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Implications of Artificial Intelligence on the Critical Thinking Ability of PGMI Students in Social Studies Courses Elementary / MI

Fadhil Nur Hidayat[1], Aziz Mukhamad Thoha[2], Dexani Widyasari[3] Zeva Adi Fianto[4], Aminul Qodat[5]
[1]Pendidikan Guru Madrasah Ibtidaiyah, STIT Al Mubarok Bandar Mataram, Lampung Tengah, Indonesia
[2]Pendidikan Agama Islam, STIT Al Mubarok Bandar Mataram, Lampung Tengah, Indonesia
[3]Pendidikan Dasar, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia
[4]Pendidikan Guru Sekolah DasarUniversitas Pamulang, Tangerang Selatan, Indonesia
[5]Pendidikan Agama Islam, STIT Al Mubarok Bandar Mataram, Lampung Tengah, Indonesia
[1*]kisangga1986@gmail.com, [2]Azizthoha97@gmail.com, [3]dexaniwidyasari@gmail.com, [4]Zevaadi@unpam.ac.id, [5]aminulqodat@gmail.com

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ABSTRACT

This research has the **objective** of understanding in depth the implications of using Artificial Intelligence (AI) on students' critical thinking skills in Social Studies learning. The study employed a qualitative approach and was conducted with students of the Madrasah Ibtidaiyah Teacher Education (PGMI) study program at STIT Al Mubarok Lampung Tengah who have experience using AI in academic activities. Subjects were selected through purposive sampling based on their active involvement in technology use during the learning process. Data were collected via semi-structured interviews, observation, and documentation. Data analysis was carried out interactively, including data condensation, data display, and conclusion drawing, while data validity was maintained through source and technique triangulation. The **results** indicate that students utilize AI as an initial learning instrument to simplify complex Social Studies materials and to find creative ideas in lesson planning. The implications of AI on critical thinking are ambivalent; on one hand, this technology helps broaden perspectives and arguments, but on the other hand, it triggers a tendency for instant thinking that risks reducing the depth of independent critical analysis. Nevertheless, reflective awareness was found in some students who continue to verify information through official academic sources. This study concludes that the integration of AI in teacher education requires the strengthening of digital literacy so that students can utilize technology wisely without sacrificing the analytical and reflective skills essential for prospective elementary school educators.

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A. INTRODUCTION

Advances in digital technology have brought about significant changes in various aspects of human life, including the field of education. One rapidly evolving innovation is *Artificial Intelligence* (AI) (Truong & Papagiannidis, 2022).This technology not only serves as a tool to access information but is also capable of generating content, providing analysis, and offering solutions to various problems quickly(Wang et al., 2025). (Wang et al., 2025). In higher education, the presence of AI has transformed the way students learn, search for references, and complete academic assignments. These changes mark a shift in

the learning process from independent information seeking toward the use of technology as a partner in learning activities (George & Wooden, 2023; Jafari & Keykha, 2024).

These developments raise questions about how the use of AI impacts students' thinking processes, particularly their critical thinking skills. Critical thinking is one of the essential competencies in 21st-century education because it involves the ability to analyze information, evaluate arguments, and make rational and reflective decisions(Tohani & Aulia, 2022; Wardani & Fiorintina, 2023). In teacher education, this ability is of great importance because prospective educators are not only required to master the subject matter but also to have the capacity to guide students in developing critical and independent thinking(Dilekçi & Karatay, 2023; Mahmud & Wong, 2022; Molla et al., 2023).

The Elementary Madrasah Teacher Education (PGMI) program plays a strategic role in preparing prospective elementary school teachers who are competent both academically and pedagogically(Nuryanto et al., 2026; Romadhan, 2026; Wulandari, 2025).One relevant field of study in developing PGMI students' critical thinking skills is Social Studies (IPS) in the context of elementary school education. Social Studies instruction is not only oriented toward mastering concepts but also emphasizes the ability to understand social realities, analyze societal issues, and develop a reflective attitude toward various social phenomena(Hidayat & Munir, 2026). These characteristics make Social Studies instruction a relevant context for examining the use of AI, particularly because prospective teachers need to develop the ability to evaluate information, construct arguments, and understand social issues from various perspectives before implementing them in elementary school classrooms.

In this regard, the use of AI presents both opportunities and challenges for the development of students' critical thinking skills; on the one hand, AI makes it easier for students to access information, find references, and understand course material through structured explanations(Aithal & Aithal, 2023; Sajja et al., 2024). Appropriate use has the potential to broaden perspectives, enrich arguments, and encourage deeper exploration of ideas(A. Dzogovic et al., 2024; Yıldız, 2025). On the other hand, the ease of obtaining answers can foster a tendency toward instant thinking if students accept AI outputs without conducting their own verification, comparison, and evaluation(Alqahtani et al., 2023; Chen et al., 2023).

This issue is particularly significant in social studies education, which demands interpretation and analysis of complex social realities; reliance on AI has the potential to reduce students' engagement in the reasoning process, whereas its use accompanied by a critical mindset can help broaden understanding of an issue(Abdullah & Basheer, 2024; Berson & Berson, 2024; Yetişensoy & Rapoport, 2023). Thus, the implications of AI use for critical thinking skills cannot be understood solely based on the existence of the technology itself but must be examined through how students use it, evaluate the information it generates, and integrate it into the learning process.

Research on AI in education is advancing rapidly, but previous studies reveal differences in several aspects, particularly regarding research focus and how critical thinking skills are conceptualized. Based on the research focuses cited in this article, a number of studies have examined AI primarily in relation to the effectiveness of the technology, improvements in learning outcomes, student engagement, and learning efficiency(A. Dzogovic et al., 2024; Gligorea et al., 2023; Sabri & Wais, 2025; Sajja et al., 2024; Tanjung Dian Fitria & MM, 2024; Truong & Papagiannidis, 2022; Yıldız, 2025). These studies provide a foundation for understanding AI's potential in supporting learning activities; however, the focus on the benefits and optimization of technology use

does not, in and of itself, explain how students process AI-generated information, evaluate the accuracy of its responses, or construct arguments based on their own understanding. Thus, the issue that requires further examination is not merely whether AI aids the learning process, but rather how students' interactions with AI unfold and how these interactions relate to critical thinking processes.

From a research perspective, studies on AI in education have also expanded across various educational fields and academic (Filgueiras, 2024; Kamalov et al., 2023; A. Nguyen et al., 2023). Nevertheless, based on the literature used in this study, research that specifically examines the intersection of AI use, social studies learning in elementary education, and the experiences of PGMI students still needs to be expanded. This context has unique characteristics because PGMI students not only serve as technology users in completing academic tasks but also as future teachers who will be responsible for designing learning experiences and developing students' thinking skills. Therefore, an understanding of AI use among PGMI students must take into account the characteristics of social studies learning and its implications for students' readiness to fulfill their pedagogical roles. This cannot yet be fully explained by research findings that only address AI use in higher education in general or in different fields of study.

Another gap relates to how critical thinking skills are understood and studied; a number of studies on the relationship between technology and critical thinking tend to treat these skills as outcomes that can be measured or evaluated(Dinsmore & Fryer, 2023; Florence Ebikiemo & Eunice C., 2023; Ibnu Fitrianto & Al Mukaromah Hidayat, 2024). While this approach is important for providing an overview of the level of critical thinking skills, it may not be sufficient to explain the processes underlying those achievements. Assessment of final outcomes, for example, does not always reveal how students select questions to ask the AI, verify the accuracy of information, compare answers with other sources, consider alternative explanations, or revise arguments they have formulated. Thus, further research is needed that focuses on the process of AI use and students' learning experiences in real-world learning situations.

Based on this discussion, the research gap lies in the insufficient understanding of the connection between the context of PGMI students, the characteristics of social studies learning in elementary school education, and the process of using AI in the development of critical thinking skills. Previous research focusing on the effectiveness of technology has not directly explained the dynamics of students' reasoning when interacting with AI. Meanwhile, studies that treat critical thinking as a measurable outcome do not necessarily reveal the processes by which students examine information, construct arguments, and form attitudes toward the answers generated by AI. These gaps highlight the need for research that not only discusses the benefits or limitations of AI but also explores how students use and interpret this technology in social studies learning.

On that basis, the novelty of this study lies in its exploration of the experiences and practices of PGMI students in using AI in social studies learning oriented toward elementary school education. First, this study positions PGMI students as the subjects of the study, who possess unique characteristics as both AI users and prospective elementary school teachers. Second, this study focuses on social studies learning a context that demands the ability to interpret social phenomena, evaluate information, and construct arguments—so the use of AI must be understood in relation to these disciplinary characteristics. Third, this study explores the process of AI use, including how students utilize the generated answers, evaluate information, verify findings, and build understanding and arguments. With this focus, this study is expected to yield a contextual understanding of patterns of AI use that either support or potentially limit students'

engagement in critical thinking processes. Thus, this study does not merely evaluate AI as an effective or ineffective technology but examines how students interact with it in the practice of social studies learning within the context of teacher education.

B. METHODS

This study employs a qualitative approach using the case study method to gain an in-depth understanding of the implications of *Artificial Intelligence* (AI) use on students' critical thinking skills in the Elementary School/Madrasah Ibtidaiyah (SD/MI) Social Studies Education course(Taylor et al., 2015). The research was conducted at STIT Al Mubarok in Central Lampung within the Madrasah Ibtidaiyah Teacher Education (PGMI) program, involving students who had taken the Social Studies Learning for Elementary School/Madrasah Ibtidaiyah course and had experience using AI in academic activities. The research took place from November 2025 to March 2026.

Informants were selected using *purposive sampling*, taking into account the relevance of the students' experiences to the research focus(Creswell & Poth, 2024; Tight, 2024). A total of eight students were involved as informants based on their engagement in using AI to support learning activities and complete academic assignments. The informants in this study were PGMI (Islamic Elementary School Teacher Education) students who had taken the Elementary/Islamic Elementary School Social Studies course and had experience using AI. They were selected because they could provide relevant insights into how they used AI, how they perceived its use, and how they analyzed, evaluated, and reflected on the information it generated. The selection of eight informants was guided by the relevance of their backgrounds to the research objectives and their ability to provide in-depth information about the phenomenon under study. In a case study, the adequacy of informants is not determined solely by the number of participants but also by the relevance of their experiences and the depth of the information they provide for understanding the case.

Data were collected primarily through semi-structured interviews, supported by observation and documentation to strengthen the understanding of the research phenomenon. The interviews were conducted face to face, with each session lasting approximately 60-100 minutes. A semi-structured interview format was used, allowing the researcher to follow a prepared interview guide while asking additional questions to explore the informants' experiences, clarify their responses, and gain a deeper understanding of the information they shared. The primary research instrument is the researcher, using interview guidelines focused on three aspects: (1) patterns of AI use in social studies learning at elementary schools (SD) and Islamic elementary schools (MI); (2) students' perceptions of the role of AI in academic activities; and (3) the implications of AI use on critical thinking processes, particularly in analyzing, evaluating, and reflecting on information. Data analysis was conducted interactively through the stages of data reduction, data presentation, and drawing conclusions(Sugiyono, 2017), data validity was ensured through triangulation of sources and techniques to strengthen the consistency and credibility of the findings(Tisdell et al., 2015).

C. RESULT AND DISCUSSION

1. Patterns of Use of Artificial Intelligence in Elementary Social Studies Learning

Based on the results of the research, it was found that Artificial Intelligence (AI) has become a part that is quite close to the academic activities of PGMI students, especially in the elementary social studies learning course, students use AI in various forms of learning activities, ranging from looking for references, understanding material concepts,

compiling assignments, to obtaining ideas in designing social studies (microteaching) learning, the presence of AI is seen as a technology that is able to provide convenience, speed, and efficiency in the learning process.

Table 1. Findings of Patterns of Use of Artificial Intelligence in Social Studies Learning Courses for Elementary

Yes	Key Findings	Indications of Findings
1	AI is used as a learning resource	Students often use AI rather than books or journals as the initial search for material to find ideas or inspiration
2	AI helps in understanding the material of the Elementary Social Studies Learning Course	AI is used to summarize and simplify the material of elementary social studies courses that are considered complex
3	AI supports the preparation of academic assignments	Students use AI to search for initial references but mostly still validate the references encountered, social case examples, and ideas in interactive learning models on micro teaching and so on
4	There has been a change in the learning patterns of students	Students are used to getting answers quickly and instantly
5	Some students continue to verify information	Students compare AI answers with other journals or academic sources

The results of the interviews show that most students use *Artificial Intelligence* (AI) as the first step in understanding the material of elementary social studies courses, students feel that AI is able to provide simpler explanations than conventional academic sources which tend to be complex and take longer to search. As expressed by one of the students: "*If there is an assignment for the social studies course, I sometimes open AI first to find an overview of the material, because it is faster to understand than reading a long journal."* (Interview, M1). The statement indicates that students use AI as an entry *point* before switching to other academic sources, this phenomenon shows a shift in learning patterns in the digital era, where efficiency and speed of access to information are the main considerations. Another informant also revealed that AI helped them organize social studies materials that are broad and multidisciplinary: *"... Sometimes social studies materials are too broadly discussed, so I ask AI to summarize important points to make them easier to learn"* (Interview, M3. These findings show the role of AI as a tool to simplify complex concepts that cover social, economic, cultural, and historical aspects more systematically.

The results of this study are in line with the study by Putri & Panduwinata (2025) which explains that the use of AI provides easy access to information and supports learning effectiveness(Putri & Panduwinata, 2025). In addition to making it easier to understand the material, AI is used in the preparation of academic assignments to find references, examples of social cases, and contextual learning ideas, one of the students explained: *"Usually I use AI to look for examples of social cases or examples of social studies learning methods so that the practical tasks (microteaching) are more varied."* (Interview, M5). This statement confirms that AI is not only used to search for instant answers, but also to explore creative ideas in practicum *microteaching*. Students feel that AI helps find relevance between the material and contemporary social conditions that are appropriate to be presented in class, this shows that AI serves as a medium of knowledge exploration

that supports the development of learning(D. Nguyen et al., 2020; Sabri & Wais, 2025). The findings also strengthen the research of Putri Andani (2025) which states that AI can improve students' exploratory abilities if used reflexively (Andani & Friyatmi, 2025).

However, the use of AI is starting to influence academic culture towards more practical learning patterns, some students admit to relying more often on AI than doing independent searches through books or scientific journals, as confirmed by the following statement: *"Now if I have an assignment, I often ask AI first instead of opening a book or looking for my own journal."* (Interview, M7). This tendency indicates a risk to the depth of the learning process, where students' focus shifts to the final outcome rather than the process of academic exploration ((Gligorea et al., 2023; Sajja et al., 2024; Wang et al., 2025). This phenomenon shows that AI has changed the way students obtain information towards efficiency-based patterns (Han et al., 2024; Luo, 2023). This is in line with the research of Putra & Astuti (2025) and Cholvistria (2025) which warns that over-reliance on AI can reduce the depth of critical thinking and independent abilities if not balanced with sound analysis (Cholvistaria & Gunawan, 2025).

However, the facts in the field also show that there is a reflective awareness in some students. They do not immediately receive information from AI because they are aware of the risk of data inaccuracy. One of the students explained: *"Usually I check the answer again, because sometimes the AI answers are too general or some are not right."* (Interview, M2). This critical attitude shows that students still try to validate AI findings with original sources such as journals or official books. Another student added: *"For important tasks, usually keep looking for official journal articles or the appropriate ones, because they are afraid that information from AI is not valid, or even made up."* (Interview, M4). These findings show that the use of AI does not completely eliminate academic culture, but rather changes the pattern of access to information. Research by Siswanto & Rakha (2026) explains that the use of Generative AI in higher education has given rise to new dynamics in the student learning process(Siswanto & Rakha, 2026), while Li & Awang (2026) stated that AI can help learning efficiency, but at the same time also raises challenges related to students' reflective abilities and independent thinking(Li & Awang, 2026). In the realm of elementary social studies courses that require in-depth social analysis, dependence on technology risks hindering the development of students' interpretive skills. Overall, these findings show that AI has formed a new learning pattern among PGMI students that is complex and highly dependent on the reflective level of awareness of each individual in utilizing the technology.

2. Implications of Artificial Intelligence on the Critical Thinking of PGMI Students

The results of the study show that the use of *Artificial Intelligence* (AI) in the learning of elementary social studies courses has quite complex and substantial implications for the critical thinking ability of PGMI students. As prospective educators at the elementary school level, critical thinking skills are a fundamental instrument that students must have, because social studies is not just a memorization subject, but a discipline that requires the ability to analyze social phenomena, evaluate the validity of information, and synchronize concepts with the reality that occurs in society (Burgos-Videla et al., 2025). On the one hand, the presence of AI in the academic space acts as a catalyst that helps students obtain information quickly and expand access to knowledge widely. However, on the other hand, the intensity of the use of AI that is too high and uncontrolled triggers a tendency to think practically, which risks reducing the depth of the process of independent critical analysis in completing academic tasks. Therefore, the use of AI in this context is a very interesting

discourse because it is directly related to students' cognitive mechanisms in processing information.

Based on the results of the interviews, some students admitted that AI helps them obtain new discourses and perspectives on a certain material or social issue. AI's capacity in providing cross-perspective information is very helpful for students at the initial stage of analysis of a multidimensional problem. As expressed by one of the students (M6), *"Sometimes AI helps give you other perspectives on social problems, so I can see social studies material from several sides of your information."* (Interview, M6)

The statement indicates that in certain aspects, AI can play a role as an instrument to expand the perspective of thinking (*cognitive expansion*), students are no longer fixated on one type of information or one textbook point of view, but rather obtain alternative explanations that support their interpretive abilities on dynamic social issues. In line with this, another informant explained that AI helps in the development of argumentation when they are faced with discussion tasks that require logical reasoning, *"In discussions, I usually use AI to find additional arguments or case examples so that the answers are more complete."* (Interview, M8). These findings show that in an ideal scenario, AI functions as a tool for exploring ideas and enriching academic references. Students use this technology not to replace the cognitive process entirely, but as a medium to deepen their understanding of social studies material through the additional data presented. The results of this study are in line with the findings of Gonsalves (2026) who explained that AI can support the development of critical thinking skills if optimized as a means of information exploration and academic reflection to strengthen students' analysis base (Gonsalves, 2026). However, the results of this study also reveal an important dark side, where the use of AI triggers a tendency to think practically or instantly in most students. The availability of quick and well-structured answers makes students tend to be more comfortable with the final result (*Product*) compared to being actively involved in the process of in-depth review of learning resources (*Process*). One of the students (M3) admitted that there was a degradation of thinking motivation, *"Sometimes when you use AI you can get an answer right away, so it's lazy to think too long."* (Interview, M3)

This condition is a strong indication that the passive use of AI can degrade students' critical thinking processes, when technology is used only to take shortcuts, students lose the opportunity to practice high-level thinking skills (*Higher Order Thinking Skills*). Students become accustomed to receiving pre-arranged answers without going through a process of exploration and self-internalization. This has the potential to reduce the depth of critical thinking due to the loss of the habit of questioning, testing, or verifying the information obtained. The same thing was conveyed by other informants who showed a pattern of dependence, *"If the AI has given me a complete answer, I usually use it immediately, sir, rarely analyze it anymore."* (Interview, M9). These findings show that there are serious challenges in the academic realm of PGMI. Critical thinking essentially requires the ability of students to analyze skeptically, compare various sources, and verify data before being used as an argument. This phenomenon strengthens the results of research by Sardar Faroq Ahmd Khan et al. (2026) who assert that the reliance on instant answers due to the excessive use of AI can reduce the quality of students' critical thinking processes if not balanced with adequate evaluative skills(Sardar Faroq Ahmd Khan et al., 2026).

In addition to triggering an instant thinking pattern, the use of AI also affects students' access patterns to primary learning resources. There is a prominent tendency in the form of reduced interest in students to read scientific articles or academic literature in depth because they feel that the summaries produced by AI are sufficient for their information

needs. As stated by one of the students, *"Now I use AI more often than reading journal articles in full, because it is faster and simpler."* (Interview, M5). This change in behavior shows a shift in learning culture from what was originally based on in-depth exploration of primary sources to a learning culture that is all practical and superficial. In social studies learning, this situation needs to be a special concern for educators, because the lack of comprehensive exploration of sources can cause students' social interpretation processes to be less sharp and less grounded. Without reading the journal in its entirety, students lose an understanding of the methodology, research context, and limitations of a scientific finding.

However, this study also found an important fact about the existence of reflective awareness in some students who continue to try to maintain their critical reasoning in the midst of the onslaught of technology. They realize that the information generated by AI algorithms is limited, prone to bias, and still requires a manual verification process. This was explained by informant M1, *"I usually compare AI answers with original sources such as journal articles, for fear of inaccurate information."* (Interview, M1). This awareness of not fully accepting information without self-evaluation shows that AI can still be used critically by students who have good academic integrity and digital literacy. This reflective attitude is also supported by the statements of other informants who are aware of the intellectual risks of the technology, *"I think AI helps, but if everything is accepted immediately, it makes us think less."* (Interview, M7). These findings are in line with the research of Hao et al (2026) and Damayanti et al (2026) which emphasizes that the impact of AI is highly dependent on how the technology is positioned in the learning ecosystem. Strengthening digital literacy and academic supervision is very important so that students do not just become passive users who swallow raw information(Damayanti et al., 2026; Hao et al., 2026).

Overall, the implications of AI on the critical thinking power of PGMI students show a prominent influence and are strongly influenced by the level of individual reflective awareness. In the realm of elementary social studies courses that require in-depth social analysis, dependence on technology without cognitive filters risks hindering the development of students' interpretive powers. However, if used as a dialogue partner to expand perspectives, AI has the potential to enrich their academic insights. Therefore, the main challenge for PGMI education in the future is how to integrate AI without having to sacrifice students' critical reasoning acumen and independent thinking in understanding complex social realities.

3. Digital Literacy Challenges and Strategies in AI-Based Social Studies Learning

The findings regarding practical usage patterns and the implications of AI on the critical thinking power of PGMI students raise an urgency regarding the importance of redefining digital literacy. The main challenge in AI-based social studies learning does not lie in the availability of technology, but in the ability of students to navigate ethically and critically the *outputs* produced by algorithms. In this case, technological determinism, where technology is considered as the sole force that shapes the way of learning, must be countered by strengthening human agency through comprehensive digital literacy. This challenge is increasingly urgent because PGMI students are prospective educators who will later be responsible for instilling social values and analytical skills in elementary school students in the future.

In addition, field findings show that students realize that the use of AI does not always produce information that can be received directly without verification. One of the informants stated, *"Sometimes we use AI because it is fast, but for social studies materials*

that have many social examples, the answer is sometimes too general, so we have to check again from other sources." (Interview, M4). Another informant also revealed, *"AI helps find information, but if it is not compared to journals or books, sometimes we don't know which is correct or just a simple summary."* (Interview, M6). This statement shows that the main challenge of using AI in social studies learning is not only related to access to information, but also students' ability to select, verify, and interpret information critically.

Based on the facts in the field, the first challenge that arises is the risk of intellectual erosion due to the ease of access to information. Students are often trapped in the digital comfort zone, where the process of seeking truth (*search for truth*) is replaced by the answer search process (*search for answer*). This is in line with concerns raised in various literature that the unlimited accessibility of AI can paralyze students' intellectual fighting power in dissecting heavy literature(Bearman et al., 2023; Kaabeche, 2025; Palma, 2025). The second challenge is related to the aspects of validity and information bias, social studies is a discipline that is loaded with social values and interpretations(Karjus, 2025; Zhan & Niu, 2023). If students rely only on AI whose databases may have certain biases, then the objectivity and depth of their social analysis will be threatened, as confirmed by the M4 informant, concerns about fabricated information or AI hallucinations suggest that the challenge of validity is a real reality to be faced.

Responding to these challenges, a digital literacy strategy is needed that is integrated into the PGMI curriculum, especially in elementary social studies learning courses. The first strategy is the shift in the role of lecturers from informants to facilitators of critical thinking and data verifiers, learning no longer focuses on what the answers are, but on how the answers are obtained and verified. Lecturers must encourage students to always triangulate data, namely comparing AI answers with primary sources such as scientific journals and original textbooks, as has been done by a small number of students such as M1 and M2. This strategy is in line with the thinking of Siswanto & Rakha (2026) who emphasize that the new dynamics in higher education require a synergy between artificial intelligence and human supervision to maintain the quality of the learning process (Siswanto & Rakha, 2026)

The second strategy is the application of a problem-based learning model (*Problem-Based Learning*) or real-life case analysis that can't be solved with just a simple command (*prompt*) in AI, students must be confronted with local social phenomena that require in-depth field observation and human interpretation. In this way, AI is only positioned as an initial data collection tool, while final synthesis and decision-making remain the domain of students' critical thinking. This is supported by the opinion of Li & Awang (2026) that the efficiency offered by AI must be balanced with tasks that spur independent thinking and deep reflection in order for challenges to intellectual independence to be overcome(Li & Awang, 2026)

The third strategy is to strengthen academic ethics and information literacy from an early age, students need to be given a deep understanding of the risks of digital plagiarism and the importance of respecting the process of academic exploration. Digital literacy is not just the ability to operate software, but the ability to critically evaluate the quality of information and realize the ethical impact of the use of this technology (Andani & Friyatmi, 2025). As affirmed by Hao et al. (2026) and Damayanti et al. (2026), strong digital literacy is the main bulwark so that students do not become trapped as passive users. Ultimately, the right digital literacy strategy in social studies learning will turn AI challenges into great opportunities for improving the quality of PGMI education, where technology and human critical reason can go hand in hand to create more inclusive and deeper social understanding.

D. CONCLUSION AND SUGGESTIONS

This study concludes that the use of *Artificial Intelligence* (AI) in elementary school social studies (IPS) learning by PGMI students at STIT Al Mubarok in Central Lampung has ambivalent implications, where AI serves as an initial learning tool to simplify complex material while simultaneously risking the promotion of instant thinking patterns that reduce the depth of independent analysis. Nevertheless, students' reflective awareness in validating information through official sources is a determining factor in maintaining the quality of critical reasoning amid the rapid flow of digital information. Pedagogically, the findings regarding the students in this study highlight the importance of faculty guidance in AI use, particularly through fostering the habit of verifying information, comparing sources, and engaging in critical reflection on AI-generated answers. As a recommendation for future researchers, it is hoped that this study can be expanded by using a mixed-methods approach to quantitatively measure the impact of AI use on students' critical thinking skills, as well as to explore the effectiveness of problem-based learning models integrated with various generative AI platforms within a broader and more diverse context of teacher education.

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