RESEARCH PAPER

The Psychological Impact of AI Tools in Education for Students

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Abstract

The integration of Artificial Intelligence (AI) in education is reshaping academic learning, presenting both significant opportunities and notable challenges for student development. This study examines the impact of AI technologies on students' learning processes and academic performance, focusing on their perceptions and the challenges linked to AI use. The research targeted engineering and degree students with first-hand experience in AI-enhanced learning environments. A purposive sample of 85 participants was selected to ensure relevant insights. Data collection was conducted through a structured questionnaire containing 11 items: seven closed-ended questions measuring perceptions, usage, and the perceived effectiveness of AI tools, and four open-ended questions exploring personal experiences, expectations, and concerns. Quantitative data were analyzed using frequencies and percentages, while qualitative responses were examined through thematic analysis using both vertical (individual response) and horizontal (cross-response) strategies to identify key themes. Results indicate that AI contributes positively by supporting personalized learning, improving academic performance, and increasing student engagement. However, concerns were raised regarding over-dependence on AI, reduced critical thinking, data privacy issues, and academic dishonesty. The findings emphasize the need for a structured framework and ethical standards to guide AI integration. A balanced and responsible approach is crucial to ensure effective, inclusive, and ethically sound use of AI in higher education learning environments.

Keywords: Artificial Intelligence (AI), opportunities, critical thinking, Learning

How to cite this article: Josephine GMR, Bhagyasri DM, Vyshnavi G, Pranathi Sree KSS. The Psychological Impact of AI Tools in Education for Students. Int J Drug Deliv Technol. 2026;16(56s): 678-684. DOI: 10.25258/ijddt.16.56s.71
Source of support: Nil.
Conflict of interest: None.

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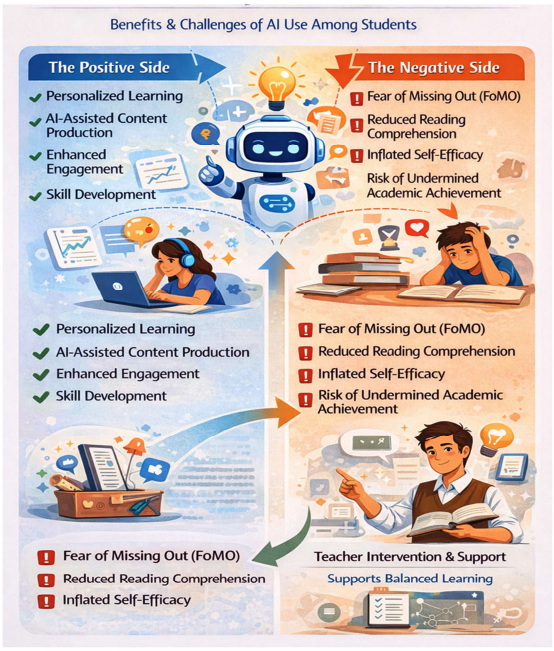
Introduction: The rapid advancement of Artificial Intelligence (AI) is transforming numerous sectors, with education being no exception. AI plays a vital role in both general and higher education, shaping students' academic development by presenting a combination of opportunities and challenges (Edtech, 2020). From personalized learning environments to intelligent tutoring systems that offer tailored guidance, support, and feedback based on individual learning patterns and knowledge levels (Hwang et al., 2020), AI holds the potential to revolutionize education (Holmes et al., 2019) and meet the diverse needs of learners. However, the mere adoption of advanced AI technologies does not guarantee positive educational outcomes (Castaneda & Selwyn, 2018; Du Boulay, 2000; Selwyn, 2016). Integrating AI into academic environments brings forward important questions concerning equity, accessibility, and the shifting role of traditional teaching methods.The impact of AI on education is both transformative and multifaceted. AI facilitates personalized learning by adjusting educational content to suit the specific needs of each student (Hennekeuser et al., 2024). Research indicates that students in such environments demonstrate increased self-efficacy and a more favorable attitude toward their studies (Johnson & Smith, 2019). These benefits are increasingly realized through AI-driven tools that process large datasets to identify learning gaps and provide targeted interventions (J. A. Baker, 2021). For instance, AI-powered platforms like adaptive learning systems have been proven to boost student engagement and academic performance by offering real-time feedback and customized learning pathways (Luckin et al., 2016; Zawacki-Richter et al., 2019).

Traditionally, students are encouraged to take active roles in their education by cultivating skills

in exploration, analysis, and problem solving. Critical thinking remains a cornerstone of the learning experience. Educators frequently use questioning strategies, collaborative activities, and assignments to foster students' abilities to assess information and form independent viewpoints (Facione, 2020). However, the swift data analysis and insightful responses provided by AI challenge these traditional methods, prompting debate over the boundaries between human learning and machine learning. While AI is adept at processing and analyzing data efficiently, it often lacks the depth, creativity, and contextual understanding found in human cognition (Luckin et al., 2016). This highlights the importance of adopting a balanced approach to AI integration—one that supports rather than substitutes human interaction and the cultivation of critical thinking skills (Wu, 2023).



Nonetheless, the incorporation of AI in education brings notable challenges. Successfully integrating AI requires a comprehensive understanding of both the technology and the learning process. These complexities are further intensified by ethical issues, particularly with the increasing prevalence of generative AI. For example, (Qadir, 2023) points to the risk of students misusing AI tools in dishonest or unauthorized ways, such as completing assignments with AI-generated content without appropriate attribution. Moreover, the use of AI in monitoring, control, and evaluation can jeopardize trust and reduce student autonomy in learning environments (Williamson, 2017). Higher education institutions must establish clear guidelines regarding the scope and function of AI in academic contexts to address these issues effectively (Holmes &Tuomi, 2022).

With the evolution of data processing and computing technologies, the application of AI in education—commonly known as Artificial Intelligence in Education (AIED)—has expanded rapidly. Tools such as intelligent tutoring systems, educational robots, learning analytics dashboards, adaptive learning platforms, and human–computer interactions have shown great promise in enhancing educational outcomes (Chen et al., 2020; Zawacki-Richter et al., 2019). For instance, intelligent tutoring systems can provide personalized feedback and assistance, thereby improving student engagement and learning success (Luckin et al., 2016). Likewise, adaptive learning platforms utilize AI to customize content based on learners' individual needs, leading to more effective and efficient learning (Holmes et al., 2019).

Despite these technological advancements, integrating AI into education raises essential questions about compatibility with established educational theories. While prior studies have addressed the challenges (Hwang et al., 2020), obstacles (T. Baker et al., 2019), and potential future directions (Pinkwart, 2016), few have thoroughly examined the various functions of AI and their alignment with pedagogical principles. For instance, how well do AI tools support constructivist or socio-cultural theories that emphasize collaboration, context, and critical thinking? (Luckin et al., 2016). Additionally, the long-term implications of AI on teaching practices, student learning, and educational equity have not yet been fully explored (Selwyn, 2022). A key concern is ensuring that AI complements rather than replaces human engagement. Although AI excels in automating tasks and generating data-driven insights, it lacks the empathy, imagination, and interpretive depth of human educators (Holmes &Tuomi, 2022). An overdependence on AI for feedback and assessment might diminish opportunities for meaningful discussion and reflective thinking, both of which are vital for fostering higher-order cognitive skills (Facione, 2020). Furthermore, ethical considerations—including issues of data privacy, algorithmic bias, and unequal access—must be addressed to promote fair and inclusive learning environments (O'Neil, 2016).

AI has remarkable potential to reshape education through personalized and adaptive learning solutions. However, its integration demands careful attention. A nuanced understanding of how AI intersects with educational theories, along with

strategies to address ethical and instructional challenges, is crucial. Adopting a balanced, human-centered approach that prioritizes equitable access will help ensure AI enhances rather than hinders educational progress.This study investigates the impact of artificial intelligence (AI) technologies on the learning processes and academic performance of students Degree and Engineering students. Specifically, the research seeks to identify the types of AI technologies being used, how frequently they are utilized, and students' perceptions of their effectiveness in improving academic outcomes. Additionally, it explores the concerns and challenges associated with incorporating AI in educational settings.

Sample and Data Collection: The sample consisted of 85 second-year students, purposefully selected from the degree and Engineering programs, which emphasize AI integration. A purposive, non-probabilistic sampling method was used to ensure the inclusion of participants with direct experience in AI-integrated learning environments, thereby enhancing the relevance and validity of the findings. Second-year students were selected due to their foundational academic knowledge and early exposure to advanced technologies such as AI. This approach allowed for a focused investigation of individuals with practical experience using the technologies central to the study. However, given the relatively small sample size and its concentration on specific academic programs, the findings are considered preliminary and exploratory. They should not be generalized to all students in these programs or to those in unrelated disciplines. Future studies with larger and more diverse populations are recommended to strengthen the generalizability of the results.

Data were collected through a self-administered questionnaire distributed via Google Forms. This platform was selected for its accessibility and built-in analytical features, facilitating streamlined data management. The study used a mixed-methods design, combining both quantitative and qualitative approaches. The questionnaire included 11 items: 7 closed-ended questions [Items 1, 2, 3, 4, 5, 6, 7] and 4 open-ended questions, designed to capture students' perceptions, usage, experiences, and expectations regarding AI in education.

Analysis: Quantitative data were analyzed using descriptive statistical methods, specifically frequency and percentage calculations, to present a clear summary of students' perceptions, usage patterns, and the perceived effectiveness of AI tools. Qualitative data, derived from responses to the open-ended questions, were examined using thematic analysis, following the widely recognized framework proposed by Braun and Clarke (2006). This ensured a systematic, transparent, and rigorous approach to identifying, analyzing, and reporting recurring patterns (themes) within the dataset.

The analysis was conducted at two levels: vertical analysis, which examined individual responses to uncover unique insights; and horizontal analysis, which explored patterns across the full dataset to provide a holistic understanding of emerging themes. To ensure validity and reliability, the process adhered to a structured, iterative approach based on Ezzy (2002), involving several key steps: transcription of participants' responses; creation of a coding scheme; development of an analysis grid; analysis of transcripts and thematic interpretation; and calculation of statistical indicators.

To enhance the robustness of the results, data triangulation was applied. Responses from students in the Degree and Engineeringprograms were compared to detect program-specific trends and validate the consistency of identified themes. This mixed-methods strategy, combining both qualitative and quantitative data, enabled a detailed and trustworthy understanding of students' perceptions of AI in education.

Data Interpretation

The data interpretation addressed each research question using both quantitative and qualitative methods. Quantitatively, frequencies were calculated within specific thematic categories, while qualitatively, responses were analyzed using statistical and thematic techniques.According to the statistical data, [95.6%] of respondents reported using artificial intelligence technologies in academic activities. This high percentage reflects widespread adoption and the growing integration of AI into educational practices. Regarding the types of AI used, [88.2%] of students reported using virtual assistants (e.g., ChatGPT, Siri, Google Assistant), followed by [42.4%] who use AI-based educational platforms (e.g., Coursera, Duolingo), [17.6%] who use automatic content generation tools, [8.2%] who use data processing tools (e.g., predictive analysis), and [3.5%] who use other AI types. Frequency and percentage analyses revealed a strong preference for virtual assistants due to their accessibility and ease of use.

In terms of usage frequency, [57.6%] of students reported using AI weekly, [18.8%] daily, [11.8%] monthly, [11.8%] rarely, and only [1.2%] reported not using AI tools. These results suggest that AI has become an integral part of academic routines.When asked about AI's impact on learning, [80%] of students agreed it enhances their educational experience, while [17.6%] were uncertain, and [2.4%] saw no benefit. Regarding

academic performance, [82.4%] believed AI improved outcomes, [15.3%] noticed no significant change, [3.5%] felt it limited learning, and [2.4%] believed it had a negative impact.

On learning efficiency, [83.5%] of students believed AI improved efficiency, [10.6%] disagreed, and [7.1%] were unsure. The majority valued quick access to information and organizational support, though some remained skeptical or unfamiliar with AI's full capabilities.Students also expressed concerns, notably about receiving incorrect or imprecise answers ([48.2%]), negative effects on critical thinking ([16.5%]), over-dependence on AI ([16.5%]), data privacy risks ([9.4%]), authorship concerns ([3.5%]), and "other" issues ([5.9%]).For the item "What suggestions do you have for improving the use of AI in education to more effectively support the learning process?", thematic analysis was used to identify four main themes:

Proper Integration of AI in Educational Activities ([27 responses]): Students called for AI tools to be embedded strategically into teaching, emphasizing personalized learning, instant feedback, and gap-detection algorithms.

Table 1. Suggestions for improving the use of AI in education.

1. Proper Integration of AI in Educational Activities
2. Limited and Controlled Use of AI
3. Improved Accuracy of Information
4. Others

Limited and Controlled Use of AI ([14 responses]): Many advocated for balanced use, cautioning against over-reliance and encouraging the development of clear guidelines.To strengthen the validity and reliability of our findings, data triangulation was employed by comparing responses from students enrolled in different academic programs, specifically degree and Engineering. This approach enabled the identification of program-specific trends and allowed for the cross-verification of recurring themes across varied student populations. The triangulation process enhanced the robustness of the results by confirming the consistency of key insights, regardless of academic background. The findings indicate that although students recognize the significant potential of AI to improve the educational process, they also express concerns and provide constructive suggestions for its better integration. Overall, there is strong support among students for a thoughtful, well-regulated, and responsible use of AI in education. Many emphasize the importance of ensuring AI tools enhance, rather than replace, traditional learning practices. The thematic analysis underscores the need for AI to complement existing pedagogical approaches and uphold educational integrity.

Table 2. Ways in which the use of artificial intelligence enhances the learning process.

1. Timesaving
2. Optimization of Information Comprehension
3. Information Structuring
4. Others

Improved Accuracy of Information ([14 responses]): Students stressed the need for validated, reliable AI outputs to avoid misinformation."What are the main ways in which the use of artificial intelligence enhances your learning process? (e.g., helps with understanding materials, saves time, provides additional resources, etc.)", three key thematic categories were identified (Table 2): (1) **Timesaving** (42 responses): Students reported that AI reduces time spent on research, data processing, and repetitive tasks, allowing more focus on comprehension and critical thinking. (2) **Optimization of Information Comprehension** (24 responses): AI tools, like intelligent tutors, simplify complex topics and present them in accessible formats, improving engagement and retention. (3) **Information Structuring** (16 responses): Students appreciated AI's ability to organize content, create outlines, and support research structuring, helping them manage information more effectively. This analysis demonstrates a generally positive perception of AI's role in education, coupled with a critical awareness of its limitations and areas for improvement.

Table 3. Main challenges or limitations encountered when using IA.

1. Accuracy of Information
2. Over-dependence on Technology
3. Various Errors
4. Other Challenges

For the item "What are the main challenges or limitations you encounter when using artificial intelligence for your studies? (e.g., incorrect information, excessive dependence on technology, lack of personalization, etc.)", four thematic categories were identified (Table 3):

(1) **Accuracy of Information** ([60 responses]): The most frequently cited issue was the reliability of AI-generated content. Students expressed concerns about receiving incorrect or outdated information, which could mislead learning and affect academic outcomes.

(2) **Over-dependence on Technology** ([7 responses]): Some students noted that relying too heavily on AI might reduce their capacity for

critical thinking and hinder the development of independent learning strategies.
(3) **Various Errors** ([6 responses]): This theme includes system glitches, misinterpretations, or formatting issues that occasionally interrupt the learning process.
(4) **Others** ([6 responses]): This category comprises additional, less common challenges that did not fit the main themes, highlighting a range of user-specific limitations.

This category included calls for user-friendly interfaces, transparency in AI decision-making, and affordable access to AI tools. To strengthen the robustness and validity of these findings, descriptive statistical methods were employed to calculate the frequency of responses within each thematic category, adding a quantitative layer to complement the qualitative analysis. This methodological approach allowed for a more comprehensive understanding of AI's impact on the learning process. The results reveal that AI is integrated into various aspects of education, enhancing both efficiency and depth of learning. Student responses emphasize that AI significantly contributes to saving time, improving comprehension, and organizing information—factors that together support a more personalized and effective learning experience.

Table 4. Impact of using AI on learning and collaboration with classmates or professors.

1. Positive Impact
2. Negative Impact
3. Neutral Impact

To complement the qualitative analysis, descriptive statistical methods were applied to calculate the frequency of responses within each thematic category, thereby providing a quantitative foundation for the identified themes. This triangulation of data (i.e., combining qualitative thematic analysis with quantitative frequency counts) enhances the validity of the findings by offering a well-rounded perspective on students' concerns about AI use in education. These results highlight the necessity for continuous attention to the challenges posed by AI integration. The concerns raised in student responses underscore the importance of ensuring accuracy, reliability, and ethical implementation of AI tools to avoid risks such as over-reliance and technical errors, while promoting their effective use to support traditional learning.

For the item "How would you describe the impact of using artificial intelligence on the way you learn and collaborate with classmates or professors?", three thematic categories were identified (Table 4):
(1) **Positive Impact** ([51 responses]): Many students reported that AI positively influenced their learning and collaboration. They cited improved access to resources, tailored educational content, and enhanced communication through tools such as intelligent tutoring systems, discussion platforms, and automated feedback. These tools were credited with increasing efficiency, engagement, and streamlining academic interactions.
(2) **Negative Impact** ([15 responses]): Some students experienced drawbacks, including diminished critical thinking, reduced human interaction, and concerns about the reliability of AI-generated content. For these students, AI sometimes created a sense of detachment in collaborative learning.
(3) **Neutral Impact** ([15 responses]): Other participants noted no major change in their learning or collaboration due to AI. While they found AI tools useful, they did not view them as significantly transformative, suggesting that AI serves more as a supplementary aid rather than a core influence in academic exchanges.

Descriptive statistical methods were applied to calculate frequency distributions for each thematic category, providing a clear quantitative representation of students' perceptions regarding AI's impact on learning and collaboration. These quantitative findings closely align with the qualitative data, where the majority of respondents highlighted AI's significant potential to improve academic experiences. Many students reported that AI tools facilitated better access to resources, personalized content delivery, and more efficient communication with peers and professors, all of which contribute to enhanced learning and collaboration.

However, the presence of negative and neutral responses reveals important areas for improvement. Concerns about the accuracy of AI-generated information, diminished human interaction, and the risk of over-reliance on technology suggest that AI integration is not without challenges. Some students expressed worries that excessive dependence on AI might weaken critical thinking skills and reduce meaningful academic engagement. Others felt that AI tools, while useful, did not drastically change their learning or collaborative processes.In conclusion, the thematic analysis indicates an overall positive attitude towards AI integration in education, with most students experiencing benefits in their academic work. Nevertheless, the findings emphasize the need for a balanced approach—addressing the limitations and ethical considerations—to ensure that AI enhances rather than hinders the educational experience. This cautious optimism

highlights the importance of careful implementation and ongoing evaluation of AI in academic settings.

This article analyzes *The Psychological Impact of AI Tools in Education for Students*, focusing on their perceptions and the challenges associated with AI integration in education. The results show that [95.6%] of respondents use AI in their academic activities, highlighting the deep integration of this technology into modern learning environments. Virtual assistants are the most widely used AI applications ([88.2%]), providing support for information retrieval, task organization, and real-time feedback. Additionally, [42.4%] of respondents use AI-based educational platforms, reflecting a shift toward more personalized and interactive learning approaches. These tools help students access relevant information quickly, manage tasks efficiently, and receive instant feedback, enhancing both productivity and engagement.

The thematic analysis of open-ended responses reveals a dual perspective. While many students favor AI integration to complement traditional teaching methods, others—especially within the academic community—advocate for balanced regulations and stronger validation protocols. Triangulated data from academic programs such as Engineering and Degree confirm the consistency of these concerns, strengthening the validity of the study.This research concludes that AI offers significant benefits: personalized learning, improved academic outcomes, and increased student engagement. However, concerns persist, including over-reliance on technology, diminished critical thinking, and academic fraud. Educational institutions must implement data protection policies and mitigate algorithmic bias, carefully evaluating the pros and cons of AI implementation. These findings support previous studies showing that AI can personalize educational content and improve performance (Krause et al., [2024]).

Our study also highlights key concerns: nearly half of respondents ([48.2%]) questioned the accuracy of AI-generated content, while others warned of technological dependence undermining human interaction and critical thinking. These issues echo current literature. A recent study noted the negative impact of AI on critical thinking and social interaction, emphasizing the importance of ethical frameworks and validation tools (Ju, [2023]). Likewise, Săseanu et al. ([2024]) advocate for strict control measures, and Łodzikowski et al. ([2023]) stress the need for ethical guidelines in educational AI use.

AI should *complement*, not replace, traditional learning methods. Responsible implementation can bring major advantages, supporting a more flexible and effective educational experience. However, given the small sample size and its limitation to specific academic programs, the findings remain exploratory and cannot be generalized to all students. The impact of AI on creativity and critical thinking also warrants further investigation. Future research should include a broader, more diverse sample—spanning different fields, academic years, and backgrounds—to provide a more comprehensive picture of AI's educational implications.

Conclusion

In conclusion, our research article, *"The Psychological Impact of AI Tools in Education for Students,"* highlights that AI has become an essential element of the modern academic landscape, offering significant benefits such as personalized learning, increased student engagement, and improved access to educational resources. While most students view AI positively—emphasizing its effectiveness in enhancing learning efficiency and academic performance—important concerns persist. These include issues related to the accuracy of AI-generated content, the risk of over-dependence on technology, and a potential decline in critical thinking skills. To ensure the responsible and effective integration of AI in education, we recommend implementing comprehensive training programs for both educators and students, establishing clear guidelines and validation protocols to ensure the reliability of AI outputs, and enforcing ethical standards and privacy policies to protect student data and prevent algorithmic bias. Furthermore, we encourage longitudinal research using larger and more diverse samples to better understand the long-term impacts of AI on academic performance and career development. By addressing these recommendations, educational institutions can ensure that AI complements—rather than replaces—traditional teaching methods, ultimately fostering a more balanced, efficient, and personalized learning environment that supports the development of essential cognitive and professional skills.

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