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A Quantitative Analysis of Artificial Intelligence's Impact on Students' Mindset and Critical Thinking in Higher Education

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Abstract

The rapid advancement of Artificial Intelligence (AI) has significantly transformed higher education, redefining how students learn, reason, and engage with academic content. This study investigates the impact of AI utilization on students' mindsets and critical thinking skills within university learning settings. Employing a quantitative research design, data were gathered through an online questionnaire administered to 28 students from various academic disciplines. The survey assessed students' engagement with AI tools including ChatGPT, Gemini, and Perplexity in learning processes such as understanding course materials, completing assignments, and problem-solving activities. The results indicate that most participants perceive AI as highly beneficial for enhancing comprehension, efficiency, and creativity in academic work. Students report that AI applications help them approach problems from diverse perspectives and stimulate idea generation. Nevertheless, concerns about overdependence are evident, as 53.6% of respondents believe that excessive reliance on AI may diminish autonomy and critical reasoning capacity. While a majority of students claim to verify AI-generated responses, a minority remain unaware of biases and inaccuracies, emphasizing the need to strengthen AI literacy in academic contexts. Overall, the findings suggest that AI serves as both a catalyst for deeper learning and a potential risk to intellectual independence. Its integration into higher education must therefore be approached with pedagogical mindfulness, ensuring that AI acts not as a replacement for human thought but as a tool for reflection, creativity, and metacognitive growth. Educators are encouraged to design learning experiences that require students to analyze, compare, and critique AI outputs critically. In conclusion, AI represents a dual-edged innovation: when applied ethically and reflectively, it can foster a growth-oriented mindset and strengthen critical thinking, but without proper guidance, it may cultivate intellectual complacency and dependency.

Keywords: Artificial Intelligence, Mindset, Critical Thinking, Higher Education, Students

1. Introduction

The development of Artificial Intelligence (AI) technology has brought significant changes to various aspects of life, including higher education. AI now serves not only as a tool but also as an integral part of the learning process, from providing personalized materials to conducting in-depth academic data analysis. With AI's ability to process information quickly and accurately, students can gain broader and more efficient access to learning resources and receive more specific and timely feedback.

However, behind these conveniences lie concerns about the impact of AI on students' thinking patterns and critical thinking skills. Critical thinking is an important skill that must be developed in higher education so that students can analyze, evaluate, and solve problems independently. Some studies suggest that excessive reliance on AI can reduce students' ability to think critically, diminish creativity, and hinder independence in problem-solving. This is because AI tends to provide instant solutions, which may make students less adept at decision-making based on their own reasoning [1]

On the other hand, AI also has significant positive potential in supporting the development of critical thinking. AI can help students organize and interpret information more effectively, as well as provide intellectual challenges through various alternative solutions that force them to evaluate different perspectives. Additionally, AI can reduce the

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administrative burden on teachers, allowing them to focus more on developing students' critical thinking skills through more personalized and interactive teaching [2].

Artificial intelligence has the potential to permeate and bring about significant changes in the education sector. This is evident from the fact that before the advent of computers and other technologies, teachers and students were directly involved in teaching and learning activities. Computer and telecommunications technology has continued to evolve over the years, leading to the development of artificial intelligence. With the introduction and use of new technology in education, artificial intelligence has also found widespread application in education. The emergence of new technology in the form of artificial intelligence has opened our minds to the importance of technological advancement. This is especially true for university students. Not only does it greatly simplify various tasks, but it can also be used to open new perspectives on various topics. Artificial intelligence itself is a branch of computer science that enables machines or computers to perform tasks as effectively as humans [3].

2. Literature Review

2.1 Artificial Intelligence (AI) in Higher Education

The integration of Artificial Intelligence (AI) into higher education has rapidly transformed how students engage with information, construct knowledge, and approach academic tasks. In this evolving educational landscape, AI tools such as ChatGPT, Gemini, and Perplexity have become increasingly prevalent, raising important questions about their role in shaping students' mindsets and critical thinking skills. Scholars continue to debate whether AI technologies merely assist cognitive processes or gradually replace essential human reasoning and independent thought. A foundational study by [4] conducted a systematic review on AI applications in higher education, identifying significant benefits in learning personalization, assessment automation, and student engagement. According to the study, AI facilitates real-time feedback and adapts instructional content to students' individual learning styles, thereby promoting learning effectiveness. However, the authors warned that technological interventions must be grounded in ethical frameworks and pedagogical intent to avoid over-dependence on algorithms. Educators, therefore, remain central in fostering higher-order thinking by guiding students to question and critique AI-generated information. Artificial Intelligence, as defined by [9], is a branch of computer science that develops systems capable of performing tasks that normally require human intelligence, such as reasoning, learning, and language understanding. In higher education, AI has been applied in the form of chatbots, smart tutors, recommendation systems, and automatic grading platforms [10][11]. These tools expand access to education and accelerate feedback processes while supporting competency-based learning. Nevertheless, [12] and [13] emphasize that AI use must adhere to ethical principles to ensure it enhances, rather than replaces, the pedagogical role of educators. Research by [14] confirms that AI, when integrated responsibly, can significantly improve instructional quality and learning outcomes.

2.2 Mindset in Learning and the Role of AI

Mindset is a cognitive framework that shapes how individuals perceive challenges and respond to learning experiences. According to Dweck's theory, students with a fixed mindset believe abilities are innate and avoid challenges, whereas those with a growth mindset view ability as improvable through effort and perseverance [15]. Students who cultivate a growth mindset are more likely to embrace failure as an opportunity to learn and to persist in achieving mastery. In the context of AI-based learning, mindset determines whether students use AI as a learning partner or a shortcut. Those with a growth mindset perceive AI as a tool for exploration, reflection, and skill development, while fixed-mindset learners may rely on AI for instant solutions without deeper understanding. Research by [16] indicates an increasing trend in growth mindset orientation among students when supported by adaptive learning technologies. AI systems can personalize materials according to learners' pace and provide immediate feedback, encouraging self-improvement and continuous learning [17][18]. Moreover, [5] explored the dual nature of generative AI technologies and found that tools like ChatGPT can enhance analytical reasoning by presenting multiple interpretations of a problem. However, the same study warned that uncritical use might lead to passive learning, where students internalize AI responses as final truths. Thus, developing a reflective mindset becomes crucial to ensure that AI use stimulates inquiry rather than complacency.

2.3 Critical Thinking Skills in the AI Era

Critical thinking involves the ability to analyze, evaluate, and synthesize information logically and objectively [19]. It enables individuals to assess assumptions, weigh evidence, and draw reasoned conclusions. In higher education, critical thinking is a core competency for lifelong learning and informed decision-making. The emergence of AI has introduced both opportunities and risks to this process. According to [20], AI-assisted learning can strengthen critical thinking when students are encouraged to question and validate AI outputs. Interacting with AI in simulations or problem-solving contexts allows learners to compare multiple viewpoints, refine arguments, and develop reflective reasoning. Similarly, [21] found that AI-based learning platforms enhance analytical and reflective skills in problem-solving, while [22] reported improved logical argumentation among students who used AI for data analysis. However, other evidence highlights the risk of cognitive disengagement. A neuroscience study from the Massachusetts Institute of Technology (2025) revealed that students writing with AI assistance exhibited reduced activation in brain regions related to reasoning and memory—an effect termed metacognitive laziness. This tendency to offload cognitive effort to machines may weaken independent thought and long-term retention. Complementary research by [7] observed that heavy AI reliance diminishes peer collaboration and classroom interaction, limiting opportunities for dialogic learning and ethical reflection. Conversely, [8] demonstrated that AI tools, such as academic chatbots, can promote inclusivity by helping students—especially international or first-generation learners—build confidence in formulating questions and engaging in discussions. Overall, the literature indicates that AI's impact on students' mindset and critical thinking is context-dependent. When integrated thoughtfully—supported by ethical guidance, reflective instruction, and human scaffolding—AI can serve as a catalyst for deeper learning and intellectual growth. Yet, uncritical or habitual dependence on AI risks undermining students' independence, creativity, and self-regulated learning.

3. Method

3.1 Research Design and Approach

This study adopts a quantitative research design, which emphasizes systematic and objective measurement of numerical data to examine relationships among variables. Quantitative methods enable researchers to describe, explain, and predict phenomena through statistical analysis and controlled data collection procedures. According to [23], quantitative research involves clear stages—problem identification, hypothesis formulation, data collection, and hypothesis testing—allowing researchers to draw logical and verifiable conclusions. In line with this paradigm, the study employed a descriptive survey approach to explore the influence of Artificial Intelligence (AI) use on students' mindsets and critical thinking skills in higher education. The quantitative design was selected because it provides a structured overview of students' perceptions, behavioral tendencies, and attitudes toward AI utilization in learning environments. As emphasized by [24], quantitative approaches offer a scientific foundation for evaluating trends and patterns across populations, especially when studying emerging technological impacts in education.

3.2 Population and Sampling Procedure

The population of this study consisted of undergraduate students enrolled in various academic programs at Universitas Amikom Purwokerto. Given the exploratory nature of the research, a non-probability purposive sampling technique was applied. This method allowed the selection of participants based on a specific criterion—namely, that respondents had prior experience using AI-based tools in their academic activities such as assignments, problem-solving, or study assistance. A total of 28 students participated in the survey. They represented diverse academic disciplines. Such heterogeneity aimed to capture a broad spectrum of student experiences and attitudes toward AI-assisted learning. While the sample size was relatively small, it was sufficient to provide indicative insights into current student behavior and perceptions regarding AI integration in higher education.

3.3 Data Collection Techniques

Data were collected through an online questionnaire distributed using Google Forms. The link was shared through institutional communication channels, social media platforms, and academic discussion groups to ensure accessibility

and voluntary participation. The online format allowed respondents to complete the survey conveniently while maintaining anonymity and confidentiality. The questionnaire consisted of two main sections:

a. Demographic Information: Items capturing gender, academic program, and semester level to contextualize respondent diversity.

b. Substantive Questions: Items assessing AI usage frequency, purposes of use, perceived impact on learning comprehension, creativity, problem-solving, perspective-taking, and critical thinking.

A Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5) was employed to measure the intensity of respondents' agreement with given statements. The use of scaled responses facilitated statistical interpretation and the identification of patterns in attitudes and perceptions.

3.4 Data Analysis Procedures

Data obtained from the online survey were compiled and analyzed using descriptive statistical techniques. Percentages and frequency distributions were calculated to illustrate respondent tendencies in AI utilization and their perceived impacts on cognitive and affective dimensions of learning. To ensure clarity and transparency, the data were organized and visualized using Microsoft Excel, which aided in tabulation and graphical presentation of key findings. Charts and tables were developed to highlight trends such as the frequency of AI use, perception of its influence on problem-solving, and its relation to creativity and critical thinking skills. The analytical process emphasized interpretative narration—linking numerical results to conceptual frameworks from previous studies on AI in education. This approach enabled the researchers to provide both quantitative and qualitative insights, connecting empirical findings to theoretical understandings of mindset formation and cognitive development.

3.5 Research Ethics and Limitations

All participants voluntarily provided informed consent prior to participation. Responses were kept confidential and used solely for academic research purposes. No personally identifiable information was collected, ensuring adherence to research ethics and data protection standards. While the study offers valuable initial insights, it is limited by its small sample size and single-institution focus, which may affect generalizability. Future research with larger and more diverse samples, complemented by inferential statistical analysis, is recommended to validate and extend these findings.

4. Results and Discussion

4.1 Finding of Data Analysis

The results of the questionnaire indicate that the respondents in this study consisted of students from a variety of academic programs. In terms of gender, the majority of respondents were male (57.1%), while females accounted for 42.9%. When looking at academic programs, the largest number of respondents came from the Information Systems department, accounting for 14.3%, while the remainder were distributed across other departments. In terms of semester level, the fourth semester had the highest number of respondents, accounting for 39.3%. In terms of the use of AI technology in academic activities, the majority of respondents, 92.9%, stated that they had already used AI technology such as ChatGPT, Perplexity, or Gemini. Only 7.1% of respondents stated that they had never used AI in their academic activities. When asked about the frequency of use (Figure 1), 42.9% of respondents admitted to using AI almost every day, primarily for purposes such as generating ideas, finding references, completing assignments, and understanding new material. Additionally, 35.7% of respondents use AI several times a week, 17.9% use it only occasionally, and the remaining 3.6% stated they use AI only a few times a month.

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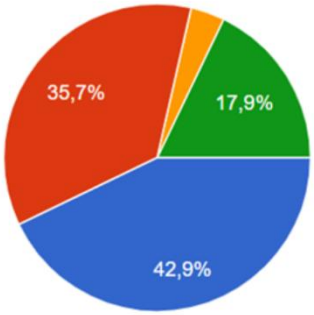

Figure 1. Time Period for Using AI to Complete College Assignments

In terms of understanding lecture material, 64.3% of respondents felt that AI was very helpful in understanding the material taught, while 28.6% said it was somewhat helpful. A small percentage, 3.6% of respondents, felt that it was not very helpful or not helpful at all. These findings show that, in general, AI has made a positive contribution to students' academic understanding. However, when asked about the impact of AI on problem-solving abilities, half of the respondents (50%) felt that AI tends to make them overly reliant on technology, thereby reducing their independent thinking. Despite this, 28.6% of respondents felt that AI helped them think systematically, and 14.3% felt that AI did not significantly influence how they solve problems.

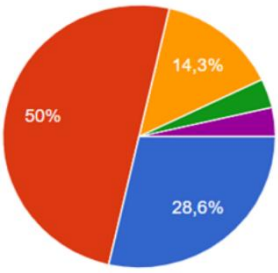

Figure 2. Impact of AI on Problem Solving Abilities

Regarding the influence of AI on creativity in completing tasks, most respondents stated that the influence was quite significant (46.4%), with 39.3% stating that the influence was very significant. Only 10.7% felt that the influence of AI on their creativity was minimal. This shows that most students feel that there has been an increase in productivity and efficiency in completing academic tasks with the help of AI. In addition, students were also asked about AI's ability to help them see a problem from various perspectives. A total of 60.7% felt that it was quite helpful, 28.6% felt that it was very helpful, and only 10.7% felt that it was not helpful in this regard. This shows that AI is able to broaden students' perspectives in seeing and analyzing problems more comprehensively.

Regarding the habit of verifying information obtained from AI, the majority of respondents (64.3%) stated that they always double-check the information provided by AI before using it or sharing it with others. A total of 32.1% admitted to only occasionally verifying, while 3.6% stated that they never verify. Despite the convenience provided by AI, students still maintain a critical awareness to check the accuracy of the information obtained. Finally, in assessing the impact of AI use on critical thinking skills, the majority of respondents (53.6%) agreed that the use of AI can reduce independent critical thinking skills. Another 10.7% strongly agreed with this statement. However, 32.1% of respondents disagreed, indicating that not all students feel that AI has a negative impact on their critical thinking skills. Interestingly, despite concerns about dependence on AI, the majority of respondents still support the formal integration of AI into the learning process at universities, with 53.6% agreeing, 35.7% remaining undecided, and only 7.1% disagreeing.

4.2 AI's Contribution to Understanding Academic Materials

The data revealed that 64.3% of students considered AI very helpful in understanding academic materials, while 28.6% found it somewhat helpful. This reflects a strong trend indicating that AI tools, such as ChatGPT, have been instrumental in simplifying complex academic content into more digestible explanations. For instance, many students use AI to clarify unfamiliar terminology, summarize lengthy reading materials, or generate examples related to course

topics—actions that support active comprehension. This finding aligns with [4], who emphasized that AI enhances learning personalization by adapting content delivery to students' individual needs and pace. Through natural language interfaces, students can engage in one-on-one interaction with AI, asking questions multiple times without judgment or time pressure something not always feasible in traditional classroom settings.

Moreover, from a theoretical standpoint, these results support the constructivist learning theory, which posits that learners actively construct knowledge through interaction and exploration. AI facilitates this constructivist process by enabling students to test their understanding, receive instant feedback, and refine their mental models. Rather than passively receiving information, students use AI as a cognitive scaffold that bridges prior knowledge with new concepts. This self-directed inquiry, enabled by AI, empowers students to take ownership of their learning. However, while the data points to improved material comprehension, it is critical to consider how students interact with AI—whether it leads to deep engagement or superficial understanding. Future research could explore whether repeated AI usage cultivates long-term retention or merely short-term clarity.

4.3 Dependency and Independent Thinking

While AI tools offer valuable assistance, 50% of respondents reported a growing dependence on these technologies, expressing concern over a decline in independent thinking. This suggests a potential trade-off: the more students rely on AI to answer questions or complete tasks, the less they practice constructing arguments or solutions on their own. This phenomenon aligns with the findings of the MIT neuroscience study, which identified reduced neural activity in brain regions responsible for reasoning and problem-solving when students relied heavily on AI-assisted writing. The study introduced the term metacognitive laziness, describing a behavioral shift where users outsource the struggle of thinking to external systems. Research [7] reinforced these concerns by highlighting how AI dependency could limit peer collaboration and dialogic learning, essential processes for cultivating critical reflection and empathy. As AI provides quick answers, students may bypass the intellectual discomfort and ambiguity that often lead to deeper learning. This reliance can impair the development of epistemic agency—the learner's sense of responsibility in evaluating truth and constructing knowledge. To mitigate this, educational strategies should include tasks that require critical engagement with AI output, such as evaluating its limitations, identifying biases, or generating alternative answers—thus transforming AI from a crutch into a catalyst for thought.

4.4 Creativity and Multidimensional Thinking

The findings show that 85.7% of students perceived AI to have a significant or moderate impact on their creativity and task completion. This suggests that AI not only aids efficiency but also stimulates ideation and alternative approaches to academic problems. For example, students use AI to brainstorm essay topics, structure arguments, or identify novel perspectives in debates—actions that contribute to divergent thinking. These behaviors are supported by [5], who observed that generative AI tools like ChatGPT can offer multiple interpretations of a problem, prompting users to weigh contrasting viewpoints. This act of comparison and synthesis is a core element of analytical creativity. Rather than replacing creative thinking, AI can serve as a creative provocateur—posing possibilities that students might not have initially considered. However, the depth of creativity is dependent on how students use these tools. If AI is used merely to copy ideas, it undermines originality. But when students manipulate, combine, and challenge AI-generated outputs, it supports the Bloom's taxonomy levels of analysis, synthesis, and evaluation. Therefore, educators should encourage AI usage for exploration and expansion rather than solution-finding alone, nurturing curiosity and innovation in learning.

4.5 Information Verification and Digital Awareness

An encouraging outcome is that 64.3% of respondents reported always verifying AI-generated information, indicating the development of digital skepticism and awareness. This critical behavior is essential in an age where AI tools can occasionally produce hallucinated or biased content. By routinely double-checking facts, students demonstrate metacognitive regulation—an awareness of one's cognitive limitations and strategies to overcome them. Research [6] emphasized that such reflective practices are more likely to develop when AI use is supported by explicit guidance and scaffolding from instructors. When students are taught to question, validate, and critique AI-generated responses, they become active processors rather than passive consumers of information. Nevertheless, the data also reveal that 3.6% of students never verify the output. This minority highlights a gap in AI literacy, which could expose students to

misinformation or undermine academic integrity. It underscores the urgent need for universities to implement AI ethics training, promoting a culture of digital responsibility.

4.6 AI's Impact on Critical Thinking

A central concern of this study is the influence of AI on students' critical thinking abilities. The data shows that over half (53.6%) agreed that AI reduces their capacity to think critically and independently. This confirms the warning of Facion [20], who stated that critical thinking involves active questioning, evidence-based reasoning, and reflective judgment—skills that can atrophy when learners accept AI responses uncritically. While AI can provide quick answers, true critical thinking demands students to ask: Is this answer logical? What assumptions underlie it? Could there be a better approach? Without these interrogations, students risk intellectual stagnation. To counter this, AI must be reframed not as an endpoint, but as a starting point for deeper exploration. Educators can design activities where students must

a. Compare AI-generated answers with peer-reviewed literature
b. Identify potential biases in AI outputs
c. Defend or refute AI claims using scholarly reasoning

Such activities reinforce critical literacy and ensure that students remain intellectually autonomous in an AI-rich academic environment.

4.7 Implications for Higher Education Stakeholders

The findings of this study have several practical implications for stakeholders in higher education, particularly faculty members, academic institutions, and education policymakers. As artificial intelligence becomes increasingly integrated into learning environments, it is crucial to ensure that its use enhances—rather than diminishes—students' cognitive and reflective abilities. First and foremost, educators must play a central role in guiding students toward the responsible and critical use of AI technologies. Rather than allowing students to passively accept AI-generated content, instructors should design assignments and class discussions that encourage critical evaluation of AI responses. For example, students can be asked to compare AI outputs with peer-reviewed academic sources, justify which source is more valid, or critique the limitations of generative models. This approach not only promotes active learning but also reinforces academic integrity and reflective judgment.

Secondly, higher education institutions should consider integrating AI literacy and ethics into the formal curriculum. This includes offering workshops, seminars, or elective courses that teach students how to use AI tools productively, evaluate bias in algorithms, and understand the ethical implications of AI in education. By equipping students with this foundational knowledge, institutions can foster a culture of critical engagement with technology rather than uncritical dependence. Third, universities should develop clear and transparent policies regarding the use of AI in academic work, including in assignments, assessments, and research. Such policies should delineate acceptable and unacceptable uses of AI tools, and encourage students to disclose when AI assistance has been used. This is particularly important in maintaining fairness in academic evaluation and avoiding plagiarism-related misconduct.

In addition, institutional leaders must ensure that AI tools are equitably accessible to all students. While some learners may already be proficient in using AI, others may lack exposure or resources. Equal access to digital tools and support services is essential for preventing disparities in learning outcomes. Finally, collaborations between universities and AI developers can foster the creation of educational tools that are not only technologically advanced but also pedagogically sound. Stakeholder input from educators, students, and curriculum experts should inform the design of AI-based learning systems that prioritize cognitive growth, ethical awareness, and academic autonomy.

4.8 Suggestions for Future Research

While this study provides initial insights into the influence of AI on students' mindsets and critical thinking skills in higher education, several limitations offer opportunities for future research development. First, the study involved a relatively small sample size (n = 28) drawn from diverse academic programs at a single university. Although this diversity enriches the dataset, the limited number of participants restricts the generalizability of the findings. Future research should consider involving a larger and more representative sample from multiple institutions, including public

and private universities across different regions. This would provide a more comprehensive understanding of students' perceptions and behaviors regarding AI use in academic contexts.

Second, this study used a cross-sectional survey design, which captures respondents' experiences and perceptions at a single point in time. To better understand how students' interactions with AI evolve and affect their cognitive development over time, future studies could employ a longitudinal approach. Tracking students' use of AI across semesters or academic years may reveal deeper patterns in mindset shifts, learning autonomy, and changes in critical thinking performance. Third, the current study focused on general AI usage without differentiating between types of AI tools. Future research could benefit from exploring how specific AI applications—such as generative language models (e.g., ChatGPT), learning management assistants, or academic chatbots—uniquely impact students' cognitive and reflective processes. By categorizing AI use more precisely, researchers could uncover tool-specific benefits or risks.

Moreover, additional variables could be introduced to enrich the analysis. These may include demographic characteristics such as students' age, level of study, prior academic performance, or digital literacy levels. Examining these factors may help identify which student populations are more vulnerable to AI overuse or which groups benefit most from AI-supported learning. Finally, future researchers are encouraged to explore qualitative dimensions of AI integration, including student attitudes, motivation, and emotional responses. In-depth interviews or focus group discussions could provide richer insights into how students navigate the tension between convenience and critical engagement when using AI.

5. Conclusion

Based on the results of the study, it can be concluded that the use of Artificial Intelligence (AI) technology in higher education has a diverse impact on students' mindsets and critical thinking skills. Most students feel that AI helps them understand the material, complete assignments, and see problems from various perspectives. AI is also considered capable of increasing student efficiency and creativity in the learning process. However, there are genuine concerns about the potential for excessive reliance on this technology, which could reduce independence and the ability to engage in deep critical thinking. Questionnaire results indicate that most students are aware of the need to verify information from AI, indicating a critical awareness in its use. Overall, AI has the potential to be an effective tool in supporting the development of critical thinking patterns and skills, provided it is used wisely and accompanied by appropriate pedagogical approaches. Therefore, the integration of AI in learning must be balanced with the strengthening of students' analytical, reflective, and independent decision-making abilities.

In addition to summarizing the key findings, this study provides a unique contribution to the growing body of literature on artificial intelligence and its role in higher education. While many existing studies have focused on the technical implementation or cognitive benefits of AI tools, this research highlights the nuanced impact of AI not only on students' academic performance but also on their mindset and capacity for independent, critical thought. The novelty of this study lies in its dual focus: examining both the cognitive benefits and psychological risks associated with AI integration from the perspective of students across diverse academic disciplines. By capturing students' perceptions of AI's influence on their learning strategies, creativity, and decision-making processes, this study offers fresh insight into how AI affects students not just as learners, but as thinkers. Furthermore, this research adds value to current educational discourse by emphasizing the importance of reflective and ethical AI usage. It bridges a gap between technological enthusiasm and pedagogical caution, encouraging institutions and educators to view AI as a tool that must be used consciously and critically. Ultimately, this study contributes to the understanding that the effective integration of AI in higher education requires more than access and automation—it demands deliberate pedagogical strategies that cultivate metacognition, academic integrity, and intellectual independence. These findings can serve as a foundation for future innovations in AI-supported education that prioritize human-centered learning.

6. Declarations

6.1. Author Contributions

Author Contributions: Conceptualization, N.L.P., R.A.P., and C.I.; Methodology, N.L.P. and R.A.P.; Software, C.I. and R.A.P.; Validation, R.A.P. and N.L.P.; Formal Analysis, N.L.P.; Investigation, C.I. and R.A.P.; Resources, R.A.P. and N.L.P.; Data Curation, C.I.; Writing—Original Draft Preparation, N.L.P.; Writing—Review and Editing, R.A.P. and C.I.; Visualization, R.A.P. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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6.4. Institutional Review Board Statement

Not applicable.

6.5. Informed Consent Statement

Not applicable.

6.6. Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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