

Chapter 7

The Automation Trap: Unpacking the Consequences of Over-Reliance on AI in Education and Its Hidden Costs

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ABSTRACT

With the growing presence of artificial intelligence (AI) in classrooms, its influence on how students think, learn, and interact deserves close scrutiny. However, its increasing integration and accessibility raise concerns about AI dependency among students. Excessive reliance on AI may weaken essential cognitive skills, including critical thinking, problem-solving, and creativity, which are crucial for academic and professional success. Moreover, diminished human interaction with teachers and peers threatens the human aspect of education. This chapter critically examines the risks of AI over-reliance, emphasizing its long-term consequences on student development. Left unchecked, this dependency may lead to surface-level learning and hinder the cultivation of independent thought. The normalization of AI-generated outputs may also blur the line between authentic learning and algorithmic convenience. It highlights the shift from AI as a supportive tool to a potential source of dependency and advocates for a more balanced, human-centered integration of technology in education.

INTRODUCTION

AI is transforming education by improving adaptive learning, streamlining processes, and customizing instruction to meet individual needs (Haleem et al., 2022; Ocaña-Fernández et al., 2019). These advancements foster more dynamic and efficient learning experiences (Chen & Lin, 2024; Khosravi et al., 2022). Generative AI models like ChatGPT, Gemini, Claude, and Copilot further streamline research, content creation, and academic workflows (Acut et al., 2024). AI tools assist students with text summarization, grammar correction, translation, lesson planning, and exam question generation, making learning more accessible (Dempere et al., 2023; Grassini, 2023). Studies highlight that these technologies foster independent learning, boost engagement, enhance critical thinking and student motivation (Hmoud et

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al., 2024; Montenegro-Rueda et al., 2023). Additionally, teachers use AI tools like ChatGPT to create customized materials, streamline teaching, and improve assessments (Xiao et al., 2025).

While AI offers significant advantages, it also raises ethical, cognitive, and pedagogical concerns, particularly regarding over-reliance by both students and teachers (Seo et al., 2021). Zhang et al. (2024) describe AI dependency as excessive reliance on AI in academic, daily, and social contexts, encompassing both frequent use and psychological reliance. According to the cognitive-behavioral framework (Davis, 2001), low academic self-efficacy increases stress, leading students to turn to AI as a coping mechanism. Zhang et al. (2024) found that students with low self-efficacy rely more on AI for decision-making and task fulfillment, reinforcing dependency (Morales-Garcia et al., 2024). This suggests that AI reliance is not just about convenience but a psychological adaptation to academic pressures.

Over-reliance on AI not only weakens students' problem-solving and creativity skills (Çela et al., 2024) but also may disrupt their cognitive flexibility—their ability to adapt and generate new solutions in unfamiliar situations (Spiro et al., 1988). Students may engage in surface-level learning, accepting AI outputs without critical evaluation, which discourages deep research and source credibility assessment (Santiago Jr et al., 2023). Beyond cognitive decline, AI dependency raises ethical concerns like plagiarism and academic dishonesty (Nguyen et al., 2024) while also reducing human interaction, leading to social isolation and weakened interpersonal skills (Akgun & Greenhow, 2022; Ifelebuegu et al., 2023).

Given these risks, it is crucial to approach AI as a double-edged sword that requires responsible and ethical integration in educational settings. While AI has the potential to enhance learning experiences, its unregulated use may undermine fundamental cognitive and academic skills. Thus, this chapter critically examines the pitfalls associated with AI dependency, its ethical and cognitive consequences, and its long-term effects on student learning and engagement. Additionally, it proposes strategies to ensure a balanced AI integration that safeguards human-centered education while maximizing AI's potential.

MAIN FOCUS OF THE CHAPTER

The growing use of AI in education raises concerns about over-reliance and its impact on students' cognitive skills. Research indicates that excessive AI dependence may weaken critical thinking, creativity, and problem-solving abilities (Liu et al., 2023). Raising awareness of both AI's benefits and ethical risks is essential for promoting responsible use (Dwivedi et al., 2023). If not used ethically, AI tools risk turning students into automated thinkers rather than active learners. These concerns highlight critical research questions:

- How does automation affect students' cognitive and academic development as human interaction decreases?
- Can AI dependency lead to weaken fundamental thinking skills such as critical thinking, problem-solving and creativity?
- Does easy access to AI-generated information distract students from deep learning?

While AI offers undeniable benefits, its risks and ethical challenges must not be overlooked. Existing research has largely focused on AI's benefits, such as personalized learning and automation of tasks, yet there is a significant gap in understanding its unintended cognitive and ethical consequences—particularly the long-term risks of AI over-reliance in educational contexts. This chapter addresses these gaps by

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