulness, and perceived value—have been shown to exert strong effects on technology use behavior (Albayati, 2024; Carolus et al., 2023; Chan, 2025; Parveen et al., 2024; Sharif et al., 2025), a key intrinsic motivational factor—namely perceived playfulness in interactions with AI—has received comparatively limited attention in models explaining AI tool use. Unlike traditional information retrieval tools such as Google Search, GenAI systems offer conversational and interactive experiences that allow users to engage in dynamic exchanges, receive personalized responses, and continuously refine outputs through dialogue. Such interactive characteristics may create a stronger sense of enjoyment, curiosity, and engagement during the learning process, making perceived playfulness particularly relevant in the context of GenAI use. Considering

facilitating conditions and perceived playfulness together may therefore offer a clearer account of how external support and intrinsic motivation shape students' AI tool use in learning.

This study addresses these gaps in three ways. **First**, it shifts the analytical focus from usage intention to actual AI tool use, thereby more accurately capturing the nature of AI adoption in learning. **Second**, it integrates two critical antecedents—facilitating conditions and perceived playfulness—to develop a more comprehensive model of GenAI tool use, with empirical results demonstrating that both factors positively influence students' AI tool use in learning. **Third**, the study provides robust empirical evidence of the direct and positive effect of AI tool use on academic performance, thereby extending and consolidating findings that have remained limited and fragmented in the existing literature. For practical uses, the findings offer important implications for universities in designing AI-enabled learning ecosystems, including the development of supportive policies, investments in technical infrastructure, capacity building for faculty and support staff, digital skills training, and the design of engaging learning experiences that encourage students to use AI in appropriate, creative, and effective ways.

Beyond the introduction, the remainder of this article is organized as follows. The next section presents the theoretical foundations and research hypotheses, followed by the research methodology, results, and discussion. The article concludes with a summary of key findings, managerial implications, study limitations, and directions for future research.

2. Theoretical foundation and hypothesis development

2.1. Theoretical foundation

2.1.1. Concepts of the key constructs

In the contemporary higher education context, AI is increasingly adopted to enhance learning effectiveness. This study examines four key constructs: facilitating conditions (FC), perceived playfulness (PP), AI tool use (AIU), and academic performance (AP). Facilitating conditions refer to students' perceptions of the availability of infrastructural, technical, and organizational support—such as technological infrastructure, technical assistance, instructional guidance, and institutional support—that enable effective AI use in learning (Dahri et al., 2024).

Perceived playfulness reflects the extent to which AI use is perceived as enjoyable, engaging, and intrinsically motivating. Rooted in Flow theory, this construct emphasizes the role of positive user experience in fostering sustained technology use (Parveen et al., 2024). AI tool use, the central construct of the model, is defined as the extent to which students apply AI tools to support academic tasks. In the context of higher education, AI tools refer to commonly used generative AI applications that support learning and academic activities, including conversational AI systems and AI-assisted content generation platforms such as ChatGPT, Gemini, Microsoft Copilot, Grammarly, and other AI-based writing or learning support tools frequently adopted by students. Following Dahri et al. (2024), this construct captures AI's role in document creation, rapid content generation, information accuracy enhancement, and learning material preparation. Academic performance, the outcome variable, represents the extent to which AI use improves learning outcomes. In this study, academic performance refers to students' self-reported perceptions of improvements in their learning outcomes rather than objective indicators such as GPA or official academic records. Therefore, the construct reflects perceived academic performance based on students' subjective evaluations of their learning experiences and outcomes. Consistent with Bilquise et al. (2024), it encompasses enhancements in creativity and academic achievement,

knowledge acquisition, learning experience, and overall learning effectiveness.

2.1.2. Theoretical background

This study is grounded in two core theoretical frameworks: the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) and Flow theory (Csikszentmihalyi, 1990). UTAUT integrates several foundational models of technology acceptance, including the Technology Acceptance Model (TAM), the Theory of Reasoned Action (TRA), and the Theory of Planned Behavior (TPB), to explain individuals' technology use behavior. Within the UTAUT framework, facilitating conditions are regarded as a critical determinant that directly influences actual technology use. Prior research in educational settings suggests that when students have access to adequate infrastructure, receive instructional guidance, and benefit from technical support, they are more likely to use learning technologies effectively (Moradi, 2025; Parveen et al., 2024).

In contrast, Flow theory focuses on learners' intrinsic motivation and affective experiences. A state of "flow" emerges when task challenges are well aligned with individuals' capabilities, leading to heightened concentration, a sense of control, and enjoyment during task engagement (Csikszentmihalyi, 1990). In AI-supported learning contexts, perceived playfulness can be viewed as a manifestation of the flow experience, occurring when students perceive the process of using AI as both enjoyable and cognitively stimulating. Previous studies have demonstrated that perceived playfulness enhances user engagement and increases the likelihood of technology use, which subsequently contributes to improved learning outcomes and academic performance (Parveen et al., 2024).

The integration of UTAUT and Flow theory enables a more comprehensive explanation of students' AI tool use behavior. While UTAUT emphasizes the role of facilitating conditions in enabling and sustaining AI use, Flow theory explains how perceived playfulness motivates students to actively engage with AI tools. Taken together, the two perspectives explain how facilitating conditions and perceived playfulness are associated with AI tool use and, subsequently, with students' academic performance.

2.2. Hypothesis development

2.2.1. Facilitating conditions and AI tool use

The UTAUT model emphasizes facilitating conditions (FC) as a key determinant influencing both users' behavioral intentions and their actual technology use (Venkatesh, 2022). Empirical evidence further supports this perspective in AI-supported learning contexts. Specifically, a recent study by Moradi (2025) demonstrates that facilitating conditions exert a positive and significant effect on students' AI tool use in learning. In particular, the availability of digital infrastructure and a well-developed digital ecosystem has been identified as a necessary prerequisite for the effective adoption of AI in educational settings (Rojas & Chiappe, 2024). In addition, Qiu (2019) highlights the critical role of instructors in guiding students and providing essential learning support tools that facilitate effective technology use. Drawing on these theoretical arguments and empirical findings, this study proposes the first hypothesis:

H1: Facilitating conditions have a positive effect on students' AI tool use in learning.

2.2.2 Perceived playfulness and AI tool use

Csikszentmihalyi (1990) found that perceived playfulness exerts a significant positive effect on both users' intentions and actual technology use, as it generates positive affective experiences and encourages repeated engagement. Consistent with this argument, Parveen et

al. (2024) found that users who perceive a technology as enjoyable are more likely to interact with it frequently and continue using it over time. Based on these theoretical arguments and empirical findings, the present study proposes the second hypothesis:

H2: Perceived playfulness has a positive effect on students' AI tool use in learning.

2.2.3. AI tool use and academic performance

To date, a growing body of research has demonstrated that the adoption of AI in education contributes to improvements in learners' academic performance across multiple educational levels, ranging from primary and secondary education to higher education (Alneyadi & Wardat, 2023; Azamatova et al., 2023; García-Martínez et al., 2023; Zhang & Aslan, 2021). Specifically, AI-based learning support tools provide comprehensive assistance that enables students to enhance both their knowledge acquisition and professional skill development (Azamatova et al., 2023). AI not only delivers accurate and reliable information but also strengthens learning confidence and improves students' decision-making capabilities (Bhutoria, 2022). Moreover, AI systems offer timely feedback that allows students to monitor their learning progress and adjust their study strategies accordingly (Dahri et al., 2024). Based on this empirical evidence, the present study proposes the third hypothesis:

H3: AI tool use has a positive effect on students' academic performance.

3. Methodology

3.1. Sample and data collection

This study employed convenience sampling across universities in Northern, Central, and Southern Vietnam. Potential participants were invited to complete an online survey via Zalo, email, and Messenger between September and November 2025. Of the 650 collected responses, 128 were excluded due to incomplete data or straight-lining, resulting in 522 valid questionnaires for analysis. Following Hair et al. (2019), the minimum sample size for PLS-SEM was determined using the 10-times rule. Given a maximum of two incoming structural paths and four indicators per construct, the minimum required sample size was approximately 40 observations. Thus, the final sample (N = 522) substantially exceeds this threshold, ensuring adequate statistical power.

All respondents participated voluntarily and had prior experience using AI tools for learning. The sample consisted of 28% male and 72% female students, with representation across academic years and regions. The gender imbalance observed in the sample may partially reflect the enrollment characteristics of the academic disciplines and programs represented in the survey, where female students account for a relatively larger proportion. Most respondents were enrolled in public universities (94.3%). Detailed sample characteristics are reported in **Table 1**.

Table 1. Sample Characteristics

Variable	Frequency	Percentage	Variable	Frequency	Percentage
Gender			Educational level		
Male	146	28%	First-year	136	26.1%
Female	376	72%	Second-year	179	34.3%
Total	522	100%	Third-year	56	10.7%
			Final-year	151	28.9%
			Total	522	100%

University Type			Geographical distribution		
Public universities	492	94.3%	Northern region	161	30.8%
Private universities	30	5.7%	Central region	193	37%
Total	522	100%	Southern region	168	32.2%
			Total	522	100%

3.2. Measurement

All measurement scales were adapted from established studies in the literature. The original English items were translated into Vietnamese and then back-translated to ensure semantic equivalence, with both procedures conducted by a faculty member in Economics and Business Administration. Subsequently, in-depth interviews with two relevant experts and ten university students were carried out to assess the suitability of the research model and the clarity of the measurement items. The feedback confirmed the appropriateness of the framework, leading to minor refinements of the questionnaire. The final survey comprised two sections: demographic information and items measuring AI tool use in learning and academic performance.

The measurement scales for AI tool use and academic performance were adapted from Dahri et al. (2024), while those for facilitating conditions and perceived playfulness were drawn from Parveen et al. (2024). All constructs were measured using four observed indicators, with detailed items reported in **Appendix A.1**.

3.3. Analysis method

SPSS version 20 was used to conduct descriptive statistical analyses, while partial least squares structural equation modeling (PLS-SEM) was employed to assess both the measurement and structural models. PLS-SEM is suitable for this study because it does not require strict distributional assumptions, unlike covariance-based SEM (CB-SEM), which assumes multivariate normality (Hair et al., 2022). The PLS-SEM analyses were performed using SmartPLS version 4.0, following the evaluation procedures and criteria recommended by Hair et al. (2019).

4. Results

4.1. Measurement model

The quality of the measurement model was assessed using Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). In accordance with established guidelines, Cronbach's alpha and CR values exceeding 0.70 and AVE values greater than 0.50 were considered indicative of adequate internal consistency reliability and convergent validity. The results show that all constructs—academic performance (AP), AI tool use (AIU), facilitating conditions (FC), and perceived playfulness (PP)—meet these recommended thresholds, thereby confirming satisfactory reliability and convergent validity.

Discriminant validity was examined using both the Fornell–Larcker criterion and the heterotrait–monotrait ratio (HTMT). As presented in Table 2, the square root of the AVE for each construct exceeds its correlations with other constructs, fulfilling the Fornell–Larcker criterion. In addition, all HTMT values are below the conservative threshold of 0.90, further supporting adequate discriminant validity among the constructs.

Table 2. Reliability and Convergent Validity of the Measurement Model

Variables	Items	Outer loading	Cronbach's Alpha	CR	AVE
Academic performance	AP1	0.898	0.875	0.914	0.728
	AP2	0.866			
	AP3	0.895			
	AP4	0.746			
AI tool use	AIU1	0.783	0.810	0.875	0.637
	AIU2	0.830			
	AIU3	0.786			
	AIU4	0.792			
Facilitating Conditions	FC1	0.735	0.684	0.808	0.513
	FC2	0.720			
	FC3	0.691			
	FC4	0.719			
Perceived Playfulness	PP1	0.770	0.820	0.881	0.649
	PP2	0.789			
	PP3	0.835			
	PP4	0.818			

Notes: (1) The outer loading of indicator FC3 (0.691) is slightly below the recommended threshold of 0.70. However, the construct's Cronbach's alpha exceeds 0.60, composite reliability (CR) is above 0.70, and average variance extracted (AVE) is greater than 0.50. Given its theoretical relevance and its contribution to adequately capturing the domain of the construct, this indicator was retained in the model; (2) Convergent validity is established, as the AVE values of all latent constructs exceed the recommended threshold of 0.50.

Table 3. Discriminant Validity Assessment of the Measurement Model Using the Fornell–Larcker Criterion and HTMT

Variables	AP	AIU	FC	PP
AP	0.853	0.513	0.606	0.716
AIU	0.601	0.798	0.517	0.511
FC	0.777	0.695	0.716	0.580
PP	0.838	0.618	0.778	0.806

Notes: (1) The bold values on the diagonal represent the square roots of the average variance extracted (AVE). (2) The correlation coefficients and HTMT values are reported above and below the diagonal, respectively.

Source: Compiled by the authors, 2026

4.2. Structural model

4.2.1. Structural model quality assessment

According to Hair et al. (2019), R^2 and Stone–Geisser's Q^2 are used to evaluate the explanatory power and predictive relevance of the structural model. The results show that the minimum R^2 and Q^2 values are 0.263 and 0.322, respectively, indicating adequate explanatory power and satisfactory predictive relevance. Furthermore, all variance inflation

factor (VIF) values are below the threshold of 5.0, suggesting that multicollinearity among the explanatory constructs is not a concern.

4.2.2. Structural model hypothesis testing

A bootstrapping procedure with 5,000 resamples was conducted based on the original sample of 522 observations. The results indicate that all proposed hypotheses are supported. For H1, facilitating conditions have a positive and statistically significant effect on AI tool use ($\beta = 0.333$, $t = 5.462$, $p < 0.05$), with a moderate effect size ($f^2 = 0.111$), suggesting that supportive conditions explain a meaningful proportion of variance in students' AI tool use. Similarly, H2 is supported, as perceived playfulness positively influences AI tool use ($\beta = 0.318$, $t = 5.653$, $p < 0.05$). The effect size ($f^2 = 0.101$) indicates a moderate and comparable impact to that of facilitating conditions, highlighting the importance of intrinsic enjoyment in AI-related learning behaviors. Finally, H3 is strongly supported, with AI tool use exerting a substantial and statistically significant effect on academic performance ($\beta = 0.513$, $t = 11.102$, $p < 0.05$). This relationship exhibits the largest effect size ($f^2 = 0.357$), underscoring AI tool use as a key determinant of students' academic performance.

Table 3. Hypothesis Testing Results

Paths (hypothesis)	Original Sample (O)	Sample mean (M)	STDEV	T statistics	P-values	Results	f^2
Direct effects							
FC→AIU	0.333	0.335	0.061	5.462	0.000	H1: Support	0.111
PP→AIU	0.318	0.320	0.056	5.653	0.000	H2: Support	0.101
AIU→AP	0.513	0.517	0.046	11.102	0.000	H3: Support	0.357
Notes: AIU: AI tool use; AP: Academic performance; FC: Facilitating conditions; PP: Perceived playfulness; (2) $N = 522$, Bootstrap sample size 5,000							

4.3. Discussion

The results support H1, H2, and H3: facilitating conditions and perceived playfulness are positively related to AI tool use, which is positively related to students' academic performance. Support for H1 indicates that facilitating conditions have a positive and significant effect on actual AI tool use. This finding extends the explanatory power of the UTAUT model in AI-enabled learning contexts, consistent with Venkatesh (2022), and aligns with prior evidence, which emphasizes the foundational role of technological infrastructure, digital platforms, and AI ecosystems in effective AI adoption (Moradi, 2025). Moreover, the instructional guidance and pedagogical integration provided by instructors remain essential, reinforcing the argument that investments in AI technologies without adequate technical support and training are unlikely to yield substantial educational benefits (Qiu, 2019).

Support for H2 demonstrates that perceived playfulness positively influences AI tool use, providing further empirical validation of Flow theory, which highlights the role of positive emotional experiences in sustaining technology engagement (Csikszentmihalyi, 1990). Consistent with Parveen et al. (2024), the findings suggest that when AI tools are perceived as engaging and intellectually stimulating, students are more likely to integrate them into their regular learning activities. This underscores the importance of experiential and affective considerations in the design and implementation of AI-based learning systems.

Finally, support for H3 confirms that AI tool use has a positive and significant impact on academic performance. This result is consistent with prior studies showing that AI

enhances learning outcomes by facilitating access to knowledge, providing timely feedback, and supporting personalized learning and academic decision-making (Bhutoria, 2022; Dahri et al., 2024). The relatively strong impact observed in the Vietnamese context may be explained by the rapid adoption of digital technologies among students and the increasing AI tool uses to support academic activities. In particular, GenAI tools may provide immediate access to information, learning support, and content generation capabilities that help students overcome time constraints and learning challenges. Such benefits may be especially salient in an emerging educational context where students are actively exploring AI applications to improve learning efficiency. In practice, students frequently engage with widely used AI tools such as ChatGPT, Gemini, Canva AI, Grammarly, and AI-assisted translation tools to support content creation, language tasks, and learning activities. These findings indicate that AI can support academic work and self-directed learning when students use it purposefully and receive appropriate institutional support.

5. Conclusion and research implications

This study identifies the key determinants of AI tool use in learning and examines its impact on students' academic performance. Using validated measurement scales for facilitating conditions, perceived playfulness, AI tool use, and academic performance, the empirical results provide robust support for the three proposed hypotheses.

The study offers three theoretical contributions. **First**, the study redirects analytical attention from intention to actual AI tool use, offering a more precise representation of how AI is adopted in learning contexts. **Second**, by incorporating two key antecedents—facilitating conditions and perceived playfulness—it develops a more integrative framework for understanding GenAI tool use, with empirical evidence confirming the positive influence of both factors on students' AI use in learning. **Third**, the findings provide strong empirical support for the direct and positive impact of AI tool use on academic performance, thereby extending and consolidating prior evidence that has been relatively scarce and fragmented in the existing literature.

Based on the findings, several managerial and policy implications emerge. First, for higher education institutions, facilitating conditions should be strengthened through adequate technological infrastructure, stable internet access, formal support mechanisms, AI literacy integration into digital skills training, and clear academic integrity guidelines to support responsible AI use. Second, for lecturers, AI should be positioned as a learning tool that supports higher-order thinking and creativity rather than mere information retrieval, while creating engaging learning experiences that enhance students' perceived playfulness toward AI use. Third, for students, AI tools should be used purposefully to enhance learning quality and academic development.

Despite its contributions, this study has limitations. The use of self-reported data may introduce perceptual bias, the analysis does not differentiate AI use across learning activities, and the cross-sectional design precludes longitudinal assessment. In addition, the sample was predominantly drawn from students enrolled in public universities, which may limit the representativeness of the findings across different higher education contexts, particularly private institutions. Accordingly, future research should employ longitudinal designs, incorporate mediating or moderating variables (e.g., self-regulated learning, AI ethics awareness, or AI dependency), and adopt qualitative approaches to gain deeper insights into students' AI use practices and their implications for learning and academic thinking; while also extending samples across different types of higher education institutions to improve the representativeness of findings.

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Appendix A1.

Construct	Code	Vietnamese item	English item
AI Tool Use (Dahri et al., 2024)	AIU1	Bạn nhận thấy AI hữu ích trong việc tìm kiếm tài liệu học tập, bài giảng và hỗ trợ giải bài tập.	You find AI useful for searching learning materials, lecture content, and assisting with problem solving.
	AIU2	Bạn nhận thấy AI giúp bạn nhanh chóng xây dựng nội dung phù hợp trong quá trình học tập và nghiên cứu.	You find that AI helps you quickly develop relevant content during your learning and research activities.
	AIU3	Bạn nhận thấy việc sử dụng AI khiến bạn tự tin hơn về độ chính xác và tính phù hợp của nội dung trong quá trình học tập và nghiên cứu.	You feel more confident about the accuracy and relevance of content when using AI in your learning and research.
	AIU4	Bạn nhận thấy AI là một công cụ có giá trị trong việc hỗ trợ chuẩn bị tài liệu học tập và nghiên cứu.	You perceive AI as a valuable tool for supporting the preparation of learning and research materials.
Academic Performance (Dahri et al., 2024)	AP1	Bạn nhận thấy việc sử dụng AI góp phần cải thiện khả năng sáng tạo và kết quả nghiên cứu của bạn.	You perceive that using AI contributes to improving your creativity and research outcomes.
	AP2	Bạn nhận thấy AI giúp bạn nâng cao kiến thức và đa dạng hóa thông tin của mình.	You find that AI helps enhance your knowledge and diversify the information you access.
	AP3	Bạn nhận thấy công cụ AI giúp bạn cải thiện trải nghiệm học tập và kết quả học tập.	You perceive that AI tools improve your learning experience and academic outcomes.
	AP4	Bạn nhận thấy công cụ AI có ảnh hưởng tích cực đến hiệu quả học tập tổng thể (điểm tích lũy và xếp hạng) của bạn.	You perceive that AI tools have a positive impact on your overall academic performance (GPA and academic ranking).
Facilitating Conditions (Parveen et al., 2024)	FC1	Bạn có đầy đủ phương tiện cần thiết để sử dụng AI (máy tính, điện thoại, mạng wifi).	You have sufficient resources (computer, smartphone, and internet access) to use AI tools.
	FC2	Bạn có thể tìm kiếm sự hỗ trợ từ người khác khi gặp khó khăn trong quá trình sử dụng AI.	You can obtain support from others when you encounter difficulties in using AI tools.

	FC3	AI phù hợp với bạn hơn so với các công cụ tìm kiếm và xử lý thông tin khác (Google, Grammarly) mà bạn đang sử dụng.	AI tools are more suitable for than other information search and processing tools (e.g., Google, Grammarly) that you currently use.
	FC4	Bạn có đầy đủ kiến thức cần thiết để sử dụng AI.	You have sufficient knowledge to use AI tools effectively.
Perceived Playfulness (Parveen et al., 2024)	PP1	Bạn nhận thấy công cụ AI tốt hơn so với các công cụ tìm kiếm và xử lý dữ liệu khác.	You perceive AI tools as better than other data search and processing tools.
	PP2	Bạn nhận thấy công cụ AI tạo ra ấn tượng thân thiện và giống con người.	You perceive AI tools as friendly and human-like.
	PP3	Bạn nhận thấy việc sử dụng công cụ AI mang lại tác động tích cực cho bạn.	You perceive that using AI tools has a positive impact on you.
	PP4	Bạn nhận thấy mình tự tin khi sử dụng công cụ AI.	You feel confident when using AI tools.