The Negative Effects of Over-Reliance on AI Tools in IT Student Learning

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Abstract

This study explores the possible drawbacks of information technology (IT) students' over-reliance on artificial intelligence (AI) tools. While AI-powered tools like code generators and debugging tools greatly improve learning effectiveness, an over-reliance on them might hinder the growth of critical thinking, ethical responsibility, and fundamental programming skills. The study polled IT students using a descriptive quantitative methodology to investigate their perceptions and usage habits of AI products. The results show that whereas AI tools facilitate quicker task completion, they may potentially reduce cognitive involvement. This study encourages us to develop enduring abilities and maintain academic integrity in the revolutionary field of IT education by serving as a reminder of the significance of a balanced approach to AI use.

Keywords: Artificial Intelligence, IT Education, Programming Skills

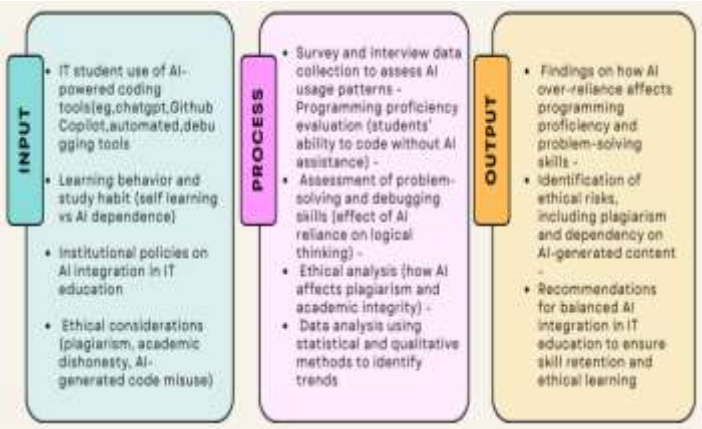
Introduction

The goal of the study "The Negative Effects of Over-Reliance on AI Tools in IT Student Learning" is to investigate the effects that an excessive reliance on AI tools has on IT students' learning. Learning has been revolutionized by the growing use of AI-based coding aids due to their increased simplicity and efficiency. However, there have been worries raised about their potential long-term effects on programming skills, problem-solving abilities, and career readiness. These ramifications are essential to making sure that the use of AI in IT training promotes rather than inhibits skill development. Researchers reveal both the benefits and dangers of employing AI in learning. Code editors and auto-completion tools boost productivity and decrease cognitive load. Jonassen supports their use in critical thinking; however, Sweller cautions that over-reliance on such tools may overtax memory and hinder learning. Pea and Zhai et al. contend that overdependence results in surface learning and stifles intellectual growth, as students shun critical thinking. Kerimbayev et al. also associate excessive AI use with lower participation and critical thinking.In programming education, research by Takerngsaksiri et al. , Kazemitabaar et al. , and Nguyen et al. concludes that AI-assistive tools like GitHub Copilot limit students' attention to code logic, ultimately impairing their debugging capabilities and problem-solving skills.Long-term implications are not adequately researched. Gibbs calls for further analysis, whereas Rowsell warns that AI

superiority may undervalue scholarly involvement and widen skill gaps. There are also ethical issues. Pea and Schreurs & Vloeberghs cite plagiarism, authorship, and issues of academic integrity that are attributed to content created by AI.Other authors—Bianchi , Ahmed , and Bantugan & Khup —emphasize that AI, while beneficial, may undermine intellectual autonomy. Duenas & Ruiz Nguyen , and da Silva advocate for an ethical, balanced application of AI in education. Aymen & Zakarya , Al-Jahwari & Yousif , point out that uncritical usage has the potential to corrupt analytical thinking. Redefined pedagogy is of primary importance, held as AI supports, not replaces, cognition. Language and general education studies also echo the same concerns. Stress, ethical underpinnings, and the need for metacognitive involvement. At the same time, Khan and Clarke & Konak advocate digital literacy as a basic necessity for dependence on artificial intelligence. Finally, researchers like Khlaif and Hamamra , Asad and Shah , Ifedayo and Ajayi , and George et al. emphasize the need for discipline, ethical consciousness, and basic skill acquisition to mitigate the risks of excessive dependence on AI in learning.This study aims to determine the degree of reliance that IT students have on AI technologies and the effects that this dependence has on their academic performance. The effects of AI on programming ability, problem-solving skills, and ethical considerations will be thoroughly examined. This study intends to help policymakers and educators create well-rounded plans for integrating AI in IT education by reviewing and synthesizing existing research and offering practical recommendations. In the end, the results will help guarantee that students gain the autonomous problem-solving skills required to thrive in the changing IT environment, in addition to the fundamental technical skills.

Conceptual Framework

Current literature recognizes the advantages and disadvantages of AI-supported education.Though such tools enhance learning efficiency, minimize errors, and offer immediate solutions, they can also reduce mental effort and encourage a dependency that inhibits skill acquisition. Conventional methods of learning enhance active problem-solving and good reasoning; however, the extensive use of AI tools has the potential to erode students' skills in debugging, perfecting, and writing code on Their own. Hence, there is a need to determine the impact of dependency on AI on student performance. This research is underpinned by Cognitive Load Theory (Sweller, 1988) and Constructivist Learning Theory (Vygotsky, 1978). By Cognitive Load Theory, overreliance on AI tools diminishes cognitive effort, and so learning is shallow, and there is poor retention of programming ideas.



The study will focus on the following key areas:

The extent to which AI reliance affects programming proficiency

The impact of AI dependence on students' ability to solve problems and debug code

The correlation between AI usage and academic integrity concerns

The role of educators and institutions in regulating AI integration in education

Ultimately, this research aims to provide a deeper understanding of the implications of AI dependence on IT student learning. By identifying the challenges and risks associated with AI over-reliance, this study will contribute to the development of strategies for responsible AI integration in IT education. The findings will help institutions formulate guidelines and policies that promote effective AI usage while ensuring that students retain essential programming skills and ethical academic practice

Methodology

Design

This study adopted a descriptive quantitative research design, which is suited to identifying and analyzing trends, behaviors, and perceptions through numerical data. This approach is ideal when the goal is to present the current state of a phenomenon without manipulating any variables.

Respondents and Sampling

The participants were selected through purposive sampling, ensuring that all respondents met pre-defined criteria relevant to the research problem. A total of [insert number] respondents participated, representing [insert relevant demographic or sector details]. This method was used to enhance the relevance and accuracy of the data collected.

Instrumentation

A structured questionnaire was developed and validated by field experts to ensure reliability and clarity. The instrument contained two sections: (1) demographic profile and (2) items measuring the key variables of the study using a five-point Likert scale ranging from “Strongly Disagree” to “Strongly Agree.”

Data Collection Procedure The data collection process began after securing permission from the concerned authorities and obtaining informed consent from the respondents. The questionnaire was administered physically and/or online depending on the accessibility and

preference of participants. Follow-up communications ensured the completeness and accuracy of responses.

Statistical Treatment

The collected data were tabulated and analyzed using the following statistical tools:

Mean – to determine the average perception or frequency.

Median – to find the central tendency of the responses.

Mode – to identify the most common response.

Standard Deviation – to measure the dispersion and variability in the dataset.

Interpretation of values was based on standard Likert-scale interpretation ranges. Data were presented in tables with corresponding narrative analyses.

Ethical Considerations

Ethical standards were strictly followed throughout the research process. All participants were informed about the purpose of the study, their rights as participants, and the confidentiality of their responses. Participation was voluntary, and all data were stored securely.

Results and Discussion

Demographic Profile of the Respondents

The respondents of this study comprised 12 participants, primarily female (12 out of 10), predominantly aged between 20–25 years old. Most respondents are Second-Year and Third-Year College IT students, forming a highly relevant population for this research, which explores AI-assisted learning in programming education

Age Group	Gender	Year Level	Frequency
20–25	Female	2nd Year College	12
20–25	Female	3rd Year College	10
18–19	Male	1st Year College	5
20–25	Male	2nd Year College	10

Table 1: Demographic Profile of Respondents Gender Distribution:

The demographic data reveals that female respondents outnumber males, with 22 females and 15 males, indicating that female IT students are more actively engaging with AI tools for programming tasks. The majority of respondents are second-year college students (22), followed by third-year (10) and first-year students (5), with no other groups recorded. The prominence of second-year students reflects a critical learning phase where foundational knowledge merges with applied problem-solving. Their participation provides valuable insights into the impact of AI on programming education. Regarding age, most respondents fall within the 20–25 year range, suggesting a mature and experienced group well-prepared to engage with emerging technologies.

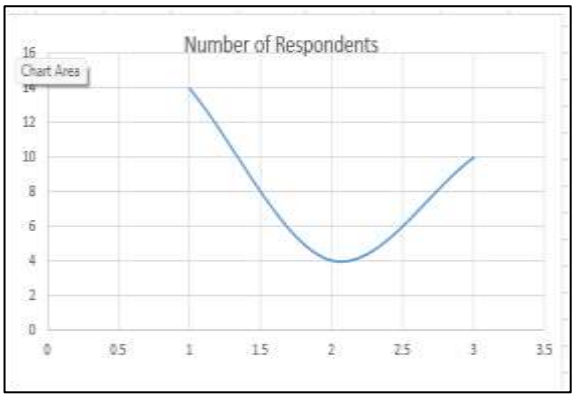


Figure 1 Frequency of AI Tool Usage

14 out of 28 participants, or half of the respondents, said they "always" use AI tools in their programming job, indicating a significant reliance on these technologies. Furthermore, eight respondents said they use AI tools "sometimes," and four said they use them "often." This distribution shows a clear trend toward the growing incorporation of AI tools into students' everyday learning routines. According to the research, AI is especially appreciated for offering quick fixes and ongoing assistance with coding tasks, hence confirming its significance as a crucial element of their educational journey.

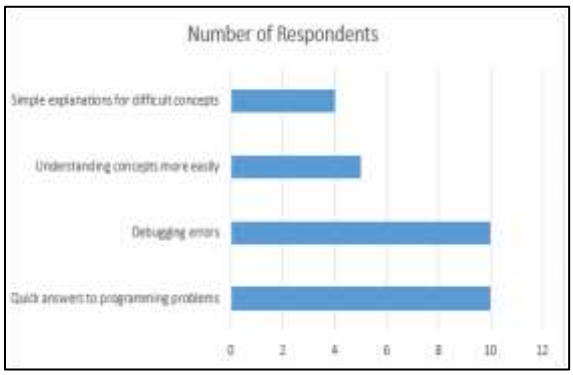


Figure 2 Purpose of Using AI Tools

Figure 2 reveals that the predominant reason respondents depend on AI tools is to swiftly solve problems and correct coding errors, indicating that AI has become an essential assistant for practical programming tasks. While students also appreciate how AI aids in comprehending complex concepts and simplifies challenging topics, the data clearly shows that their primary reliance on AI is for fast, immediate assistance with coding challenges. This underscores AI's significant role as both a supportive learning resource and a dependable problem-solving partner throughout their programming journey.

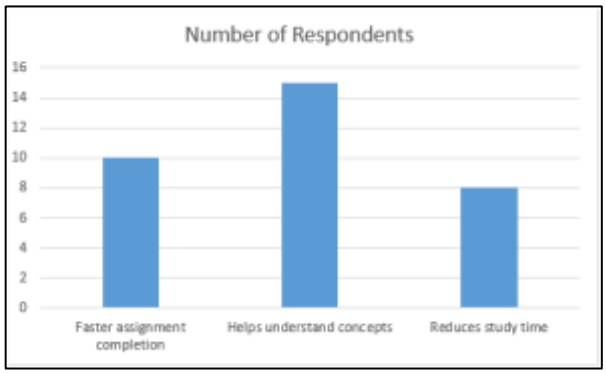


Figure 3 Perceived Benefits of AI Tools

Figure 3 illustrates that the primary advantage of using AI tools, according to the majority of respondents, is their ability to enhance understanding of core concepts, highlighted by 15 participants. Additionally, 10 respondents identified the speed at which assignments can be completed as another significant benefit, demonstrating how AI tools effectively boost efficiency. Furthermore, 8 participants noted that AI assists in reducing their overall study time, reinforcing the notion that AI serves as a valuable and time-saving ally in their educational journey.

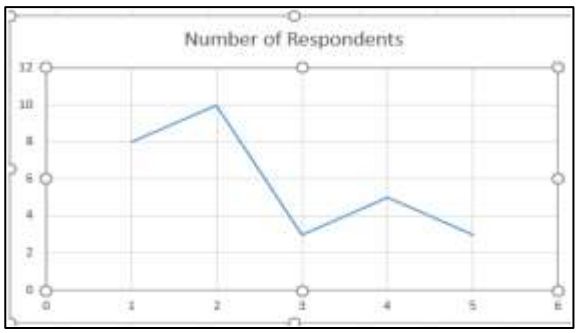


Figure 4 Confidence in Debugging

Figure 4 illustrates an increasing trend toward favorable use of AI among IT students and a growing level of comfort with such tools. Specifically, 10 respondents mentioned being confident that they can make use of AI tools, while 8 respondents stated that they are moderately confident. Nevertheless, note that despite the overall pattern of increasing comfort with AI tools, there still is a minimal group of respondents—3 persons—who express a lack of confidence, as well as another 3 respondents who refused to answer. This difference implies that although a large majority of students are adopting AI, a minority still encounter problems, especially where independent problem-solving and critical-thinking ability are involved. Overall, the information indicates strong acceptance of AI in their educational process.

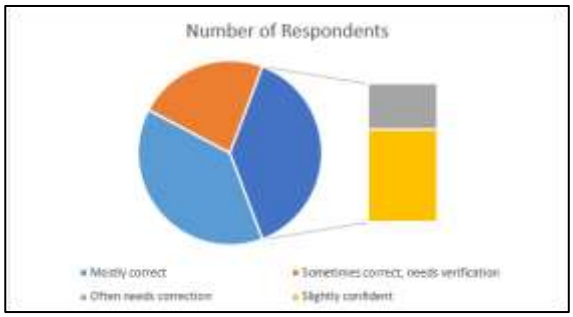


Figure 5 Accuracy of AI Tool Outputs

Figure 5 depicts students' opinions regarding the correctness of AI tools in their academic work. 15 out of the total respondents think that AI outputs are mostly correct, demonstrating high confidence in the tools. However, 9 respondents indicated that although they make use of AI, its answers are sometimes subject to rechecking, which is a healthy skepticism. On the other hand, 5 of them believe that AI often requires correction, which indicates that, while they employ AI, they do not find it completely reliable.

In addition, 10 of the respondents said that they are only slightly sure that they can judge the accuracy of AI output. This is an important finding: although AI is widely seen as a positive, students are aware of its limitations and recognize the need to double-check its output to guarantee the accuracy of their work. This guarded optimism indicates that, although students appreciate AI for time-saving, they also realize the need to double-check its output to guarantee the accuracy of their work.

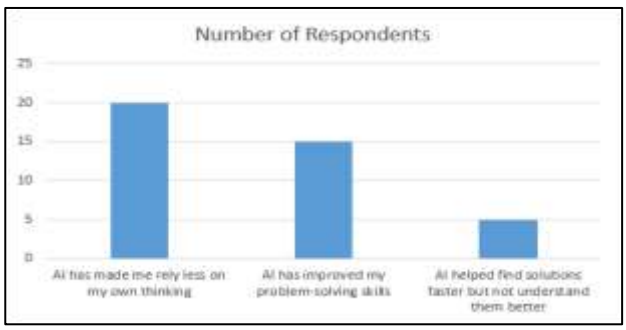


Figure 6 Impact on Thinking Skills

Figure 6 presents the responses and provides a major split view on how AI is affecting mental activity and skill acquisition. The largest single category of responses, consisting of 20 answers, is that AI has made them rely less on their thinking skills.

This implies that although AI technologies can be very efficient, they have the potential to decrease the necessity for independent thinking, and therefore, the potential for reliance on these technologies. On the other hand, 15 participants mentioned that AI has enhanced their problem-solving abilities, citing it as an essential tool for developing logical thinking and strategy formulation. In contrast, 5 participants stated that although AI assists them in locating solutions faster, it does not necessarily make them more knowledgeable. This

suggests that while AI may speed up task accomplishment, it may not necessarily help in deeper learning or understanding of the concepts involved.

Discussion:

This study emphasizes the tremendous influence of AI tools on the learning process of IT students. The majority of the respondents indicated that AI assists them in comprehending programming concepts better and finishing tasks faster, particularly with challenging problems. Immediate feedback and clear explanations are now critical in solving complex coding problems.

But some students were concerned about the use of AI, pointing out a lack of confidence in debugging without it. Although most appreciate AI, they also feel compelled to check its outputs, being aware of its limitations. Additionally, the respondents admitted that overdependence on AI could lower their critical thinking and participation. To offset this, students proposed establishing solid coding foundations, applying AI as a learning tool instead of a bypass, and examining AI-produced work.

In general, the study is directed towards the twin effect of AI: it brings about efficiency but can impede deeper learning when not employed reflectively

Conclusion:

This research brings to light that although AI devices can improve the efficiency of learning, overusing them will reduce the IT students' coding skills, logical reasoning, and sense of accountability in academics. It supports the notion that AI must be perceived as an augmentative tool rather than a learner or problem solver. The knowledge presented is precious, but findings are limited due to the smaller number and mix of participants. Future studies need to investigate the implications of long-term AI use on learning in different learning environments. Eventually, the responsible application of AI is needed to develop skilled and independent professionals among students.

References

A. F. A. da Silva, "Critical thinking and artificial intelligence in education," *ProQuest Dissertations*, 2024.https://www.proquest.com/openview/a09d11b42366d97314af81541b98400c

A. E. Ifedayo and B. Ajayi, "Ethical and cognitive impacts of AI in learning environments," *Sanskriti Journal of Humanities*, vol. 3, no. 1, 2025. https://sanskritijournal.com/index.php/ssj/article/view/14

A. S. George, T. Baskar, and P. B. Srikaanth, "The erosion of cognitive skills in the technological age," *Partners Universal Journal of Research*, vol. 4, no. 1, 2024.http://researchgate.net/publication/381452876_The_Erosion_of_Cognitive_Skills_in_the_Technological_Age_How_Reliance_on_Technology_Impacts_Critical_Thinking_Problem-Solving_and_Creativity

C. Clarke and A. Konak, "AI in programming courses and critical thinking skills," *Journal of Cybersecurity Education and Research*, vol. 1, 2025.https://digitalcommons.kennesaw.edu/jcerp/vol2025/iss1/5/

C. Zhai, S. Wibowo, and L. D. Li, "The effects of over-reliance on AI dialogue systems on students' cognitive abilities: A systematic review," *Smart Learning Environments*, vol. 11, no. 28, 2024. [Online]. Available: https://doi.org/10.1186/s40561-024-00316-7

D. Aymen and B. Zakarya, "The influence of AI on students' critical thinking," *Centre Univ Mila*, 2024. https://dspace.centre-univ-mila.dz/jspui/handle/123456789/3409

D. H. Jonassen, *Computers as Mindtools for Schools: Engaging Critical Thinking*, 2nd ed., Columbus, OH: Merrill/Prentice Hall, 2000. https://www.researchgate.net/publication/245753708_Computers_as_Mindtools_for_engaging_learners_in_critical_thinking

Gibbs, Graham, and Harriet Dunbar-Goddet. "The effects of programme assessment environments on student learning." *The Higher Education Academy* (2007). https://www.uio.no/om/organisasjon/utvalg/utdanningskomiteen/moter/2007/011107/Osak1/HEA%20Assessment%20report%20FINAL%20%283%29.pdf

J. Rowsell, "Students fear over-reliance on AI 'devalues' higher education," *Times Higher Education*, Apr. 2024https://www.insidehighered.com/news/tech-innovation/artificial-intelligence/2024/08/09/college-students-fear-overreliance-ai-could

J. Sweller, "Cognitive load during problem solving: Effects on learning," *Cognitive Science*, vol. 12, no. 2, pp.257–285, https://www.sciencedirect.com/science/article/abs/pii/0364021388900237

I. Bianchi, "Integrating AI in education: Strategies for enhancing critical thinking through technology," *ResearchGate*, 2024. [Online]. Available: https://www.researchgate.net/profile/Isabella-Bianchi-5/publication/384632240_Integrating_AI_in_Education_Strategies_for_Enhancing_Critical_Thinking_Through_Technology/links/67001df39e6e82486f012586/Integrating-AI-in-Education-Strategies-for-Enhancing-Critical-Thinking-Through-Technology.pdf

M. Al-Jahwari and M. J. Yousif, "The impact of AI tools on education: ChatGPT in focus," *Artificial Intelligence and Robotics for Digital Learning*, 2024. https://testojs.acaa-p.com/index.php/AIRDJ/article/view/30

M. Kazemitabaar et al., "Studying the effect of AI code generators on supporting novice learners in introductory programming," *arXiv preprint arXiv:2302.07427*, 2023. https://dl.acm.org/doi/abs/10.1145/3544548.3580919

M. M. Asad and S. S. Shah, "Impact of critical thinking approach on dependence in AI-enhanced learning," *Emerald Insight*, 2024. https://www.emerald.com/insight/content/doi/10.1108/978-1-83549-486-820241010/full/html?skipTracking=true

N. Kerimbayev, T. Adamova, R. Shadiev, and F. Altinay, "Smart learning environments and critical thinking development," *International Journal of Emerging Technologies in Learning*, vol. 20, no. 2, pp. 145–153, 2025. https://link.springer.com/article/10.1186/s40561-024-00360-3

R. D. Pea, "Beyond amplification: Using the computer to reorganize mental functioning," *Educational Psychologist*, vol. 20, no. 4, pp. 167–182, 1985.

S. M. Ahmed, "Critical analysis of the impact of AI in higher education and its consequences on students," *ResearchGate*, 2024. [Online]. Available: https://www.researchgate.net/publication/389897530_Critical_Analysis_of_the_Impact_of_AI_in_Higher_Education_and_Its_Consequences_on_Students

W. M. Khan, "Analyzing AI tools' impact on critical thinking," *JALT*, vol. 7, no. 1, 2024. https://jalt.com.pk/index.php/jalt/article/view/218

W. Takerngsaksiri et al., "Students' perspective on AI code completion: Benefits and challenges," *arXiv preprint arXiv:2311.00177*, 2023. https://ieeexplore.ieee.org/abstract/document/10633447

Z. N. Khlaif and B. Hamamra, "AI paradox in higher education: Over-reliance and its impact," *ResearchSquare*, 2025. https://www.researchsquare.com/article/rs-6127885/v1