

*International Journal of Learning, Teaching and Educational Research*  
 Vol. 25, No. 9, pp. 77–89, September 2026  
<https://doi.org/10.26803/ijlter.25.9.4>  
 Received Jun 17, 2026; Revised Aug 10, 2026; Accepted Aug 11, 2026

## Exploring University Students' AI Literacy through Reflective Journals

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Citation:

Lee, J. L., & Jeong, S. H.  
 (2026). Exploring  
 University Students' AI  
 Literacy through  
 Reflective Journals.  
*International Journal of  
 Learning, Teaching and  
 Educational Research*,  
 25(9), 77–89.  
<https://doi.org/10.26803/ijlter.25.9.4>

**Abstract.** University students increasingly use generative artificial intelligence (GenAI) for academic work, yet frequent access can coexist with uncritical reliance, inaccurate output, and uncertainty about authorship and responsible use. Although AI-literacy scales identify broad dimensions of competence, fewer qualitative studies have examined how non-Science, Technology, Engineering and Mathematics students describe AI literacy after a credit-bearing course. This qualitative study explored how university students conceptualized AI literacy and AI-supported learning through end-of-course reflective journals. Using voluntary response sampling, 20 students enrolled in a regular three-credit general education course at a Korean national university consented to the study of their journals. Two findings encompassing five subthemes were identified: (1) AI literacy as critical and ethical academic competence, including competence beyond technical skill, verification and epistemic responsibility, and ethical authorship; and (2) learner-controlled AI-supported learning, including personalized learning support and human-AI collaboration. Participants described AI literacy as involving inquiry, evaluation, transparency, responsibility, and retention of human judgment. Because the study used retrospective self-reports from one course and did not triangulate journals with interviews, observations, or performance measures, the findings represent participants' perceptions rather than measured competence or causal course effects.

**Keywords:** AI literacy; university students; generative AI; qualitative thematic analysis; higher education

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## 1. Introduction

Generative artificial intelligence (GenAI) has changed the learning conditions under which university students search for information, compose texts, create visual materials, translate ideas, and evaluate academic resources (Kong, Cheung, & Zhang, 2023; Kong, Korte et al., 2025). In the current educational environment, students increasingly interact with systems that generate text, images, explanations, and other outputs in response to user input. This shift requires a broader understanding of literacy that includes not only access to information but also the ability to guide, evaluate, and reflect on AI-mediated learning processes (Laupichler et al., 2023; Yilmaz et al., 2024).

GenAI literacy has become a central concern in higher education. Ng et al. (2024) conceptualized AI literacy as a set of knowledge, skills, and attitudes that enable individuals to understand, use, evaluate, and engage with AI systems. This definition is especially relevant for university students because their use of AI often occurs in academic tasks such as writing, reading, presentation design, translation, information search, visual production, and problem-solving. Students who can operate AI tools but cannot evaluate outputs may become dependent on plausible but inaccurate information. In contrast, students who understand the affordances and limitations of AI can use these tools as resources for inquiry, revision, and self-regulated learning (Johnston et al., 2024; Ma & Chen, 2024).

The emergence of GenAI has made AI literacy more urgent because the practical problems students face are not limited to learning how to operate this tool. In everyday academic work, students may accept plausible but inaccurate explanations, cite fabricated sources, depend on generated text before developing their own position, disclose too little about AI assistance, or enter sensitive information into commercial systems. Therefore, low-barrier access does not guarantee meaningful learning. Students should identify what they need, formulate useful questions, evaluate the credibility and relevance of outputs, compare claims with reliable sources, and retain responsibility for final academic decisions. Although these practices are often discussed as prompt engineering or prompt literacy (Jeong, 2025; Nong et al., 2024), they form part of a broader academic competence involving interpretation, judgment, authorship, and ethical responsibility.

Despite the rapid growth of AI-literacy research, important empirical and methodological gaps remain. Survey scales identify broad patterns of knowledge, use, evaluation, and ethics, but they provide less detail about how students themselves interpret AI-supported learning, uncertainty, verification, and responsibility. Qualitative evidence is also limited for non-STEM students, whose AI literacy develops through ordinary academic tasks rather than technical training. To address these gaps, this study examined how students in a credit-bearing introductory AI course described AI literacy in their own reflective journals. AI literacy was treated as the focal construct rather than a directly measured performance outcome.

### 1.1 Research Questions

**RQ1:** How do university students describe AI literacy after completing a GenAI-supported university course?

**RQ2:** Which dimensions of AI literacy are evident in students' reflective journals, particularly in relation to learning support, verification, ethical use, and human agency?

## 2. Literature Review

AI literacy has increasingly been conceptualized as a multidimensional form of competence rather than a narrow set of technical skills. Early discussions of digital competence often emphasized access, operation, and information handling. Recent work on AI literacy in higher education has expanded this focus to include conceptual understanding, practical application, critical evaluation, ethical judgment, and responsible participation in AI-mediated environments.

Kong, Cheung, and Zhang (2023), for example, showed that AI literacy education can support university students' conceptual understanding, sense of empowerment, and ethical awareness, suggesting that AI literacy should be treated as an educational outcome that integrates knowledge, practice, and responsibility. Similarly, Kong, Korte et al. (2025) argued that AI literacy is becoming a necessary educational skill because AI systems increasingly shape how learners access information, communicate ideas, and make decisions. This broader understanding is particularly important in university contexts, in which students are expected not only to use AI tools efficiently but also to evaluate their limits and consequences.

A major contribution of recent AI literacy research is the effort to clarify the dimensions that constitute AI literacy. Ng et al. (2024) proposed an affective, behavioral, cognitive, and ethical approach, emphasizing that AI literacy encompasses learners' feelings toward AI, their use of AI, their understanding of AI systems, and their ethical decision-making when interacting with AI. This framework is useful for higher education because students' engagement with AI is rarely limited to technical operations. Students may use GenAI to search for explanations, produce drafts, revise language, create multimodal outputs, or receive feedback. However, these practices require judgment about accuracy, authorship, transparency, and appropriate dependence. Therefore, AI literacy should be understood as a layered competence that connects knowledge of AI systems with reflective and responsible use in academic learning.

Several studies have attempted to operationalize AI literacy through measurement instruments. Laupichler et al. (2023) developed a scale to assess AI literacy among non-experts, Hwang et al. (2023) proposed a digital literacy scale for college students in the AI era, and Ma and Chen (2024) developed and validated an AI literacy scale for Chinese college students. Nong et al. (2024) and Gümüş and Kara (2025) extended this measurement work. Research in Korean university contexts has likewise examined students' AI-literacy perceptions and the relationship of prior coding or AI learning to those perceptions (Lee et al., 2024; Lee & Davis, 2025). These studies provide structured ways to identify AI literacy

as a measurable construct. However, scale-based evidence may not fully capture how students interpret uncertainty, verification, authorship, and the meaning of AI used in their own learning.

Research on generative AI in higher education further demonstrates that AI literacy is closely connected to students' perceptions, learning practices, and academic decision-making. Chan and Hu (2023) reported that students recognize both the benefits and challenges of generative AI in higher education, including its usefulness for learning support and its risks for academic integrity, accuracy, and overreliance. Johnston et al. (2024) similarly showed that students' perspectives on generative AI are complex, combining interest in the educational possibilities of AI with concern about appropriate use. Yilmaz et al. (2024) added that acceptance of generative AI is an important factor in understanding whether and how students are likely to integrate AI tools into learning. Both of these studies suggest that AI literacy education should not assume that students are either passive users or resistant observers but rather that they actively interpret AI tools through their learning goals, academic tasks, and ethical concerns.

Recent studies also indicate that AI literacy must include awareness of reliance, verification, and epistemic responsibility. Hou et al. (2025) developed a measure of undergraduate students' reliance on generative AI during problem-solving, showing that reliance itself has become an important educational issue. If students accept AI-generated responses without verification, AI use may weaken inquiry, reduce independent judgment, or reproduce inaccurate information. Conversely, when students compare AI outputs with textbooks, official sources, academic databases, and their own disciplinary understanding, generative AI can become a starting point for deeper learning rather than a replacement for it. This distinction is central to AI literacy because responsible AI use depends on learners' ability to recognize both the usefulness and the fallibility of AI-generated information.

The ethical dimension of AI literacy has received increasing attention in research, institutional guidance, and education policy. Christ-Brendemühl (2025) showed that university guidelines commonly address responsible use, transparency, and academic integrity, while Lee and Jeong (2023) demonstrated the growing policy salience of AI education in South Korea. Ng et al. (2024) positioned ethics as a core dimension of AI literacy, and Kong, Cheung, and Zhang (2023) reported that AI-literacy education can strengthen ethical awareness. Therefore, ethical AI use should not be treated as a rule-based topic added after technical instruction. It should be embedded in decisions about prompting, revising, citing, disclosing, and evaluating AI-supported work.

Although existing studies have advanced the conceptualization and measurement of AI literacy, several gaps remain. First, much of the literature relies on survey instruments or policy-oriented analysis, which are useful for identifying broad patterns but less effective for revealing how students narrate their own AI-related learning experiences. Second, studies of generative AI often emphasize tool affordances, acceptance, or institutional challenges. In contrast, fewer studies examine how students describe the development of AI literacy after participating

in an AI-supported course. Third, more qualitative evidence is needed from non-STEM university students, whose AI literacy may develop through everyday academic tasks rather than through technical training. Reflective journals can address this gap by allowing students to describe how they understand AI, how they use generative AI in learning, the risks they notice, and how they position themselves in relation to AI-generated outputs.

Based on this literature, the present study examined university students' AI literacy through reflective journals written after a generative AI-supported learning experience. The study was grounded in the view that AI literacy is a multidimensional educational construct involving conceptual understanding, practical use, critical verification, ethical awareness, and human agency. By focusing on students' reflections, the study complements existing scale-based and policy-oriented research and provides qualitative insight into how students make sense of generative AI within their learning. This approach is directly aligned with the research questions because it investigated how students perceive AI literacy and what their reflections reveal about AI literacy education in higher education.

### 3. Methodology

This study employed a qualitative design to examine university students' descriptions of AI literacy in a GenAI-supported learning context. The data-collection instrument was an end-of-course reflective journal containing guided open-ended prompts. The open-ended written responses refer to entries within the reflective journals, not to a separate instrument or dataset. This design was appropriate for examining how students interpreted and described their experiences; it was not intended to test a causal relationship or objectively measure AI competence.

#### 3.1 Course Design

The study was situated in a regular three-credit general education course, *Introduction to Artificial Intelligence*, delivered face-to-face during a semester at a national university in Korea in 2025. The study examined this documented, credit-bearing course offering as its instructional context, rather than treating it as a newly developed or formally validated research intervention. It targeted undergraduate students from non-STEM disciplines and assumed no prior academic background in programming, mathematics, or computer science. Its documented content covered the historical emergence of AI, foundational concepts, basic operating mechanisms, machine learning, deep learning, large language models, and GenAI, together with social, cultural, ethical, educational, and occupational implications. The present study examined this course as the instructional context and did not claim that the course itself undergoes a separate research-specific validation process.

The course incorporated lectures, discussions, collaborative activities, problem-solving exercises, and project-based learning. Students used general-purpose GenAI functions for text-based questioning, concept explanation, writing feedback, and multimodal project development related to their academic interests or prospective fields of study; their projects included presentation and video

outputs. These disciplinary applications were completed within the single course and did not represent data from additional courses. Because platform-level usage was not part of the analyzed dataset, and product names were not consistently reported in the journals, the study reported GenAI use by function and did not attribute the findings to a specific commercial tool. The course provided a structured context for students to connect AI concepts with academic practices. However, the study did not infer individual development or course effectiveness from the reflective data alone.

### **3.2 Data Collection and Analysis**

At the end of the course, students were invited to submit a reflective journal addressing three areas: (1) how they understood AI literacy, (2) how they had used GenAI to support learning, and (3) how they interpreted the ethical boundaries of AI use. Students were asked to describe concrete learning experiences and explain their reasoning. The journal was submitted once at the end of the course rather than after each course unit. Participation in the research was voluntary, and students were informed that participation would not affect their grades or academic evaluation.

The accessible course group comprised 30 non-STEM undergraduate students enrolled in the course. Of these students, 20 voluntarily consented to the use of their journals. The source of the qualitative data was therefore the 20 participating students; the collection instrument was the guided reflective journal; and the textual entries contained in those journals constituted the dataset. Demographic characteristics that were not collected in the original study were not retrospectively inferred.

Thematic analysis was conducted following the general procedures described by Vaismoradi et al. (2013). First, all journal entries were read repeatedly for familiarization. Second, initial codes were assigned to meaningful statements concerning AI education, prompt use, question generation, feedback, writing, disciplinary application, verification, authorship, transparency, responsibility, and human agency. Third, related codes were grouped into candidate themes. Fourth, the candidate themes were checked against the full dataset to ensure that they represented recurring patterns rather than isolated comments. Fifth, the themes were refined, organized into two overarching findings, and interpreted in relation to the research questions and AI-literacy literature.

Trustworthiness was supported through repeated engagement with the full dataset, an explicit code-to-theme procedure, and the use of representative participant quotations. Identifiers such as S1, S2, and S14 were used as anonymous source markers. The reflection prompts were conceptually aligned with the research questions. Accordingly, the findings are reported as thematic interpretations of participants' written perceptions, not as direct measures of AI competence.

## 4. Findings

The analysis produced two overarching findings, comprising five subthemes. The first finding, AI literacy as critical and ethical academic competence, included verification and epistemic responsibility, and ethical authorship. The second finding, learner-controlled AI-supported learning, included personalized learning support and human-AI collaboration. This structure distinguishes how participants conceptualized AI literacy from how they described enacting it.

### 4.1 Finding 1: AI Literacy as Critical and Ethical Academic Competence

#### 4.1.1 *AI literacy is more than technical skill acquisition*

Across the reflections, students defined AI education as broader than simply learning to use software, code, or technical systems. Rather than treating AI literacy as a purely instrumental skill, students described it as a capacity to understand AI, use it critically, and make informed judgments about its outputs. A student wrote that AI education is “not simply about learning technology, but about developing the ability to understand and critically use artificial intelligence” (S1). Another student similarly defined AI education as “not merely learning AI technology but developing the ability to think and solve problems together with AI” (S14). A third student described AI education as “not limited to coding or algorithm learning,” but as including an understanding of AI’s social and educational implications.

These responses indicate that students’ understanding of AI literacy extended beyond operational competence. Students did not only emphasize how to operate AI tools; they also emphasized interpretation, judgment, and responsible use. This was especially visible in reflections that described AI education as a form of literacy. One student characterized AI education as an “expansion of intellectual literacy,” arguing that education should cultivate the ability to question and verify AI-generated outputs through human judgment (S6). Another described AI education as learning to understand AI’s principles and limitations while using it appropriately as a learning tool (S15). This subtheme suggests that students framed AI literacy as a multidimensional educational goal involving technical understanding, critical thinking, ethical responsibility, self-directed learning, and human judgment.

#### 4.1.2 *Verification and epistemic responsibility*

This subtheme concerned verification, fact-checking, and critical distance from AI-generated outputs. Students repeatedly noted that generative AI can produce inaccurate, fabricated, or biased information. As a result, they emphasized the need to verify AI output through textbooks, official sources, academic databases, or other reliable materials. One student wrote that generative AI provides fast and convenient answers, but “its content is not always accurate,” so users must judge and verify the information themselves (S1). Another stated that AI may produce hallucinations and that information or numerical data provided by AI should not be trusted without checking official academic databases or books (S2). A further reflection similarly noted that AI can present false information plausibly and that statistics or quotations provided by AI must be checked against sources (S14).

Students argued that simply accepting AI answers could weaken learning, whereas comparing AI outputs with textbooks, official data, or an individual's own understanding could strengthen critical thinking. For example, one student described using AI to organize information on a public administration topic, then checking actual statistical data and rewriting the material in their own words (S16). Another wrote that, in history or ethics learning, AI explanations should not be accepted as they are but compared with additional sources (S5). This subtheme suggested that students' AI literacy included an epistemic dimension: students recognized that AI-generated information requires evaluation.

#### *4.1.3 Ethical authorship and transparent AI use*

Ethical use was another central subtheme across the reflections. Students repeatedly argued that AI should not replace learners' own thinking, writing, or academic responsibility. Ethical AI use was described through several related principles: avoiding plagiarism, disclosing AI use, maintaining authorship, protecting privacy, respecting copyright, and ensuring that the final work reflects the student's own understanding. A student wrote that submitting AI-generated writing without revision is academic misconduct and that students must reconstruct it in their own language (S1). Another student stated that copying AI-generated text into an assignment is "no different from plagiarism" and that students should clearly disclose which parts were supported by AI and for what purpose (S2).

Transparency was also emphasized. Students suggested that AI use should be acknowledged in assignments through notes, comments, or explanations of how AI was used. One reflection stated that if AI assistance was used, the student should indicate this use to maintain academic honesty and trust with the instructor (S14). Another emphasized that the scope of AI use, such as idea generation or proofreading, should be specified in academic work (S4). The ethical subtheme also included privacy and copyright. One student cautioned against entering sensitive personal information, unpublished research data, or private course materials into AI systems because such data could be reused or stored (S3).

## **4.2 Finding 2: Learner-controlled AI-supported learning**

### *4.2.1 Generative AI as a personalized learning partner*

Students frequently describe generative AI as a learning assistant, tutor, partner, or guide. Their examples showed that AI was used to support concept clarification, writing revision, argument development, learning design, language learning, and disciplinary understanding. One student wrote that when difficult concepts arose in class, they asked the AI to explain them in simpler terms and then asked follow-up questions to deepen their understanding (S1). AI was also described as a writing and feedback tool. Students reported using AI to check sentence flow, identify logical gaps, suggest counterarguments, and improve drafts. One student wrote that after drafting a report, they asked AI to evaluate whether the logical flow was natural and whether the argument was clear (S16). Another described entering their own argument into AI and asking it to identify weaknesses or possible counterarguments, thereby strengthening the final reasoning (S2). In these cases, AI was not described as producing the final assignment independently, but as providing feedback on student-generated work.

All discipline-specific examples in this subtheme were applications discussed in projects and reflections produced within the same *Introduction to Artificial Intelligence* course; they were not collected from additional courses. Some reflections also showed discipline-specific applications. A law-oriented reflection described using AI to summarize legal facts, compare lower-court and supreme court reasoning, and identifying tensions between traditional custom and constitutional values (S6).

A humanities-oriented reflection described using AI to reorganize philosophical concepts, compare thinkers, and conduct dialogic argument practice (S13). An early childhood education example described using AI to explain difficult educational concepts and organize possible causes of children's selective eating practices, after which the student added their own interpretation (S15). These examples suggest that students' AI literacy involves contextualizing AI use within their own learning needs and academic fields.

#### 4.2.2 Human agency in human-AI collaboration

The final subtheme integrated the previous findings by showing that students often conceptualized AI literacy as a form of human-AI collaboration. AI was valued as a powerful tool, but students repeatedly emphasized that the human learner must remain the subject of judgment, interpretation, and final decision-making. Several students described AI as a tool that expands rather than replaces human thinking. One reflection stated that "AI is not replacing my brain but should be a lever that expands my brain's ability" (S3). Another student wrote that AI should be used not as a simple answer provider but as a supplementary tool to expand thinking (S1).

Students also emphasized the importance of preserving subjectivity. One student summarized that AI should be a framework provider or editor that identifies gaps in a student's draft, rather than a substitute that fills in the student's thinking (S13). These statements suggest that students were developing a view of AI literacy centered on controlled, reflective, and intentional use. Considered together, the reflections suggest that students' AI literacy was not simply about knowing how to operate AI tools. It involved a developing understanding of how to position oneself in relation to AI: as a questioner, evaluator, author, ethical user, and decision-maker.

## 5. Discussion

The first research question examined how students described AI literacy after completing a GenAI-supported course. The first overarching finding showed that participants conceptualized AI literacy as critical and ethical academic competence rather than as a narrow technical skill. Their journals emphasized understanding AI, verifying outputs, maintaining authorship, using AI transparently, and retaining responsibility for academic judgment. This interpretation is consistent with the account by Ng et al. (2024) of AI literacy as a combination of affective, behavioral, cognitive, and ethical dimensions.

The second research question examined the dimensions of AI literacy evident in students' reflective journals. The second overarching finding, learner-controlled AI-supported learning, integrated two related subthemes: personalized learning support and human-AI collaboration. Students described cycles of question formulation, feedback, revision, verification, and reflection in which AI could support learning without replacing the learner's final judgment. Prompt writing therefore appeared in the journals not merely as a technical procedure but as a form of question-driven academic communication.

The findings also clarify the role of generative AI as a learning partner. Students used AI to simplify difficult concepts, receive feedback on writing, identify weaknesses in arguments, compare perspectives, and apply ideas within disciplinary contexts. These practices show that generative AI can support learning when students use it as a dialogic resource rather than as a substitute for thinking. This supports prior work on AI-supported and technology-mediated learning. The present findings add that the educational value of AI depends on the learner's ability to define goals, interpret responses, and retain responsibility for final judgment (Cardon et al., 2023).

Verification emerged as one of the strongest dimensions of AI literacy. Students recognized that AI-generated outputs can be inaccurate, fabricated, or misleading, and they emphasized the need to check information against textbooks, official sources, academic databases, and their own understanding. This finding is important for higher education because it shows that AI literacy must include epistemic responsibility. Students need to distinguish between convenience and credibility, speed and accuracy, plausibility and evidence. AI literacy education should therefore teach verification not as an optional add-on but as a central academic practice (Chan & Hu, 2023).

Ethical responsibility and transparency were also core dimensions of students' AI literacy. Students repeatedly emphasized that AI should not replace their own thinking or writing. They associated responsible AI use with avoiding plagiarism, acknowledging AI assistance, protecting privacy, respecting copyright, and reconstructing AI-supported material in their own language. This finding suggests that students can develop nuanced ethical understandings when they are invited to reflect explicitly on AI use. It also implies that university policies should be accompanied by pedagogical guidance. Rules alone may not be sufficient; students need opportunities to discuss what responsible AI use entails in actual academic tasks (Christ-Brendemühl, 2025).

## 6. Conclusion

This study contributes context-bound qualitative evidence about how 20 voluntary participants in one university course described AI literacy in end-of-course reflective journals. Their accounts identified two overarching findings. First, participants conceptualized AI literacy as critical and ethical academic competence involving more than technical operation; they emphasized verification, epistemic responsibility, authorship, transparency, and informed judgment. Second, they described learner-controlled AI-supported learning in

which GenAI could provide explanation, feedback, and discipline-related support without replacing the learner's final decisions. Collectively, the findings show that participants associate responsible AI use with active questioning, source checking, revision, disclosure, and preservation of human agency. This interpretation extends scale-based accounts by illustrating how these dimensions were expressed in students' own written reflections. For higher education, the study suggests that AI literacy should be approached as an integrated academic practice rather than as stand-alone tool training.

The value of AI support, as represented in these accounts, depended on whether learners continued to formulate questions, inspect evidence, explain revisions, and make accountable decisions. This learner-controlled orientation offers a practical basis for connecting conceptual knowledge, academic practice, and ethical responsibility within AI-literacy education. However, the findings document articulated perceptions within one course; they do not demonstrate performance-based competence, change over time, or causal effects of the course.

## 7. Limitations and Future Research

Several limitations constrain the interpretation and transferability of the findings. The study involved a voluntary sample of 20 students from a single course at one Korean university and relied on one retrospective, self-reported data source. Journals were submitted at the end of the course, which may have introduced recall and self-presentation bias. The data was not triangulated with interviews, focus groups, observations, usage logs, or performance measures. The results therefore should not be generalized to all university students or interpreted as causal evidence. Future research should collect staged or unit-based reflections, combine multiple data sources, include performance-based tasks, and examine AI-literacy practices across institutions, disciplines, and time.

## Conflict of Interest

The authors declare that they have no conflicts of interest.

## 9. Acknowledgments

The authors acknowledge the use of Grammarly during the preparation of this manuscript. The tool was used solely to improve the language, grammar, and overall readability of the manuscript.

## 10. Funding

This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2026S1A5A8003870).

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