

The influence of digital literacy and ChatGPT use on the critical thinking ability among library and information science students

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History:

Submitted: 18-11-2025

Revised: 16-02-2026

Accepted: 16-03-2026

Keyword:

Digital literacy, ChatGPT, critical thinking, students, linear regression

Abstract

Introduction. This study, grounded in digital literacy theory, examines how students' critical thinking abilities are shaped by digital competency and the use of generative AI in educational settings. The main objective is to determine how ChatGPT use and digital literacy together affect the development of critical thinking. The participants are the library and information science students, who are expected to demonstrate strong competencies in information technology and critical information evaluation.

Research Methods. This study employed a correlational design involving 106 third-semester students from the 2024 cohort. Responses were obtained using a 1–5 Likert-scale questionnaire.

Data Analysis. The data analysis involved multiple linear regression, Sobel mediation testing, and bootstrapping. Tests for validity, reliability, and classical assumptions were conducted, and heteroscedasticity was addressed using robust standard errors (HC3).

Results. The results highlight that digital literacy and ChatGPT use collectively accounted for 62.2% of the variance in critical thinking skills. ChatGPT use was the strongest predictor ($\beta = 0.535$) and partially mediated the relationship between digital literacy and critical thinking (indirect effect = 0.342; 95% CI = 0.192–0.455).

Conclusion. The study emphasized the importance of integrating digital literacy and ethical AI to enhance students' critical thinking skills.



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 <https://doi.org/10.22146/bip.v22i1.26210>

A. INTRODUCTION

The rapid development of information and communication technology has caused a shift in the educational context, leading to a new era of learning and information retrieval. One important discovery in this domain is Artificial Intelligence (AI), particularly generative AI such as ChatGPT. Across various academic fields, these generative AI tools are used to generate text, ideas, concepts, and explanations. Students can now use AI for various academic-related activities such as searching for quotes, constructing arguments, and even summarizing readings much more quickly. This trend indicates a paradigm shift from traditional methods of information retrieval to AI-based retrieval. Previous studies, including Dwivedi et al., (2023) and Zawacki-Richter (2024), all agree that this is not a negative thing. Rather, it is evidence of inevitable progress. This is an era where technology truly makes things easier for humans, even in terms of generating information with the help of sophisticated tools. However, it is important to emphasize that the existence of these tools should not make the generation increasingly lazy in thinking. Therefore, this department is here to provide solutions through relevant academic learning to create a balance in terms of the use of AI technology with alignment in terms of critical thinking.

On the other hand, AI tools can offer significant benefits, including increased work efficiency, accelerated completion of urgent tasks, improved work tidiness, and quick suggestions. They can even be extremely beneficial in times of unexpected work, providing a solution and providing peace of mind. However, while AI tools like ChatGPT offer convenience and numerous benefits, they still raise several concerns. Several studies have reported that uncritical use of generative AI may reduce students' depth of analysis and reflective engagement, a phenomenon often associated with cognitive offloading or automation bias (Dwivedi et al., 2023; Zawacki-Richter et al., 2024). When students rely on AI-generated responses without evaluating underlying assumptions, evidence, or reasoning, critical thinking

processes may be weakened. Conversely, when ChatGPT is used intentionally and reflectively, it can function as a cognitive scaffold that supports higher-order thinking, such as concept clarification, argumentative exploration, and dialogic learning (Martín-Alguacil et al., 2025). This highlights the crucial role of digital literacy in enabling students to critically evaluate AI-generated content and use AI tools as learning partners rather than substitutes for independent thinking.

One of the most widely utilized generative AI tools across various groups is ChatGPT, mostly due to its accessibility, free service, and user-friendliness. A large-scale study by Madzík et al. (2026) reveals that the fast-maturing process for such generative AI has reshaped access to knowledge and created cross-disciplinary innovation. The study further proposes a four-pronged value-creation conceptual model illustrating how the innovation progresses through a cycle of technological development, data and algorithm engineering, ethical and compliance screening, and adoption in domains such as education, healthcare, and business. Despite these various innovations, studies on the pedagogical integration of generative AI remain limited and context-specific. Liang & Wu (2024), for instance, report no significant increase in students' critical thinking capacity following the implementation of a ChatGPT-integrated instructional design, although students expressed increased critical thinking awareness and contextually grounded reasoning.

In contrast, a review of 30 empirical studies by Raitskaya & Tikhonova (2025) identifies a predominantly positive impact of generative AI on critical thinking, particularly in idea development, conceptualization, argument formation, and academic writing. Additionally, the review highlights the risk of cognitive offloading and the strong influence of contextual factors and instructional methods in shaping the learning process. From this perspective, generative AI poses significant potential to enhance critical thinking when embedded into structured

learning activities that promote active reasoning, metacognitive reflection, and independent thinking. The findings from the previous studies, however, reveal an important gap in the literature. While the large-scale studies collectively suggest that ChatGPT can support cognitive development, the classroom-based research indicates limited or insignificant impacts on critical thinking. Moreover, existing studies primarily focus on technological integration and instructional innovation, without systematically examining learners' competencies or addressing ethical, security, and misinformation issues required for the responsible implementation of generative AI.

Essentially, all of the above research underscores the importance of digital literacy in AI applications. Only by improving digital literacy skills will critical thinking skills be fostered, particularly in the use of ChatGPT, which is so familiar to almost everyone. Unfortunately, the available evidence base is limited and should be further enhanced by conducting more longitudinal studies and providing an enhanced formal theoretical base. In this study, generative AI is viewed based on its positive influence on students' quality of critical reasoning. In terms of academic ideas and reasoning development, however, it mostly depends on the learning context and the learning strategies used. What distinguishes this research from the previous studies is the investigation of the potential interactions between digital literacy and the usage of ChatGPT on the critical thinking capabilities of library science students. In Indonesia, specifically in the context of library training, there are limited empirical studies investigating the relationship between these three factors: digital literacy, ChatGPT use, and critical thinking skills. The present study aims to bridge this and offers a theoretical contribution to the literature related to student behaviors regarding information retrieval and cognitive processing in the era of AI. This research is important to be carried out as a form of attention in finding and maximizing solutions so that it can be used as a basis for determining the future direction of a

generation that remains intelligent and critical.

This research is grounded in the context of higher education in Indonesia, where the rapid adoption of digital technology and AI-based tools is not always accompanied by adequate training in digital literacy and critical thinking. In practice, many students are increasingly exposed to AI-generated information, but their ability to critically evaluate sources, arguments, and evidence remains uneven. This situation indicates a potential gap between technology adoption and cognitive readiness, particularly among library science students who are expected to interact critically with information. Therefore, this study aims to examine how digital literacy and the use of ChatGPT relate to students' critical thinking skills in the Indonesian academic context. The scientific novelty of this research lies in the combination of digital literacy, the use of ChatGPT, and critical thinking skills among library science students as active users of information technology. These results are expected to deepen knowledge about student academic behavior in the AI era and provide implications for the development of a critical digital literacy-based curriculum at Islamic universities, particularly the library science program at UIN Alauddin Makassar.

B. LITERATURE REVIEW

1. Digital Literacy

First appearing in Glister (1997), the term 'digital literacy' is defined as one's capability in absorbing and using information in different forms from different sources as presented on computers. Later, a definition adopted by UNESCO took up the terms competences, attitudes and, awareness that enable individuals to access and analyze digital tech in critical, ethical, and productive ways (Jones, 2018). In many contexts, information retrieval and processing are pivotal in determining the quality of human life, making digital literacy an essential skill to acquire. In education settings, Ateeq et al., (2025) noted that digital literacy refers to learners' ability to recognize, assess, and skillfully use digital technology in solving

problems. Several of these concepts agree that digital literacy is an important matter in improving human critical thinking skills. This capability includes technical expertise, critical appraisal of digital content, and the ability to implement technology-based solutions for academic assignment completion.

Furthermore, Rubin (2020) defines digital literacy as a skill to help communities navigate the complexities of digital information. Amidst the constant stream of information and increasing disinformation, digital literacy and critical thinking skills are core competencies that librarians and library science students must possess. Digital literacy is the ability that enables individuals to use technology in accessing, processing, and then utilizing retrieved information to solve real-life problems. Furthermore, Agustin & Krismayani (2019) emphasized that acquiring the ability to understand digital information became urgent due to today's ever-evolving technological developments. The core competencies referred to in this research are being studied in-depth in the library science department. Within the department, this is continuously developed and is crucial to the core curriculum because it is related to preparing prospective librarians with the moral responsibility to carry out their duties once they become librarians. These librarians will then educate users on how to use AI effectively.

On the other hand, the benefits of digital literacy skills as a provision for prospective librarians are directly related to the processing of information that will be served to users. When they have good digital literacy skills, they will automatically think critically. If so, then all information will be filtered before it reaches the user. This is a positive thing to prevent the spread of increasingly rampant false information. It also legitimizes libraries as institutions that provide valid information. This statement is supported by various studies, including research on the relationship between digital literacy and critical thinking, which has been investigated in multiple studies. For instance, a study by Putranto (2025) revealed that those students

with higher digital literacy skills tend to demonstrate better critical thinking skills for information processing. This result highlights the need for individuals to develop critical thinking skills. In the digital information age, information is abundant and complex (Redhana, 2024), causing more students to be inclined to develop critical thinking skills. This ability helps individuals distinguish fact from opinion and identify information that needs to be questioned to avoid spreading hoaxes or becoming victims of digital manipulation.

Digital literacy is, therefore, necessary for all library science students who are about to become professional librarians. Practicing librarians likewise need to continue developing this skill because they will eventually encounter challenges that require critical thinking and digital literacy skills. This illustration would require them to engage in digital literacy training and seminars and to be responsive to developments in information technology (Haryanti et al., 2025).

Drawing from theoretical works and previous studies, digital literacy can be characterized as a multidimensional competency, consisting of technical skills, critical assessment of digital information, and ethical awareness in the use of technology. In the age of information overload and disinformation, digital literacy is important to nurture critical thinking in a digital world. Digital literacy is, first and foremost, an academic foundation that is required for the students of library science. Moreover, it serves as a professional competency that must be continuously developed to support their future strategic role as information managers and assessors in society.

2. Utilization of ChatGPT

ChatGPT is one type of generative AI designed by OpenAI that generates natural text based on user input (McAdoo, 2023). In higher education, ChatGPT has been commonly integrated into several academic skills, such as writing, summarizing readings, organizing ideas, and even practicing academic conversations. Various studies

have found both potential positives and disadvantages in the use of ChatGPT among students. As an illustration, Dwivedi et al., (2023) proposes that critical applications of ChatGPT can enhance learning efficiency and expose students to different perspectives. In contrast, Zawacki-Richter et al., (2024) caution against cognitive laziness, emphasizing the risk that the analytical ability will slowly decline as we increasingly depend on instant solutions, i.e., AI-generated responses. According to the researchers, Zawacki's opinion is what needs to be underscored. This is not just an opinion but a reminder and a message of caution that even though ChatGPT makes various academic tasks easier, it is still necessary to prioritize critical thinking to maintain strong reasoning and increase brain intelligence over time. Unlike a knife that becomes blunt due to misuse, critical thinking is important.

Meanwhile, Martín-Alguacil et al., (2025) stated that ChatGPT was not positioned to replace human insight but rather served as a catalyst for inquiry and discussion among students. The study also noted that ChatGPT might encourage students to accept the output as it was, especially when answers were presented with a high degree of confidence despite containing inaccuracies or hallucinations. However, the study also showed that integrating AI into learning activities could trigger the development of critical thinking skills, as students were encouraged to question and critique the information provided.

In the context of library science students, ChatGPT can be utilized as a reflective tool for understanding information, enhancing source evaluation skills, and strengthening scientific communication skills. However, its use is strongly influenced by the user's digital literacy level. Students with high digital literacy are most likely using AI more selectively and responsibly (Kurniawan, 2025).

Theoretically, ChatGPT as a form of generative AI can serve a dual purpose in its use within higher education contexts. When it is used thoughtfully and carefully, ChatGPT can enhance education through an

increase in efficiency, a widening of the horizons, and a facilitation of higher-order thinking. On the other hand, a lack of critical inquiry may reduce students' analytical ability due to reliance on automated responses. The productive use of ChatGPT depends heavily on students' digital literacy. Particularly, it is their ability to use AI selectively, ethically, and responsibly by treating it as a tool to support learning, rather than to replace the process of thinking.

3. Critical Thinking Ability

Zyl et al., (2020) argue that critical thinking is now considered a necessary skill in the 21st-century work environment. Critical thinking makes crucial progress in enhancing the quality of argumentative voice, expression, clarity, and prose. In such situation, critical thinking contributes immensely to better arguments, clarity of expression, argumentation, and coherence, especially when it comes to composing good academic writing. By utilizing critical thinking strategies, students can reason effectively and think in a more organized and critical manner. As they analyze and assess information, they will be able to organize their thoughts and scrutinize it more analytically.

This fact implies that student engagement and analysis are the building blocks for more holistic views of their critical thinking and that critical ideas are critical for them. For instance, when students write about climate change, they need to consider different points of view, such as scientific data, public opinion, and government policy (Haliq et al., 2025). By thinking critically, students could doublecheck the reliability of information they are referring to and then argue based on verified facts. Thus, a critical thinker is well-equipped to understand information, assess its credibility, identify weak arguments, and develop evidence-supported views. Similarly, a study by Widiastuti & Kania, (2021) illustrates how students' critical thinking skills can be strengthened through digital literacy practices by engaging in active and reflective approaches to technology. These activities

may include assessing online information sources and data-driven discussions. Theoretically, critical thinking skills in the 21st century are important because they improves the quality of students' clarity of reasoning and academic coherence in their argumentation. These skills enable students to process multiple perspectives at different levels, determine how credible the source of the information might be, and develop evidence-supported arguments. Students' active and reflective engagement in digital literacy has been proven to be effective in improving critical thinking skills, especially due to the increasingly complex uses of digitally generated and processed information.

4. Intervariable Relationships

From a theoretical perspective, critical thinking skills are affected by digital literacy levels, as being digitally literate will give people better access to and the capacity to evaluate information systematically (Law et al., 2018). Meanwhile, the use of ChatGPT can either strengthen or weaken critical thinking skills, depending on how it is applied. Using ChatGPT to examine arguments, verify concepts, or seek new perspectives can improve the students' critical thinking skills (Dwivedi et al., 2023). On the other hand, learners who employ ChatGPT as a tool for copying results without thinking may experience a decline in analytical skills. When used critically, ChatGPT has been shown to serve as a cognitive scaffolding (Kasneci et al., 2023) that supports higher-order thinking processes. All in all, ChatGPT and digital literacy are two powerful aspects that can affect the critical thinking ability of library science learners. Digital literacy equips students with the ability to assess and manage information, and ChatGPT serves as a potential medium to develop this kind of higher-order thinking skill.

5. Research Conceptual Model

Based on previous theoretical and research studies, the conceptual framework of this research can be illustrated as follows:

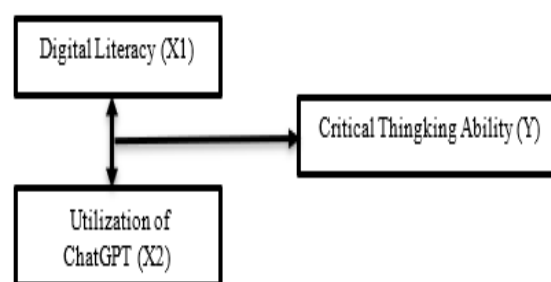


Chart: Relationship of the research variables in this study based on theories

The chart is developed based on the previous studies showing that digital literacy plays a crucial role in developing students' critical thinking skills by enabling them to critically evaluate and synthesize digital information (UNESCO, 2018). Furthermore, recent research suggested that students with higher digital literacy could use generative AI tools like ChatGPT more reflectively and ethically (Dwivedi et al., 2023). Furthermore, ChatGPT has been shown to function as a form of cognitive scaffolding that supports higher-order thinking processes when used critically (Kasneci et al., 2023). These links are outlined in the above conceptual framework. The model shows that digital literacy (X1) and the use of ChatGPT (X2) are assumed to influence critical thinking skills (Y), both partially and simultaneously.

6. Research Hypothesis

Based on the conceptual model above, the hypotheses proposed in this study are:

- H1: There is a positive and significant correlation between digital literacy and the critical thinking skills of library science students at UIN Alauddin Makassar.
- H2: There is a significant correlation between the use of ChatGPT and the critical thinking skills of library science students at UIN Alauddin Makassar.
- H3: Digital literacy and the simultaneous use of ChatGPT significantly influence the critical thinking skills of library science students at UIN Alauddin Makassar.

C. RESEARCH METHODS

1. Types and Research Approaches

This study used a quantitative approach with a correlational research design (Santoso & Madiistriyatno, 2021). This approach was selected to determine the relationship among the independent variables, namely digital literacy (X_1) and ChatGPT usage (X_2), and the dependent variable, namely students' critical thinking skills (Y). A linear regression analysis was employed to examine the extent to which digital literacy and ChatGPT usage are associated with students' critical thinking skills.

2. Population and Sample

A population is the entire group of individuals sharing specific characteristics relevant to a study, while a sample is a subset of the population (Swarjana, 2022). The population of this study involved all students of the Department of Library Science, Faculty of Adab and Humanities, UIN Alauddin Makassar, class of 2024, third semester, who were actively attending lectures in the 2025/2026 academic year.

Although the population of this study was relatively small and clearly defined, consisting of 120 third-semester library science students, a sample was drawn to ensure manageable data collection and to account for potential non-response. The sample size was determined using Slovin's formula with a 5% margin of error (Sujarweni & Utami, 2019), as follows:

$$n = \frac{N}{1 + N(e)^2}$$

The n represents the sample size, N the population size, and e the margin of error (0.05).

Therefore:

$$\begin{aligned} n &= \frac{120}{1 + 120(0.05)^2} \\ n &= \frac{120}{1 + 120(0.0025)} \\ n &= \frac{120}{1 + 0.3} \end{aligned}$$

$$\begin{aligned} n &= \frac{120}{1.3} \\ n &\approx 92 \end{aligned}$$

Although Slovin's formula has been criticized for its frequent misuse when applied without considering its underlying assumptions, it remains commonly used in survey-based educational research involving finite populations and exploratory correlational objectives. In this study, the formula was applied as a practical approximation under the assumption of maximum population variability, which is appropriate when prior information about population variance is limited. The resulting minimum sample size was 92 respondents; however, data were successfully collected from 106 students, exceeding the required threshold and thereby enhancing the statistical stability of the analysis. Nonetheless, it is acknowledged that future studies may employ alternative approaches, such as power analysis, to obtain a more rigorous estimation of sample size.

3. Data Collection Techniques

Data were collected through a closed-ended questionnaire instrument in a Likert scale format from 1 to 5 (1 = strongly disagree, 5 = strongly agree). The questionnaire was divided primarily into three sections:

- a. Digital Literacy Variable (X_1) – based on UNESCO (2018), indicators are as follows:
 1. Access to and searching for digital information.
 2. Ability to evaluate the credibility of information.
 3. Ability to apply technology effectively.
 4. Knowledge of digital ethics and security.
- b. ChatGPT Utilization Variable (X_2) – adopted from the literature (Dwivedi et al., 2023) and contains the following information:
 1. Average level of ChatGPT use for academic purposes.

2. Purpose and use cases (for ideation, writing, analysis, and learning).
 3. Dependence and critical reflection on its use.
 4. Ethical perspectives on AI output.
- c. Critical Thinking Skills (Y) variable – adapted from the framework (Kasneci et al., 2023) along with the use of indicators:
1. Analysis and interpretation of information.
 2. Evaluation and assessment of arguments.
 3. Inference and logical conclusion drawing.
 4. Reflection and self-regulation in thinking.

The questionnaire was initially piloted in a small group with twenty respondents to ensure item clarity and construct validity before being included as the main data collection instrument.

4. Validity and Reliability

To assess item-total correlations, validity testing was conducted using the Pearson product-moment correlation between the scores of each item and the total score. An item was considered valid if the calculated r value was greater than the tabulated r value ($\alpha = 0.05$). This test provides evidence of internal consistency even though it only represents one aspect of instrument validity. Reliability testing was conducted using Cronbach's alpha, with a criterion of $\alpha \geq 0.70$, indicating acceptable internal consistency. This approach assesses the extent to which each item consistently measures the intended construct.

5. Data Analysis Techniques

The data analysis was conducted in several stages:

- First, descriptive analysis was carried out to explain the data profile of respondents and the distribution of answers for each variable.
- Second, a classical assumption test was performed to evaluate the suitability of the regression model, including the

normality test (Kolmogorov–Smirnov), multicollinearity test, and heteroscedasticity test, to ensure the feasibility of the regression model (Berger & Zhou, 2014).

- Next, multiple linear regression analysis was conducted to examine how students' critical thinking ability (Y) was associated with digital literacy (X_1) and ChatGPT utilization (X_2). The equation model used was as follows:

$$Y = a + b_1X_1 + b_2X_2 + e$$

where:

Y = critical thinking ability,

X_1 = digital literacy,

X_2 = ChatGPT utilization,

a = constant,

b_1, b_2 = regression coefficients,

e = error.

The (partial) t-test was done to observe the impact of each independent variable on the dependent variable. The F-test (simultaneous) was applied to determine the combined effect of independent variables on the dependent variable. Meanwhile, the coefficient of determination (R^2) was used to determine the extent to which digital literacy variables and ChatGPT use could explain students' critical thinking competencies. All steps in the data analysis were performed using SPSS version 26.

6. Research Location and Timeline

This research took place at the Department of Library Science, Faculty of Adab and Humanities, UIN Alauddin Makassar. Data collection was carried out from October to November 2025, consisting of instrument testing, distribution of the main questionnaire, data processing, and analysis of the results.

D. RESULTS AND DISCUSSION

1. Research result

a. Descriptive Statistics

As illustrated in Table 1. Descriptive Statistics of Research Variables, all three research variables have an average score

above 3.80 on a 1–5 Likert scale. Digital literacy averaged 3.92, ChatGPT usage 3.88, and critical thinking skills 3.95. These scores indicate that all variables are in the high category, indicating that students generally have high digital literacy skills, are relatively active in using ChatGPT, and demonstrate relatively strong critical thinking skills. The range of minimum and maximum scores, which are not too far from the average, also indicates consistency of responses among respondents.

b. Reliability Test Results

Based on the research results presented in Table 2. Cronbach's Alpha Reliability Results, the reliability test showed that all variables had Cronbach's Alpha values above 0.80, namely 0.848 for digital literacy, 0.911 for ChatGPT utilization, and 0.874 for critical thinking skills. These figures indicate excellent reliability, indicating that the research instrument has excellent internal consistency and is suitable for further analysis.

c. Multiple Linear Regression Results

At the same time, the research results, as outlined in Table 3. Results of Multiple Linear Regression Analysis (Robust Standard Error), explain that digital literacy and ChatGPT usage accounted for 62.2% of the variance in critical thinking skills. The effect of ChatGPT appeared partially significant ($\beta = 0.535$), while digital literacy remained significant but with a smaller effect ($\beta = 0.317$). These results indicate that students' critical thinking skills were more influenced by ChatGPT usage than by their digital literacy levels.

d. Mediation Analysis Results

Next, the analysis continued with a mediation model as outlined in Table 4. Mediation Analysis of ChatGPT Utilization. It was found that the digital literacy coefficient decreased from $\beta = 0.659$ (total effect) to $\beta = 0.317$ (direct effect) after the ChatGPT usage variable was entered into the model. This decrease indicates a potential indirect pathway. Furthermore, high digital literacy theoretically enables students to use ChatGPT more effectively, and the use of ChatGPT will help develop critical thinking

skills. Therefore, a mediation test should be conducted to confirm whether ChatGPT usage functions as a mediator in this relationship.

The results of analysis show that the use of ChatGPT significantly mediates the relationship between digital literacy and critical thinking skills. The findings indicate that digital literacy plays an influential role in ChatGPT usage ($\beta = 0.640$), and the use of ChatGPT significantly influences critical thinking skills ($\beta = 0.535$). The Sobel test ($p < 0.001$) and bootstrapping (95% CI = 0.192–0.455) provide evidence for an indirect effect of 0.342, which is also proven significant. In addition, the coefficient of the direct effect of digital literacy decreases from 0.659 to 0.317, indicating partial mediation when the mediator is included. Therefore, it can be inferred that digital literacy improves critical thinking skills both directly and indirectly through increased ChatGPT use by students. The results show that digital literacy and ChatGPT usage significantly contribute to students' critical thinking skills. The results of multiple linear regression revealed that these two variables can explain 62.2% of the variation in critical thinking skills simultaneously. Additionally, the use of ChatGPT was found to be the most dominant factor that partially explained critical thinking skills, with a coefficient of 0.535 and a significance of 0.000, and digital literacy explained critical thinking skills with the second-largest coefficient of 0.317.

2. Discussion

a. The Influence of Digital Literacy on Critical Thinking Skills

The findings of this study indicate that there is a positive and significant impact of digital literacy on students' critical thinking skills. This finding is consistent with earlier studies (Rubin & Rubin, 2020; Redhana, 2024; Putranto, 2025) that position digital literacy as an essential competency in managing complex digital information. The findings imply that students with high digital literacy are better at evaluating the credibility of information, critically selecting sources, and transforming information into new

knowledge. However, in the multiple regression model, the effect of digital literacy on critical thinking skills decreased after the addition of the ChatGPT usage variable to the regression model (β from 0.659 to 0.317). This evidence demonstrates that the effect of digital literacy to some extent does not operate directly but is modulated by another variable: ChatGPT usage. While digital literacy proves to be a valuable foundation, it is not the sole variable that can contribute to the development of students' critical thinking, as it might be shaped by the use of digital technology.

b. The Effect of ChatGPT Utilization on Critical Thinking Skills

In this study, ChatGPT use was revealed as the most dominant factor influencing students' critical thinking skills with a regression coefficient of $\beta = 0.535$ and $p < 0.001$. This result suggests that students can be considered to be better critical thinkers when they use ChatGPT more productively, such as for understanding concepts, seeking explanations, validating understanding, or exploring alternatives to an idea. The more effectively students use ChatGPT, the better their critical thinking skills become. This is because ChatGPT can serve as a cognitive support for students to analyze, synthesize, and evaluate information. By providing rapid feedback and additional perspectives, ChatGPT assists learners' metacognitive processes that are at the heart of critical thinking. This insight supports the idea of generative AI as an intellectual partner that mediates the development of advanced cognitive skills when utilized consciously and purposefully, not merely as a tool for generating immediate responses.

c. Mediation of ChatGPT Utilization in the Relationship between Digital Literacy and Critical Thinking

Mediation analysis revealed that the interaction between digital literacy and critical thinking skills was significantly mediated by ChatGPT use. This was observed based on the indirect effect value of 0.342, which was significant in the Sobel test ($Z = 5.344$; $p < 0.001$) and bootstrapping (95% CI = 0.192–0.455). Some degree of

mediation is observed as the findings show a small reduction in the coefficient on the digital literacy effect from 0.659 (total effect) to 0.317 (direct effect) when the ChatGPT use variable is included in the model. This result illustrates that digital literacy directly enhances the acquisition of students' critical thinking skills and promotes a more effective ChatGPT use. Therefore, digital literacy is seen as a prerequisite for productive use of ChatGPT by students and consequently improves their critical thinking abilities. This finding confirms that AI applications and digital literacy collectively contribute to the development of critical thinking skills.

3. Research Implications

The findings of this study reinforce and extend recent Scopus-indexed research on AI use in higher education. Consistent with Dwivedi et al. (2023), the results confirm that ChatGPT can enhance learning outcomes when used critically, as evidenced by its strong contribution to students' critical thinking skills. However, this study also supports the caution raised by Zawacki-Richter et al. (2024), showing that without sufficient digital literacy, reliance on AI tools may reduce analytical engagement. The partial mediation effect identified in this study empirically demonstrates that digital literacy functions as a prerequisite enabling students to use ChatGPT productively rather than passively. Furthermore, the findings align with Martín-Alguacil et al. (2025), who emphasize that ChatGPT should not replace human reasoning but act as a catalyst for inquiry and reflection. Together, these results highlight the necessity of integrating digital literacy, AI ethics, and guided instructional strategies into higher education curricula, particularly in library and information science programs, to ensure that AI tools support rather than undermine students' critical thinking development.

E. CONCLUSION

This study concludes that digital literacy and the use of ChatGPT plays a significant role in shaping the critical thinking skills of library science students. The findings

indicate that both factors contribute positively to students' ability to analyze, evaluate, and reflect on information in academic contexts. Among the two variables, the use of ChatGPT emerges as a more prominent factor in supporting critical thinking when it is applied reflectively and purposefully, while digital literacy functions as a foundational competence that enables students to engage with AI tools more critically. These results suggest that critical thinking development in the AI era is not solely determined by technological access but by how students understand, evaluate, and utilize digital tools within an ethical and reflective learning framework. This means that, when students use ChatGPT without good digital literacy skills, it will have an impact on decreasing critical thinking skills. This applies in general. What is interesting from the results of this study is that when students use ChatGPT in conjunction with digital literacy, ChatGPT actually improves their critical thinking skills and tends to be strong. However, if it is not paired, ChatGPT decreases one's ability to think critically. This is proven by the results of the heteroscedasticity test. Furthermore, future researchers should investigate other factors that may function as mediators or moderators, such as learning motivation, metacognitive abilities, or AI intensity, to refine findings regarding the relationship between digital literacy and technology use and students' critical thinking skills. Educational institutions can also establish clear guidelines for the ethical use of ChatGPT and other similar AI tools. In addition, they can facilitate training, offer resources, and create support systems led by librarians, who should also be critical in guiding users in digital literacy or assessing (AI-generated) content and promoting the ethical and responsible use of ChatGPT and other AI technologies. Overall, these recommendations strategically support educational institutions to responsibly implement an AI technology integration in teaching and learning processes while also improving students' digital literacy and critical thinking skills.

REFERENCES

- Agustin, N. C., & Krismayani, I. (2019). Kemampuan literasi digital mahasiswa S-1 angkatan 2018 Fakultas Ilmu Budaya Universitas Diponegoro. *Jurnal Ilmu Perpustakaan*, 8(3), 94-107. <https://doi.org/10.14710/jip.v8i3.94-107>
- Ateeq, A. ., Almuraqab, N. A. S. ., Alfiras, M. ., Elastal, M. ., & BinSaeed, R. H. . (2025). The impact of adaptive and interactive ai tools on student learning: From digital literacy to advanced skills. *International Journal of Innovative Research and Scientific Studies*, 8(6), 961–973. <https://doi.org/10.53894/ijirss.v8i6.9775>
- Berger, V. W., & Zhou, Y. (2014). *Kolmogorov–smirnov test: Overview*. Wiley Statsref: Statistics Reference Online.
- Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., Baabdullah, A. M., Koohang, A., Raghavan, V., & Ahuja, M. (2023). “So what if ChatGPT wrote it?” Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*, 71, 102642, 1-63. <https://doi.org/10.1016/j.ijinfomgt.2023.102642>
- Gilster, P., & Glister, P. (1997). *Digital literacy*. Wiley Computer Pub. New York.
- Haliq, A. et al. (2025). Exploring the impact of critical thinking and digital literacy on students' academic essay writing skills. *Diksi*, 33(2), 143–156. <https://doi.org/10.21831/diksi.v33i2.88078>
- Haryanti, N. P. P., Suhartika, I. P., & Harsana, I. K. G. (2025). The analysis of librarian digital literacy of universities in Bali. *Berkala Ilmu Perpustakaan dan Informasi*, 21(1), 1-13. <https://doi.org/10.22146/bip.v21i1.12014>
- Jones, P. W. (2018). *International policies*

- for third world education. UNESCO, literacy and development. Routledge.
- Kasneci, et al. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences*, 103, 102274, 1-9.
<https://doi.org/10.1016/j.lindif.2023.102274>.
- Kurniawan, S. (2025). *Literasi digital untuk abad ke-21*. Pustaka Aksara.
- Law, N. W. Y., Woo, D. J., De la Torre, J., & Wong, K. W. G. (2018). A global framework of reference on digital literacy skills for indicator 4.4. 2. UNESCO Institute for Statistics. <https://unesdoc.unesco.org/ark:/48223/pf0000265403>
- Martín-Alguacil, N., Avedillo, L., Mota-Blanco, R. A., Marañón-Almendros, M., & Gallego-Agúndez, M. (2025). ChatGPT as a virtual peer: Enhancing critical thinking in flipped veterinary anatomy education. *International Medical Education*, 4(3), 1-18.
<https://doi.org/10.3390/ime4030034>.
- McAdoo, T. (2023). How to cite ChatGPT. *APA Style Blog*, 7.
<https://apastyle.apa.org/blog/how-to-cite-chatgpt>
- Peter Madzík, Lukáš Falát, Renata Skýpalová, Lenka Jašušáková, Dominik Zimon, (2026). ChatGPT in science and research: How generative AI drives innovation and knowledge development. *Journal of Innovation & Knowledge*, 12(100889), 1-19.
<https://doi.org/10.1016/j.jik.2025.100889>.
- Putranto, A., Haryati, H., Gandariani, T., Mitrayati, Siregar, Y. A. & Khaerudin, R.B. (2025). Keterkaitan tingkat literasi digital dan kemampuan berpikir kritis di kalangan mahasiswa era society 5.0. *Jurnal Pengabdian Masyarakat dan Riset Pendidikan*, 4(1), 2532–2539.
<https://doi.org/10.31004/jerkin.v4i1.1994>.
- RaitskayaL., & Tikhonovae. (2025). Enhancing critical thinking skills in ChatGPT-human interaction: A scoping review. *Journal of Language and Education*, 11(2), 5-19.
<https://doi.org/10.17323/jle.2025.27387>.
- Redhana, I Wayan. (2024). *Literasi digital: Pedoman menghadapi society 5.0*. Samudera Biru. Yogyakarta.
- Rubin, R. E., & Rubin, R. G. (2020). *Foundations of library and information science*. American Library Association.
- Safitri, F., Ramlah, R., Sandy, W., & Siregar, A. C. (2025). *Literasi digital dalam dunia pendidikan*. Sonpedia Publishing Indonesia.
- Santoso, I., & Madiistriyatno, H. (2021). *Metodologi penelitian kuantitatif*. Indigo Media.
- Sujarweni, V. W., & Utami, L. R. (2019). *The master book of SPSS*. Anak Hebat Indonesia.
- Swarjana, I. K., & Skm, M. P. H. (2022). *Populasi-sampel, teknik sampling & bias dalam penelitian*. Penerbit Andi.
- UNESCO, A. (2018). A global framework of reference on digital literacy skills for indicator 4.4. 2. UNESCO Institute for Statistics, 2. link?
- van Zyl, A., Turpin, M., Matthee, M. (2020). How can critical thinking be used to assess the credibility of online information?. In: Hattingh, M., Matthee, M., Smuts, H., Pappas, I., Dwivedi, Y.K., Mäntymäki, M. (eds) Responsible design, implementation and use of information and communication technology. I3E 2020. Lecture Notes in Computer Science(), vol 12067. Springer, Cham.
https://doi.org/10.1007/978-3-030-45002-1_17
- Weijun Liang., Yanjun Wu., (2024). Exploring the use of ChatGPT to foster EFL learners' critical thinking skills from a post-humanist perspective. *Thinking Skills and Creativity*, 54, 101645, 1-14.
<https://doi.org/10.1016/j.tsc.2024.101645>.
- Widiastuti, W., & Kania, W. (2021). Penerapan metode diskusi untuk meningkatkan kemampuan berfikir kritis dan pemecahan masalah. *Jurnal*

Pendidikan Ekonomi Indonesia, 3(2), 259–264.

<https://doi.org/10.17509/jpei.v3i2.50746>

Zawacki-Richter, O., Bai, J. Y. H., Lee, K., Slagter van Tryon, P. J., & Prinsloo, P. (2024). New advances in artificial intelligence applications in higher education. *International Journal of Educational Technology in Higher Education*, 21(1), 1-4. <https://doi.org/10.1186/s41239-024-00464-3>

TABLE LIST

Table 1 Descriptive Statistics of Research Variables

Variabel	N	Mean	Std.Dev	Min	Max
Digital Literacy (X ₁)	106	3,92	0,47	2,80	4,90
Utilization of ChatGPT (X ₂)	106	3,88	0,53	2,50	4,88
Critical Thinking (Y)	106	3,95	0,48	2,70	4,90
Digital Literacy (X ₁)	106	3,92	0,47	2,80	4,90
Utilization of ChatGPT (X ₂)	106	3,88	0,53	2,50	4,88

Source: Primary data processed, 2025

Table 2 Cronbach's Alpha Reliability Results

Variabel	Number of Items	Cronbach's α	Criteria
Digital Literacy (X ₁)	10	0,848	Reliable
Utilization of ChatGPT (X ₂)	8	0,911	Reliable
Critical Thinking (Y)	10	0,874	Reliable

Source: Primary data processed, 2025

Table 3 Results of Multiple Linear Regression Analysis (Robust Standard Error)

Variable	Coefficient (β)	Std. Error (Robust)	t-count	Sig. (p)
Constant	5,214	0,458	11,386	0,000
Digital Literacy (X ₁)	0,317	0,081	3,901	0,000
ChatGPT Utilization (X ₂)	0,535	0,083	6,425	0,000

Source: Primary data processed, 2025

Table 4 Mediation Analysis of ChatGPT Utilization

Analysis Pathway	Coefficient (β)	Std. Error	t/Z	Sig. (p)
Path a: X ₁ → X ₂	0,640	0,073	8,73	0,000
Path b: X ₂ → Y (control X ₁)	0,535	0,083	6,43	0,000
Path c: X ₁ → Y (total effect)	0,659	0,066	9,98	0,000
Path c': X ₁ → Y (direct effect)	0,317	0,081	3,90	0,000
Indirect Effect (a × b)	0,342	—	—	Significant
Sobel Test	—	—	5,344	0,000
Bootstrapping 95% CI	—	—	—	0,192 – 0,455

Source: Primary data processed, 2025