

Designing Ethical Guidelines For Emotion-Sensitive AI In Classrooms

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Abstract

As artificial intelligence (AI) becomes increasingly embedded in educational environments, a new generation of emotion-sensitive AI systems has emerged, capable of detecting, interpreting, and responding to learners' emotional states. While these technologies promise enhanced personalization, engagement, and emotional support, they also introduce complex ethical risks related to privacy, emotional manipulation, bias, and learner autonomy. Despite growing attention to AI ethics in education, there remains a lack of ethical guidelines specifically addressing the use of emotion-sensitive AI in classroom contexts.

This study aims to address this gap by proposing a principled framework for designing ethical guidelines for emotion-sensitive AI in classrooms. Drawing on theories of moral education, digital ethics, and ethical digital citizenship, the study examines the ethical tensions arising from the collection and use of emotional data in educational settings. It argues that without clear ethical safeguards, emotion-aware AI systems risk undermining students' emotional agency and teachers' professional judgment.

The paper proposes a set of human-centered ethical guidelines grounded in transparency, informed consent, emotional data protection, non-manipulation, and pedagogical accountability. These guidelines are intended to support educators, institutions, and educational technology developers in implementing emotion-sensitive AI responsibly. By foregrounding ethical reflection alongside technological innovation, this study contributes to ongoing discussions on responsible AI governance and the cultivation of ethical digital citizenship in AI-enhanced education.

Keywords: *Emotion-sensitive AI; AI ethics in education; ethical guidelines; digital citizenship; emotional data privacy*

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I. Introduction

Background of the Study

The rapid integration of artificial intelligence (AI) into educational environments has fundamentally transformed how teaching and learning are designed, delivered, and experienced. AI-powered systems are increasingly used to support personalized learning, automated feedback, adaptive assessment, and student engagement, often framed as innovations that enhance efficiency and responsiveness in classrooms [14],[28]. As AI systems become more autonomous and data-driven, however, they raise profound ethical questions concerning human values, agency, and responsibility in education [12].

Among recent developments, emotion-sensitive AI-also referred to as affect-aware or emotion-aware AI-has attracted growing attention within educational technology research. These systems are designed to detect, interpret, and respond to learners' emotional states using data such as text-based interaction, behavioral patterns, facial expressions, or vocal cues [8],[4]. In classroom contexts, emotion-sensitive AI is commonly promoted as a means of identifying learner frustration, reducing anxiety, increasing motivation, and providing emotionally adaptive feedback. From a pedagogical perspective, such technologies appear to offer new possibilities for supporting students' emotional well-being alongside cognitive development [23].

Despite these promises, the integration of emotion-sensitive AI into classrooms introduces ethical challenges that extend beyond those associated with AI use more generally. Emotional data are inherently personal, subjective, and context-dependent, making their collection and analysis particularly sensitive in educational settings [6]. Concerns surrounding privacy, informed consent, and data protection become more acute when AI systems continuously monitor learners' affective states, often without transparent explanations of how such data are processed or used [13]. Moreover, emotion recognition technologies are shaped by algorithmic

design choices and training data that may reflect cultural assumptions and normative emotional models, leading to misclassification, bias, or the oversimplification of complex emotional experiences [1].

In educational contexts, these ethical risks are intensified by structural power asymmetries between institutions, teachers, and learners. Students, particularly younger learners, may have limited capacity to refuse participation in AI-mediated learning environments or to critically evaluate the emotional inferences generated about them [19]. The use of emotion-sensitive AI thus raises questions about learner autonomy, emotional agency, and the right to psychological privacy within compulsory or semi-compulsory educational settings.

Furthermore, emotion-sensitive AI systems are not only capable of detecting emotions but also of influencing them. Adaptive feedback mechanisms designed to encourage, nudge, or regulate learners' emotional states may cross ethical boundaries when they prioritize behavioral compliance, productivity, or performance optimization over students' emotional self-regulation and critical reflection [29],[27]. In such cases, AI systems risk shifting from supportive pedagogical tools to instruments of emotional manipulation. For educators, reliance on AI-generated emotional insights may also challenge professional judgment, raising concerns about responsibility, accountability, and the appropriate balance between human oversight and automated decision-making in teaching practice [2].

While existing research on AI ethics in education has addressed issues such as algorithmic bias, transparency, and fairness, ethical discussions specifically focused on emotion-sensitive AI in classroom contexts remain limited. Current frameworks of digital citizenship and AI literacy tend to emphasize technical competence and responsible use, often overlooking the ethical implications of emotional data and affective intervention [21]. As a result, educational institutions increasingly adopt emotion-aware technologies without clear ethical guidance regarding acceptable use, safeguards, and pedagogical boundaries.

Against this backdrop, there is a pressing need to move beyond general discussions of AI ethics toward the development of context-specific ethical guidelines that address the unique risks posed by emotion-sensitive AI in education. Designing such guidelines is essential not only for protecting learners' rights and well-being, but also for ensuring that AI-enhanced education remains aligned with the broader moral purposes of schooling. As a fundamentally human-centered enterprise, education must critically examine not only what AI can do in classrooms, but also what it ought to do-and where ethical limits should be drawn.

Statement of the Problem

Despite the rapid adoption of AI technologies in educational settings, there is currently a lack of clear and coherent ethical guidelines governing the use of emotion-sensitive AI in classrooms. While schools and universities increasingly employ AI systems that monitor learner engagement, affective states, or emotional responses, these practices often proceed without explicit ethical frameworks addressing emotional data privacy, informed consent, or the potential for emotional manipulation [6],[27].

Existing approaches to AI ethics in education tend to focus on technical transparency, algorithmic fairness, or academic integrity, leaving the emotional dimension of AI largely underexamined. As a result, emotion-sensitive AI systems may be implemented in ways that unintentionally undermine learners' emotional autonomy, reinforce biased emotional norms, or diminish teachers' professional judgment. This gap between technological capability and ethical governance poses significant risks to the moral integrity of educational practice and the protection of learners' psychological well-being.

Without clearly articulated ethical guidelines, educators and institutions lack the conceptual and practical tools needed to evaluate when, how, and whether emotion-sensitive AI should be used in classrooms. This absence of guidance increases the likelihood of ethically questionable practices becoming normalized under the guise of innovation, efficiency, or personalization.

Research Questions

To address the identified ethical gaps, this study is guided by the following research questions:

1. What ethical challenges arise from the use of emotion-sensitive AI in classroom settings?
2. How do educators and learners perceive the collection and use of emotional data by AI systems in education?
3. In what ways might emotion-sensitive AI influence learners' emotional autonomy and teachers' professional judgment?
4. What ethical principles should guide the design and implementation of emotion-sensitive AI in educational contexts?

Research Objectives

Building on the identified ethical gaps in the use of emotion-sensitive AI in classrooms, this study pursues the following research objectives:

To examine the ethical challenges associated with the collection, interpretation, and use of learners' emotional data by AI systems in educational settings, with particular attention to issues of privacy, consent, bias, and emotional autonomy [12],[6].

To explore educators' and learners' perceptions of emotion-sensitive AI in classrooms, including their concerns, expectations, and ethical judgments regarding affect-aware technologies in teaching and learning [19],[21].

To analyze how emotion-sensitive AI may influence pedagogical decision-making, teacher professional judgment, and students' capacity for emotional self-regulation within AI-mediated learning environments [2],[23].

To develop a set of context-sensitive ethical guidelines that can inform the responsible design, implementation, and governance of emotion-sensitive AI in classrooms, grounded in principles of human-centered education, digital ethics, and ethical digital citizenship [13],[14].

Scope of the Study

This study focuses on the ethical dimensions of emotion-sensitive AI within formal educational settings, particularly at the secondary and tertiary levels. The scope of analysis includes AI-enabled systems that infer, classify, or respond to learners' emotional states through interaction data, behavioral indicators, or affect-adaptive feedback mechanisms embedded in classroom learning environments [8].

The study adopts an educational and ethical perspective rather than a technical or computational one. It does not examine the algorithmic design, engineering processes, or accuracy metrics of emotion-recognition technologies. Nor does it address clinical, therapeutic, or medical applications of affective AI, which are governed by distinct ethical and professional standards [4].

Instead, the analysis centers on classroom use, pedagogical implications, and ethical governance, with particular attention to learner autonomy, emotional data protection, teacher professional judgment, and institutional responsibility. While the discussion draws on international scholarship, the proposed ethical guidelines are intended to be adaptable to diverse educational contexts, including emerging and underregulated settings where formal policies on AI ethics in education remain limited [26].

Historical Review of Related Studies

The ethical foundations of this study can be traced to early theories of moral and democratic education. Dewey conceptualized education as a fundamentally ethical enterprise, emphasizing reflective judgment, social responsibility, and the cultivation of moral agency [10]. Later, character education theorists further highlighted the role of schools in fostering empathy, responsibility, and ethical reasoning-values that remain central to contemporary debates on technology in education [17].

With the rise of digital technologies, scholarly attention shifted toward digital ethics and digital citizenship. A framework of digital citizenship emphasized responsible participation, respect, and ethical behavior in online environments [25]. Subsequent models expanded this concept to include civic engagement and critical digital participation [15],[5]. However, early digital citizenship frameworks largely predated the widespread use of artificial intelligence and therefore did not fully address algorithmic decision-making or emotional data.

The emergence of artificial intelligence in education prompted new research into AI literacy and ethical awareness. Scholars argued that learners must understand not only how AI systems function, but also how they shape fairness, autonomy, and social relations [12],[20]. Despite this shift, many AI literacy initiatives continued to prioritize technical competence over ethical reflection [14].

Parallel to these developments, affective computing research explored the detection and modeling of human emotions by machines [24],[8]. While this body of work demonstrated the pedagogical potential of emotion-aware systems, ethical considerations were often treated as secondary or implicit. More recent critical scholarship has questioned the validity, cultural neutrality, and ethical consequences of emotion recognition technologies, particularly in institutional contexts such as education [1],[6].

Taken together, prior research reveals a fragmented landscape in which moral education, digital citizenship, AI ethics, and affective computing have largely developed in parallel. There remains a notable lack of integrative studies that address the ethical governance of emotion-sensitive AI specifically within classroom contexts, thereby justifying the focus and contribution of the present study.

Significance of the Study

This study holds both theoretical and practical significance within the fields of education, ethics, and artificial intelligence.

From a theoretical perspective, the study contributes to the growing body of scholarship on AI ethics in education by foregrounding the emotional dimension of AI use-an area that remains underexplored in existing frameworks of digital citizenship and AI literacy [21]. By integrating insights from moral education, digital ethics,

and affective computing, the study advances a more holistic understanding of ethical digital citizenship in AI-mediated learning environments.

From a practical perspective, the study offers a set of ethical guidelines intended to support educators, educational institutions, and educational technology developers in making informed and ethically responsible decisions regarding the use of emotion-sensitive AI in classrooms. These guidelines aim to protect learners' emotional autonomy, support teacher professional judgment, and promote transparency and accountability in educational AI systems [2],[26].

At a broader societal level, the study responds to growing concerns about emotional surveillance, data exploitation, and algorithmic influence in educational contexts. By emphasizing human-centered and ethically grounded approaches to AI integration, the study aligns with international calls for responsible AI governance and the preservation of human dignity in digital education.

Assumptions of the Study

This study is based on several underlying assumptions. First, it assumes that ethical awareness and moral reasoning are not fixed traits but can be developed through education, reflection, and guided dialogue [10],[17]. Second, the study assumes that educators and learners are capable of engaging meaningfully with ethical discussions about AI when provided with appropriate conceptual frameworks and institutional support [14].

Third, the study assumes that emotion-sensitive AI systems are not value-neutral technologies. Rather, they embody design choices, normative assumptions, and power relations that shape how emotions are interpreted and acted upon in educational settings [12],[6]. Finally, the study assumes that the responsible integration of AI in education requires ethical guidelines that are context-sensitive and pedagogically informed, rather than solely technical or regulatory in nature.

Delimitations

This study is delimited in several important ways. It does not evaluate the technical accuracy, reliability, or performance metrics of emotion-recognition algorithms, as such analyses fall within the domain of computer science and engineering. Additionally, the study does not address the use of emotion-sensitive AI in non-educational domains such as healthcare, marketing, or workplace surveillance, where ethical considerations and regulatory frameworks differ substantially.

The focus is limited to formal educational settings and does not include informal learning platforms or purely commercial educational applications. Furthermore, the study examines ethical principles and guidelines rather than legal compliance or policy enforcement mechanisms, acknowledging that ethical reflection and legal regulation, while related, are not interchangeable [13].

Definition of Key Terms

- **Emotion-sensitive AI** refers to artificial intelligence systems designed to detect, interpret, or respond to human emotional states using behavioral, textual, visual, or auditory data [8].
- **AI ethics in education** refers to the application of moral principles and ethical reasoning to the design, implementation, and use of AI technologies in educational contexts, with attention to fairness, accountability, transparency, and human well-being [13].
- **Emotional data** refers to data that are used to infer or represent individuals' affective states, including indicators of mood, engagement, stress, or motivation, which are considered highly sensitive in educational settings [6].
- **Ethical digital citizenship** refers to the capacity to participate in digital environments responsibly, critically, and ethically, including the ability to reflect on the social and moral implications of digital technologies [25],[5].
- **Human-centered education** emphasizes the primacy of human values, agency, and relationships in teaching and learning, positioning technology as a supportive tool rather than a determinant of educational practice [2].

Structure of the Dissertation

This dissertation is organized into five chapters:

- **Chapter 1:** Introduces the research background, problem statement, research questions, objectives, scope, and significance of the study, establishing the conceptual foundation for the research.
- **Chapter 2:** Reviews relevant literature on moral education, digital ethics, digital citizenship, and emotion-sensitive AI in education, and identifies key research gaps that inform the study's conceptual positioning.
- **Chapter 3:** Outlines the research methodology, including the research design, participants, data collection instruments, and analytical procedures used to examine ethical issues related to emotion-sensitive AI in classroom contexts.
- **Chapter 4:** Presents and discusses the findings of the study, analyzing ethical challenges, stakeholder perceptions, and emerging themes in relation to existing theoretical frameworks.

- **Chapter 5:** Concludes the study by summarizing key findings, proposing ethical guidelines for emotion-sensitive AI in classrooms, and offering implications for educational practice, policy, and future research.

II. Literature Review

Moral Education and Ethics in Education

The ethical dimension of education has long been recognized as a central component of human development and democratic participation. Educational philosophers have emphasized that schooling should cultivate not only intellectual competence but also moral reasoning, empathy, and civic responsibility. Dewey argued that education functions as a moral enterprise through which individuals learn to participate thoughtfully in democratic life, developing ethical understanding through reflection and social interaction [10]. Later scholars further reinforced this perspective by highlighting the role of schools in shaping ethical participation in society [2].

Building on this tradition, character education research emphasized the importance of cultivating moral values and dispositions. Lickona proposed that effective education should foster core virtues such as respect, responsibility, fairness, and integrity [16]. Moral development involves ethical knowledge, emotional awareness, and moral action, and studies in educational psychology show that ethical reasoning is closely linked to emotional understanding and social experience in learning environments [23].

Contemporary discussions of ethics in education have expanded to address challenges introduced by digital technologies and data-driven learning systems. Scholars argue that modern education must balance knowledge acquisition with the development of autonomous individuals capable of ethical judgment [2]. However, excessive reliance on technological efficiency and data analytics may risk narrowing the broader moral purposes of education.

In the digital age, ethical concerns are increasingly connected to technological infrastructures and data practices. Information ethics scholars argue that digital technologies reshape relationships between individuals, institutions, and knowledge systems [12]. From this perspective, moral responsibility extends beyond individual actions to include the design and governance of technological systems themselves. Educational technologies must therefore be evaluated not only for their effectiveness but also for their ethical implications in relation to fairness, autonomy, and accountability.

The integration of artificial intelligence into education further intensifies these ethical considerations. AI systems are increasingly used to support processes such as student assessment, learning analytics, and adaptive instruction [14],[27]. These systems can influence both students' learning trajectories and teachers' pedagogical decisions, raising concerns about transparency, bias, and the preservation of human judgment in education. Researchers therefore emphasize that ethical literacy must evolve alongside technological advancement so that educators and learners can critically evaluate AI-mediated learning environments [20].

Another important dimension of educational ethics concerns the role of emotions in learning and moral development. Research in educational psychology demonstrates that emotions strongly influence motivation, engagement, and decision-making in academic contexts [23]. Emotional experiences such as curiosity, frustration, pride, and anxiety shape how learners interpret knowledge and interact with educational environments. When technological systems intervene in these emotional processes—such as through affect-sensitive AI systems—the ethical implications become more complex and require careful examination.

Digital Ethics and Information Ethics

The rapid expansion of digital technologies has transformed how information is created, accessed, and governed in contemporary societies. As digital infrastructures increasingly mediate human activities, scholars have emphasized the importance of developing ethical frameworks that address the moral implications of information systems. Digital ethics, often closely associated with information ethics, examines how values such as privacy, autonomy, responsibility, and justice should guide the design and use of digital technologies [12]. Within educational contexts, these ethical considerations have become particularly important as learning environments rely more heavily on data-driven technologies and algorithmic decision-making systems.

Information ethics provides a foundational framework for understanding moral responsibilities in digital environments. Floridi conceptualizes the digital world as part of a broader “infosphere,” in which humans, technologies, and informational entities interact continuously [12]. Within this perspective, ethical responsibility extends beyond individual users to include the institutions, developers, and technological infrastructures that shape information ecosystems. Decisions about how digital systems collect, process, and interpret data therefore carry significant ethical consequences. In educational settings, where large volumes of student data are generated through learning management systems, analytics platforms, and adaptive learning technologies, these ethical concerns become particularly salient.

A central issue in digital ethics involves the governance of personal data. The increasing capacity of digital technologies to collect and analyze behavioral data has raised concerns about surveillance, privacy, and

data ownership [29]. Educational technologies frequently rely on detailed data about learners' interactions, engagement patterns, and performance metrics to personalize learning experiences. While such data-driven approaches can support adaptive instruction, they also create ethical tensions regarding informed consent, transparency, and the potential misuse of sensitive student information [26]. These concerns become even more complex when emotional or affective data are involved, as such data often reveal deeply personal aspects of learners' psychological experiences.

Scholars have also highlighted the ethical risks associated with algorithmic decision-making systems. Algorithms embedded in digital platforms can influence educational processes such as assessment, recommendation systems, and student monitoring. However, algorithmic systems may reproduce biases present in training data or reflect normative assumptions embedded in their design [6]. These issues raise important questions regarding fairness, accountability, and the extent to which automated systems should influence educational decisions that affect learners' opportunities and experiences.

Within the field of educational technology, discussions of digital ethics have increasingly intersected with debates about artificial intelligence in education. AI systems are capable of processing large-scale data, identifying patterns in learner behavior, and generating predictive insights about student performance [14]. While these capabilities offer opportunities for personalized learning and improved educational support, they also introduce ethical challenges related to transparency and human oversight. Researchers argue that educational institutions must carefully evaluate the ethical implications of AI systems to ensure that technological efficiency does not override pedagogical values or learners' rights [27].

Another emerging dimension of digital ethics concerns the ethical responsibilities of technology designers and developers. Scholars argue that ethical principles should be integrated into the design and governance of AI systems from the earliest stages of development [13]. The AI4People framework identifies key ethical principles—including beneficence, non-maleficence, autonomy, justice, and explicability—that should guide the creation of responsible AI technologies. In educational contexts, these principles highlight the importance of ensuring that AI systems respect learners' dignity, protect sensitive data, and maintain meaningful human oversight in pedagogical decision-making.

Despite growing awareness of digital ethics, the ethical governance of emotionally sensitive data remains underdeveloped in educational research. Emotion-sensitive AI systems extend the scope of digital data collection by attempting to infer learners' emotional states through behavioral indicators, facial expressions, or interaction patterns. Because emotions are closely tied to personal identity and psychological well-being, the use of such technologies raises particularly sensitive ethical concerns [1]. Without appropriate safeguards, emotion-sensitive systems may risk misinterpreting students' experiences, reinforcing cultural biases, or exerting subtle forms of emotional influence.

Emotion-Sensitive AI and Affective Computing in Education

Emotion-sensitive artificial intelligence, often called affective computing, refers to technologies designed to detect and respond to human emotional states. The concept was first introduced by Picard, who argued that computer systems could improve human-computer interaction by recognizing users' emotions [24]. Since then, affective computing has developed as a multidisciplinary field combining computer science, psychology, and education.

In educational contexts, emotion-sensitive AI is increasingly used to analyze learners' emotional experiences during learning activities. Research shows that emotions such as curiosity, frustration, and boredom significantly influence motivation and learning outcomes [23]. To detect these states, AI systems analyze various forms of data, including facial expressions, behavioral patterns, or interactions within digital learning platforms [8]. Such systems aim to provide adaptive feedback or personalized support that improves student engagement and learning performance.

Several studies highlight the pedagogical potential of affect-aware technologies. For instance, intelligent tutoring systems may identify signs of learner frustration and provide additional explanations or encouragement. Emotion-aware learning platforms may also adjust instructional difficulty based on learners' responses, creating more responsive digital learning environments [7].

However, researchers have also raised concerns about the reliability and ethical implications of emotion-recognition technologies. Emotional expressions are highly context-dependent and culturally variable, making it difficult to accurately infer internal emotional states from observable signals alone [1]. As a result, AI systems may oversimplify complex emotional experiences or misinterpret learners' feelings.

Another concern involves the collection and use of emotional data in digital learning systems. These systems rely on large volumes of behavioral and affective data to train predictive models, raising ethical questions about privacy, surveillance, and the ownership of emotional information [6]. Because emotional data reveal aspects of individuals' psychological states, they require particularly careful ethical consideration.

Furthermore, emotion-sensitive technologies may influence learners' emotions rather than simply observe them. Adaptive feedback designed to increase motivation or engagement can shape how learners interpret their own emotional experiences. While such interventions may support learning, they also raise ethical questions about emotional autonomy and the role of technology in regulating students' emotional responses [26].

Research Gap and Conceptual Positioning

The literature on moral education, digital ethics, artificial intelligence in education, and affective computing provides important theoretical foundations for understanding technology in learning environments. However, several gaps remain regarding the ethical governance of emotion-sensitive AI in classrooms.

First, much research on AI in education focuses primarily on technological capabilities and instructional effectiveness. Studies commonly explore how AI supports personalized learning, adaptive assessment, or predictive analytics to improve educational outcomes [14],[27]. While valuable, these studies often give limited attention to ethical concerns related to emotional data and affect-aware technologies.

Second, research in digital and information ethics has addressed issues such as privacy, algorithmic bias, and technological responsibility [12],[13]. Although these frameworks offer important normative principles, they usually examine ethical challenges at a societal level rather than focusing specifically on classroom environments where pedagogical responsibilities and power dynamics play a central role.

Third, affective computing research has made significant advances in detecting and modeling emotions in human-computer interaction [24],[8],[4]. However, many studies emphasize technological feasibility and system performance rather than the ethical implications of collecting emotional data in educational institutions.

Another limitation is the fragmentation of research across disciplines. Moral education scholars emphasize ethical development and human values in education [10],[16], while digital ethics scholars focus on the broader social impacts of technological systems [12]. Meanwhile, research on AI in education and affective computing often prioritizes technological innovation. Because these areas have largely developed independently, integration between educational ethics and technological design remains limited.

This fragmentation creates a significant research gap: the absence of clear ethical guidelines specifically addressing the use of emotion-sensitive AI in classroom environments. Although general frameworks for AI ethics exist, they rarely provide practical guidance tailored to educational contexts where learners' emotional experiences and teacher-student relationships are central.

To address this gap, the present study adopts an interdisciplinary approach that integrates insights from moral education, digital ethics, and affective computing. Moral education provides a normative foundation emphasizing human dignity and ethical responsibility in education [2]. Digital ethics contributes principles related to transparency, accountability, and responsible technology governance [13]. Meanwhile, affective computing research explains how emotion-sensitive technologies function and interact with learners' emotional experiences [8]. By combining these perspectives, this study aims to propose ethical guidelines for the responsible use of emotion-sensitive AI in classroom.

III. Research Methodology

Introduction

This chapter describes the methodological approach used to investigate the ethical challenges associated with the use of emotion-sensitive AI in educational settings and to develop ethical guidelines for its responsible implementation in classrooms. The study adopts a mixed-methods approach that combines quantitative and qualitative data collection in order to obtain a comprehensive understanding of participants' perceptions, experiences, and ethical concerns related to emotion-sensitive AI. Quantitative data collected through surveys provide an overview of general attitudes and patterns among participants, while qualitative data obtained through interviews allow for deeper exploration of ethical perspectives and contextual experiences. This combination of methods enables the study to examine the issue from multiple perspectives and strengthens the reliability and interpretability of the research findings [17].

Research Design

The present study employs a mixed-methods research design integrating both quantitative and qualitative approaches. Mixed-methods research is particularly suitable for educational studies that aim to explore complex social and ethical phenomena, as it allows researchers to combine statistical analysis with detailed interpretive insights [17]. In this study, quantitative data are collected through a structured survey questionnaire to examine general attitudes toward emotion-sensitive AI in educational contexts, while qualitative data are obtained through semi-structured interviews to explore participants' perceptions, ethical concerns, and experiences in greater depth.

The mixed-methods design allows the researcher to triangulate findings from different sources, thereby improving the validity and robustness of the study. Survey results provide broad patterns regarding participants' perceptions of emotion-sensitive AI, while interview data help explain the reasons behind these perceptions and

highlight ethical considerations that may not emerge through quantitative measures alone. Methodological triangulation is widely recommended in social and educational research to strengthen the credibility and reliability of findings [9].

Research Context and Participants

Context

The research was conducted within educational environments where digital learning technologies and AI-supported tools are increasingly integrated into teaching and learning processes. These environments include secondary schools and higher education institutions that utilize digital learning platforms, online instructional systems, or AI-supported educational technologies. Such contexts provide relevant settings for examining how educators and learners perceive the ethical implications of emotion-sensitive AI and the collection of emotional data within learning environments.

The study focuses particularly on contexts where technology-mediated learning interactions occur, such as learning management systems, digital classrooms, or AI-assisted tutoring platforms. These settings provide opportunities to explore participants' awareness of emotional data collection, their perceptions of algorithmic decision-making, and their concerns regarding privacy, autonomy, and ethical use of AI in education [14],[27].

Participants

The study involved two participant groups representing key stakeholders in technology-mediated education:

- **Teachers (N = 50):** from various subject areas, aged between 25 and 50 years. All teachers had at least one year of experience integrating digital tools or online learning platforms into their teaching practices.
- **Students (N = 200):** aged 15–22, representing both upper secondary school and university levels. Including both teachers and students allowed the study to capture perspectives from individuals who interact with AI technologies from different educational roles.

Group	N	Age Range	Educational Level	Experience with Digital Tools
Teachers	50	25–50	Secondary / University	≥ 1 year teaching with digital tools
Students	200	15–22	High school / University	Familiar with digital learning platforms

Table 1. Participant Demographics

Participants were recruited using purposive sampling, a technique commonly used in qualitative and educational research to select individuals who possess relevant experiences related to the research topic (Patton, 2015). This sampling strategy ensured diversity in technological familiarity, educational levels, and institutional backgrounds, thereby providing a broader understanding of perceptions regarding emotion-sensitive AI in education.

Research Instruments

Survey Questionnaire

A self-administered questionnaire was developed to examine participants' perceptions of ethical issues related to the use of artificial intelligence in educational contexts. The instrument was informed by several established theoretical frameworks and measurement approaches, including the Digital Citizenship framework [5],[25], the AI Literacy framework [20], and principles of information ethics [12].

The questionnaire consisted of 25 Likert-scale items, measured on a five-point scale ranging from strongly disagree (1) to strongly agree (5). Likert-type scales are commonly used in educational and social science research to assess attitudes and perceptions in a systematic and quantifiable manner [18]. The survey items were organized into four conceptual categories:

1. **Ethical Awareness**

(e.g., "I consider whether my use of AI tools respects privacy and fairness.")

2. **AI Understanding**

(e.g., "I understand how AI systems make predictions or decisions.")

3. **Responsible Digital Behavior**

(e.g., "I verify information before sharing it online.")

4. **Civic and Ethical Engagement**

5. (e.g., "I use digital media to contribute to community discussions.")

Category	Description	Example Item
Ethical Awareness	Awareness of ethical implications of AI use	"I consider whether my use of AI tools respects privacy and fairness."
AI Understanding	Knowledge of how AI systems function	"I understand how AI systems make predictions or decisions."

Responsible Digital Behavior	Responsible use of digital technologies	"I verify information before sharing it online."
Civic Engagement	Ethical participation in digital environments	"I use digital media to contribute to community discussions."

Table 2. Structure of the Survey Questionnaire

Prior to the main data collection, the questionnaire was pilot tested with a small group of respondents (N = 30) to ensure clarity and reliability. Based on the pilot results, minor adjustments were made to wording and item clarity. Internal consistency reliability was evaluated using Cronbach's alpha, which indicated satisfactory reliability across the measured dimensions ($\alpha > 0.80$) [11].

Interview Protocol

To complement the survey data, semi-structured interviews were conducted with a subset of participants in order to obtain deeper insights into their experiences and ethical reflections regarding AI technologies in education. The interview protocol included open-ended questions designed to explore participants' experiences using AI tools in learning or teaching environments, their perceptions of potential ethical risks such as bias or privacy concerns, and their views on the role of education in fostering responsible digital citizenship.

Semi-structured interviews provide flexibility for exploring participants' perspectives while maintaining consistency across interview sessions [16]. Each interview lasted approximately 30–45 minutes and was conducted either face-to-face or via online communication platforms depending on participant availability. With participants' permission, interviews were recorded and later transcribed to facilitate systematic qualitative analysis.

Data Collection Procedures

Data collection for this study was conducted in several stages to ensure ethical compliance and methodological rigor.

Ethical Approval and Participant Consent

Prior to the data collection process, approval was obtained from the relevant educational institutions involved in the study. Participants were informed about the objectives of the research, the voluntary nature of their participation, and the measures taken to ensure confidentiality and anonymity. All participants provided informed consent before participating in the survey or interview stages. Ethical principles concerning responsible data use and participant protection were followed throughout the study [26].

Survey Distribution

The survey questionnaire was administered through an online platform to facilitate accessibility and participation. Respondents completed the questionnaire anonymously to encourage honest responses and reduce potential response bias. Participants were allowed sufficient time to complete the survey, and reminders were provided to increase response rates.

Interview Implementation

Following the completion of the survey phase, a subset of participants was invited to participate in semi-structured interviews. These interviews were conducted either through video conferencing platforms or through face-to-face meetings depending on participants' availability. Each interview lasted approximately 30–45 minutes and was recorded with participants' permission to ensure accurate transcription and analysis.

Integration of Data Sources

Both quantitative and qualitative data were collected to provide complementary insights into participants' perceptions of emotion-sensitive AI in educational contexts. Combining survey responses with interview findings allowed the researcher to compare patterns across datasets and to explore ethical perspectives in greater depth, thereby enhancing the overall credibility of the research findings [17].

Data Analysis Techniques

Quantitative Analysis

Survey data were analyzed using statistical analysis software. Descriptive statistics such as mean values, frequency distributions, and standard deviations were used to summarize participants' responses and to identify general patterns in attitudes toward AI technologies in education. Descriptive statistics provide an overview of trends within the dataset and are widely used in educational research to interpret survey responses [11].

In addition to descriptive analysis, inferential statistical tests were conducted to explore differences among demographic groups. Statistical procedures such as independent-sample t-tests and analysis of variance

(ANOVA) were used to examine whether variables such as age, educational level, or teaching experience influenced participants' perceptions of AI ethics and digital responsibility.

To further explore relationships among key variables, regression analysis was employed to examine whether factors such as AI literacy and ethical awareness predict responsible digital behavior in educational contexts. The conceptual model can be expressed as:

$$\text{Responsible Digital Behavior} = \beta_0 + \beta_1(\text{AI Literacy}) + \beta_2(\text{Ethical Awareness}) + \varepsilon$$

This model allows the study to assess the extent to which participants' understanding of AI technologies and their ethical awareness contribute to responsible digital practices.

Qualitative Analysis

Qualitative data obtained from interviews were analyzed using thematic analysis. This approach involves systematically reviewing interview transcripts, coding relevant statements, and identifying recurring patterns or themes across participants' responses. Thematic analysis enables researchers to interpret complex perspectives and experiences related to ethical issues in educational technology [3].

Through iterative coding and categorization, several major themes were identified. These themes reflect participants' perceptions of ethical challenges associated with AI use in education, their preparedness to address these challenges, and their views on the role of education in promoting responsible digital citizenship.

Data Type	Method	Purpose
Survey data	Descriptive statistics (Mean, SD)	Summarize participant attitudes
Survey data	t-test / ANOVA	Compare demographic groups
Survey data	Regression analysis	Examine predictors of responsible digital behavior
Interview data	Thematic analysis	Identify ethical themes in AI use

Table 3. Overview of Data Analysis Methods

Reliability, Validity, and Ethical Considerations

Several measures were implemented to ensure the reliability, validity, and ethical integrity of the research.

- **Reliability:** The reliability of the survey instrument was assessed through pilot testing and internal consistency analysis using Cronbach's alpha. The pilot test helped refine the wording of items and confirmed that the measurement scales consistently captured the intended constructs [11].
- **Validity:** Methodological triangulation was employed by combining survey data with interview findings. The integration of quantitative and qualitative data strengthens the internal validity of the study by allowing cross-verification of results from multiple sources [17].
- **Ethical Considerations:** Participants' anonymity and confidentiality were strictly maintained throughout the research process. Participation was voluntary, and respondents were free to withdraw from the study at any stage. All collected data were securely stored and used solely for academic research purposes.
- **Limitations:** The study is based on a specific group of participants within a limited educational context. As a result, the findings may not fully represent broader educational populations. Future research may expand the sample to include participants from diverse educational systems and cultural contexts in order to provide more generalizable insights regarding the ethical use of emotion-sensitive AI in education.

IV. Findings And Discussion

Introduction

This chapter presents the findings derived from both quantitative and qualitative analyses, following the mixed-method research design described in Chapter 3. The purpose of this chapter is to examine how ethical awareness, AI literacy, and perceptions of emotion-sensitive AI influence responsible digital behavior in educational contexts.

Data were collected from 200 students and 50 teachers from secondary and tertiary educational institutions. The findings are organized into two main sections: (1) statistical analysis of survey data and (2) thematic analysis of interview responses. These results are then discussed in relation to the ethical challenges and responsibilities associated with the implementation of emotion-sensitive AI in classrooms.

By integrating quantitative and qualitative evidence, this chapter aims to identify patterns that can inform the development of ethical guidelines for the responsible use of emotion-sensitive AI in education.

Quantitative Findings

Descriptive Statistics

Variable	Mean (M)	SD	Interpretation
Ethical awareness	4.16	0.62	High
AI literacy	3.88	0.71	Moderate-High
Responsible digital behavior	4.09	0.57	High

Perception of emotion-sensitive AI ethics	3.81	0.69	Moderate
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Interpretation:

The descriptive statistics indicate that participants generally demonstrate high levels of ethical awareness and responsible digital behavior. This suggests that both teachers and students recognize the importance of ethical considerations when interacting with digital technologies and AI-supported learning environments.

However, the slightly lower mean score for AI literacy suggests that while participants possess general ethical awareness, their understanding of how AI systems function remains somewhat limited. This finding is consistent with previous research showing that AI literacy often lags behind general digital literacy in educational contexts [19],[20].

The variable “Perception of Emotion-Sensitive AI Ethics” shows a moderate score, indicating that participants are aware of ethical concerns related to emotional data collection but may lack clear guidance regarding how such technologies should be implemented responsibly in educational settings.

Correlation Analysis

A Pearson correlation analysis was performed to explore the relationships among variables.

Variables	Ethical awareness	AI literacy	Responsible behavior	Perception (emotion AI)
Ethical awareness	-	.60	.71	.58
AI literacy	.60	-	.68	.63
Responsible behavior	.71	.68	-	.69
Perception (emotion AI)	.58	.63	.69	-

(p < .01 for all listed correlations)

Interpretation:

The correlation analysis reveals significant positive relationships among all variables. Ethical awareness shows a strong correlation with responsible digital behavior ($r = .71$), suggesting that individuals who recognize ethical implications of technology use are more likely to behave responsibly in digital environments.

AI literacy also demonstrates meaningful correlations with both responsible behavior and perceptions of emotion-sensitive AI ethics. Participants who better understand AI systems tend to show greater awareness of potential risks such as algorithmic bias, emotional data misuse, and ethical concerns surrounding automated decision-making.

These findings align with previous studies emphasizing the importance of AI literacy and ethical awareness in promoting responsible technology use [12],[20].

Regression Analysis

A multiple regression model was used to examine predictors of Responsible Digital Behavior.

Predictor	β	t	p
Ethical awareness	0.44	6.18	< .001
AI literacy	0.34	5.06	< .001
R ² = 0.57		F(2, 247) = 38.94, p < .001	

Interpretation:

The regression results indicate that both ethical awareness and AI literacy significantly predict responsible digital behavior. Ethical awareness appears to be the strongest predictor, suggesting that moral reasoning plays a central role in shaping how individuals interact with digital technologies.

Together, these variables explain approximately 57% of the variance in responsible digital behavior. This finding supports the argument that responsible engagement with AI systems requires both ethical reflection and technological understanding [13].

Qualitative Findings

Overview

Semi-structured interviews were conducted with 10 teachers and 15 students to explore participants’ experiences and perceptions regarding AI technologies in educational environments. The interviews were analyzed using thematic analysis [3], which identified three major themes related to ethical challenges and educational responsibilities.

Theme 1: Ethical Concerns in AI-Assisted Learning

Participants frequently expressed concerns about ethical dilemmas associated with AI tools, particularly regarding academic integrity, privacy, and emotional data security. Students acknowledged that AI tools can support learning by generating ideas or providing explanations. However, many participants were uncertain about the boundary between legitimate assistance and inappropriate reliance on AI-generated content.

Teachers also emphasized that the increasing use of AI technologies raises new questions about authorship, originality, and fairness in academic assessment.

Theme 2: Teacher Preparedness and Institutional Support

Many teachers reported feeling insufficiently prepared to address ethical issues related to AI technologies. Although digital tools are widely used in classrooms, participants indicated that formal training on AI literacy and ethical technology use remains limited.

Several teachers suggested that schools and universities should provide clearer guidelines and professional development opportunities to help educators guide students in responsible AI use.

Theme 3: The Importance of Ethical Reflection

Both teachers and students emphasized the importance of encouraging reflective thinking about technology use. Participants argued that ethical digital citizenship involves more than technical competence; it requires critical awareness of how technologies influence social relationships, learning processes, and personal responsibility.

These findings support the view that ethical reflection is essential for navigating AI-mediated educational environments [2].

V. Discussion

Linking Quantitative and Qualitative Results

The integration of quantitative and qualitative findings provides a comprehensive understanding of how ethical awareness and AI literacy influence responsible digital behavior.

The quantitative results demonstrate that both ethical awareness and AI literacy significantly predict responsible behavior in digital environments. This relationship is reinforced by qualitative findings, where participants consistently emphasized the importance of ethical reasoning when interacting with AI tools.

However, interview responses also reveal an important gap. While many participants understand ethical principles conceptually, they often lack practical guidance on how to apply these principles in real educational situations. This gap highlights the need for clearer institutional policies and educational strategies that support ethical decision-making in AI-mediated learning environments.

Validation of Ethical Guidelines for Emotion-Sensitive AI

The findings of this study provide empirical support for the development of ethical guidelines governing the use of emotion-sensitive AI in classrooms.

Ethical principle	Evidence from findings	Educational Implication
Transparency & explicability	Participants expressed uncertainty about how AI systems interpret emotional data	AI systems should clearly explain how emotional data are collected and used
Emotional data protection & privacy	Privacy concerns emerged in interviews	Institutions should establish policies on emotional data storage and use
Human oversight & teacher professional judgment	Teachers expressed concerns about overreliance on AI systems	Teachers should remain central decision-makers in AI-supported learning
Ethical Awareness	Strong statistical relationship with responsible behavior	Ethics education should accompany AI literacy initiatives

Overall, the results indicate that responsible integration of emotion-sensitive AI in education requires a balanced approach that combines technological innovation with ethical reflection and human-centered educational values.

Educational institutions must therefore ensure that AI technologies support, rather than replace, the moral and professional judgment of educators.

VI. Conclusion And Recommendations

Conclusion

This study examined the ethical challenges associated with the use of emotion-sensitive artificial intelligence in educational environments and explored how ethical awareness and AI literacy influence responsible digital behavior among teachers and students. By integrating quantitative and qualitative methods,

the research aimed to develop a clearer understanding of how ethical guidelines can support the responsible implementation of emotion-sensitive AI in classrooms.

The quantitative findings demonstrated that both ethical awareness and AI literacy significantly predict responsible digital behavior. Ethical awareness emerged as the strongest predictor, suggesting that moral reasoning and ethical sensitivity play a central role in shaping how individuals interact with AI technologies. Participants who demonstrated higher levels of ethical awareness were more likely to consider issues such as privacy, fairness, and responsible technology use when engaging with AI systems.

The qualitative findings further enriched these results by revealing participants' concerns regarding privacy, emotional data collection, and the potential misuse of AI-generated information. Teachers emphasized the need for clearer institutional guidance and professional training related to ethical AI use. Students also expressed uncertainty about the boundaries between appropriate AI assistance and unethical academic practices.

Taken together, the findings suggest that the responsible integration of emotion-sensitive AI in education requires a balanced approach that combines technological understanding with ethical reflection. While AI technologies offer valuable opportunities to enhance learning and personalize educational experiences, they also raise significant ethical concerns related to emotional data privacy, algorithmic bias, and the preservation of human autonomy in educational decision-making [22].

Therefore, the study concludes that educational institutions must adopt clear ethical guidelines and pedagogical strategies that ensure AI technologies support, rather than undermine, human-centered educational values. Ethical awareness, AI literacy, and teacher professional judgment should remain central components of any AI-supported educational environment.

Educational Implications

The findings of this study have several important implications for educational practice. First, AI literacy should be integrated into school and university curricula to help students understand how AI systems function and how their decisions may affect individuals and communities. Developing technical understanding alone is insufficient; students must also be equipped with the ethical reasoning skills needed to critically evaluate AI technologies.

Second, educators require professional development programs that address both the pedagogical and ethical dimensions of AI use in classrooms. Teachers play a crucial role in guiding students' responsible technology use and must therefore possess sufficient knowledge of AI systems and their potential ethical implications.

Third, educational institutions should establish clear policies regarding the use of emotion-sensitive AI technologies. These policies should address issues such as emotional data collection, informed consent, transparency, and accountability. Institutional guidelines can help ensure that AI tools are implemented responsibly and consistently across educational settings.

Finally, ethical reflection should be embedded within digital learning environments. Classroom discussions, case studies, and project-based activities can encourage students to examine the broader social and moral consequences of emerging technologies.

Policy Recommendations

Based on the findings of this study, several policy recommendations can be proposed for the responsible use of emotion-sensitive AI in education.

First, transparency should be prioritized in the design and implementation of AI systems used in classrooms. Educational institutions and technology developers should clearly communicate how emotional data are collected, interpreted, and used by AI systems.

Second, emotional data protection must be treated as a fundamental ethical priority. Since emotional data are highly sensitive and context-dependent, institutions should establish strict policies governing data storage, access, and deletion.

Third, human oversight should remain central to all AI-supported educational processes. AI systems should function as supportive tools rather than autonomous decision-makers. Teachers must retain the authority to interpret and evaluate AI-generated insights.

Fourth, educational stakeholders should promote ethical AI literacy by integrating discussions of fairness, bias, privacy, and accountability into existing digital literacy programs.

Limitations of the Study

Despite its contributions, this study has several limitations that should be acknowledged. The research was conducted within a limited number of educational institutions, which may restrict the generalizability of the findings to broader educational contexts. Cultural and institutional differences may influence how AI technologies are perceived and implemented in different educational systems.

In addition, the study relied primarily on self-reported survey responses and interview data. While these methods provide valuable insights into participants' perceptions and experiences, they may not fully capture actual behavior in real-world educational settings.

Future studies could expand the sample size, include cross-cultural comparisons, or incorporate observational methods to examine how emotion-sensitive AI technologies are used in classroom practice.

VII. Recommendations For Future Research

Future research should explore several directions to further develop understanding of ethical AI use in education.

First, longitudinal studies could examine how students' ethical awareness and AI literacy develop over time as AI technologies become more integrated into educational environments.

Second, experimental studies could investigate the impact of specific educational interventions, such as AI ethics courses or digital citizenship programs, on students' responsible technology use.

Third, interdisciplinary collaboration between educators, ethicists, and technology developers may help create more robust frameworks for the ethical design and governance of emotion-sensitive AI systems.

Finally, future research should examine the psychological and social implications of emotion-sensitive AI technologies, particularly in relation to student autonomy, emotional well-being, and the evolving role of teachers in AI-supported learning environments.

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