

A Survey on AI Ethical Awareness of Chinese University Students

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Abstract: *With the deep integration of AI into education, the ethical issues arising from its use by university students have become increasingly prominent, reflecting this demographic's weak ethical awareness. This study surveyed 277 Chinese university students using a modified AI ethical awareness scale, yielding the following results: (1) Overall, students exhibited a moderately high level of AI ethical awareness, but there were imbalances across the subdimensions; (2) Upper-year students and those from non-STEM exhibited significantly higher AI ethical awareness compared to lower-year students and those from STEM; (3) Gender and frequency of AI use did not significantly impact AI ethical awareness. These findings reveal the current state and shortcomings of AI ethical awareness among university students, identify differences by grade level and major, and provide empirical evidence for differentiated AI ethics education in higher education.*

Keywords: *University Students; AI Ethical Awareness; Current Status of Ethical Awareness; AI Ethics Education*

1. Introduction

Currently, artificial intelligence is profoundly transforming the way knowledge is created, transmitted, and acquired, presenting unprecedented opportunities and ethical risks in education. Against this backdrop, scholars worldwide have begun to explore the potential applications and risks of AI in educational contexts. However, existing research primarily focuses on the ethical challenges posed by AI to the educational field as a whole, and insufficient attention has been given to university students' status and weaknesses in their ethical awareness regarding AI.

AI ethical awareness refers to the recognition and understanding of ethical issues arising from AI and their importance. It encompasses not only awareness of technical specifications but also the sensitivity to values when facing profit-related decisions. University students, as typical "digital natives," are active users and future consumers of AI products. While enjoying the benefits of technology, they also face risks such as dependence on technology, privacy breaches, and academic dishonesty. Awareness leads to behavior; therefore, the level of AI ethical awareness among university students will influence their ability to develop and apply AI responsibly. However, students currently exhibit significant cognitive imbalances in their ethical awareness regarding AI, with a disconnect between theoretical education and moral practice. For instance, some students may have basic digital skills but lack an understanding of deeper ethical dimensions, such as "human-machine collaboration and autonomy" and "fairness and sustainable development" [1]. Such a lack of ethical awareness could result in the misuse or abuse of AI tools. Therefore, investigating the current state of AI ethical awareness among contemporary university students is critical for guiding them toward responsible AI usage and ultimately achieving the ideal vision of harmonizing human and machine benefits.

2. Literature Review

2.1 Current Studies on AI Ethical Awareness

AI ethics refer to the moral principles and value standards that should be adhered to in the development and application of AI technologies. The European Union published the "Ethics Guidelines for Trustworthy AI" in 2019, proposing three essential requirements: legality, ethics, and robustness [2]. China also places significant emphasis on AI ethics establishment, as demonstrated by the "Ethical Norms for the New Generation of Artificial Intelligence" released by China's AI Governance

Committee in 2021, which suggests principles such as enhancing human welfare, promoting fairness and justice, protecting privacy and safety, ensuring controllability and trustworthiness, and reinforcing accountability^[3]. In summary, the core principles of AI ethics can be categorized into five aspects: human-centeredness, fairness and justice, transparency, safety and controllability, and accountability, which collectively define the ethical boundaries for AI technology development. AI ethical awareness, therefore, is the individual's understanding of these guidelines.

Through the Delphi method, Hu et al. developed a framework containing four dimensions of educational AI ethical awareness: "human-machine collaboration and autonomy," "student welfare and development," "fairness and sustainable development," and "safety and controllability" ^[1]. The study showed that university students demonstrate significant imbalances in AI ethical awareness, particularly low scores in the dimensions of "fairness and sustainable development" and "safety and controllability." Additionally, a survey conducted by Hulifan et al. on application-oriented universities found that university students exhibit general insensitivity towards technology ethics, lack adequate vigilance regarding potential risks arising from the absence of ethics, and possess relatively weak knowledge reserves in this field ^[4]. Kim et al. developed and validated a scale measuring AI ethical awareness, including dimensions such as responsibility, stability, reliability, and discrimination, to discern users' ethical perceptions during AI service acceptance ^[5]. Ghotbi et al. surveyed international university students on ten key ethical issues, finding that unemployment risks due to AI were the most concerning (58%), followed by emotional AI's impact on human behavior and issues surrounding robot rights (12%), while concerns about social control and AI bias were comparatively lower^[6]. These studies indicate that, globally, university students need to deepen their understanding of AI ethics and improve their ability to predict risks.

2.2 Differences in AI Ethical Awareness among Different Student Groups

Current research has explored differences in AI ethical awareness among college students based on demographic characteristics, such as gender and academic background. Regarding gender, Wang et al. surveyed 730 students from universities in Chinese mainland and Hong Kong, China. They found a significant disparity: female students exhibited higher ethical awareness of AI than their male counterparts ^[7]. Results from Mazaherian et al. showed that females had greater concern about the misuse and distortion of AI information, indicating a stronger risk perception ^[8]. Mihoc et al. reported findings from a study with 230 sophomore computer science students, revealing that males were more focused on the potential impacts of AI in warfare and drone control. In contrast, females prioritized ethical considerations and values when helping others ^[9]. However, some studies reported no significant differences in AI ethical awareness between male and female students ^[10].

In examining the impact of academic major on AI ethical awareness, current studies show mixed results. Wu Dan et al. conducted an empirical survey of 1,651 Chinese undergraduates, finding significant differences by academic discipline: students from information science departments demonstrated superior knowledge and ability in AI. In contrast, no significant differences in ethical awareness were observed across fields ^[11]. Conversely, Wang et al. found that students from STEM and non-STEM disciplines showed no notable differences across AI ethical dimensions ^[7]. Current research indicates that the impact of college students' academic backgrounds on their ethical awareness regarding AI warrants further investigation. Existing studies primarily focus on STEM and information resource management students regarding AI ethical awareness, and empirical research on non-STEM students remains scarce. Therefore, when investigating AI ethical awareness among university students, it is essential to consider differences across gender, academic major, and personal factors, such as academic year and AI usage frequency.

3. Research Design

3.1 Research Questions

This study aims to investigate two questions: (1) What is the current status of AI ethical awareness among university students? (2) Is AI ethical awareness among university students influenced by gender, academic year, major background, and usage frequency?

3.2 Data Collection and Research Subjects

This study used a questionnaire adapted from Kim et al.'s AI ethical awareness scale^[5]. The initial scale included eight dimensions, each with 24 questions, three per dimension. For brevity, clarity, and understanding, the questionnaire underwent adjustments via the Delphi method to better fit the Chinese university student context. Additionally, background information (gender, academic year, academic major, frequency of AI product usage) was added to the final survey. An online survey was distributed, yielding 309 responses. After removing invalid submissions, including erroneous responses on lie detection items, those completed in less than 80 seconds, and those providing uniform answers, the effective sample size reached 277, resulting in an effective response rate of 89.6%. The sample distribution is displayed in Table 1.

Table 1: Background Information and Distribution of Research Subjects

Basic Information		N	P
Gender	Male	89	32.1%
	Female	188	67.9%
Academic Year	Lower-year	151	54.5%
	Upper-year	126	45.5%
Academic Major	STEM	127	45.8%
	Non-STEM	150	54.2%
Usage Frequency	Low Frequency Usage	32	11.6%
	High Frequency Usage	245	88.4%

3.3 Statistical Analysis

3.3.1 Reliability and Validity Analysis of the Questionnaire

(1) Reliability

Reliability is typically measured by Cronbach's Alpha, which assesses the true reliability of the responses in the sample. The reliability testing results for the scale used in this study are shown in Table 2.

Table 2: Reliability Analysis

Reliability Analysis	
Cronbach's Alpha	Number of items
0.733	24

The reliability coefficient of the questionnaire scale, as presented in Table 2, is Cronbach's $\alpha > 0.7$. This indicates that the questionnaire has good reliability and high internal consistency.

(2) Validity

This questionnaire uses a mature scale developed through a Delphi survey involving six AI education experts, including university professors. The Content Validity Ratio (CVR) ranges from 0.58 to 0.96, reflecting good validity.

3.3.2 Descriptive and Differential Statistical Analysis

The research uses descriptive statistics to address the Research Question (1), which examines the current state of AI ethical awareness among university students. (2) This study employs an independent-samples t-test to examine whether there are significant differences in AI ethical awareness across groups of university students.

4. Results

4.1 Current Status of AI Ethical Awareness

According to Table 3, university students' AI ethical awareness scores across subdimensions ranged from 2.94 to 4.08, with transparency and explainability (M=4.08), responsibility (M=3.82), and employment (M=3.73) achieving the highest scores. Conversely, the dimensions related to robot rights (M=3.06), the boundaries of AI ethics (M=2.98), and stability (M=2.94) received comparatively lower scores. The average score across all eight dimensions is 3.40, indicating that students' AI ethical

awareness is at a moderately high level but still has room for improvement, particularly in the dimension addressing the boundaries of AI ethics and stability.

Table 3: Descriptive Statistical Results of AI Ethical Awareness among University Students

Dimension/Variables	M	SD
Responsibility	3.82	0.60
Stability	2.94	0.67
Discrimination	3.39	0.48
Transparency and Explainability	4.08	0.58
Human-centeredness	3.23	0.63
Employment	3.73	0.55
Boundaries of AI Ethics	2.98	0.54
Robot Rights	3.06	0.83
Overall	3.40	0.29

4.2 Analysis of Variability among Different Groups

This study employed independent-samples t-tests to examine the mean AI ethical awareness of university students across different genders, academic grades, academic majors and usage frequencies. The results showed that there are no significant differences in the overall AI ethical awareness scores between genders. There are significant differences in AI ethical awareness based on grade levels. There are significant differences in AI ethical awareness based on academic backgrounds. There are no significant differences in AI ethical awareness based on usage frequency.

4.2.1 No Significant Difference in AI Ethical Awareness among University Students by Gender

There is no significant difference in overall AI ethical awareness scores between genders ($t = -1.136$, $p = 0.258$), indicating that male and female students do not differ significantly in their overall level of AI ethical awareness. This suggests that male and female university students perform consistently across these ethical awareness dimensions. The results are shown in Table 4.

Table 4: Gender Differences in University Students' AI Ethical Awareness

Gender	N	M	SD	Test Results
Male	89	3.37	0.34	$t = -1.136$
Female	188	3.42	0.26	$P = 0.258$

4.2.2 Upper-year students Have Higher AI Ethical Awareness than lower-year students

There is a significant difference in overall AI ethical awareness scores among university students across academic years ($t = -2.124$, $p = 0.035 < 0.05$). Upper-year students scored significantly higher in AI ethical awareness than lower-year students ($p < 0.05$). This finding indicates that AI ethical awareness is higher among upper-year students than among lower-year students. The results are shown in Table 5.

Table 5: Year Differences in AI Ethical Awareness among University Students

Academic Year	N	M	SD	Test Results
Lower-year	151	3.37	0.33	$t = -2.124$
Upper-year	126	3.44	0.22	$P = 0.035^*$

*Note: * indicates $p < 0.05$.

This result indicates that as students progress to higher grade levels, their overall ethical awareness regarding AI improves gradually. Upper-year students demonstrate a more mature understanding of core ethical issues, including Responsibility and Accountability, Algorithmic Discrimination, Algorithmic Transparency, and the Impact of AI on Employment. This enhanced awareness may be attributed to the greater accumulation of professional knowledge and broader social experiences that upper-year students possess. Such factors contribute to their deeper insights and understanding of the ethical implications surrounding AI technology.

4.2.3 Students in Non-STEM Have Higher AI Ethical Awareness than Those in STEM

There is a significant difference in overall AI ethical awareness scores across academic majors ($t = -4.453$, $p < 0.001$). Students majoring in non-STEM scored significantly higher than those majoring in STEM, indicating that non-STEM students exhibit a more outstanding level of AI ethical awareness.

The results are shown in Table 6.

Table 6: Major Differences in AI Ethical Awareness Among University Students

Academic Major	N	M	SD	Test Results
STEM	127	3.32	0.28	t=-4.453
Non-STEM	150	3.47	0.28	P<0.001*

*Note:*indicates p<0.05.

4.2.4 No Significant Difference in AI Ethical Awareness Based on Usage Frequency

The independent-samples t-test results indicate that there is no significant difference in overall AI ethical awareness scores between low-frequency and high-frequency users (t = -0.645, p = 0.523). This suggests that both groups perform similarly in terms of their overall level of AI ethical awareness. The results are shown in Table 7.

Table 7: Differences in Usage Frequency of AI Ethical Awareness Among University Students

Usage Frequency	N	M	SD	Test Results
Low Frequency	32	3.36	0.41	t=-0.645
High Frequency	245	3.41	0.27	P=0.523

5. Discussion

5.1 Characteristics of AI Ethical Awareness among University Students

This study used a questionnaire to examine AI ethical awareness among university students today. The findings indicate that:(1)AI ethical awareness is moderately high, albeit uneven across dimensions, reflecting a developmental imbalance within the group. Students scored higher in superficial normative areas (like "transparency" and "responsibility")while scoring lower in deeper ethical principles ("AI ethics boundaries" and "stability"), which may result from a prevalent utilitarian perspective among students, where they prioritize practical applications of AI over ethical considerations^[12];(2)Gender does not significantly affect overall AI ethical awareness levels, indicating consistency between male and female students in their ethical perceptions. This may be attributed to the current equal access to educational resources and equal opportunities to engage with AI technologies among male and female students in higher education institutions;(3)There are significant differences in AI ethical awareness scores among different academic years, with upper-year students demonstrating superior awareness compared to lower-year students. This phenomenon likely correlates with the deeper engagement and accumulated experiences of upper-year students in academic and practical contexts. As students advance in academic grades, they may encounter more content related to academic ethics or professional ethics norms through systematic study of specialized courses, internships, practical training, and graduation theses, leading to more mature reflections on relevant ethical issues;(4)Significant disparities exist based on academic major, with students in non-STEM showing more pronounced AI ethical awareness than their STEM counterparts. This could be attributed to the more contemplative and critical approach students in non-STEM courses typically engage in, providing them with heightened sensitivity to ethical concerns associated with AI; Courses in STEM primarily focus on technical applications and engineering practices, lacking systematic training in ethical awareness. Their understanding of ethical issues often remains at a vague level, making it difficult to identify deeper ethical concerns^[13].(5)Frequency of AI usage does not appear to significantly impact AI ethical awareness levels among students, suggesting that frequent use does not necessarily lead to an increased recognition of ethical issues. This may be attributed to frequent users focusing solely on the efficiency benefits of AI rather than its ethical dimensions.

5.2 Recommendations for Enhancing AI Ethical Awareness among University Students

Based on an analysis of the current state and group differences in AI ethical awareness, this study offers three recommendations to enhance university students' AI ethical awareness. First, major educational institutions should improve their curricula on AI ethics to balance technological innovation with ethical standards, fostering responsible builders of the intelligent era who understand and apply ethical considerations in technology^[14]. Course content should encompass national strategies for AI, technological stability, ethical boundaries, and harmonious human-machine interaction, teaching not just ethical knowledge of technology but also guiding values to promote a deep fusion of technology

and ethics, transforming abstract ethical principles into perceptible value guidance. Second, universities should innovate teaching models to strengthen students' ethical reflection abilities. By utilizing case studies, situational analyses, and discussions of ethical dilemmas, institutions can augment students' learning of both foundational and ethical knowledge, encouraging them to dissect the moral dilemmas inherent in AI applications, such as algorithmic discrimination, privacy breaches, and academic forgery, and fostering independent ethical reasoning. Lastly, tailored educational interventions should be implemented for groups, particularly lower-year students and those in STEM fields, where AI ethical awareness is weaker. Universities should establish layered, compulsory, or elective AI ethics courses with differentiated content tailored to students' diverse academic backgrounds and year levels, emphasizing the cultivation of AI ethical awareness among key demographics to ensure targeted, timely ethical education. Generalized courses on AI ethics should be introduced in the first and second academic years to bridge knowledge gaps. In contrast, AI ethics content should be integrated into technical majors to guide students in exploring the boundaries of AI technology^[15].

5.3 Conclusions and Future Directions

This study has made significant findings regarding the status and group differences in AI ethical awareness among university students, yet several limitations persist. First, the sample size was relatively small, with a significantly higher proportion of female students and frequent users than male students and infrequent users, which may partially affect the external validity of the conclusions. Future studies might expand their scope to include a broader range of university student populations across regions and institutions to enhance the generalizability of their findings. Second, the data were primarily sourced from self-reports, which could introduce social desirability bias, undermining the authenticity of reported attitudes and behaviors. Furthermore, while the questionnaire was based on a validated scale and localized, there remains room for structural optimization. Future research could adopt longitudinal or intervention studies to address the limitations of the questionnaire, providing more objective measures to accurately capture subjects' ethical awareness levels.

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