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Impact of Artificial Intelligence on Academic Literacy among University Students in Indonesia: A Case Study

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Abstract

The rapid adoption of Artificial Intelligence (AI) tools in higher education has transformed learning practices, prompting concerns about their influence on students' critical thinking, originality, and independent engagement with academic materials. This study explores the perceived impact of AI on academic literacy among Indonesian university students, with particular attention to critical thinking, originality, and independent learning. Employing a qualitative approach, the study captures students' experiences and perspectives, revealing that while AI tools such as ChatGPT and Grammarly are perceived to enhance learning efficiency, they may also diminish deeper engagement with academic content and critical thinking processes. Many participants reported a tendency to rely on AI-generated summaries, which they associated with reduced independent analysis and creativity. Nevertheless, the findings suggest that when AI tools are integrated with thoughtful pedagogical strategies, they can support the development of academic literacy within ethical boundaries. The study underscores the importance of implementing AI literacy programs and ethical guidelines to foster responsible and reflective use of AI in academic contexts.

Keywords: Academic Literacy, Artificial Intelligence, Higher Education

INTRODUCTION

The rapid advancement of Artificial Intelligence (AI) technology, particularly generative AI, has profoundly transformed higher education, particularly in how students access, process, and produce academic information. By 2025, AI driven platforms such as ChatGPT, Notion AI, Grammarly, and QuillBot have become integral to students' academic routines. No longer mere supplementary tools, these applications now play a central role in supporting tasks ranging from understanding complex materials to generating complete academic papers (Rao et al., 2025). This shift signifies a departure from traditional learning models, which emphasised human interaction and cognitive effort, towards technology-driven practices prioritising efficiency and automation.

Despite the benefits, this technological transformation raises concerns. Increasing reliance on AI tools has been associated with reduced engagement in deep reading, reflective writing, and critical thinking processes essential to academic literacy (Liu et al., 2023). Academic literacy including critical thinking, analytical reasoning, argument construction, and originality is foundational to quality higher education (Zhang et al., 2025; Nazari et al., 2021). Delegating these cognitive processes to AI systems risks eroding students' intellectual development and independent learning capacities.

International studies present a complex picture. While AI has the potential to personalise learning and support cognitive development when combined with pedagogical guidance (Tapalova & Zhiyenbayeva, 2022; Holmes et al., 2019), it can also facilitate surface-level academic work, encourage overreliance, and increase the risk of concealed plagiarism (Yu et al., 2024; Zhai et al., 2023). Survey data, such as the Educause (2023) report, show that although 68% of university students in the United States actively use AI tools, only 31% report fully understanding the material they submit. Similar patterns are emerging in Indonesia, suggesting growing risks of superficial engagement and weakened critical literacy.

Furthermore, scholars such as Selwyn (2019) and Zawacki-Richter et al. (2019) caution that AI cannot substitute the pedagogical role of educators and highlight the tendency of AI applications to prioritise technical tasks such as grammar correction over fostering deeper intellectual engagement. In this context, AI's impact is highly dependent on how it is integrated into educational practices, with Chan et al. (2023) and Schiff (2021) noting that instructional strategies play a critical role in either mitigating or amplifying the risks associated with AI use.

While considerable research has explored AI's educational impacts in developed countries, there is limited empirical understanding of its influence on academic literacy in developing nations, particularly Indonesia (Abbasi et al., 2025). Given Indonesia's diverse educational landscape with stark contrasts between urban and 3T (frontier, outermost, and underdeveloped) regions, AI adoption presents unique challenges and opportunities. Urban students benefit from better access and infrastructure yet face academic pressures that may foster dependency on AI. Conversely, students in 3T regions often use AI to overcome limited resource access but risk superficial engagement due to inadequate academic support.

This study addresses a critical gap by investigating how AI impacts not merely academic outputs but the deeper cognitive dimensions of academic literacy specifically critical thinking, originality, and independent learning within the Indonesian university context. By focusing on Indonesia, a country undergoing rapid but uneven digital transformation, this research provides a much-needed, contextually nuanced understanding that is currently lacking in the literature.

The overarching aim of this study is to critically analyse the impact of AI usage on the academic literacy of Indonesian university students. Specifically, it examines how AI influences students' critical thinking abilities, independence in learning, and the originality of their academic work. By offering empirical insights into these dynamics, this study seeks to inform higher education policies and pedagogical strategies that harness the benefits of AI while safeguarding the core mission of education: cultivating independent, reflective, and ethically responsible learners.

METHODS

Design

This study employed a descriptive qualitative approach using case study design aimed at gaining an in-depth understanding of how the use of AI impacts students' academic literacy, particularly in the context of a shift from independent learning to reliance on technology. This approach was selected because it allows

for a comprehensive portrayal of phenomena based on participants' perceptions, experiences, and behaviors within their natural environment (Creswell, 2009).

Participants

This research was conducted at Universitas Negeri Makassar, with data collection taking place from March to April 2025. The study participants consisted of 15 students who are active undergraduate students in their fourth semester, from various disciplines, who regularly use AI tools in their academic activities. Participants were selected through purposive sampling (See Table 1), a technique that enables the selection of individuals based on specific criteria, such as active engagement with AI and the ability to provide rich and relevant information (Lim, 2024).

Table 1. Participant Selection Criteria

Criteria	Description
Academic Level	Active undergraduate students in their fourth semester.
Disciplinary Background	Students from various disciplines, allowing for a diverse perspective on the use of AI in academia.
AI Tool Usage	Participants must regularly use AI tools such as ChatGPT, Grammarly, Notion AI, etc., in their academic activities.
Academic Experience	Students in their fourth semester have accumulated sufficient academic experience and possess an understanding of fundamental concepts in higher education, including academic literacy.
Purpose of Selection	The fourth-semester students are expected to be more adept at using AI tools in their academic tasks and have a more mature perspective on their academic journey.

Data Collection

The data for this study were collected using in-depth interviews which conducted both online and offline, employing a semi-structured format. This method allowed participants to freely express their views and experiences regarding the influence of AI tools on their academic learning (Rubin & Rubin, 2011). Interview questions included prompts, here are some examples: "Can you describe a time when you used ChatGPT or Notion AI to help you complete an assignment?" and "Have you ever felt that using AI made you less involved in understanding the material?" These questions encouraged students to share specific experiences, such as relying on Grammarly for essay revisions or using QuillBot to paraphrase articles without fully reading them.

Data Analysis

The data analysis followed the principles of thematic analysis, as outlined by Miles et al. (2014). The process included data reduction, data display, and conclusion drawing. Recurring patterns and key themes were identified from the interviews, observations, and documents. These findings were then interpreted within the broader context of how academic literacy is being transformed by the integration of AI tools.

This research also adopted a reflective cyclical model, beginning with preliminary observations of AI use, continuing with data collection and initial analysis, and moving into reflective interpretation. This cycle was repeated as needed to enhance the depth and validity of the findings. The iterative nature of the process aligns with the principles of action research, as proposed by Kemmis (2010), emphasizing continuous learning and refinement throughout the study.

To ensure the validity of the findings, member checking was employed. After the initial analysis, participants were asked to review and confirm the accuracy of the interpretations, ensuring that the researcher's conclusions authentically reflected the participants' perspectives and experiences. Additionally, triangulation was used by drawing from multiple data sources Interviews, observations, and document analysis to cross-verify findings. This multi-faceted approach strengthened the reliability and depth of the conclusions.

RESULTS AND DISCUSSION

Results

Patterns of AI Use in Students' Academic Activities

Findings from in-depth interviews with 15 undergraduate students (fourth semester and above) across various academic programs, supported by three months of field observations, revealed that approximately 86% of students regularly incorporate artificial intelligence (AI) tools into their daily academic activities. AI is used not only for major assignments but also for routine academic tasks such as preparing class presentations, summarising lectures, and formulating verbal responses during discussions.

The most frequently used AI applications among students were ChatGPT, Grammarly, QuillBot, and Notion AI. ChatGPT was primarily employed to generate essay responses, create writing outlines, and simplify complex lecture content. Grammarly and QuillBot were commonly used to correct grammar, enhance writing fluency, and rephrase text to align with academic standards. Meanwhile, Notion AI was utilised to summarise documents, outline presentations, and automatically generate study notes from videos or reading materials. Together, these tools played a central role in supporting students' academic activities across a range of tasks.

Students reported that the use of AI significantly enhanced their efficiency in processing and understanding information, particularly under conditions of heavy academic workload. As students noted:

> *"AI, especially ChatGPT, really helps me in drafting major assignments quickly. Often, I feel I can understand concepts faster because AI provides a direct explanation."* (Management Student)

> *"Grammarly and QuillBot help me refine my language, so I feel more confident submitting my work."* (Development Economics Student)

Shifts in Academic Literacy: From Autonomy to Dependence

The data also revealed a notable shift in students' academic literacy practices following the integration of AI into their learning routines. Traditionally, academic literacy required students to engage in deep reading, critical analysis, synthesis of ideas, and independent argument construction. However, the widespread use of AI has led to a shift towards more dependent forms of learning, where intellectual engagement is increasingly replaced by reliance on AI-generated outputs.

Instead of engaging directly with full academic texts, students often use AI to obtain condensed summaries, explanations, or complete drafts with minimal cognitive effort. This shift was evident in several student responses:

> *"I used to read academic articles in full, but now I often just read the abstract and conclusions, because AI can give me a comprehensive summary. It saves me time."* (Computer Science Student)

"It's more efficient and fits my tight schedule. I can get the core of a topic directly without spending too much time." (Psychology Student)

Overall, while AI tools have contributed to greater efficiency, the findings suggest that they may also reduce opportunities for critical engagement, independent learning, and the development of deeper academic skills.

Students' Dependence on AI Technology

One of the most noticeable behavioral changes among university students in the era of artificial intelligence is their high level of dependence on AI technology to complete nearly all aspects of their academic activities. This dependence is not limited to major tasks such as writing academic essays but extends to daily academic routines, including reading scholarly journals, preparing presentations, and even participating in class discussions.

Table 2. Frequency of AI Use in Academic Activities

Academic Activity	Never Uses AI	Occasionally Uses AI	Frequently Uses AI
Essay Writing	2 students	4 students	9 students
Reading Scholarly Journals	5 students	6 students	4 students
Preparing Presentations	1 student	7 students	7 students
Participating in Class Discussions	6 students	5 students	4 students

The data indicate that AI usage is particularly prevalent for cognitively demanding tasks such as essay writing and presentation development. Approximately 60% of students reported regularly using AI tools to assist with essay writing, while 47% relied on AI for developing presentations. Participants highlighted the perceived benefits of AI integration in these academic tasks. Two students reflected:

"AI helps me develop better presentations, and I can focus my time on understanding the material, not just creating slides," suggesting that AI support enables deeper engagement with content rather than with technical production (Medical student).

"I frequently use AI for writing essays, especially when deadlines are tight," pointing to AI's role in managing academic pressures and time constraints (Law student).

Ethical and Academic Implications on the Standards of Student Scientific Work

Another significant consequence of the widespread use of artificial intelligence (AI) in higher education is the erosion of originality in students' academic work. During interviews, several informants openly admitted to delegating the entire writing process of their assignments and academic papers to AI tools, intervening only at a surface level such as rephrasing certain sentences or adjusting tone to sound more personal. Interview Quote:

"I often submit the entire essay writing to AI. Sometimes, I only modify some parts to match my style, but the initial draft is all from AI." (Law Student)

"AI provides me with a draft that helps a lot, so I focus on editing and refining it." (Engineering Student)

Discussion

Impact on Academic Literacy

The integration of AI into students' academic activities reflects a significant shift in how they interact with academic sources. While AI tools improve learning efficiency, as noted by Luckin & Holmes (2016), there is a risk of creating a "user-centered dependency system." In such a system, students may begin to rely on AI as a substitute for the genuine learning process, rather than using it as a supporting tool. This shift leads to a decline in students' initiative to explore primary academic sources such as books, journals, or scholarly articles. Holmes et al. (2019) echo this concern, stating that the current educational systems lack the regulatory and pedagogical infrastructure to guide ethical and responsible AI usage. In many cases, students are not sufficiently informed about the boundaries of AI usage, resulting in overreliance on AI tools even for tasks designed to cultivate critical and analytical thinking. As a result, students may lose opportunities to develop higher-order thinking skills through independent effort.

Shift in Literacy and Learning Methods

As AI tools become more prevalent, students may begin to rely more on surface-level learning rather than engaging deeply with academic texts. This shift from deep learning to shallow learning is reflected in the trend where students prefer reading only abstracts and conclusions of academic papers, rather than engaging with the full content (Gera et al., 2023). This change in reading habits leads to a decline in students' ability to synthesize information, engage in critical analysis, and develop independent thought. Hwang et al. (2023) found that extensive use of generative AI tools negatively impacts students' analytical thinking abilities. Their study showed that reflective thinking, a cornerstone of higher education, is being replaced by automatic outputs generated by AI systems.

Risks of Cognitive Offloading

The overreliance on AI tools, particularly for tasks like essay writing and presentation preparation, can lead to cognitive offloading, where students delegate cognitive tasks to AI systems. Wahn et al. (2023) argue that AI has become an extension of human cognition. While this can improve productivity and efficiency, over time, it may undermine independent thinking, as students increasingly rely on machine-generated outputs rather than constructing logical reasoning on their own.

Ethical Considerations and Academic Integrity

As highlighted by Cotton et al. (2024), the use of AI in academic settings raises significant ethical questions, particularly around originality and plagiarism. Students who rely heavily on AI tools may bypass essential cognitive processes, including logical reasoning and source evaluation, which are crucial for maintaining academic integrity. Selwyn (2019) emphasizes that higher education institutions must provide comprehensive AI literacy training for both students and faculty. This training should focus on ethical boundaries, the validity of AI generated content, and the importance of academic originality. Institutions must also adapt their assessment systems to evaluate not only the final output of assignments but also the intellectual processes behind them, such as through research logbooks, reflective journals, and oral presentations.

Findings from Indonesia in Comparison to International Studies

In the Indonesian context, many students described regular use of AI tools to support their academic tasks, a pattern that reflects similar trends reported in Western countries (Yusuf et al., 2024; Tight, 2022).

Participants also reported a noticeable shift in learning habits, with a preference for reading only abstracts and conclusions rather than engaging deeply with full academic texts, mirroring concerns about surface learning raised in international studies (Mårtensson et al., 2011). Furthermore, the interviews highlighted a perceived lack of institutional support and ethical guidance regarding AI use, aligning with international calls for clearer regulatory frameworks (Holmes et al., 2019). Finally, students' accounts pointed to an increasing cognitive reliance on AI tools, indicating a risk of cognitive offloading, which has similarly been identified as an emerging concern in global research (Ji et al., 2025).

Implications

This study broadens the theoretical understanding of academic literacy by recognising AI as a critical influencing factor. While traditional literacy emphasised reading, writing, and critical thinking, AI tools now reshape how students engage with information, promoting efficiency but potentially weakening deep cognitive processes. Academic literacy must therefore include the critical and ethical use of AI while maintaining independent reasoning. Practically, lecturers should provide clear guidelines on AI use and foster discussions on its ethical implications, while institutions must develop AI literacy programs that strengthen critical evaluation skills. Assessment systems should also shift focus towards students' intellectual processes rather than final outputs. Future research should explore the long-term cognitive impacts of AI dependency, the role of faculty training in promoting AI literacy, and cross-cultural comparisons to guide responsible AI integration in education.

CONCLUSIONS

The findings of this study demonstrate a significant transformation in academic literacy among Indonesian university students due to the widespread adoption of AI tools. While AI enhances efficiency and supports academic productivity, it also fosters cognitive dependency, diminishes deep learning, and raises ethical concerns regarding academic integrity. The shift from autonomous learning to reliance on machine-generated outputs indicates a critical need for redefining academic literacy to include AI literacy. To address these challenges, both educators and institutions must implement strategic interventions that promote ethical AI use, encourage critical thinking, and adapt assessment methods to evaluate students' cognitive engagement rather than mere final outputs.

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AUTHOR CONTRIBUTIONS STATEMENT

All authors involved in the writing, reviewing and editing of this manuscript.

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