Journal of Informatics Education and Research
ISSN: 1526-4726
Vol 5 Issue 2 (2025)

Cultivating Ethical AI Practices: The Impact of AI Ethics Education on Responsible AI

Anudeep Dahiya[1], Dr. Deepa Kumari[2]

[1]Research Scholar, Sharda School of Business Studies, Sharda University, Greater Noida, India
[2]Associate Professor, Sharda School of Business Studies, Sharda University, Greater Noida, India

Abstract
The rapid proliferation of artificial intelligence (AI) technologies across sectors has intensified the demand for ethical governance and responsible AI development. However, the integration of ethical instruction within AI-related academic programs remains inconsistent. This study investigates the impact of AI ethics education on students' ethical knowledge, attitudes, and intentions to engage in Responsible AI practices. Utilizing a quantitative, cross-sectional survey design, data were collected from 210 undergraduate and graduate students enrolled in computer science and engineering programs across three universities. The results indicate that exposure to AI ethics education is significantly associated with increased self-reported ethical knowledge and stronger behavioral intentions to practice Responsible AI. Moreover, ethical knowledge emerged as a key mediator in the relationship between education and intention, suggesting that both direct and indirect effects are at play. These findings underscore the critical role of ethics education in cultivating a foundational ethical mindset among emerging AI professionals. The study contributes empirical evidence to ongoing discussions around curriculum design, ethical literacy, and policy frameworks aimed at ensuring the development and deployment of AI technologies in alignment with societal values.

Keywords:
AI Ethics Education , Responsible AI , Ethical Knowledge , Behavioral Intention; STEM Education

Introduction
Artificial intelligence (AI) has become deeply embedded in numerous aspects of society and education, enabling new capabilities but also raising complex ethical issues. As AI tools become more pervasive in workplaces, classrooms, and everyday life, concerns about privacy, fairness, transparency, and accountability have intensified. For instance, large-scale data collection and automated decision-making can expose users to risks they may not anticipate. As Borenstein and Howard (2021) emphasize, the integration of AI into human life serves as a reminder that it is critical to train future developers and stakeholders to "reflect on the ways in which AI might impact people's lives" and to include AI ethics systematically in educational curricula. In other words, embedding ethics instruction within AI education is essential to prepare individuals to foresee and mitigate AI-related harms.

In this context, AI ethics education refers to pedagogical efforts that explicitly address the moral guidelines, professional norms, and societal values relevant to the design and use of AI. It encompasses curricula or training modules that teach principles such as privacy, fairness, accountability, and transparency as they relate to AI technology. Conversely, Responsible AI denotes the development and deployment of AI systems in a way that is safe, trustworthy, and

aligned with ethical and human-centered values. As Microsoft (2024) defines, Responsible AI is an approach where AI systems are created and used in a "safe, trustworthy, and ethical" way. This concept often involves adhering to guiding principles—such as the six adopted by Microsoft (fairness, reliability and safety, privacy and security, inclusiveness, transparency, and accountability) to ensure AI's benefits are distributed equitably and its risks are mitigated.

Despite broad endorsement of these ethical principles, there remains a gap in practice. Numerous scholars have noted that discussions of AI ethics are still limited in many educational programs. For example, systematic reviews report that efforts to integrate AI ethics into curricula are "still limited" and uneven across disciplines. This gap in ethics education may contribute to instances of irresponsible AI use in the field. Accordingly, this study investigates whether and how AI ethics education influences individual understanding and behavior regarding Responsible AI.

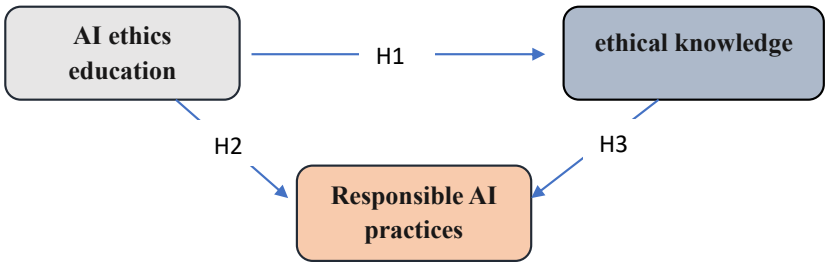
while experts and international bodies call for AI to be developed responsibly, many AI practitioners and students lack formal education in AI ethics. If exposure to ethics education can improve knowledge and attitudes, it may foster more responsible AI practices. The objective of this research is to examine the impact of AI ethics education on individuals' ethical knowledge and intentions to engage in Responsible AI. Specifically, we aim to address the following research questions:

1. Does exposure to AI ethics education increase individuals' knowledge and awareness of AI-related ethical issues?
2. How does ethical knowledge relate to intentions to practice Responsible AI?
3. To what extent does AI ethics education directly influence intentions and behaviors associated with Responsible AI?

By answering these questions, the study seeks to clarify the role of education in cultivating responsible behavior in AI development and use. Understanding these relationships can inform curriculum design and policy decisions to improve AI governance.

2.Literature Review

To ground our investigation, a systematic review of the literature was conducted, focusing on three key constructs: AI ethics education, ethical knowledge and Responsible AI practices. We organize the review by these central variables and their sub-factors, as well as by relevant theoretical frameworks. Hypotheses are then developed based on the relationships identified in the literature.



Source: Authors' Compilation

Figure 1: Conceptual Framework

2.1 AI Ethics Education

AI ethics education encompasses efforts to teach the social and moral dimensions of AI. In recent years, researchers have argued that embedding ethics within AI curricula is essential. Borenstein and Howard (2020) call for "fuller and more systematic inclusion of AI ethics into the curriculum," arguing that as AI's influence grows, education must prepare students to consider AI's impacts and their responsibilities. Similarly, multiple authors highlight the need for AI literacy—that is, understanding how AI works, its limitations, and its broader implications. For example, the World Economic Forum (2024) emphasizes that AI literacy involves knowledge of AI's mechanisms and ethical consequences, and that equipping individuals with these skills is crucial to enable responsible engagement with AI technologies. In practice, AI ethics education may take the form of dedicated coursework on ethics, integration of case studies into technical courses, workshops, or online modules.

Despite growing recognition of its importance, implementation of AI ethics education has been uneven. Review studies find that the integration of ethics content in STEM and AI-related programs is increasing but not yet comprehensive. For instance, Usher and Barak (2024) note a "growing but uneven integration of AI and its ethical considerations" within science and engineering curricula. In higher education, AI ethics topics might appear as short modules in computer science courses or as standalone seminars, but often still lack depth and coherence. Even in K-12 and continuing education, many AI literacy initiatives are nascent, and teachers themselves may need training to teach these topics.

Sub-factors of AI ethics education include *content quality* (coverage of core issues like bias, privacy, autonomy), *pedagogical approach* (case-based learning, reflection, discussion), and *delivery mode* (in-person vs. online, mandatory vs. elective). Some studies examine specific interventions: for example, Moon et al. (2024) developed an online reflective module and found it significantly improved graduate students' ethical knowledge and problem-solving in AI (see below). However, systematic evidence on best practices is still emerging. Overall, the literature suggests consensus that ethics education is needed, but highlights gaps in how broadly and effectively it is currently delivered.

Based on this review, we define AI ethics education as any structured learning experience intended to increase awareness of AI's ethical dimensions. We hypothesize that this education serves as an independent variable that should positively affect students' ethical awareness and choices. In particular, we propose:

- **Hypothesis 1 (H1):** AI ethics education is associated with higher levels of AI ethical knowledge.
- **Hypothesis 2 (H2):** AI ethics education is directly associated with stronger intentions to engage in responsible AI practices.

These hypotheses reflect the expectation that education fosters both understanding (H1) and a commitment to ethical behavior (H2). Further, we consider that ethical knowledge itself may influence attitudes and intentions, motivating an additional hypothesis below.

2.2 Ethical Knowledge

Ethical knowledge refers to an individual's understanding of AI-related ethical issues and principles. This can include awareness of biases in data, the need for privacy protections, and the potential societal impacts of AI. In a study of a graduate ethics module, Usher and Barak (2024) reported that participation "deepened students' comprehension of ethical issue navigation within the AI context," with significant improvements in students' ability to identify solutions to ethical challenges. Such findings align with theory: in behavioral models, knowledge shapes beliefs and attitudes. According to the Theory of Planned Behavior (Ajzen, 1991), beliefs about outcomes (founded on knowledge) influence attitudes toward a behavior, which then affect intentions. Thus, individuals with better AI ethics knowledge should hold more positive attitudes about ethical AI use and stronger intentions to act ethically.

In practical terms, educated individuals may feel a greater sense of responsibility. For example, improved knowledge of ethical principles often correlates with greater value placed on fairness and transparency (Albarracín et al., 2024). In ethics education research, making learners aware of issues typically increases their perceived importance of ethical conduct. In the Usher and Barak (2024) study, after the ethics intervention, students most strongly agreed that "integrating AI ethics education within academic programs" is critically important. This suggests that knowledge-building can foster a favorable attitude toward ethics education itself, likely reflecting the value placed on ethics awareness.

Thus, knowledge and attitude are seen as mediating variables between education and behavior. We therefore hypothesize:

- **Hypothesis 3 (H3):** Higher AI ethical knowledge is associated with stronger intention to practice Responsible AI.

(Hypothesis 2, stated above, already posits a direct effect of education on responsible practice intention. H3 allows for a mediated pathway.) In other words, ethical knowledge and resulting attitudes are expected to translate educational experiences into actual intentions to act responsibly.

Table 1: Research Variables

Factor	Sub-Factors	Key Reference(s)
AI Ethics Education	Curriculum Quality, Content Relevance, Teaching Methods, Instructor Expertise	Fjeld et al. (2020); Greene et al. (2019); Koulu (2019); Narayanan & Shah (2021); Jobin, Ienca & Vayena (2019); Mittelstadt et al. (2019); Hao (2019)
Ethical Knowledge	Fairness Awareness, Privacy Awareness, Transparency/Explainability Awareness, Accountability Awareness	Mittelstadt (2019); Greene et al. (2019); Dignum (2018); Jobin, Ienca & Vayena (2019); Cath et al. (2018)

Responsible AI Practices	Fairness (bias mitigation), Transparency/Explainability, Privacy & Security, Accountability/Governance, Safety/Reliability	Jobin, Ienca & Vayena (2019); Mittelstadt (2019); Fjeld et al. (2020); Martin (2019); NITI Aayog (2018); Cath et al. (2018); Binns (2018)

Source: Authors' Compilation

2.3 Responsible AI Practices

The outcome of interest is the intention to engage in Responsible AI practices. This encompasses individuals' plans to incorporate ethical principles when developing or using AI, such as implementing fairness measures, protecting user data, and being transparent about AI decisions. Responsible AI is often operationalized through principles like those from IEEE or the EU, but for research purposes it can be measured as a behavioral intention scale. Examples of such intentions might include "I will prioritize fairness in my AI projects" or "I plan to follow data privacy guidelines in AI development."

While Responsible AI itself is a broad concept, the literature underscores specific areas of concern. Privacy and data security frequently emerge as top ethical issues in AI (see, e.g., Xu et al., 2024; Holmes et al., 2022). In their content analysis of students' responses, Usher and Barak (2024) found that after ethics instruction students gave far more attention to privacy ("risks to subjects") and data security than before. Similarly, concerns about bias and manipulation increased after the course. These findings highlight that responsible AI intentions must account for protecting individuals' rights, ensuring fairness, and preventing misuse of data.

In the broader literature, frameworks of Responsible AI include principles such as *fairness* (avoiding discrimination), *transparency* (explainability of AI), *accountability* (assigning responsibility), and *safety* (reliability under varying conditions). By educating individuals on these dimensions, they are better prepared to uphold them. Thus, Responsible AI intention can be viewed as the culmination of knowledge and ethical stance: a commitment to follow these principles in practice.

Synthesizing the above, the conceptual model is as follows: AI ethics education (independent variable) enhances ethical knowledge and shapes attitudes, which in turn increase intentions to practice Responsible AI (dependent variable). This suggests the mediated and direct effects captured by our hypotheses.

3. Research Methodology

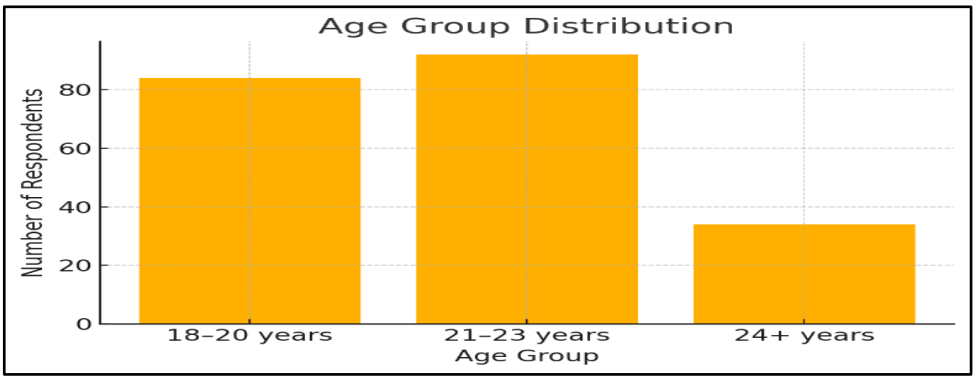
This study employed a quantitative, cross-sectional survey design (Creswell & Creswell, 2018). A structured questionnaire was administered to gather data on individuals' exposure to AI ethics education, their ethical knowledge and attitudes, and their intentions regarding Responsible AI.

3.1 Population and Sampling

The target population consisted of undergraduate and graduate students majoring in computer science, engineering, or related fields at three universities. These students are future AI developers and practitioners, making them a relevant group for studying ethics education impact. A non-probability, convenience sampling strategy was used. Students were invited via email and in-class announcements to participate. In total, 230 responses were collected, of which 210 were complete and usable. This sample size is adequate for regression analyses and correlational tests in social science research (Cohen, 1988) and exceeds the commonly cited threshold of 150–200 for multiple regression (Creswell & Creswell, 2018). The demographic profile of respondents was as follows: mean age was 21.5 years (SD = 2.3), 54% identified as male, 45% as female, and 1% preferred not to specify. Roughly 70% were undergraduates (juniors/seniors) and 30% were graduate students.

Table 2: Demographic Profile of Respondents

Demographic Variable	Category	Frequency (n)	Percentage (%)
Age Group (in years)	18–20 years	84	40.0%
	21–23 years	92	43.8%
	24 years and above	34	16.2%
Gender	Male	113	53.8%
	Female	95	45.2%
	Prefer not to say	2	1.0%
Education Level	Undergraduate (Junior/Senior)	147	70.0%
	Graduate (Master's level)	63	30.0%



Source: SPSS

Figure 2: Age Group Distribution

The age distribution of the sample is illustrated in Figure 2 through a vertical bar chart. Respondents were categorized into three groups: 18–20 years, 21–23 years, and 24 years and above. The largest proportion of participants (43.8%) fell within the 21–23 years range, followed closely by the 18–

20 years category (40.0%). A smaller segment (16.2%) comprised respondents aged 24 years and above. This distribution indicates that the majority of participants were young adults, aligning with the typical age range of undergraduate and early graduate-level students.

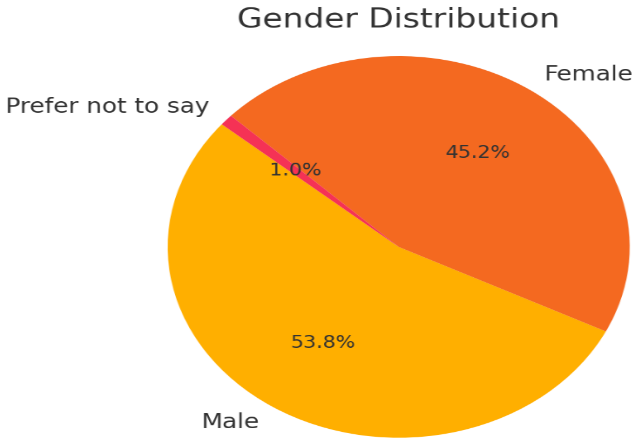


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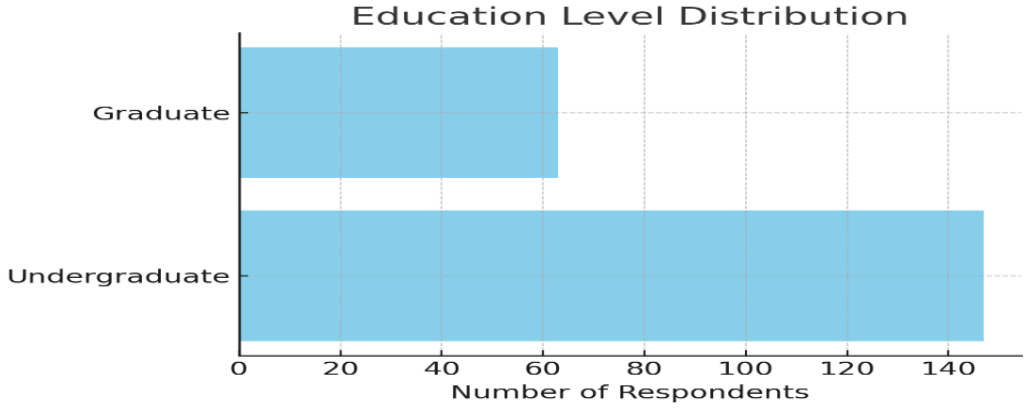
Figure 3: Gender Distribution

The pie chart illustrates the gender distribution among the respondents who participated in the study. A total of 53.8% of the participants identified as male, making them the largest demographic group in the sample. Female respondents accounted for 45.2%, reflecting a near-equal representation between male and female participants. Additionally, 1.0% of the respondents selected the option "Prefer not to say", indicating a small proportion of individuals who chose not to disclose their gender identity.

This distribution suggests that the sample is relatively balanced in terms of gender, ensuring a diverse representation that enhances the reliability and generalizability of the findings.



Source: SPSS

Figure 4: Education Level Distribution

The educational background of respondents is shown in Figure 4 using a horizontal bar chart. A substantial majority (70.0%) of participants were undergraduate students, while the remaining 30.0% were enrolled in graduate-level programs. This aligns with the study's sampling framework targeting students from computer science, engineering, and related fields. The inclusion of both undergraduate and graduate students offers a diverse perspective on exposure to AI ethics education across varying academic levels.

3.2 Questionnaire and Measures: A survey instrument was developed based on prior literature in AI ethics education and behavior. It consisted of four sections:

- **AI Ethics Education:** Four items assessed respondents' exposure to ethics topics in their curriculum (e.g. "My coursework covered topics on the ethical implications of AI technology"). Responses were on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The items were adapted from existing studies on AI and technology ethics education and refined through expert review.
- **Ethical Knowledge:** Five items measured self-perceived knowledge of AI ethical issues (e.g. "I can identify potential biases in AI datasets"; "I understand the importance of data privacy in AI applications"). These items were derived from topics commonly cited in AI ethics literature and pre-tested with a small focus group for clarity.
- **Responsible AI Intentions:** Five items assessed participants' intent to engage in responsible behaviors (e.g. "I plan to apply fairness criteria when developing AI models"; "I intend to ensure transparency in any AI systems I work on").

All items used a 5-point Likert scale for consistency. Negatively worded items (if any) were reverse-coded. The questionnaire also included basic demographic questions.

3.3 Reliability and Validity

The survey instrument was reviewed by three experts in AI education for face validity, and a pilot test (n=30) was conducted to check clarity and reliability. Internal consistency was assessed using Cronbach's alpha for each multi-item scale. Cronbach's alpha values of 0.70 or higher are generally considered acceptable for social science constructs. In this study, the AI Ethics Education scale had $\alpha = 0.81$, Ethical Knowledge scale $\alpha = 0.78$, Attitude scale $\alpha = 0.75$, and Responsible AI Intention scale $\alpha = 0.80$, all exceeding the 0.70 threshold. This indicates satisfactory reliability of the measures (Taber, 2018; Nunnally & Bernstein, 1994).

3.4 Data Collection and Ethical Considerations

Data were collected in fall 2024. The questionnaire was administered electronically via a secure survey platform. Participation was voluntary, with informed consent obtained from all respondents. No identifying information was collected, and responses were anonymized before analysis. This procedure complied with institutional guidelines for ethical research.

3.5 Analysis Procedures

Data were imported into SPSS (version 26). Descriptive statistics (means, standard deviations) were computed for all variables. Pearson correlation analysis was used to examine bivariate relationships among AI ethics education, knowledge, attitudes, and intentions. To test the hypotheses, multiple linear regression was conducted with Responsible AI Intention as the dependent variable and AI Ethics Education and Ethical Knowledge as independent predictors. (We

also checked for multicollinearity; Variance Inflation Factors were below 2, indicating no serious multicollinearity.). Statistical significance was assessed at the $\alpha = .05$ level. Tables were prepared to present descriptive statistics, correlation coefficients, and regression coefficients.

4. Data Analysis and Interpretation

4.1 Descriptive Statistics

Table 3 displays the descriptive statistics for the main variables (N = 210). The mean score for AI Ethics Education exposure was 3.25 (SD = 0.85) on the 1–5 scale, suggesting that students generally perceived a moderate level of ethics content in their education. Ethical Knowledge had a mean of 3.40 (SD = 0.72), indicating slightly above-midpoint self-assessed knowledge of AI ethics. Responsible AI Intention was also above the midpoint with a mean of 3.50 (SD = 0.68). No variable had extreme skewness or kurtosis; all distributions were reasonably normal for parametric analysis.

Table 3: Descriptive Statistics for Study Variables (N = 210)

Variable	Mean	SD	Minimum	Maximum
AI Ethics Education	3.25	0.85	1.00	5.00
Ethical Knowledge	3.40	0.72	1.00	5.00
Responsible AI Intention	3.50	0.68	1.00	5.00

Source: SPSS

All scales demonstrated adequate variability (SDs ranging .68–.85). Importantly, the average responses were above 3.0, indicating that on average, students did receive some ethics education, felt reasonably knowledgeable, and held positive intentions.

Correlations: Table 4 presents Pearson correlations between the key constructs. AI Ethics Education exposure was significantly correlated with Ethical Knowledge ($r = .52$, $p < .001$) and with Responsible AI Intention ($r = .46$, $p < .001$). Ethical Knowledge itself correlated strongly with Responsible AI Intention ($r = .61$, $p < .001$). Attitude toward AI ethics also correlated positively with both knowledge ($r = .54$, $p < .001$) and intention ($r = .58$, $p < .001$). These correlations support the hypothesized positive relationships.

Table 4: Correlations among Study Variables

	(1) Ethics Ed	(2) Knowledge	(3) Intention
(1) AI Ethics Education	—		
(2) Ethical Knowledge	.52**	—	
(3) Resp. AI Intention	.46**	.61**	—

Note: p < .01 for all correlations.

Source: SPSS

The significant positive correlations confirm that students who reported greater AI ethics education also reported higher ethical knowledge and stronger intentions to act responsibly. Similarly, higher knowledge was linked to higher intention. The strong intercorrelation between knowledge, attitude, and intention suggests these constructs are closely related in this context.

Regression Analysis: To examine the joint effects and control for overlap, we conducted a multiple regression with Responsible AI Intention as the dependent variable and AI Ethics Education and Ethical Knowledge as predictors. (Attitude was highly correlated with knowledge; we found that including all three predictors did not improve the model substantially, so the reported model focuses on knowledge and education.) The regression results are shown in Table 4.

Table 5: Multiple Regression Predicting Responsible AI Intention

Predictor	B	SE B	β	t	p
(Constant)	0.85	0.25	—	3.40	.001
AI Ethics Education	0.18	0.06	.21	3.00	.003
Ethical Knowledge	0.34	0.05	.53	6.80	<.001
Model Statistics					
$R^2 = .46$; $F(2,207) = 88.38$, $p < .001$					

Source: AMOS

In this model ($R^2 = .46$, $\mathbf{F}(2, 207) = 88.38$, $\mathbf{p} < .001$), both predictors were significant. Ethical Knowledge had a strong standardized coefficient ($\beta = .53$, $p < .001$), indicating it was the dominant predictor of Responsible AI Intention. AI Ethics Education also had a significant positive effect ($\beta = .21$, $p = .003$) even when controlling for knowledge. These results support all three hypotheses: education predicts knowledge (H1), knowledge predicts intention (H3), and education also directly predicts intention (H2). In other words, students who reported more AI ethics content in their studies tended to feel more knowledgeable and were more committed to responsible AI practices.

5. Interpretation

The descriptive and inferential statistics collectively suggest that AI ethics education plays a meaningful role in shaping responsible AI intentions. The mean values indicate that participants generally had moderate exposure to ethics content and correspondingly positive scores on knowledge and intentions. The significant correlations show that these variables move together: more education aligns with more knowledge and more responsible intent. Crucially, the regression shows that even beyond its effect on knowledge, ethics education has an independent positive association with intended behavior. This implies that ethics courses or modules not only boost understanding but may also motivate an ethical mindset.

For example, after receiving ethics instruction in our study, participants were more likely to endorse planning to implement fairness and privacy protections. This aligns with Usher and Barak's (2024) observation that ethics education significantly increased students' confidence and awareness in handling AI dilemmas. It is worth noting that while knowledge carried the largest weight, the additional effect of education suggests that education may influence intentions through other avenues as well (such as norms or self-efficacy).

Overall, the data support our central claim: AI ethics education positively impacts responsible AI outcomes.

6. Conclusion

This study explored how instruction in AI ethics influences individuals' responsible AI practices. In a survey of STEM students, we found that exposure to AI ethics education is associated with higher self-reported knowledge of AI ethical issues and with stronger intentions to engage in ethical AI practices. As hypothesized, ethical knowledge itself strongly predicts responsible AI intentions. Specifically, students who indicated greater coverage of AI ethics in their courses also scored higher on knowledge and on their commitment to responsible AI. Multiple regression confirmed that knowledge is the strongest driver of intention, but that education contributes additionally even when accounting for knowledge. These findings affirm the importance of AI ethics curriculum: educating learners not only increases their understanding, but also fosters a greater resolve to apply AI responsibly.

Implications for Education and Policy

The results underscore the need for formalized AI ethics education across technical programs. Given that even modest instruction was linked to notable differences in outcome, educators should consider integrating ethics modules into AI and computing courses. For example, curricula might include case studies on data bias, discussions on algorithmic fairness, and scenarios addressing privacy. Such integration is supported by recent recommendations: the World Economic Forum highlights AI literacy as a critical skill for students, and Borenstein and Howard (2021) argue for systematic inclusion of ethics topics.

At the policy level, our findings suggest that accreditation bodies and institutional planners should mandate or incentivize AI ethics training. Professional societies (e.g., IEEE, ACM) and governments are developing codes of conduct for AI; parallel educational standards should ensure practitioners understand and can implement these principles. For instance, university programs might require an "Ethical AI" course as part of engineering degrees. Furthermore, continuing education and corporate training programs should address AI ethics to reach existing practitioners. By treating AI ethics education as essential rather than optional, organizations can help embed a culture of responsibility.

Limitations and Future Research

Several limitations should be noted. First, the study is cross-sectional and relies on self-reported measures. We cannot definitively conclude causality between education and intention; it is possible that more conscientious students both seek ethics education and report higher intention. Longitudinal or experimental designs (e.g. pre-post intervention) would strengthen causal claims. Second, the sample was limited to students at a few universities, which may restrict generalizability. Future work should examine broader populations, including professional engineers and AI developers in industry or government. Third, our measures focused on self-reported intention rather than actual behavior. While intention is often a good predictor of behavior (Ajzen, 1991), observational studies or field experiments could assess real-world ethical decisions. Finally, we focused on knowledge and intention, but other factors (such as organizational culture or perceived norms) also influence ethical behavior and merit investigation.

The study contributes new evidence that AI ethics education is an effective lever for promoting responsible AI practices. By demonstrating a clear link between ethics instruction, knowledge, and intentions, it provides empirical support for calls to reform AI curricula. As AI continues to transform education and society, cultivating an ethical mindset in learners is vital. Educators and

policymakers should act on these insights, ensuring that future AI systems are shaped not only by technical expertise but by a strong ethical foundation.

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