

Current Research and Critical Reflections on AI Ethics Literacy Among University Students*

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As artificial intelligence (AI) becomes embedded in university students' learning, social interactions, and knowledge production, ethics education is shifting from general warnings about risks toward contextual judgment and responsible practice. This article reviews the conceptual foundations, research themes, measurement approaches, and educational strategies addressed in the literature on university students' AI ethics literacy published between 2021 and 2026. Research has expanded from broad normative discussions to literacy frameworks, student experiences, and educational assessment. However, studies remain inconsistent in their treatment of ethical knowledge, value orientations, judgment, and behavior. Science and technology ethics, digital ethics, and AI ethics are related but not interchangeable. Distinctions must also be maintained between self-reports and actual competence, and between institutional compliance and ethical judgment. Future research should examine students' specific contexts of AI use, establish the applicability of assessment instruments, develop longitudinal and behavioral evidence, and incorporate student participation into educational governance. These efforts can help move research on ethics literacy beyond normative advocacy toward educational practices whose processes and outcomes can be explained and evaluated.

Keywords: university students, AI ethics literacy, ethics education

Introduction

The educational significance of AI lies not only in improving the efficiency of information processing but also in changing how students acquire knowledge, complete tasks, and assume responsibility. When students use generative AI to develop outlines, explain concepts, analyze data, or revise texts, the boundary between technological assistance and the displacement of human agency often requires judgment in relation to the task. Students may be proficient in operating a tool without understanding how training data relate to output bias. They may also endorse academic integrity without knowing which forms of collaboration require disclosure. These issues make university students' AI ethics literacy an important research topic connecting technology use, moral development, and university governance.

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Chinese-language research provides substantial normative resources for examining this topic. Lu and Cui (2022) reviewed AI ethics research in China in terms of its development, risk governance, the responsibilities of different actors, and the causes of ethical problems. They also identified shortcomings in translating theory into practice, organizing the field, and achieving balanced coverage of research subjects. Xu (2021) further examined the distance between ethical principles and technical implementation, emphasizing the need to reconcile competing interests within complex social systems. These studies indicate that ethical problems cannot be resolved simply by listing principles. However, their primary focus is AI and its social implications; they do not directly establish what university students know, how they make judgments, or whether they can consistently act responsibly.

This article examines literature on university students' AI ethics literacy from 2021 to 2026 and reviews 25 particularly relevant publications. It focuses on conceptual meanings, research developments, and limitations in existing studies, and considers directions for improving research and educational practice.

Conceptual Meanings and Related Distinctions in AI Ethics Literacy

From AI Ethics to Individuals' Ethics Literacy

Research on AI ethics and AI literacy provides two main routes to understanding ethics literacy. The former examines the value commitments guiding technological development, the limits of acceptable risk, and the allocation of responsibility; the latter addresses the capabilities people need to understand, use, and evaluate technology. In their review of 47 publications, Almatrafi, Johri, and Lee (2024) identified constructs including recognition, understanding, application, evaluation, creation, and ethical action, demonstrating that ethics has become part of the broader discussion of AI literacy. Nevertheless, including ethics as a dimension does not establish an independent, unified concept of ethics literacy, nor does it mean that different scales measure the same competence. Li, Wang, and Zhang (2023) proposed four overarching components for students in higher vocational education: knowledge, thinking, skills, and ethics. Their ethics component includes attitudes, responsibility, and political thought, with an emphasis on information security, self-regulation, and social responsibility. Liu (2025), in a study of university students' digital ethics literacy, identified four aspects: digital security literacy, digital value principles, digital conduct norms, and digital responsibility. These frameworks organize their concepts around competence structures, value requirements, or practical activities. Although each offers useful insights, their organizing principles differ; the presence of four components in each does not establish a common structure. The literature has not yet reached a unified conceptual definition. Concepts therefore need to be understood in relation to the populations and educational contexts being studied, rather than equating proficiency with tools with ethical competence (Almatrafi et al., 2024; Li et al., 2023; Liu, 2025).

Technical Understanding as a Condition for Judgment Rather Than a Sufficient Guarantee

AI ethics literacy differs from general moral literacy because ethical problems are often shaped jointly by specific technical mechanisms and arrangements for use. From an educational perspective on explainable AI, Hoel et al. (2022) argued that understanding how machine learning and related technologies work can provide a cognitive foundation for explainability and trustworthy use. For university students, this does not mean that everyone must become an algorithm engineer. Rather, students need to understand data provenance, model limitations, output uncertainty, and the consequences systems may have in different contexts. Technical knowledge should support judgment; familiarity with terminology cannot substitute for ethical learning. Nor can

it be assumed that greater technical understanding necessarily produces more ethical behavior. Drawing on a sociotechnical systems perspective, Meng (2022) examined the dual character of AI and its ethical design, showing that technological activities cannot be understood apart from human practice and social conditions. Sun et al. (2021) discussed value-sensitive design, design for transparency, and moral learning design, offering ways to understand how values enter technological systems. These accounts support attention to the responsibilities of designers and users, but they do not establish that individuals' ethics literacy directly determines a system's moral quality. Organizational incentives, data conditions, and institutional arrangements also influence system performance.

Endorsement of Ethical Principles Is Not Equivalent to Contextual Judgment

Ethical principles must be distinguished from the contexts in which they are applied. In discussing approaches centered on positioning, embedding, and normativity, Dai (2023) highlighted the difficulties faced by general solutions and offered an alternative perspective informed by moral particularism. For university education, this suggests that recalling principles such as fairness, transparency, and responsibility is not equivalent to resolving real problems. For example, the same writing-assistance function may be subject to different requirements in language exercises, research reports, and creative writing competitions. Sound judgment requires knowledge of rules as well as an understanding of task purposes, disclosure requirements, and effects on others. Ethical responsibility also needs to be considered throughout the identification of problems, the making of choices, and responses to their consequences. Tian et al. (2023) emphasized the value-oriented character of AI ethics education and the importance of multidisciplinary collaboration, contributing to discussions of educational goals in Chinese universities. This suggests that values education must be embedded in specific learning processes. General endorsement of values cannot directly demonstrate mature judgment in AI-related situations. How principles are understood and applied in tasks remains an empirical question.

Major Developments in Research on University Students' AI Ethics Literacy

From General Accounts of Risk to Educational Relationships and Specific Tasks

Early and foundational research primarily approached the topic through social and ethical risks. Zhang, Liu, and Chang (2021) examined the ethics of AI in education in relation to changes in educational actors and their relationships, emphasizing adjustments to educational settings and behavioral norms. Yu and Liu (2022) proposed governance measures addressing educational data, recommendation algorithms, the digital divide, and socioemotional issues. An important contribution of these studies is that they extend ethical concerns beyond isolated questions of personal morality to educational relationships mediated by technology. Yet the existence of risk provides a rationale for ethics literacy education; it does not directly demonstrate a deficiency in students' literacy, much less establish its magnitude. Zhang and Jia (2021) analyzed the social and ethical dilemmas of AI at three levels: improving efficiency, supporting decisions, and replacing human decision-making. They emphasized that different degrees of human-AI interaction entail different risks. This perspective helps distinguish students' contexts of use. Searching for information, asking a system for alternative explanations, and allowing a system to make judgments on one's behalf involve different responsibilities. Research on ethics literacy therefore needs to ask both which tools students use and which tasks they delegate, while examining whether students retain the capacity to verify, question, and make final decisions.

Generative AI has made responsibility for knowledge production more salient. Jiang (2023) discussed difficulties concerning knowledge selection, trust, and intellectual property arising from the combination of AI

and the internet. In university learning, this discussion suggests that academic integrity involves more than avoiding the copying of others' words: it also requires verifying sources, identifying fabricated content, disclosing technological assistance, and assuming responsibility for the final text. Public communication research provides another set of issues relevant to students' everyday activities. Lin et al. (2021) analyzed public perceptions and value judgments through Weibo discussions of prominent events involving intelligent technologies, finding differences in the concerns of different groups of participants. Wei and Chen (2023) examined ethical issues arising from instrumental rationality, data use, and algorithmic recommendation in news communication. The former study sampled participants in online discussions, whereas the latter was primarily normative. Neither can directly establish university students' levels of ethics literacy. Nevertheless, they suggest that students may not only receive AI-generated content but also redistribute and reproduce it. Research should therefore examine how students verify sources, recognize bias, and articulate their responsibilities in communication.

The Gap Between University Students' Understanding of AI Ethics and Their Actual Choices

Feng and Zhu (2021) surveyed four universities in Shanghai's Fengxian district and obtained 516 valid responses. They examined students' understanding of science and technology ethics and conflicts of interest, identifying inconsistencies between ethical understanding and specific choices. Based on 282 valid questionnaire responses, Hu and Qiu (2022) examined students' awareness of science and technology ethics in application-oriented universities. They found that endorsement of values, attention to ethical issues, and acquisition of relevant knowledge did not necessarily develop in parallel. These findings suggest that education should examine reasoning and choices in specific situations rather than assessing only agreement with principles. Research on digital ethics has advanced the operationalization of relevant concepts. Using a self-report questionnaire with 27 core items and 1,225 valid responses, Liu (2025) examined university students' digital ethics literacy in terms of security, values, conduct, and responsibility. This study represents an effort to move from theoretical components to questionnaire-based analysis and also considers university educational systems and supportive environments. Its scores, however, primarily reflect students' reports of their own performance and cannot directly substitute for competence tests involving AI-related tasks. Favorable internal consistency and exploratory structural analysis likewise do not establish validity across all populations and technological contexts.

Research on University Students Broadens the Contexts of AI Ethics Education

Ying (2026) reviewed 38 empirical studies related to student experiences, revealing the complexity of university students' positions on generative AI and academic integrity. Students do not simply choose between complete acceptance and outright rejection. They distinguish among uses such as having an entire text written for them, revising language, and developing ideas, and interpret boundaries when rules are unclear. These findings shift the focus of ethics literacy research from whether students obey regulations to how they understand originality, learning purposes, and intellectual labor, and how they maintain responsibility for their work. The review also identifies potential gaps between students' ethical awareness and their reported practices, with academic pressure, peer norms, and institutional information associated with these gaps (Ying, 2026). The problem therefore cannot be attributed entirely to deficiencies in students' moral character. At the same time, contextual explanations should not become grounds for absolving responsibility. Research needs to distinguish among not knowing the rules, being unable to judge conflicts, knowing the requirements but lacking the conditions to act on them, and knowingly choosing an inappropriate course of action. Different mechanisms call for different educational responses; a general appeal to raise awareness cannot address them all. Wiese et al.

(2025) analyzed AI ethics education in terms of content, assessment, and pedagogy. They found that cases, group projects, and practical activities play important roles, while formative assessment and alignment with learning objectives remain insufficient. Their review encompasses different educational levels. Its findings can inform university teaching design, but not all results can be attributed to university students. In particular, increased satisfaction at the end of a course or differences between pre- and post-tests represent different levels of evidence from demonstrating that students can independently make ethical judgments in unfamiliar situations. In undergraduate academic writing, Lan et al. (2026) discussed themes including ethical concerns, fragmented policies, and prompting competence, recommending a shift from risk prevention toward capability development. Taken together, educational studies offer a range of teaching approaches, but what a course provides, what students learn, and how long that learning persists remain distinct questions.

Assessment Research Is Beginning to Examine the Instruments Themselves

Lintner (2024) evaluated the quality of 16 AI literacy instruments examined in 22 validation studies, including 13 self-report instruments and three performance-based instruments. Evidence for structural validity and internal consistency was relatively common, whereas other measurement properties had received less attention. The significance of this finding is not that questionnaires are useless, but that the content measured, intended populations, and quality of supporting evidence must be established before scores are interpreted. More recent studies also highlight the limits of measurement. Imbamba et al. (2026) examined AI literacy scales in higher education from a sociotechnical perspective, focusing on relationships among technology, tasks, users, and organizational structures. Through a thematic analysis of generative AI literacy literature, Ramírez-Correa et al. (2026) identified an imbalance between ethical discussion and assessment research. These studies suggest that assessments of university students' AI ethics literacy should attend to institutional environments and evidence supporting interpretation, rather than simply replicate a uniform scale structure.

Critical Reflections and Directions for Improvement

Conceptual Expansion Has Outpaced Clarification of Boundaries

Existing discussions often use ethical awareness, ethics literacy, AI literacy, and digital literacy interchangeably. All emphasize responsible participation in technological environments, but they differ in scope, levels of competence, and purposes of assessment. A mismatch between concept and measurement arises when general technology-attitude items are used to draw conclusions about ethical judgment in AI contexts. Similarly, placing every desirable quality within a single overarching concept may produce a seemingly comprehensive framework that offers little explanation of why students make different choices in specific tasks. Users' value orientations also need to be distinguished from their capabilities. A positive attitude toward AI does not necessarily imply greater responsibility, and caution does not necessarily indicate stronger judgment. AI ethics education should neither make increased acceptance of tools its sole objective nor regard heightened fear as evidence of success. Future research should specify whether it addresses ethical knowledge, attitudes toward use, or actual judgment and behavior, and explain how its concepts correspond to research questions and measurement content. Findings should not be combined merely because studies use similar terminology.

Broad Ethical Norms Remain Distant From Students' Everyday Practices

The principles of privacy, fairness, transparency, and responsibility advanced in general ethics research provide direction for university education, but principles do not automatically translate into action. With privacy,

for example, students need more than an awareness that personal information should be protected. They must also determine which information belongs to others, whether its use is proportionate to the purpose, and whether a task can be completed by removing information or using alternative materials. Fairness involves recognizing stereotypes in outputs as well as considering differences in students' access to paid tools, language abilities, and accessibility support. The role of ethics literacy becomes observable when principles are applied within decision-making processes. Academic integrity should not, however, be treated as the entirety of ethics literacy. University students also engage in social interaction, internships, data collection, and public communication. They may simultaneously be information producers, data providers, and people affected by technology. Qian and Chu's (2023) discussion of the social impact of AI draws attention to these multiple responsibilities and institutional conditions. Restricting research to the detection of cheating can obscure issues such as privacy, discrimination, emotional dependence, and the public interest. It can also turn ethics education into a disciplinary instrument while overlooking students' capacity for independent judgment and participation in governance.

Self-Reports Are Prone to Overinterpretation in Assessments of AI Ethics Literacy

The statement "I know that AI may be biased" captures a self-assessment of awareness; "I am willing to protect other people's information" is closer to an attitude or intention; and "I have removed identifying information from materials before uploading them" remains a retrospective account of behavior. Each can provide research data, but none is equivalent to directly observing identification, removal, and verification in practice. Lintner's evaluation of instruments and Ying's discussion of limitations in student research both indicate the importance of recognizing the boundaries of self-report evidence (Lintner, 2024; Ying, 2026). In matters of integrity in particular, social desirability and concerns about the consequences of misconduct may affect responses. Scores cannot therefore be interpreted directly as rankings of moral character. High internal consistency alone also cannot establish an instrument's validity. Similar items may generate consistent responses without adequately covering value conflicts, different stakeholders, or actual consequences. Structural analysis describes relationships among items; it does not by itself establish that students can transfer their judgment to new tasks. Research needs to examine further whether content is appropriate for the target population, whether items are interpreted consistently, and whether scores support their intended uses. Performance-based tasks likewise require reliable scoring criteria. Adopting contextualized questions does not automatically eliminate subjective judgment or context dependence.

Explanations of the Gap Between Ethical Understanding and Action Lack Evidence of Mechanisms

Research has repeatedly discussed inconsistencies between understanding and behavior, but these inconsistencies may have different causes. Students may know general principles yet fail to recognize their relevance in a particular situation. They may recognize a problem but be unaware of feasible alternatives. They may also change their choices under time pressure or peer influence. Associations between multiple factors and self-reported scores in a single cross-sectional survey cannot establish causal direction. Researchers need to distinguish among limited competence, conflicting motivations, ambiguous rules, and resource constraints rather than substitute a broad label for an explanation of mechanisms. Students' capacity for reflection and self-regulation should also be recognized: some limit their use of tools to preserve autonomy in learning. Research focused solely on misconduct may overlook this constructive agency. Studies with greater explanatory value should examine when students make responsible choices, the conditions those choices require, and how different institutional arrangements enable or hinder their continuation.

Improving University Students' AI Ethics Literacy Requires Collaboration Among Multiple Stakeholders

Ethics literacy is often described as an individual quality that students need to develop, yet their capacity to act also depends on instructors' expectations, course design, and platform conditions. If courses provide conflicting messages about the same behavior, or impose prohibitions without explanations or alternative support, students may struggle to form stable expectations. Individual competence and institutional clarity therefore need to be examined separately. Students' performance should not be attributed entirely to inadequate literacy when relevant information is unavailable, nor should institutional factors erase their own responsibilities. Chinese research on higher education emphasizes values education, multidisciplinary collaboration, and the development of coordinated educational systems (Tian et al., 2023), providing a basis for moving beyond exclusively individual explanations. The next step is to translate these aims into observable institutional practices: whether instructors clarify acceptable AI use in assignments, whether students can discuss rules, whether advice is available in uncertain situations, and whether mistaken judgments can be reviewed. Educational governance itself also requires ethical scrutiny. Excessive surveillance in the name of integrity should be avoided, particularly where it leaves students with no option but passive compliance and no opportunity to express reasonable disagreement.

Directions for Future Research and Educational Practice

To address these limitations, future research should focus on specific tasks such as academic writing, data processing, and information communication. Interviews, self-reports, contextual judgment tasks, and analysis of students' work can be combined to examine understanding, reasons for choices, and actual performance. Assessment should specify task requirements and scoring criteria and establish applicability across disciplinary backgrounds and learning experiences. In addition to immediate pre- and post-tests, course evaluations should develop longitudinal evidence to examine whether learning transfers to unfamiliar situations, rather than interpreting short-term attitudinal changes directly as stable competence.

Educational practice can embed ethical discussion within disciplinary tasks and combine case analysis, group deliberation, practical activities, and reflective feedback to align learning objectives, teaching activities, and assessment (Wiese et al., 2025). Universities should also involve students in discussions of rules for use and provide clear requirements for disclosing collaboration, access to advice, and mechanisms for correcting errors (Ying, 2026). These improvements require the development of students' judgment and sense of responsibility, together with instructor support, equitable access to resources, and workable institutional arrangements. Their effects should be examined through sustained research.

Conclusion

Research on university students' AI ethics literacy is bringing together normative ethics, literacy education, student experiences, and technology governance. Existing literature provides a foundation concerning areas of risk, value requirements, framework components, and teaching approaches. However, conceptual boundaries, interpretations of measurement, and evidence from practice require closer alignment. Findings from general science and technology ethics or digital ethics cannot directly substitute for evidence from AI ethics contexts involving university students. Nor can endorsement of principles, self-assessment, or short-term changes in learning be equated with sustained responsible action.

Future research needs to clarify concepts, remain close to students' actual contexts of use, and strengthen evidence concerning ethical judgment and behavior. AI ethics education should help university students understand technology and its social consequences while creating learning environments that allow explanation, deliberation, and correction. Attending to both individual capabilities and institutional conditions can help move ethics literacy beyond conceptual advocacy toward sustained, assessable educational practice that respects students' agency.

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