International Journal of Education, Leadership, Artificial Intelligence, Computing, Business, Life Sciences, and Society - https://journalviral.org
DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

Learning or Just Finishing Faster? The AI Learning Paradox in Management Education: Student Perspectives on Academic Efficiency, Critical Thinking, Cognitive Independence and Experiential Learning

B. Costache,

Bucharest University of Economic Studies (ROMANIA)

Abstract: *The rapid integration of generative artificial intelligence (AI) and emerging AI agents into higher education is transforming students' learning practices, academic productivity, and approaches to complex problem-solving. However, an important pedagogical question remains: does AI primarily accelerate academic task completion, or does it contribute to deeper understanding and the development of independent intellectual competencies? This study investigates the relationship between AI-assisted academic efficiency and perceived cognitive development, drawing on a questionnaire-based investigation involving 93 management students. The research employed a structured questionnaire comprising 15 questions addressing AI usage patterns, perceived time savings, conceptual understanding, problem-solving strategies, critical-thinking abilities, cognitive independence, and expectations regarding human-centred educational practices.*

The reported response distributions indicate that 78.0% of students use AI several times per week or more frequently, while 67.5% estimate time savings of at least 10% when completing academic assignments. Although 74.0% consider AI very or extremely helpful for understanding difficult concepts, only 38.2% report improvements in independent critical thinking, whereas 34.1% perceive a reduction in their cognitive independence. These findings suggest a potential discrepancy between perceived academic productivity and cognitive development, indicating that faster task completion does not necessarily translate into deeper learning. The analysis further highlights the importance of responsible AI use, critical verification of generated information, and meaningful human interaction in technology-enhanced educational environments.

Building on these findings, the study introduces the FAST–DEEP conceptual model, distinguishing productivity-oriented AI engagement from learning-oriented practices that promote reflective reasoning, intellectual autonomy, and practical knowledge application. The article advocates integrating AI-supported business projects, reflective problem-solving activities, and human-centred assessment strategies into management curricula. Its principal contribution lies in demonstrating the importance of evaluating AI-assisted education beyond immediate efficiency gains and reconsidering pedagogical approaches that prepare students to collaborate effectively with intelligent technologies while maintaining independent judgement and responsibility.

Keywords: Cognitive Offloading; Self-Regulated Learning; Educational Technology Adoption; Metacognitive Awareness; Digital Literacy; Reflective Practice; Pedagogical Transformation.

1 INTRODUCTION

The rapid development of generative artificial intelligence (AI) and increasingly autonomous AI agents has introduced a significant transformation in higher education, reshaping how students access knowledge, complete academic assignments, and approach complex intellectual tasks. Unlike conventional educational technologies, which primarily facilitate information retrieval and communication, contemporary AI systems can generate contextualised explanations, synthesise extensive information, formulate alternative solutions, and provide interactive assistance throughout the learning process. These capabilities offer considerable opportunities for personalised learning, academic productivity, and knowledge acquisition. Nevertheless, their increasing integration into university education raises fundamental questions regarding the relationship between technological

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

assistance and the development of higher-order cognitive competencies. As students become progressively accustomed to obtaining immediate explanations and ready-made solutions, the educational significance of AI can no longer be assessed exclusively through its accessibility, perceived usefulness, or contribution to academic efficiency. A more consequential question concerns whether intelligent technologies genuinely strengthen students' understanding, analytical reasoning, and independent problem-solving abilities or primarily enable them to complete academic tasks with less time and intellectual effort.

This distinction is particularly relevant to management education, where academic preparation must extend beyond theoretical knowledge acquisition to encompass critical thinking, strategic reasoning, creativity, ethical judgement, and the capacity to address complex organisational challenges. Management students increasingly employ generative AI applications to analyse business environments, interpret financial information, develop marketing strategies, prepare presentations, and formulate recommendations for practical business problems. Although such applications may substantially accelerate academic activities, the efficiency of the resulting outputs does not necessarily demonstrate the development of corresponding managerial competencies. For example, producing a comprehensive business analysis with AI assistance does not automatically imply that a student understands the underlying assumptions, can independently evaluate competing strategic alternatives, or possesses the analytical confidence required to defend managerial recommendations. Consequently, the growing use of intelligent technologies introduces a fundamental pedagogical tension between the completion of academic tasks and the development of the intellectual capabilities that those tasks are intended to cultivate.

Existing research increasingly recognises that the educational implications of generative AI are multidimensional and cannot be adequately explained through technological adoption alone. Fuchs and Aguilos (2023), investigating university students' experiences with ChatGPT, identified autonomous learning support, digital tutoring, and academic integrity as interconnected dimensions of AI integration in higher education. Their findings suggest that intelligent assistance may facilitate independent access to educational resources while simultaneously generating concerns regarding academic responsibility and the appropriate boundaries of technological support. Similarly, Guo et al. (2025), examining generative AI use and student engagement in Chinese higher education, demonstrated that the relationship between AI-supported academic activities and learning engagement is conditioned by the characteristics of the instructional environment. Their research indicates that generative AI may support cognitive and emotional engagement under favourable pedagogical conditions, while its relationship with active learning and motivation is more complex. These contributions challenge the assumption that increased technological use necessarily produces improved educational outcomes and emphasise the importance of examining how students interact with AI within specific learning contexts.

An important implication of this emerging literature concerns the distinction between academic efficiency and meaningful learning. Generative AI can reduce the time required to identify relevant information, organise academic content, clarify difficult concepts, and generate preliminary solutions. However, improvements in task-completion speed do not necessarily correspond to equivalent improvements in conceptual understanding or independent intellectual performance. Learning involves more than obtaining accurate information; it requires students to interpret evidence, evaluate assumptions, connect theoretical concepts, and apply acquired knowledge to unfamiliar situations. When AI is used to explore alternative explanations, challenge initial interpretations, or identify weaknesses in proposed solutions, it may support these cognitive processes. Conversely, when students accept AI-generated answers without sufficient verification or substitute automated reasoning for their own analytical efforts, the technology may facilitate task completion while reducing opportunities for independent intellectual engagement. The educational consequences of AI use therefore depend not only on what the technology produces, but also on the nature and quality of the cognitive activities performed by students during their interaction with intelligent systems.

This tension can be conceptualised as the AI learning paradox, whereby technologies designed to enhance academic productivity may simultaneously create opportunities for deeper learning and conditions that encourage cognitive dependence. The paradox does not imply an inherent contradiction between efficiency and intellectual development. Rather, it suggests that these dimensions may evolve differently depending on students' learning strategies, levels of self-regulation, and capacity to critically evaluate AI-generated information. Students may perceive AI as highly beneficial for understanding difficult concepts while remaining uncertain about their ability to reproduce comparable reasoning independently. Similarly, the availability of immediate solutions may improve students' confidence in completing assignments without necessarily strengthening their capacity to address unfamiliar problems without technological assistance. Distinguishing between perceived

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

conceptual understanding, academic productivity, and cognitive independence is therefore essential for evaluating the educational implications of AI-supported learning. This distinction also raises questions concerning cognitive offloading, understood as the delegation of cognitive activities to external resources, particularly when such delegation replaces rather than complements the intellectual processes required for knowledge construction.

The implications of this paradox become especially significant in experiential learning, which represents a central component of contemporary management education. Experiential approaches connect theoretical knowledge with practical application through business simulations, organisational case studies, entrepreneurial initiatives, collaborative projects, and real-world problem-solving activities. Such educational experiences require students to interpret incomplete information, evaluate alternative courses of action, negotiate competing perspectives, and make decisions under conditions of uncertainty. Generative AI can contribute to these activities by facilitating market research, business data analysis, scenario development, and the evaluation of strategic alternatives. Research by An et al. (2023) on generative AI in collaborative knowledge construction provides a relevant perspective on how intelligent technologies interact with task performance and collaborative learning processes. Nevertheless, the educational value of AI-supported experiential activities cannot be determined solely by the technical quality of the final academic output. Within management education, meaningful learning also depends on students' capacity to explain their reasoning, critically assess recommendations, recognise contextual limitations, and assume responsibility for the decisions they formulate.

The emergence of AI agents introduces an additional dimension to this educational transformation. Whereas conventional conversational AI applications primarily respond to individual prompts, agentic systems can coordinate interconnected activities, analyse documents, retrieve information, and execute multistage tasks with varying degrees of autonomy. These capabilities may significantly influence project-based learning, academic research, and the organisation of collaborative assignments. However, increasing technological autonomy also raises questions concerning the distribution of intellectual responsibility between students and intelligent systems. When AI agents undertake substantial components of research, analysis, or project development, the distinction between technological assistance and the substitution of student effort becomes increasingly important. Consequently, universities must reconsider not only how AI agents can improve educational efficiency, but also how instructional and assessment practices can ensure that students remain actively engaged in the intellectual processes underlying their academic work.

These considerations reinforce the importance of human-centred AI integration in higher education. From this perspective, intelligent technologies should function as resources that extend students' analytical and creative capabilities without replacing their responsibility for understanding, critical evaluation, and decision-making. Human-centred educational practices therefore require a balance between technological assistance and opportunities for independent reasoning, reflective learning, and meaningful interpersonal interaction. Within management education, the role of academic instructors remains particularly important in facilitating complex discussions, challenging students' assumptions, and supporting the development of managerial judgement. Rather than positioning AI as a substitute for professors, a human-centred approach emphasises the complementary relationship between intelligent systems and human educational guidance. Such an approach also implies reconsidering assessment strategies so that academic achievement reflects not merely the quality of AI-assisted outputs, but students' demonstrated ability to interpret, justify, and independently apply the knowledge involved in their production.

Despite increasing scholarly attention to generative AI in higher education, further empirical investigation is needed into the relationship between students' perceived productivity gains and their self-assessed cognitive development. Existing studies provide valuable evidence concerning AI adoption, learning engagement, and collaborative knowledge construction. However, the distinction between using AI to accelerate academic tasks and employing it to strengthen conceptual understanding and independent problem-solving remains insufficiently examined within the specific context of management education. This distinction is particularly important because the competencies expected of future managers extend beyond technological proficiency to include critical judgement, creativity, ethical responsibility, and the ability to make informed decisions in complex organisational environments. Understanding students' experiences with AI therefore requires an analytical approach that considers not only the frequency and purposes of technological use, but also the learning strategies adopted, the perceived consequences for intellectual autonomy, and the expectations surrounding AI-supported experiential education.

Against this background, the present study investigates the relationship between generative AI use, academic efficiency, perceived learning effectiveness, critical thinking, cognitive independence,

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

and experiential learning among management students. The research addresses the central question: Are students using artificial intelligence primarily to complete academic tasks faster, or are they using it to learn more deeply and become better independent problem-solvers? To investigate this question, a questionnaire-based empirical study was conducted involving 93 management students. The research instrument comprised 15 questions examining AI adoption patterns, frequency of use, perceived time savings, conceptual understanding, problem-solving strategies, critical-thinking abilities, experiences with AI agents, and expectations regarding the integration of intelligent technologies into management education. Particular attention was devoted to distinguishing productivity-oriented AI practices, such as accelerating assignment preparation and obtaining immediate solutions, from learning-oriented approaches involving explanation-seeking, independent verification, reflective analysis, and critical evaluation of AI-generated information.

The study also examined students' perceptions of the role of AI in practical management activities, including business analysis, strategic planning, market research, decision-making simulations, and collaborative projects. By integrating these dimensions, the research sought to establish whether students perceive AI primarily as an instrument of academic convenience or as a meaningful contributor to the development of intellectual and professional competencies. Furthermore, the investigation considered students' concerns regarding technological dependence, the reliability of AI-generated information, academic integrity, and the preservation of human interaction in educational environments. These issues are particularly relevant to management education because future professionals must increasingly collaborate with intelligent technologies while retaining the analytical judgement and ethical accountability necessary for responsible organisational decision-making.

To interpret the relationship between academic productivity and cognitive development, the study introduces the FAST–DEEP model of AI-assisted management learning. The FAST dimension represents productivity-oriented engagement through faster task completion, automated academic assistance, simplified information processing, and time-saving academic workflows. In contrast, the DEEP dimension encompasses the development of critical thinking, experiential problem-solving, evaluation of AI-generated knowledge, and personal intellectual autonomy. Rather than treating efficiency and meaningful learning as mutually exclusive educational objectives, the model proposes that technological productivity gains acquire greater pedagogical value when accompanied by opportunities for independent analysis, critical reflection, and practical knowledge application. Its central premise is that the educational contribution of AI should be evaluated not only according to the speed with which students obtain answers, but also according to their capacity to understand, question, evaluate, and independently apply AI-supported knowledge. The framework is advanced as a conceptual interpretation of the educational problem rather than as an empirically validated measurement model.

The contribution of this research lies in connecting students' experiences with AI-assisted academic activities to the broader challenge of developing intellectually autonomous and professionally competent graduates. By examining the relationship between perceived efficiency, conceptual clarification, critical thinking, and experiential learning, the study provides a basis for reconsidering how intelligent technologies should be integrated into management curricula. Its findings are intended to inform pedagogical approaches that combine AI-supported business projects, reflective problem-solving, critical verification of generated information, and assessment practices that preserve students' responsibility for intellectual performance. Ultimately, the study advances the argument that the future of management education should not be defined exclusively by students' ability to complete academic tasks more rapidly, but by their capacity to transform technological assistance into deeper understanding, independent judgement, and responsible managerial action.

2. LITERATURE REVIEW

The rapid expansion of generative artificial intelligence (GenAI) in higher education has intensified scholarly debate concerning the relationship between technological efficiency, student engagement, and the development of independent intellectual competencies. Unlike earlier educational technologies, which primarily supported information retrieval and administrative processes, contemporary AI systems can generate explanations, construct arguments, analyse complex information, and propose solutions to academic problems. These capabilities create opportunities for personalised assistance and more efficient learning processes, while simultaneously raising questions about students' cognitive engagement and responsibility for knowledge construction. The emerging literature increasingly recognises that the educational value of AI cannot be established exclusively through indicators of technological adoption, academic productivity, or the quality of

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

AI-assisted outputs. Instead, meaningful evaluation requires attention to the processes through which students develop conceptual understanding, critical thinking, self-regulation, and the ability to apply knowledge independently.

Early empirical investigations demonstrated the complexity of students' experiences with conversational AI. Fuchs and Aguilos (2023) identified autonomous learning support, digital tutoring, and academic integrity as interconnected dimensions of ChatGPT adoption in higher education. Their findings suggest that intelligent systems may facilitate access to explanations and encourage self-directed academic activity, although the same technologies create opportunities for excessive dependence and inappropriate substitution of student effort. Guo et al. (2025), drawing on survey data from 72,615 undergraduate students across 25 Chinese universities, further demonstrated that the relationship between GenAI use and student engagement varies according to instructional conditions. Their findings indicate that technological assistance may be associated with favourable cognitive and emotional engagement while producing more complex relationships with active learning and motivation. These studies collectively suggest that AI adoption should not be treated as an independent indicator of educational improvement. Rather, the consequences of technological use depend on the instructional environment, the learning activities undertaken, and the extent to which students remain intellectually engaged.

The distinction between academic productivity and cognitive development has become increasingly prominent in recent theoretical discussions. Jose et al. (2025) conceptualised the cognitive paradox of AI in education as a tension between the potential enhancement of learning through personalised assistance and the possible erosion of cognitive capabilities through excessive reliance on automated solutions. Their analysis draws attention to cognitive offloading, reduced opportunities for active recall, and the importance of preserving higher-order reasoning. Similarly, Gupta et al. (2026) approach generative AI in management education through paradox theory, offering a perspective in which apparently contradictory educational outcomes may coexist. The relevance of this perspective lies in recognising that AI may simultaneously support task completion and introduce challenges to independent intellectual development. The paradox is therefore not adequately represented by a simple distinction between beneficial and harmful technology. Instead, it concerns the conditions under which technological assistance complements, transforms, or substitutes for the cognitive processes that education is intended to cultivate.

A related strand of literature examines the relationship between AI-assisted learning, cognitive effort, and self-regulation. Ertan and Esfer (2026) employ cognitive miser theory to reconsider how students allocate mental effort when completing difficult academic tasks with AI support. This perspective is relevant because learners may prefer cognitively economical strategies when immediate technological assistance is available, particularly under conditions of time pressure or task complexity. Lodge and Loble (2026) likewise identify cognitive offloading as an important consideration for educational practice. From this perspective, delegating selected cognitive activities to external technologies is not necessarily detrimental; its implications depend on whether students use the resources released through automation to engage in more demanding intellectual processes. When AI assists with repetitive information processing, students may have greater opportunities to evaluate evidence and develop complex arguments. Conversely, when automated systems replace essential analytical activities, learners may complete assignments efficiently without acquiring equivalent independent competence. The educational challenge therefore concerns the distribution of cognitive effort between the student and the intelligent system.

The relationship between efficiency and intellectual dependence is also reflected in research addressing AI-related self-efficacy. Zhu et al. (2026) examine the relationship between perceived AI efficiency, immediate gratification, self-efficacy, and AI dependency, drawing attention to the possibility that repeated reliance on rapid technological solutions may influence individuals' confidence in their own capabilities. This perspective complements the concerns raised by Arif et al. (2025), who frame AI use in higher education as a tension between enhanced learning effectiveness and declining critical-thinking skills. Surviyana and Nuryani (2026) address a comparable problem in secondary education, illustrating that concerns regarding technological convenience and independent reasoning extend beyond universities. However, the transferability of findings across educational levels requires caution because students' cognitive development, academic responsibilities, and opportunities for autonomous learning differ considerably. Collectively, these contributions reinforce the need to distinguish students' perceptions of AI usefulness from evidence of independent intellectual performance.

Recent research situated specifically within management education provides a particularly relevant foundation for the present investigation. Bergenholtz et al. (2026) examine the effects of generative AI on student performance in business-school assessment contexts, reporting different

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

consequences for students with different initial performance levels. Their findings suggest that AI assistance may reduce some cognitive demands while introducing additional difficulties associated with evaluating extensive generated information. This interpretation is important because it challenges the assumption that AI necessarily benefits all learners in equivalent ways. It also highlights the limitations of assessing educational achievement exclusively through the quality of completed tasks, particularly when intelligent technologies contribute substantially to the final output. Gupta et al. (2026) further situate these tensions within management education, where professional preparation requires students to develop analytical judgement, strategic reasoning, and the capacity to address complex organisational problems. These contributions indicate that the educational implications of AI are especially consequential in disciplines where graduates must make decisions under uncertainty rather than merely reproduce established information.

The distinction between performance and learning is particularly important when considering the role of AI in conceptual clarification and problem-solving. Pickard-Jones et al. (2024) discuss the potential of conversational AI to improve learning experiences by providing accessible explanations and opportunities for interactive questioning. Such assistance may help students overcome initial barriers to understanding unfamiliar material. Nevertheless, receiving a coherent explanation does not necessarily establish the ability to reproduce its reasoning or apply the relevant knowledge independently. Anwar et al. (2026) explicitly frame this concern through the relationship between productivity and the learning paradox in higher education. The underlying educational issue is whether faster academic performance represents improved intellectual competence or a redistribution of effort in which essential reasoning processes are increasingly undertaken by automated systems. Accordingly, studies of AI-assisted learning should differentiate between perceived understanding, independently demonstrated knowledge, and the efficiency with which students complete academic activities.

The literature on cognitive load and microlearning provides an additional perspective on the design of AI-supported learning environments. Bărbulescu and Enăchescu (2026) address microlearning activities intended to support cognitive transfer under conditions of high learning demands, while Enăchescu (2025) examines the relationship between microlearning, skill acquisition, and learning-to-learn competencies in higher education. These contributions are relevant because effective educational assistance should not merely reduce the immediate difficulty of a task; it should also support students' capacity to transfer acquired knowledge to unfamiliar situations. Alam et al. (2026) similarly address the balance between AI-related learning benefits and cognitive overload, suggesting the importance of considering how intelligent assistance affects the distribution and management of cognitive demands. From this perspective, AI-supported learning may be most valuable when explanations are appropriately structured, opportunities for active reasoning are preserved, and students are required to demonstrate understanding beyond the immediate interaction with the technology.

Experiential learning represents another important dimension of the discussion, particularly within management education. An et al. (2025) investigate the influence of generative AI on task performance and collaborative knowledge construction in a mind-mapping-based learning environment, demonstrating the relevance of examining intelligent technologies within structured collaborative activities rather than exclusively through individual adoption. Although their research concerns student teachers, its focus on collaborative knowledge construction offers a useful perspective for management education, where learning frequently involves business simulations, strategic case studies, entrepreneurial projects, and collaborative decision-making. Bărbulescu et al. (2026) discuss game-based approaches to teaching sustainability in economics, while Nguyen et al. (2025) review the relationship between game-based learning and student motivation. These contributions support consideration of active and practice-oriented pedagogies, although they do not independently establish the effectiveness of generative AI in such settings. Their relevance lies in demonstrating that meaningful learning requires structured opportunities for participation, application, reflection, and knowledge transfer.

The broader application of intelligent technologies within economics and organisational environments further strengthens the case for integrating AI into practical management education. Fashogbon et al. (2025) review applications of AI in economics, highlighting the expanding relevance of intelligent analytical tools to economic and professional activities. Aboderin (2025) examines the integration of Fourth Industrial Revolution technologies in Nigerian universities, connecting technological transformation with pedagogical development and emerging skills requirements. These perspectives suggest that management graduates will increasingly encounter AI-supported analytical and decision-making systems in professional environments. Consequently, universities face a dual responsibility: preparing students to use intelligent technologies effectively while ensuring that

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

technological proficiency does not replace independent judgement. Experiential learning activities involving AI-supported market analysis, business forecasting, strategic evaluation, and organisational problem-solving may help address this challenge when students remain responsible for interpreting evidence and defending their recommendations.

Human-centred AI integration also requires consideration of emotional, interpersonal, and ethical dimensions. Enăchescu et al. (2026) examine opportunities, risks, and ethical challenges associated with emotional AI in educational and organisational systems, emphasising concerns that extend beyond technological efficiency. Such considerations are particularly relevant to management education because professional competence involves communication, leadership, negotiation, and ethical decision-making in addition to analytical proficiency. Băltăreț u et al. (2026), although working within physical education, address innovative pedagogical approaches intended to strengthen motivation and active learning. Their contribution is relevant at the broader pedagogical level but should not be interpreted as direct evidence concerning AI-assisted management education. Together, these perspectives suggest that intelligent technologies should be integrated within learning environments that preserve meaningful human interaction and encourage students to exercise responsibility for their intellectual and professional decisions.

The institutional conditions surrounding AI adoption represent a further dimension of the emerging research agenda. Khlaif et al. (2025) address the challenges of AI over-reliance and sustainable integration in higher education, highlighting the importance of balancing technological opportunities with the preservation of meaningful learning. Cheng (2026) examines students' intentions to learn AI through expectancy-value and protection motivation perspectives, suggesting that adoption-related attitudes may be influenced by anticipated benefits and perceived risks. These contributions indicate that responsible AI integration requires more than technical access or institutional encouragement. Universities must also consider students' motivations, confidence, perceived responsibilities, and ability to critically evaluate generated information. Clear guidance concerning acceptable AI use, structured opportunities for independent reasoning, and assessment practices that make students' intellectual contributions visible may therefore be important components of human-centred educational design.

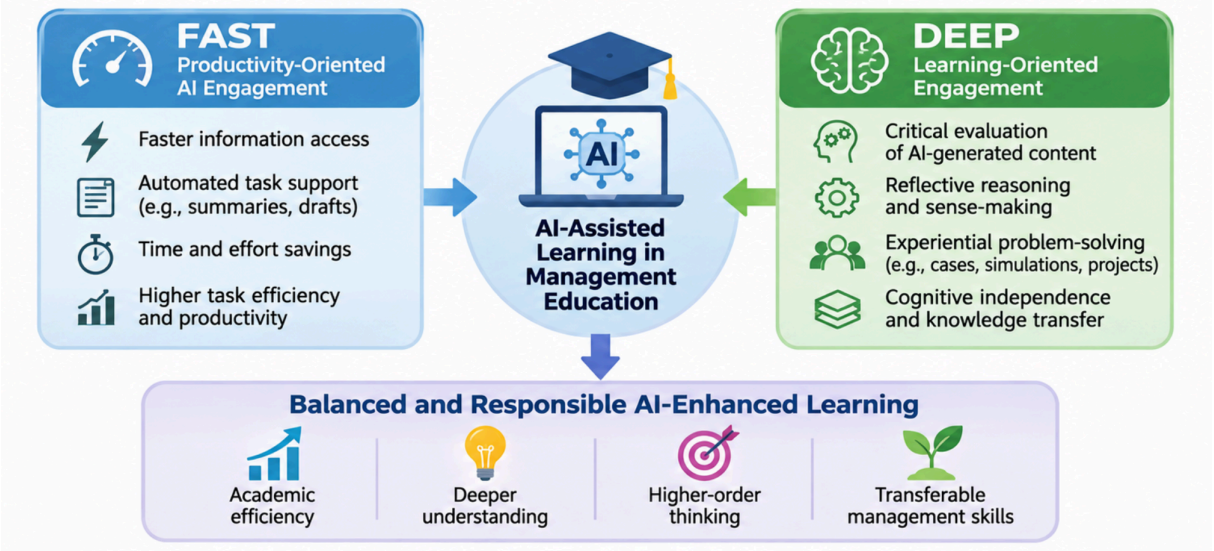
A critical synthesis of this literature identifies three interconnected gaps. First, although studies increasingly examine generative AI adoption, engagement, and perceived usefulness, academic efficiency and independent cognitive development are frequently considered without a sufficiently explicit distinction between them. Second, research addressing cognitive offloading and technological dependence provides valuable theoretical perspectives, but additional empirical investigation is needed to establish how students' reported learning strategies relate to independently assessed critical-thinking and problem-solving outcomes. Third, management education requires greater attention to the integration of AI into experiential activities in which students must interpret complex information, evaluate competing alternatives, and retain responsibility for professional judgements. The available scholarship therefore supports a differentiated approach to evaluating AI-assisted education, while also demonstrating the limitations of assuming that faster academic task completion necessarily produces deeper learning.

Against this background, the present study introduces the FAST–DEEP conceptual model to distinguish productivity-oriented AI engagement from learning-oriented practices involving critical evaluation, reflective reasoning, experiential problem-solving, and cognitive independence. The FAST dimension represents the efficiency benefits associated with automated assistance, accelerated information processing, and faster academic task completion. The DEEP dimension represents the educational objective of developing transferable knowledge, intellectual autonomy, and the ability to critically evaluate AI-supported solutions. The framework does not assume that these dimensions are mutually exclusive or that AI necessarily strengthens or weakens cognitive performance. Rather, it provides a conceptual basis for examining whether students' perceptions of technological efficiency are accompanied by comparable perceptions of independent intellectual development. By applying this distinction to questionnaire responses from 93 management students, the study seeks to contribute to the ongoing discussion concerning how universities can transform intelligent technologies from instruments of academic convenience into resources for meaningful, responsible, and intellectually demanding learning.

To synthesise the theoretical perspectives discussed in the literature and provide a conceptual foundation for the empirical investigation, this study proposes the FAST–DEEP model of AI-assisted learning in management education. The framework distinguishes between productivity-oriented AI engagement (FAST), characterised by accelerated task completion, automated academic assistance, and time savings, and learning-oriented engagement (DEEP), emphasising critical evaluation, reflective reasoning, experiential problem-solving, and cognitive independence. Rather than

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

considering these dimensions mutually exclusive, the model suggests that meaningful educational outcomes depend on integrating technological efficiency with active intellectual engagement. As illustrated in Figure 1, this integration provides a conceptual basis for understanding how AI-supported academic activities may contribute not only to improved productivity but also to deeper understanding, higher-order thinking, and transferable managerial competencies.



Source: Authors' own conceptual contribution

Figure 1. The FAST–DEEP Conceptual Model for AI-Assisted Learning in Management Education

3. METHODOLOGY

The study adopted a quantitative, descriptive, cross-sectional research design, complemented by an exploratory qualitative component, to investigate the relationship between artificial intelligence use, academic efficiency, perceived learning effectiveness, critical thinking, cognitive independence, and experiential learning among management students. The methodological approach was developed to address the central research question of whether students primarily employ generative AI to accelerate academic task completion or engage with intelligent technologies in ways that support deeper conceptual understanding and independent problem-solving. A questionnaire-based approach was considered appropriate because the investigation focused on students' reported technological practices, perceived educational benefits, learning strategies, and expectations regarding the integration of AI into management education. The research was structured around the distinction between productivity-oriented and learning-oriented AI engagement, recognising that these dimensions may coexist within individual learning experiences and should not be interpreted as mutually exclusive categories.

The empirical investigation involved 93 management students (N = 93), whose questionnaire responses constituted the analytical sample. The unit of analysis was the individual student, while the principal variables concerned the frequency and purposes of AI use, perceived academic time savings, conceptual understanding, approaches to problem-solving, self-assessed critical-thinking development, familiarity with AI agents, and attitudes towards human-centred educational practices. The study employed a non-experimental design, allowing the identification of descriptive patterns in students' perceptions without manipulating their exposure to AI technologies or introducing controlled instructional interventions. Consequently, the research was intended to characterise reported experiences and examine their educational implications rather than establish causal relationships between AI adoption and objectively measured learning outcomes. The sample was treated as an exploratory group of management students, without assuming statistical representativeness of the wider university student population.

Data were collected using a structured questionnaire comprising 15 questions organised into

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

five thematic dimensions. The first dimension addressed AI adoption and academic practices, examining the frequency of technological use, the applications most frequently employed, and the academic activities for which students sought AI assistance. The second dimension investigated perceived learning effectiveness, focusing on conceptual clarification, problem-solving strategies, estimated time savings, and self-reported changes in independent critical thinking. The third dimension examined the use of AI agents and their perceived contribution to experiential learning, particularly in practical management projects, business analysis, and decision-making activities. The fourth dimension addressed human-centred AI integration, including the verification of AI-generated information, perceived educational risks, and students' preferences concerning the relationship between intelligent technologies and academic instructors. The final dimension explored expectations regarding the future integration of AI into management curricula and included an open-ended question inviting students to propose improvements to AI-supported educational practices.

The questionnaire combined single-response multiple-choice questions, multiple-response items, and one open-ended question. Single-response items were designed to identify students' predominant perceptions or behaviours, while multiple-response questions allowed participants to indicate several relevant applications, educational priorities, or perceived benefits. This structure was particularly important because students may use AI for different purposes within the same academic context, including information retrieval, conceptual clarification, assignment preparation, and practical problem-solving. The response options incorporated positive, neutral, and negative perspectives to capture variation in students' experiences and reduce the risk of presenting AI adoption as an exclusively beneficial educational development. Questions addressing time savings and critical-thinking development included categories reflecting both perceived improvements and potential disadvantages, thereby supporting a more balanced examination of the relationship between technological efficiency and intellectual autonomy.

The operationalisation of academic efficiency focused primarily on students' reported frequency of AI use, purposes of technological assistance, and estimated reductions in the time required to complete academic assignments. Perceived time savings were measured through ordered response categories ranging from less than 10% to more than 50%, together with options indicating no noticeable efficiency gains, increased workload, or uncertainty. These responses provided an indication of students' subjective assessments of AI-supported productivity rather than independently recorded differences in task-completion time. Learning effectiveness was examined through students' evaluations of AI assistance in understanding difficult concepts and their preferred approaches to solving academic problems. Particular attention was given to distinguishing practices involving step-by-step explanation, independent problem-solving followed by AI verification, and critical analysis of generated solutions from practices primarily oriented towards obtaining immediate answers. This distinction was intended to capture differences in reported learning behaviour without assuming that any single strategy necessarily produces superior educational outcomes.

Critical thinking and cognitive independence were examined through students' self-assessments of how AI use had influenced their ability to reason and solve problems independently. The corresponding questionnaire item distinguished between significant or moderate perceived improvements, no noticeable change, and different degrees of perceived reduction in independent thinking. These responses were analysed as indicators of students' perceptions rather than direct measurements of cognitive performance. This methodological distinction is important because perceived learning benefits may not correspond precisely to objectively demonstrated competence, particularly when students evaluate their own understanding after receiving AI-generated explanations. Accordingly, the study differentiated between perceived conceptual clarification and self-assessed intellectual autonomy, recognising that students may report substantial assistance in understanding academic material while remaining uncertain about their capacity to solve comparable problems without technological support.

The experiential learning dimension examined students' perceptions of AI usefulness in practical management activities, including business data analysis, marketing strategy development, market research, financial forecasting, entrepreneurial projects, and decision-making simulations. These activities were selected because they reflect common applications of analytical and problem-solving competencies within management education. The questionnaire also investigated familiarity with AI agents, distinguishing between frequent academic use, occasional use, experimentation, awareness without practical experience, and lack of familiarity. For the purposes of the study, AI agents were understood as intelligent systems capable of performing interconnected activities, such as retrieving information, analysing documents, coordinating tasks, or supporting multistage project development. This distinction was necessary to differentiate conventional conversational assistance from more autonomous forms of AI-supported academic activity. However,

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

the questionnaire measured students' reported familiarity and use rather than independently verifying the technical capabilities of the applications employed.

The human-centred AI dimension was operationalised through questions addressing the verification of AI-generated information, perceived risks associated with technological dependence, and expectations regarding the future role of academic instructors. Verification practices were examined using ordered response categories ranging from consistent checking of generated information to reliance on AI outputs without additional validation. Perceived concerns included inaccurate information, academic integrity, reduced creativity, excessive dependence, diminished interpersonal interaction, privacy, and unequal access to advanced technologies. Students were also invited to identify preferred models of interaction between AI systems and professors, allowing the investigation to examine whether technological assistance was perceived as complementary to human teaching or as a potential substitute for selected educational functions. These measures provided a basis for considering how students understand their own responsibility for learning within increasingly AI-enabled academic environments.

The quantitative analysis was based on descriptive statistical procedures, including absolute frequencies and relative percentages for each response category. Percentages were calculated in relation to the 93 respondents, with the same denominator applied to single-response and multiple-response questions. For single-response items, response categories were treated as mutually exclusive, whereas multiple-response items permitted the selection of several alternatives; consequently, their cumulative percentages could exceed 100%. The analysis focused on identifying dominant patterns of AI adoption, perceived productivity benefits, reported learning strategies, and attitudes towards cognitive independence. Particular attention was directed towards comparing the proportions of students reporting meaningful time savings, substantial conceptual assistance, and improvements or reductions in independent critical thinking. These comparisons were interpreted descriptively because the questionnaire items measured distinct constructs and did not provide sufficient evidence to infer causal relationships between academic efficiency and cognitive development.

The open-ended question was incorporated to complement the quantitative findings by capturing students' recommendations concerning the future integration of AI into management education. The qualitative component was structured

4. RESULTS

The analysis of the questionnaire responses from 93 management students revealed a multidimensional pattern of artificial intelligence adoption, characterised by frequent academic use, substantial perceived productivity benefits, and more differentiated assessments of its contribution to critical thinking and cognitive independence. The results indicated that generative AI had become an important component of students' academic activities, although its perceived educational value varied according to the nature of the tasks performed and the degree of intellectual engagement involved. Particularly relevant to the research objectives was the distinction between students' perceptions of AI as an instrument for accelerating academic work and their evaluations of its contribution to independent reasoning and problem-solving. The findings suggested that these dimensions did not necessarily develop in parallel, providing a basis for examining the proposed AI learning paradox within management education.

The frequency of AI adoption demonstrated the substantial presence of intelligent technologies in students' academic routines. Overall, 78.0% of respondents reported using AI applications at least several times per week, including 20.3% who indicated using them several times daily and 35.0% who reported almost daily use. A further 22.8% employed AI two or three times per week, while occasional and infrequent users represented smaller proportions of the sample. ChatGPT emerged as the most frequently selected application, reported by 85.4% of respondents, followed by Google Gemini (38.2%), Microsoft Copilot (23.6%), Perplexity (20.3%), and Grammarly or comparable writing assistants (18.7%). Claude was selected by 9.8% of respondents, while 8.9% identified AI agents among the technologies used for academic activities. As students could select multiple applications, these percentages reflected overlapping patterns of technological use rather than mutually exclusive categories.

The distribution of academic activities further indicated that students employed AI for both the production of academic outputs and the clarification of educational content. Preparing assignments and presentations represented the most frequently selected activity (69.9%), followed by understanding difficult theories and concepts (62.6%) and searching for academic information

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

(57.7%). Problem-solving activities were reported by 45.5% of respondents, while 35.0% used AI to develop ideas for projects and case studies. Examination preparation (27.6%), academic writing improvement (21.1%), and study organisation (11.4%) were selected less frequently. These findings indicated that AI-supported academic activity extended beyond simple information retrieval, encompassing conceptual clarification, analytical assistance, and project development. Nevertheless, the predominance of assignment preparation suggested that immediate academic productivity constituted a particularly visible dimension of students' technological engagement.

The perceived contribution of AI to conceptual understanding was generally favourable. A combined 74.0% of respondents considered AI very or extremely helpful when attempting to understand difficult subjects or concepts, including 27.6% who evaluated its contribution as extremely helpful and 46.3% who regarded it as very helpful. A further 18.7% reported moderate benefits, whereas relatively few respondents expressed limited or negative assessments. These results suggested that students valued the accessibility of AI-generated explanations and the possibility of obtaining additional clarification when conventional educational materials proved insufficient. However, the reported usefulness of AI for conceptual understanding represented students' subjective evaluations and did not independently establish whether the knowledge acquired through AI-supported interactions could be retained or applied without technological assistance.

The perceived efficiency benefits were similarly substantial. Overall, 67.5% of respondents estimated that AI reduced the time required to complete academic assignments by at least 10%. More specifically, 14.6% reported time savings exceeding 50%, while 28.5% estimated reductions of approximately 30–50% and 24.4% indicated savings of 10–29%. A further 15.4% perceived smaller efficiency gains, while 5.7% reported no noticeable time savings. Importantly, 6.5% indicated that AI sometimes increased their workload because generated information required verification or correction, and 4.9% were unable to estimate its influence on task-completion time. These findings demonstrated that perceived productivity benefits were widespread but not universal. They also suggested that the practical value of AI depended partly on the additional effort required to assess the accuracy, relevance, and reliability of its outputs.

The relationship between AI-supported efficiency and independent critical thinking revealed a more differentiated pattern. Although 74.0% of respondents considered AI highly beneficial for conceptual clarification, only 38.2% reported improvements in their independent critical-thinking abilities. Within this group, 10.6% perceived significant improvements and 27.6% indicated slight improvements. Conversely, 34.1% reported some reduction in their capacity for independent reasoning, including 26.8% who perceived a slight reduction and 7.3% who identified a significant reduction. A further 22.0% reported no noticeable change, while 5.7% remained uncertain about the influence of AI on their cognitive independence. The proximity between the proportions reporting improvement and deterioration indicated that students' experiences of AI-assisted learning were not uniformly positive or negative. Rather, the findings suggested that the perceived cognitive consequences of AI use were considerably more heterogeneous than its reported benefits for academic productivity and conceptual clarification.

This distinction constituted the central descriptive finding of the investigation. While 67.5% of students reported time savings of at least 10% and 74.0% perceived substantial assistance in understanding difficult concepts, the proportion reporting improvements in independent critical thinking was considerably lower, at 38.2%. The results therefore identified **a discrepancy between the prevalence of perceived efficiency benefits and the prevalence of perceived cognitive improvement**. However, because these indicators represented separate questionnaire items and the available analysis was based on aggregate response distributions, the findings did not establish whether students reporting the greatest time savings were also those experiencing reduced cognitive independence. Consequently, the observed differences were interpreted as evidence of contrasting perceptions across educational dimensions rather than as proof of a direct relationship between technological efficiency and cognitive dependence.

To illustrate the central empirical finding of the study, Figure 2 compares students' perceptions of AI-assisted academic efficiency, conceptual understanding, and independent critical thinking. Although 74.0% of respondents considered AI highly beneficial for understanding difficult concepts and 67.5% reported academic time savings of at least 10%, only 38.2% perceived improvements in independent critical thinking, while 34.1% reported a reduction. This contrast highlights the AI learning paradox: substantial perceived productivity benefits do not necessarily correspond to equally favourable perceptions of cognitive development. The results should be interpreted as descriptive differences between self-reported indicators rather than evidence of a causal relationship between AI use and cognitive independence.

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

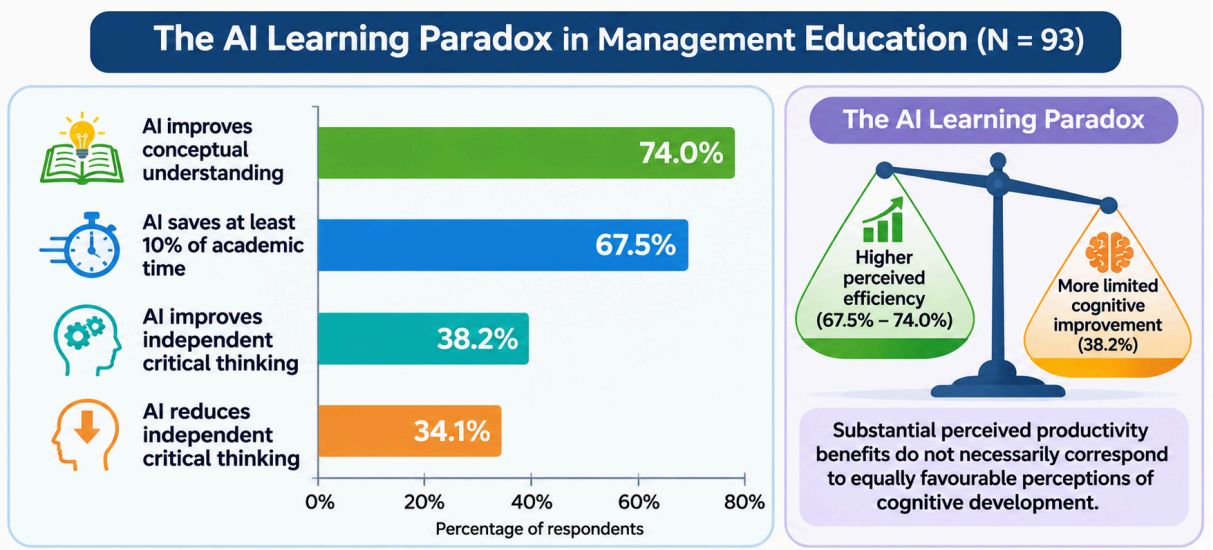


Figure 2. The AI Learning Paradox: Perceived Academic Efficiency and Cognitive Independence among Management Students (N = 93)

Source: Authors' own conceptual contribution

Figure 2. The AI Learning Paradox: Perceived Academic Efficiency and Cognitive Independence among Management Students (N = 93)

Students' reported **problem-solving strategies** provided additional insight into these differences. The most frequently selected approach involved requesting step-by-step explanations from AI to support independent problem-solving (28.5%). A further 23.6% indicated that they initially attempted problems independently before using AI to verify their reasoning, while 20.3% requested AI-generated solutions and subsequently analysed their correctness. In contrast, 17.1% reported primarily using AI to obtain quick answers, whereas 7.3% preferred seeking assistance from professors or classmates and 3.3% rarely employed AI for problem-solving. These responses suggested that students adopted different strategies when integrating AI into academic reasoning. Practices involving independent attempts, explanation-seeking, and subsequent verification were consistent with learning-oriented engagement, while the preference for immediate answers reflected a more completion-oriented approach. Nevertheless, these categories described students' predominant reported behaviours and did not establish the effectiveness of individual strategies or exclude the possibility that the same student employed different approaches across academic tasks.

The findings **concerning AI agents** revealed a distinction between widespread conversational AI adoption and more limited engagement with autonomous intelligent systems. Only 21.1% of respondents reported frequent or occasional academic use of AI agents, including 6.5% who employed them regularly for academic projects and 14.6% who used them occasionally for research or assignments. A further 7.3% reported using AI agents mainly for personal activities, while 17.1% had experimented with such technologies without incorporating them into regular academic practices. Notably, 32.5% had heard about AI agents but had never used them, and 22.0% were unfamiliar with the concept. These results indicated that students' practical experience with agentic AI remained substantially less developed than their engagement with conventional generative AI applications. The difference suggested an emerging educational need to distinguish between conversational assistance and more autonomous forms of technological collaboration, particularly in project-based management learning.

Despite relatively **limited experience with AI agents**, students expressed favourable perceptions of AI assistance in practical management activities. Overall, 56.9% considered AI very or extremely useful for business projects, case studies, and real-world problem-solving, while 29.3% regarded it as moderately useful. The most frequently selected applications were business data analysis (61.8%), marketing strategy development and business planning (56.1%), and market research (52.8%). Business decision simulations were identified by 46.3% of respondents, followed by financial analysis and forecasting (39.0%) and entrepreneurial innovation (31.7%). By comparison, team project management (22.0%) and leadership or negotiation simulations (19.5%) attracted lower levels of interest. These findings suggested that students perceived AI as particularly valuable for information-intensive and analytical management activities, while its anticipated contribution to

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

interpersonal and relational competencies was less prominent. Such differences are relevant to experiential learning because management education requires both analytical proficiency and the development of human judgement, communication, leadership, and collaborative decision-making.

Students' verification practices revealed additional concerns regarding **responsible AI engagement**. Although 15.4% reported always checking AI-generated information and 29.3% indicated doing so frequently, the largest proportion, 35.0%, verified outputs only sometimes. Furthermore, 14.6% rarely checked generated answers, while 4.1% reported never verifying them. Overall, 44.7% indicated consistent or frequent verification practices, suggesting that systematic evaluation of AI-generated information was not universal among respondents. This pattern was particularly relevant when considered alongside students' concerns regarding the educational consequences of AI use. Excessive dependence and reduced independent thinking represented the most frequently selected concern (28.5%), followed by inaccurate or fabricated information (22.8%), academic integrity (14.6%), and reduced creativity (12.2%). Other concerns included diminished human interaction, privacy and security, and unequal access to advanced technologies. Taken together, these responses indicated that students recognised potential limitations associated with AI-assisted learning, particularly regarding the reliability of generated information and the preservation of intellectual autonomy.

The findings concerning **the relationship between AI and academic instructors** further supported the importance of human-centred educational practices. The most frequently selected preference was for AI to function as a complementary learning assistant while professors retained a central educational role (37.4%). A further 28.5% supported using AI for routine explanations and exercises, allowing professors to concentrate on mentoring and practical learning activities. Another 13.8% favoured AI as a personalised tutor, while 12.2% preferred a division of responsibilities in which AI supported technical tasks and professors facilitated discussions and decision-making exercises. Only 5.7% advocated a substantially limited role for AI in education. These results indicated that respondents generally supported technological integration without necessarily favouring the replacement of human instruction. Instead, their preferences suggested an interest in educational models combining accessible technological assistance with meaningful academic guidance, critical discussion, and practical learning opportunities.

Students' recommendations for the **future integration of AI into management education** provided further evidence of this orientation. The most frequently selected institutional priority was teaching students to critically evaluate AI-generated information (69.9%), followed by developing real-world business projects incorporating AI assistance (65.9%) and introducing dedicated instruction in AI literacy and responsible technological use (59.3%). Integrating AI into existing management courses was supported by 50.4% of respondents, while 39.8% emphasised the importance of clear institutional policies regarding acceptable AI use. Additional priorities included equitable access to AI applications (30.1%) and the introduction of AI-supported business simulations (25.2%). Only 7.3% favoured limiting AI integration to preserve traditional educational practices. These responses suggested that students generally preferred structured and pedagogically purposeful AI adoption rather than unrestricted technological dependence or the exclusion of intelligent systems from academic activities.

The thematic **distribution associated with the open-ended questionnaire item** was consistent with these quantitative preferences. Critical AI use and verification represented the largest identified category (27.6%), followed by the introduction of practical AI-supported projects (23.6%) and the preservation of independent thinking and creativity (19.5%). Maintaining human interaction and academic mentoring accounted for 13.8% of the thematic distribution, while clearer ethical guidance and institutional rules represented 9.8%, and improved access to AI tools accounted for 5.7%. These categories reflected a combination of technological expectations and concerns regarding the preservation of meaningful learning. Rather than expressing a predominantly restrictive attitude towards AI, the thematic pattern emphasised the importance of developing students' capacity to use intelligent systems critically, responsibly, and in connection with practical educational experiences.

Overall, the findings revealed a distinction between the perceived operational benefits of AI and its more variable contribution to students' self-assessed cognitive development. Frequent technological adoption, substantial estimated time savings, and favourable evaluations of conceptual clarification indicated that AI was widely perceived as a useful academic resource. However, the comparatively lower proportion of students reporting improvements in independent critical thinking, together with concerns regarding technological dependence and inconsistent verification practices, suggested that academic efficiency alone was an insufficient indicator of educational effectiveness. The results also demonstrated considerable interest in AI-supported experiential activities and a preference for educational approaches preserving the complementary roles of intelligent technologies

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

and human instructors. Within the proposed FAST–DEEP framework, these patterns provided a descriptive basis for distinguishing productivity-oriented AI engagement from learning-oriented practices involving critical evaluation, independent reasoning, and practical knowledge application. The implications of this distinction for management curriculum design, experiential learning, and human-centred AI integration are examined in the following discussion.

5. DISCUSSION

The findings of this study provide evidence of a significant distinction between management students' perceived benefits from AI-assisted academic productivity and their more heterogeneous assessments of cognitive development. The central observation is that widespread AI adoption and favourable perceptions of conceptual clarification coexist with substantially less consistent reports of improvements in independent critical thinking. While 78.0% of respondents indicated using AI several times per week or more frequently, 67.5% reported academic time savings of at least 10%, and 74.0% considered AI very or extremely helpful for understanding difficult concepts, only 38.2% perceived improvements in their independent critical-thinking abilities. Conversely, 34.1% reported some reduction in independent reasoning. These findings illustrate the central tension underlying the proposed AI learning paradox: technologies that students perceive as highly effective in facilitating academic work may not be associated with equally favourable perceptions of intellectual autonomy. However, the results should not be interpreted as demonstrating that AI causes cognitive decline. Rather, they identify a discrepancy between distinct dimensions of students' self-reported educational experiences, suggesting that academic efficiency and cognitive development require separate evaluation.

This distinction contributes to the emerging literature on generative AI in higher education by challenging the assumption that technological usefulness necessarily corresponds to educational effectiveness. Fuchs and Aguilos (2023) identified autonomous learning assistance as an important benefit of conversational AI while simultaneously recognising concerns regarding academic integrity and inappropriate technological dependence. The present findings are consistent with this dual perspective, demonstrating that students can appreciate the practical advantages of intelligent assistance while expressing uncertainty about its consequences for independent reasoning. Similarly, Guo et al. (2025) reported that the relationship between generative AI use and student engagement varied according to instructional conditions, indicating that technological adoption alone does not determine the quality of learning experiences. The current study extends this discussion to management education by explicitly distinguishing perceived time savings, conceptual clarification, and cognitive independence. Although these dimensions are related conceptually, the descriptive results indicate that they should not be treated as interchangeable indicators of academic progress.

An important interpretation concerns the difference between receiving an understandable explanation and developing the capacity to reproduce or apply the underlying reasoning independently. Generative AI can provide immediate clarification, organise complex information, and present structured solutions to academic problems. These capabilities may reduce barriers to understanding and support students who require additional explanations beyond those available in conventional learning materials. Nevertheless, the perception that an explanation is clear does not necessarily establish that its content has been integrated into durable conceptual knowledge. Students may experience a sense of understanding while interacting with AI-generated material without subsequently demonstrating comparable competence when technological assistance is unavailable. This possibility is especially relevant to management education, where students must not only recognise appropriate solutions but also explain their assumptions, evaluate alternative strategies, and justify decisions under conditions of uncertainty. The findings therefore support a distinction between perceived explanatory usefulness and demonstrated intellectual mastery, while recognising that the present questionnaire did not directly measure knowledge retention or independent performance.

The variation in students' problem-solving strategies provides a possible explanation for the coexistence of favourable and unfavourable cognitive perceptions. Respondents reported different approaches to AI-assisted academic tasks, including requesting step-by-step explanations, attempting problems independently before checking their solutions, critically analysing AI-generated answers, and obtaining immediate responses. These practices involve different degrees of student participation in the reasoning process. When learners attempt to formulate an initial solution and subsequently use AI to evaluate its accuracy, the technology may provide feedback without eliminating the opportunity for independent intellectual effort. Similarly, requesting alternative explanations or challenging AI-generated recommendations may encourage reflective engagement. By contrast, obtaining

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

complete solutions before attempting a problem may reduce opportunities to practise the reasoning skills that the assignment is intended to develop. These interpretations are consistent with the broader observation that AI-supported engagement depends on instructional conditions and learning activities. Nevertheless, the available aggregate data do not establish a statistical relationship between individual problem-solving strategies and perceived changes in critical thinking. Accordingly, the educational significance of these strategies remains a theoretically informed interpretation requiring further empirical examination.

The concept of cognitive offloading offers an additional perspective on these findings. Delegating selected tasks to external technologies can be educationally productive when it reduces unnecessary effort and allows learners to concentrate on higher-order intellectual activities. For example, using AI to organise preliminary information or identify alternative sources may enable students to devote more attention to evaluating evidence and developing managerial recommendations. However, when technological assistance replaces the analytical processes through which students are expected to acquire knowledge, the same efficiency gains may coincide with reduced opportunities for independent practice. The critical distinction therefore concerns the nature of the activities transferred to AI and the intellectual responsibilities retained by the student. From this perspective, cognitive offloading should not be regarded as inherently beneficial or detrimental. Its educational value depends on whether the resulting redistribution of effort supports deeper reasoning or primarily accelerates the production of academic outputs.

The proposed FAST–DEEP model provides a conceptual interpretation of this distinction. The FAST dimension encompasses productivity-oriented AI engagement, including accelerated assignment preparation, automated information processing, rapid generation of explanations, and reduced time requirements for routine academic activities. The DEEP dimension represents learning-oriented engagement, characterised by critical evaluation, independent problem-solving, reflective reasoning, and the application of knowledge to unfamiliar situations. The findings suggest that FAST-related benefits are highly visible in students' experiences, whereas DEEP-related outcomes are more variable and potentially dependent on how AI is incorporated into learning activities. Importantly, the model does not propose that efficiency and meaningful learning are mutually exclusive. Instead, it suggests that the educational challenge lies in converting productivity gains into opportunities for greater cognitive engagement. For instance, time saved through automated information retrieval could be redirected towards evaluating competing business strategies, testing assumptions, or developing alternative interpretations of organisational problems. The FAST–DEEP distinction is therefore intended to guide pedagogical reflection rather than classify students into fixed categories or establish an empirically validated relationship between technological use and cognitive performance.

The findings concerning experiential learning further demonstrate the relevance of this approach to management education. Students expressed substantial interest in AI-supported business analysis, marketing strategy development, market research, and decision-making simulations. These applications reflect the increasing importance of intelligent technologies in professional management activities and suggest opportunities for integrating AI into practice-oriented educational experiences. However, the value of such integration depends on whether students remain responsible for the reasoning underlying their recommendations. A business project in which AI generates a market analysis and proposes a strategy may produce a technically sophisticated output without necessarily requiring students to evaluate the reliability of the underlying evidence or the feasibility of the proposed decisions. Conversely, a project requiring students to compare AI-generated scenarios, identify limitations, defend strategic choices, and reflect on the consequences of their recommendations may support more substantial analytical engagement. The investigation by An et al. (2025) into generative AI and collaborative knowledge construction reinforces the relevance of examining how intelligent systems interact with structured learning activities, although its findings should not be assumed to apply directly to managerial decision-making contexts.

These considerations suggest that universities should prioritise the pedagogical design of AI-supported experiential activities rather than treating technological integration as an educational objective in itself. In management programmes, AI-assisted projects could involve the analysis of organisational challenges, development of competing business strategies, evaluation of financial scenarios, and interpretation of market information. However, the assessment of such activities should extend beyond the completeness or presentation quality of the final output. Students could be required to explain their analytical assumptions, identify weaknesses in AI-generated recommendations, compare alternative solutions, and justify the final decisions reached. Reflective components could further encourage learners to distinguish between their own contributions and those provided by intelligent systems. Such practices would help preserve the educational objectives of experiential

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

learning while acknowledging the increasing relevance of AI-assisted professional workflows.

The findings regarding AI agents introduce a related consideration. Although conventional generative AI applications were widely used, only 21.1% of respondents reported frequent or occasional academic use of AI agents. This suggests that students' practical engagement with more autonomous systems remained comparatively limited, despite their interest in AI-supported management activities. As agentic technologies become more capable of coordinating research, analysis, and project-development processes, the distinction between assistance and substitution may become increasingly difficult to establish. In educational settings, the central issue will therefore concern how students maintain responsibility for decisions when substantial components of a task are performed through automated workflows. Universities may need to introduce activities in which students supervise AI-supported processes, verify intermediate outputs, evaluate alternative actions, and explain the rationale for accepting or rejecting automated recommendations. Such practices could contribute to the development of competencies relevant to human–AI collaboration without assuming that familiarity with AI agents automatically produces improved managerial judgement.

A further implication concerns students' capacity to evaluate the reliability of AI-generated information. Only 44.7% of respondents reported always or frequently verifying AI outputs, while the remainder indicated less consistent verification practices or did not use AI. This finding is particularly important because the usefulness of AI-generated explanations and recommendations depends partly on their factual accuracy, contextual relevance, and underlying assumptions. In management education, inaccurate market information, inappropriate financial assumptions, or unsupported strategic recommendations can undermine both academic learning and practical decision-making. Consequently, AI literacy should extend beyond technical proficiency in generating prompts or operating intelligent applications. It should include the ability to evaluate evidence, identify unsupported claims, compare information across credible sources, recognise uncertainty, and assess the limitations of automated reasoning. The strong student preference for instruction in critical evaluation, reported by 69.9% of respondents, suggests that such competencies represent a relevant priority for curriculum development.

The preservation of human interaction also emerged as an important dimension of responsible AI integration. Students generally favoured educational models in which intelligent technologies complemented rather than replaced academic instructors. This preference suggests that technological assistance and human educational guidance are not necessarily perceived as competing alternatives. AI may provide immediate explanations, support preliminary research, and facilitate routine academic activities, while professors retain responsibility for challenging assumptions, facilitating discussion, contextualising complex problems, and supporting the development of professional judgement. This division of responsibilities is particularly relevant to management education, where communication, negotiation, ethical reasoning, and leadership cannot be adequately represented through the production of technically correct written answers alone. The relationship between instructional support and AI-assisted engagement identified by Guo et al. (2023) provides further grounds for considering pedagogical context when designing human-centred educational environments.

The implications for assessment are equally significant. Traditional assignments frequently evaluate students through written reports, presentations, and analytical documents, all of which can now be produced with substantial AI assistance. Consequently, the apparent quality of an academic submission may provide an incomplete indication of the student's independent competence. Rather than relying exclusively on restrictions concerning technological use, management programmes could incorporate assessment methods that make students' reasoning processes more visible. These may include oral defences of AI-assisted projects, supervised case analyses, reflective accounts of decision-making, and assignments requiring students to critique generated recommendations. Such approaches would not necessarily eliminate inappropriate AI dependence, but they could create stronger incentives for students to understand and justify their work. Their effectiveness would nevertheless require evaluation, particularly in relation to assessment workload, fairness, accessibility, and the practical constraints faced by academic institutions.

The results also have implications for institutional policy. Students expressed support for responsible AI integration, practical learning opportunities, and clearer guidance concerning acceptable technological use. These preferences suggest that educational institutions may benefit from moving beyond a predominantly restrictive approach towards more explicit expectations regarding AI-supported academic practices. Policies could distinguish between permissible assistance, such as conceptual clarification and preliminary information organisation, and forms of use that undermine the intended demonstration of individual competence. However, institutional guidance should remain sensitive to differences between learning objectives, disciplinary contexts, and assessment formats. A practice that is appropriate in an introductory research exercise may not be

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

suitable for an assessment intended to establish independent analytical proficiency. Accordingly, responsible AI governance should be linked to the competencies that individual educational activities are designed to develop.

Despite these implications, several limitations constrain the interpretation of the findings. The study involved 93 management students and relied on self-reported questionnaire responses collected through a cross-sectional design. The results therefore describe students' perceptions rather than objectively measured changes in academic performance or cognitive ability. In particular, the observed difference between perceived efficiency gains and reported critical-thinking development cannot establish that AI use caused either improvement or deterioration in independent reasoning. The analysis also relied on aggregate response distributions, preventing the examination of whether individual students reporting substantial time savings were more or less likely to report changes in cognitive independence. Furthermore, the questionnaire did not assess the quality of AI interactions, independently verify the technologies used, or measure students' performance on comparable tasks completed with and without AI assistance. These limitations are important because students' perceptions may be influenced by prior technological experience, academic confidence, task complexity, and differences in learning strategies.

Future research could address these limitations through longitudinal and experimental designs examining how different forms of AI assistance influence independently assessed learning outcomes. Comparisons between students who use AI primarily for answer generation and those who employ it for explanation, feedback, and critical evaluation could provide stronger evidence concerning the educational consequences of different engagement strategies. Further investigation could also examine whether the FAST–DEEP framework can be operationalised through validated measurement scales and whether its proposed dimensions are associated with objective indicators of conceptual mastery, critical thinking, and problem-solving performance. Within management education, particularly valuable evidence could emerge from practical projects in which students complete comparable analytical tasks under different conditions of AI assistance, followed by independent assessments of their reasoning and decision-making capabilities.

Overall, the findings suggest that the central challenge for management education is not whether students should use AI, but how educational institutions can ensure that intelligent technologies support rather than displace the intellectual activities essential to meaningful learning. The widespread perception of academic efficiency benefits indicates that generative AI has become a relevant component of students' educational experiences. Nevertheless, the variability in reported critical-thinking outcomes, together with concerns regarding technological dependence and inconsistent verification practices, demonstrates the limitations of evaluating AI integration through productivity indicators alone. The FAST–DEEP model offers a conceptual basis for addressing this challenge by distinguishing the acceleration of academic work from the development of independent reasoning and experiential competence. Its principal pedagogical implication is that AI-assisted efficiency should be treated as a potential resource for deeper learning rather than as evidence that deeper learning has already occurred.

6. CONCLUSION

The increasing integration of generative artificial intelligence into higher education has created new opportunities for academic productivity, personalised assistance, and the development of technology-supported learning environments. However, the educational significance of these developments extends beyond the capacity of intelligent systems to accelerate information processing or simplify academic tasks. This study investigated the relationship between AI-assisted efficiency and perceived cognitive development among 93 management students, focusing on whether intelligent technologies are used primarily to complete academic activities faster or to support deeper understanding, critical thinking, and independent problem-solving. The findings highlight an important distinction between the immediate practical benefits of AI and its more differentiated contribution to students' perceptions of intellectual autonomy.

The results indicate that generative AI has become a frequently used academic resource, with 78.0% of respondents reporting use several times per week or more frequently. Substantial proportions of students also identified benefits associated with academic productivity and conceptual clarification: 67.5% estimated time savings of at least 10%, while 74.0% considered AI very or extremely helpful for understanding difficult concepts. Nevertheless, these favourable perceptions were not accompanied by equally consistent assessments of cognitive development. Only 38.2% of respondents reported improvements in independent critical thinking, whereas 34.1% perceived some

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

reduction in their capacity for independent reasoning. This contrast constitutes the central finding of the investigation and provides a descriptive basis for the proposed AI learning paradox: **the ability to complete academic tasks more efficiently does not necessarily imply a corresponding improvement in independent intellectual competence**. Importantly, the findings reflect students' self-assessments and do not establish that AI use directly improves or diminishes cognitive abilities.

The study contributes to the discussion of AI-supported higher education through the proposed FAST–DEEP conceptual model, which distinguishes productivity-oriented technological engagement from learning-oriented practices. The FAST dimension encompasses accelerated task completion, automated academic assistance, and reduced time requirements, while the DEEP dimension emphasises critical evaluation, reflective reasoning, experiential problem-solving, and intellectual autonomy. The framework suggests that these dimensions should be understood as complementary educational possibilities rather than competing objectives. Academic efficiency can create opportunities for deeper learning when the time and cognitive resources released through technological assistance are redirected towards analytical reflection, independent verification, and practical knowledge application. Conversely, efficiency gains may offer limited educational value when students rely on automated solutions without engaging with the reasoning processes underlying them. The FAST–DEEP model is therefore proposed as a pedagogical framework for interpreting AI-assisted learning rather than as an empirically validated instrument for measuring cognitive development.

The findings also emphasise **the importance of experiential learning and human-centred educational practices within management programmes.** Students expressed considerable interest in applying AI to business analysis, marketing, market research, and practical decision-making activities, while identifying critical evaluation and real-world projects as priorities for future curriculum development. These preferences suggest that universities should integrate AI into educational activities that require students to investigate complex organisational problems, compare alternative recommendations, justify managerial decisions, and critically assess the reliability of generated information. AI-supported business simulations, case studies, and collaborative projects may be particularly valuable when accompanied by reflective assignments, oral defences, and assessment practices that make students' independent reasoning visible. Such approaches would allow intelligent technologies to support professional preparation without reducing academic achievement to the production of increasingly sophisticated automated outputs.

A further implication concerns the continuing importance of academic instructors. The respondents generally favoured educational models in which AI complements human teaching rather than replaces it. This preference reinforces the need for universities to preserve opportunities for mentoring, discussion, collaborative reasoning, and the development of ethical and professional judgement. As AI agents become increasingly capable of undertaking multistage academic and professional activities, management education will also need to prepare students to supervise intelligent systems, verify their recommendations, and retain responsibility for decisions made with technological assistance. Accordingly, AI literacy should encompass not only operational competence but also critical evaluation, responsible use, awareness of technological limitations, and the capacity to exercise independent judgement.

The interpretation of these findings is subject to several limitations. The investigation employed a cross-sectional questionnaire involving 93 management students and relied on self-reported perceptions rather than objective assessments of learning performance. Consequently, the results cannot establish causal relationships between AI use, academic efficiency, and cognitive independence, nor can they demonstrate whether students reporting greater time savings experienced corresponding changes in critical-thinking ability. The exploratory sample also limits the generalisability of the findings. Future research should therefore investigate the FAST–DEEP distinction through larger and more diverse samples, longitudinal observations, and experimental comparisons of different AI-assisted learning strategies. Particular attention should be devoted to independently assessed conceptual understanding, knowledge retention, critical-thinking performance, and managerial problem-solving under conditions of varying technological assistance.

Ultimately, the findings suggest that the principal challenge facing management education is not simply to determine how extensively artificial intelligence should be incorporated into university teaching, but to establish **how AI can be used without weakening the intellectual processes that education is intended to develop**. Intelligent technologies may substantially improve the efficiency of academic work, yet their educational contribution depends on the extent to which students remain actively engaged in questioning information, evaluating alternatives, and constructing independent judgements. The future of AI-supported management education should therefore be guided by a transition from using intelligent systems primarily to finish academic tasks faster towards employing them to learn more deeply, reason more critically, and make more responsible decisions. In this

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

perspective, technological efficiency represents an opportunity for educational improvement, but intellectual autonomy remains an essential measure of meaningful learning.

ACKNOWLEDGEMENTS

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) to support language editing, improve clarity and readability, and refine academic expression. All AI-assisted suggestions were critically reviewed, verified where appropriate, and revised by the authors. The authors retain full responsibility for the research methodology, data analysis, interpretation of findings, scholarly integrity, and final content of the publication.

7. REFERENCES

1. Aboderin, O. S. (2025). Exploring integration of 4IR technologies in Nigerian universities: Implications for pedagogy and skills development. *International Journal of Education, Leadership, Artificial Intelligence, Computing, Business, Life Sciences, and Society, 2*(2), 50–66. https://doi.org/10.65222/VIRAL.2025.9.9
2. Alam, M. N., Alharbi, T. F., Islam, M. A., Amin, M. B., Mustafa, Z., Ali, Z., ... Azad, M. A. K. (2026). Integrating artificial intelligence into higher education balances student learning benefits and cognitive overload. *Scientific Reports*. [Publication details require verification.]
3. An, S., Zhang, S., Guo, T., Lu, S., Zhang, W., & Cai, Z. (2025). Impacts of generative AI on student teachers' task performance and collaborative knowledge construction process in mind mapping-based collaborative environment. *Computers & Education, 227*, Article 105227. https://doi.org/10.1016/j.compedu.2024.105227
4. Anwar, M. R., Ali, B., & Arif, A. (2026). *The productivity myth and learning paradox of generative AI in higher education*. [Publication source and bibliographic details require verification.]
5. Arif, R. M., Nisa, R., & Allah, Z. S. (2025). The paradox of artificial intelligence usage in higher education: Between enhancing learning effectiveness and the decline of students' critical thinking skills. *Tadbir: Jurnal Manajemen Pendidikan Islam, 13*(2), 472–489.
6. Băltăreț, C., Paduraru, M. E., & Mihaila, A. R. (2026). Innovative pedagogical approaches in physical education: Enhancing student motivation and active learning. *International Journal of Education, Leadership, Artificial Intelligence, Computing, Business, Life Sciences, and Society, 6*, 1–11. https://doi.org/10.65222/VIRAL.2026.3.18.38
7. Bărbulescu, R., & Enăchescu, V. A. (2026). Micro-learning activities to support cognitive transfer in high-load learning conditions. *International Journal of Education, Leadership, Artificial Intelligence, Computing, Business, Life Sciences, and Society, 11*, 77–88. https://doi.org/10.65222/VIRAL.2026.8.49.69
8. Bărbulescu, R., Matei, M.-A., & Latea, C.-D. (2026). Teaching sustainability in economics through game-based learning: An interdisciplinary approach. *International Journal of Education, Leadership, Artificial Intelligence, Computing, Business, Life Sciences, and Society, 4*(4), 12–20. https://doi.org/10.65222/VIRAL.2026.1.2.22
9. Bergenholtz, C., Vuculescu, O., Günzel-Jensen, F., & Frederiksen, L. (2026). Leveling up or leveling down? The impact of generative AI on student performance in business schools. *Academy of Management Learning & Education*. [Accepted/in press; volume, issue, and page details require verification.]
10. Cheng, H. (2026). Factors influencing university students' intention to learn artificial intelligence: Insights from expectancy-value theory and protection motivation theory. *International Journal of Human–Computer Interaction, 42*(16). [Complete page range or article identifier requires verification.]
11. Enăchescu, V. A. (2025). Microlearning and lifelong learning: Effects on skill acquisition and "learning-to-learn" competencies in higher education. *International Journal of Education, Leadership, Artificial Intelligence, Computing, Business, Life Sciences, and Society, 2*(2), 1–12. https://doi.org/10.65222/VIRAL.2025.9.5
12. Enăchescu, V. A., Bărbulescu, R., & Băltăreț, C. (2026). Emotional artificial intelligence in educational and organizational systems: Opportunities, risks, and ethical challenges. *International Journal of Education, Leadership, Artificial Intelligence, Computing, Business, Life Sciences, and Society, 9*, 43–66. https://doi.org/10.65222/VIRAL.2026.6.37.57

DOI: https://doi.org/10.65222/VIRAL.2026.9.50.70

13. Ertan, S., & Esfer, S. (2026). Cognitive miser theory as a lens for rethinking cognitive effort during difficult and complex academic tasks in AI-supported self-regulated learning. *Open Praxis, 18*(3), 539–557.
14. Fashogbon, B. A., Adeleke, R. O., & Olowe, O. A. (2025). The application of artificial intelligence in economics: A review of current trends and future directions. *International Journal of Education, Leadership, Artificial Intelligence, Computing, Business, Life Sciences, and Society, 2*(2), 67–89. https://doi.org/10.65222/VIRAL.2025.9.10
15. Fuchs, K., & Aguilos, V. (2023). Integrating artificial intelligence in higher education: Empirical insights from students about using ChatGPT. *International Journal of Information and Education Technology, 13*(9), 1365–1371. https://doi.org/10.18178/ijiet.2023.13.9.1939
16. Guo, F., Zhang, L., Shi, T., & Coates, H. (2025). Whether and when could generative AI improve college student learning engagement? *Behavioral Sciences, 15*(8), Article 1011. https://doi.org/10.3390/bs15081011
17. Gupta, J., Misra, P., & Sharma, V. (2026). Generative AI and learner paradoxes: A paradox theory–based qualitative study in management education. *International Journal of Educational Management*, 1–23. [Volume and issue require verification.]
18. Jose, B., Cherian, J., Verghis, A. M., Varghise, S. M., S, M., & Joseph, S. (2025). The cognitive paradox of AI in education: Between enhancement and erosion. *Frontiers in Psychology, 16*, Article 1550621. https://doi.org/10.3389/fpsyg.2025.1550621
19. Khlaif, Z. N., Hamamra, B., & Hussein, E. T. (2025). *AI paradox in higher education: Understanding over-reliance, its impact, and sustainable integration*. [Publication source and bibliographic details require verification.]
20. Lodge, J. M., & Loble, L. (2026). *Artificial intelligence, cognitive offloading and implications for education*. [Publication source and bibliographic details require verification.]
21. Nguyen, T. D., Le, T. Q., Luong, G. T., Nguyen, D. T., & Nguyen, T. T. (2025). A review of applying game-based learning and learning motivation: Game-based learning and learning motivation. *International Journal of Education, Leadership, Artificial Intelligence, Computing, Business, Life Sciences, and Society, 3*(3), 67–74. https://doi.org/10.65222/VIRAL.2025.12.20
22. Pickard-Jones, B., Thomson, S., Baines, S., & Otermans, P. (2024). I'm a chatbot, ask me anything: Using ChatGPT to improve learning experiences. *Journal of Learning Development in Higher Education*, Special Issue 32. [Page range requires verification.]
23. Surviyana, S., & Nuryani, P. (2026, March). The paradox of artificial intelligence in learning: The existence of technology and the challenges of critical thinking for high school students. In *DAS Conference International Series* (Vol. 3, pp. 121–126).
24. Zhu, X., Zhang, A., & Zhang, J. (2026). The double-edged sword of AI efficiency: Self-efficacy erosion as a mediator linking instant gratification and perceived AI efficacy to AI dependency. *Behavioral Sciences, 16*(4), Article 530.