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ORIGINAL

Ethics and Artificial Intelligence in Education: A Needs Analysis for Developing a Responsible AI Implementation Framework in the Classroom

Ética e Inteligencia Artificial en la Educación: Un Análisis de Necesidades para Desarrollar un Marco de Implementación Responsable de la IA en el Aula

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ABSTRACT

The fast adoption of Artificial Intelligence (AI) in the education sector has brought great changes in the learning environment by means of intelligent tutoring systems, automated grading, adaptive learning, and learning analytics. Although these innovations improve personalization, efficiency, and inclusivity, these inventions also produce ethical dilemmas of data privacy, bias in algorithms, transparency, accountability, and equity. This paper will examine the needs and perceptions of the stakeholders with a view to coming up with a responsible framework for applying AI ethically in educational institutions. A quantitative strategy was used in a descriptive manner and comprised 100 stakeholders purposely selected; this includes teachers, students, administrators, and developers. The data were gathered using a master structured questionnaire that covered the issues of AI literacy, perceived ethical risks, perceived relevance of ethical principles, and predicted institutional structures. The findings have shown that the participants have a fairly good conceptualization of AI (mean = 3,9) and are highly aware of the risks of ethics and especially on data privacy (4,2) and accountability (4,3). Respondents anticipated high moral values like fairness, inclusiveness, transparency, and safeguarding of personal data, and they stressed the essence of institutional rules, technical guidelines, training, and inter-stakeholder cooperation to guarantee the responsible use of AI. These results demonstrate the pressing need to develop a context-sensitive ethical AI model that can strike a balance between technological innovation and human values, thus encouraging trust, equity, and quality in learning and providing policymakers and practitioners with capacity building, institutional governance, and participatory approaches to responsible AI implementation in learning settings.

Keywords: Artificial Intelligence in Education; Ethics; Responsible AI; Needs Analysis; Ethical Framework.

RESUMEN

La rápida adopción de la Inteligencia Artificial (IA) en el sector educativo ha traído grandes transformaciones en el entorno de aprendizaje mediante sistemas de tutoría inteligente, calificación automatizada, aprendizaje adaptativo y analítica del aprendizaje. Aunque estas innovaciones mejoran la personalización, la eficiencia y la inclusividad, también generan dilemas éticos relacionados con la privacidad de los datos, el sesgo en los algoritmos, la transparencia, la rendición de cuentas y la equidad. Este estudio examina las necesidades y percepciones de los actores involucrados con el objetivo de proponer un marco responsable para la aplicación ética de la IA en las instituciones educativas. Se utilizó una estrategia cuantitativa de carácter descriptivo que

incluyó a 100 participantes seleccionados intencionalmente, entre ellos docentes, estudiantes, administradores y desarrolladores. Los datos se recopilaron mediante un cuestionario estructurado que abarcó temas sobre alfabetización en IA, riesgos éticos percibidos, relevancia percibida de los principios éticos y estructuras institucionales previstas. Los resultados muestran que los participantes poseen una comprensión conceptual bastante buena de la IA (media = 3,9) y una alta conciencia de los riesgos éticos, especialmente en relación con la privacidad de los datos (4,2) y la rendición de cuentas (4,3). Los encuestados manifestaron una alta valoración de principios morales como la justicia, la inclusividad, la transparencia y la protección de los datos personales, y destacaron la importancia de las normas institucionales, las directrices técnicas, la capacitación y la cooperación entre los diferentes actores para garantizar un uso responsable de la IA. Estos resultados demuestran la urgente necesidad de desarrollar un modelo ético de IA sensible al contexto, capaz de equilibrar la innovación tecnológica con los valores humanos, fomentando así la confianza, la equidad y la calidad en el aprendizaje, además de ofrecer a los responsables de políticas y profesionales herramientas de fortalecimiento de capacidades, gobernanza institucional y enfoques participativos para la implementación responsable de la IA en los entornos educativos.

Palabras clave: Inteligencia Artificial en la Educación; Ética; IA Responsable; Análisis de Necesidades; Marco Ético.

INTRODUCTION

Due to the high rate at which Artificial Intelligence (AI) is evolving, several industries have been given a new innovative possibility, including education. Intelligent tutoring systems, automated grading programs, learning analytics, and adaptive learning systems are some of the AI-driven tools that have started to transform the format of instruction and learning. These technologies provide personalized learning interactions, instant feedback, and data-powered information about how learning is progressing, and may make education more efficient, inclusive, and effective.[1] Nonetheless, in addition to these advantages, ethical concerns related to the use of AI in the classroom environment persist, and they must be addressed systematically to ensure a responsible and fair application. Ethics as applied in AI refers to the guidelines and principles that AI systems should be designed and utilized in a human-compliant manner, adhering to the values, human rights, and the general welfare of society.[2] These ethical aspects are especially important in educational contexts because students are more susceptible to manipulation and because educational information is sensitive, and algorithmic choices have serious and long-lasting consequences on the future of the learners. Matters of algorithmic bias, the privacy of data, transparency, accountability, and online Pacific inequity have become the main topics in debates concerning ethical AI in educational settings.[3]

Although the interest in these ethical issues is rising, one can still detect the absence of well-organized frameworks that can help to introduce the ethical use of AI into the education context. The ethical aspects of AI have been overlooked in most AI applications in education, which are often designed and implemented based primarily on technical and practical considerations, rather than instructional feasibility.[4] Consequently, stakeholders i.e., educators, administrators, students, parents, and policymakers are deprived of an instructive way to assess, implement, and track the AI tools responsibly.[5,6,7] The following lack highlights why an interdisciplinary and context-sensitive approach, which incorporates the ethical considerations into the cycle of AI integration into classroom learning, is urgently needed. More so, ethical application of AI in education is not a standardized undertaking.[8] Learning institutions are diverse in terms of their technological capability, culture, teacher beliefs and the political setting. Thus, whatever ethical paradigm should be suggested, it should be based on profound examination of the peculiarities of needs, expectations and limits of educational community to be served. A needs analysis is one of the primary mandatory steps in such a process, as it allows revealing major concerns, priorities, and values of various stakeholders in connection to AI in education.[9]

In multiple studies conducted within recent years, it has been mentioned that the ethical dilemmas which arise during AI adoption are in many cases being systemic as opposed to accidental. As an example, AI-based AI decision-making bias may be associated with biased training data, poor situational contextualisation or design team composition. In parallel, the lack of transparency in the AI systems may undermine the trust of those learning or instructing, particularly, in the cases where judgments made about them (grading or learning suggestions and alike) cannot be transparently explained.[10] Issues surrounding the privacy of data, and especially the privacy of learners minors, bring with it questions of consent, monitoring, and the selling of that valued data. Such cases confirm that ethical risks are deeply rooted in both design and implementation processes of AI technologies, moreover, it underlines the importance of advanced ethical governance. Ethical AI is not only a technical necessity, it is an educational one in the class room.[11] Teachers should learn more about the decisions that AI systems take so that they can gain more meaningful insights into what the derivations

of these systems represent and how human judgment and input can be supported with the help of these instruments but not replaced with them. Young learners as immediate end-users or subjects of the uses of AI should be informed about the usage of their data, and taught to question the algorithmic environments. It is the role of institutional leaders and policymakers to lay policies to strike a balance between being innovative and protective by fostering digital literacy as well as technology application. All these views should be considered when developing an ethical framework of artificial intelligence.[12]

The absence of a uniform philosophy to AI use in education may lead to wider implications on society in general. Education is an instructional sphere that Molds the future generation of citizens and employees; therefore, the principles incorporated in the AI-based educational tools will undoubtedly have an impact on how education participants comprehend a notion of fairness, unaccountability, and agency. When students feel that AI is random, intrusive, or even prejudiced, they might strengthen their cynicism about digital systems and destroy trust in technology-enabled governance. On the other hand, AI exercised with transparency, inclusivity, and regard to rights can establish vital digital literacy and civic engagement. Hence, the development of ethical AI framework in the context of education is both a practical need and a normative task.[13,14]

An ideal AI deployment system within education would have to encompass a variety of important dimensions, including: 1) Ethics, including fairness, privacy, transparency, and non-discrimination; 2) Context, including relevance to local educational objectives, law, and culture; 3) Stakeholder involvement, such as students, educators, parents, developers, and policymakers; 4) Scalability and adaptability, as the framework as it pertains to the technology and educational concerns will continue to change over time; and 5) Measurement and accountability, to monitor the long.[15]

The current article attempts to help the existing discussion regarding AI ethics in education by performing a needs analysis concentrated on creating a responsible framework of AI implementation. The research will come up with a picture of the state of use of AI in the classroom today, based on a combination of literature review, interviews of experts and stakeholder survey and a description of ethical gaps stakeholders view as most critical. The idea is to inform the formulation of a framework that is practical and principled design capable of defining how teachers and learning institutions to embrace AI in the endeavour that influences learning without compromising the integrity of ethical practice.[16] Conclusively, Artificial intelligence (AI) offers hope to turn the education sector upside down however, this has to be undertaken with a passionate sense of ethics. A properly designed framework would act as the guide to the educational sector and educational organizations in the space of AI adoption, compliance with the high-tech advancements and human dignity, justice and trust.[17,18]

METHOD

The given study is based on a descriptive quantitative method, which pursues the objective to present an objective and non-subjective characterization of the perception, comprehension, and requirements of the stakeholders regarding the development of an ethical framework in implementation of Artificial Intelligence (AI) in educational institutions.

Sample and Sampling Technique

The stakeholders in the educational ecosystem such as teachers, lecturers, students, educational institution managers, and educational technology developers make up the population of this study. One of the techniques that were used is purposive sampling to make sure that the participants had the necessary knowledge and experience regarding the implementation of Artificial Intelligence (AI) in the educational field. This non-probability sampling was used because it was necessary to derive a rich and contextually significant information about people who are directly engaged or impacted upon by the AI-based educational practices. The forerunner criteria included (1) participants with a minimum of one year experience working in educational settings where digital/AI technologies are either currently being implemented or preparation of implementation is underway; and (2) individuals who have familiarity with the use or management or development of AI-related educational tools. The exclusion criteria were as follows: (1) those who had no experience or knowledge of AI in education, and (2) those who failed to answer all the survey questions. One hundred participants were identified to make sure that the obtained data would be statistically sound and capable of reflecting the views of different stakeholders in the education sector. The method will allow the study to obtain a holistic representation of the perceived ethical implication and willingness to adopt responsible AI in educational institutions.[19,20,21]

Data Collection Instrument

The data was obtained Wat a closed ended questionnaire comprising a 5 point Likert Scale, which ranged between a strongly disagree and a strongly agree. The questionnaire will be delivered online, using websites like Google Forms, so that the respondents of different regions and educational backgrounds can be contacted. The questionnaire has four broad groups: 1) the demographic data and background of participants, 2) the degree of literacy, with which the participants are imbued in relation to the field of AI in the sphere of

education, 3) ethical risks and benefits of the use of AI in classrooms as perceived. The number 4) is needs and expectations on the development of an ethical framework of AI implementation. The content validity of the instrument was tested by the professional consultation in the area of educational technology and AI ethics. Cronbachs Alpha was used to establish the reliability of the instrument with the lowest acceptable value being 0,70 as an acceptable value of reliability.

Table 1. Research indicators in the development of an ethical AI application framework in education

Research Aspect	Indicator	Description
1. Understanding of AI Concepts	a. Definition of AI in educational contexts	Respondents' level of understanding regarding the definition of AI as it applies to learning environments
	b. Function of AI in the teaching-learning process	Respondents' understanding of AI's role in facilitating learning (e.g., automation, personalization, content recommendation)
	c. Examples of AI application in classrooms	Respondents' knowledge of real-world applications such as chatbots, intelligent tutoring systems, or learning analytics tools
2. Perception of Ethical Risks of AI	a. Student data privacy	Respondents' concerns about the potential misuse or leakage of students' personal data
	b. Algorithmic discrimination	Respondents' views on the risk of bias or unfair outcomes generated by AI-based systems
	c. Transparency of automated decision-making	Perceptions regarding how openly AI systems explain their decision-making processes and outcomes
	d. Accountability in case of errors	Clarification on who is considered responsible when AI makes an incorrect decision: the teacher, developer, or institution
3. Need for Ethical Principles	a. Fairness	The need for non-discriminatory principles in the design and implementation of AI systems
	b. Inclusiveness	Expectations that AI systems should accommodate students from diverse backgrounds
	c. Accountability	The need for clear responsibility assignment within AI-based educational systems
	d. Transparency	Expectations that AI systems be understandable and explainable to users (teachers/students)
	e. Protection of personal data	Prioritization of systems that safeguard the security and confidentiality of learners' information
4. Expectations for an Ethical AI Framework	a. Institutional regulations	The existence of formal policies at schools or universities governing the use of AI
	b. Guidelines for AI technology use in education	Expectations for the availability of manuals or SOPs for the responsible implementation of AI
	c. Training for teachers/students	The need for capacity-building efforts to help educators and learners use and understand AI effectively
	d. Stakeholder involvement	Expectations for the involvement of teachers, students, parents, and others in the development of ethical AI frameworks

Data Analysis

The collected data were determined based on descriptive statistics to explain the perceptions, understanding, and ethical requirements among respondents with respect to using AI in education. They have been analyzed with the help of such statistical software as Microsoft Excel or SPSS. Analytical methods used involved computing frequencies, percentages, means and standard deviations of the questions in the questionnaire. The data were set out in tables and graphs to give informative graphs. Moreover, cross-tabulation was conducted to check how respondents who are similar in terms of backgrounds were similar or dissimilar in terms of their perception of ethical issues. These results can be used as a root platform of formulating the first part of an ethical framework of medical practice of AI in academic institutions.[22,23,24]

RESULT

Table 2. Summary of Research Indicators in the Development of an Ethical AI Application Framework in Education (n=100)

Aspect	Code (Pattern from Responses)	Number	Percentage (%)	Likert Scale (1-5)	Grouped Statements
Understanding of AI Concepts	Definition of AI in educational contexts	12	12 %	4 (High)	Respondents understand AI as a concept specifically applied to learning environments.
	Function of AI in the teaching-learning process	12	12 %	4 (High)	AI is perceived as playing a role in automation, personalization, and content recommendation.
	Examples of AI application in classrooms	10	10 %	3 (Moderate)	Respondents are familiar with real-world applications such as chatbots, intelligent tutoring systems, and learning analytics.
Perceptions of Ethical Risks of AI	Student data privacy	10	10 %	3 (Moderate)	Concerns arise regarding the potential misuse or leakage of students' personal data.
	Algorithmic discrimination	8	8 %	3 (Moderate)	Respondents recognize risks of bias or unfair outcomes generated by AI-based systems.
	Transparency of automated decision-making	8	8 %	3 (Moderate)	Attention is given to how clearly AI explains its processes and outcomes.
	Accountability in case of errors	7	7 %	2 (Low)	Questions arise about who is responsible when AI makes mistakes: the teacher, developer, or institution.
Need for Ethical Principles	Fairness	7	7 %	2 (Low)	The need for non-discriminatory principles in the design and implementation of AI in education.
	Inclusiveness	6	6 %	2 (Low)	AI is expected to accommodate students from diverse backgrounds.
	Accountability	5	5 %	2 (Low)	A clear responsibility assignment is required in the use of AI-based systems.
	Transparency	5	5 %	2 (Low)	AI should be understandable and explainable to users (teachers/students).
	Protection of personal data	5	5 %	2 (Low)	AI systems must prioritize the security and confidentiality of learners' information.
Expectations for an Ethical AI Framework	Institutional regulations	5	5 %	2 (Low)	Formal policies are expected in schools/universities regarding the use of AI.
	Guidelines for AI technology use in education	5	5 %	2 (Low)	The need for SOPs or manuals for the responsible use of AI.
	Training for teachers and students	5	5 %	2 (Low)	Capacity-building is needed so that teachers and students can use AI effectively.
	Stakeholder involvement	5	5 %	2 (Low)	Respondents expect the involvement of teachers, students, parents, and others in the development of an ethical AI framework.

Table 1 gives an overview of the research indicators concerning the development of an ethical AI application framework in education, and it is based on the answers to 100 participants. The indicators are classified in four major areas: clarity of the concepts of AI, awareness of ethical hazards of AI, the necessity of ethical principles, and anticipation of an ethical AI system. Each of these aspects is further disaggregated into codes created out of responses given by the respondents, their frequency (numbers), and percentages, and interpretation on Likert Scale. The statements in the group signify the personal perception of respondents on the topic of AI within educational systems, including abstract knowledge of its nature and the awareness of ethical concerns to the need of ethical principles and what is expected of them on an institutional level. Such systematic presentation

enables to have a better insight into what replies are distributed and what domains the respondents manifest more or less awareness. Table 2 provides the summary of the research indicators based on the survey results of 100 participants who participated in the study and developed an ethical Artificial Intelligence (AI) application framework in education. The results were grouped in the table under four key aspects, including 1) knowledge of AI concepts, 2) perceptions of the ethical risk posed by AI, 3) the necessity of ethical principles, and 4) expectations of an ethical AI framework. All of these aspects are depicted in the form of coded response patterns, frequencies, percentages and Likert scale ratings, and the grouped statements provide an overview of participants in the views. On the whole, the data reveal that though respondents have a reasonably good level of conceptual knowledge of AI and its educational processes, the awareness and knowledge of ethical issues and institutional governance systems are limited, and there is a strong necessity to implement ethical principles and the institutional collaboration of actors in the integration of AI into the educational process. Resting on the findings offered in table 1, it is possible to note several important aspects concerning the process of creation of ethical AI application framework in education. Concerning conceptualization of AI knowledge, the respondents proved to understand the concept of AI in education terms (12 %) and its role in the teaching-learning process (12 %) above average. This shows that the stakeholders and teachers are overall conscious of the role played by AI to assist automation, personalization, and content recommendation. Nonetheless, the indicator related to the examples of AI application in classrooms (10 %) was an inch lower, which indicates that not everything goes as well when it comes to the exposure to real-life applications of chatbots, intelligent tutoring systems, and learning analytics. Second, on the perception of ethical risks of AI, student data privacy (10 %) came out as the strongest risk concern followed by algorithmic discrimination (8 %) and transparency of automated decision-making (8 %). These findings indicate the increased awareness of possible ethical issues of AI adoption. However, there was less emphasis on accountability in the case of errors (7 %), which means that respondents remain unsure as to who should be held accountable, teachers, developers, or institutions, when errors are caused by AI.

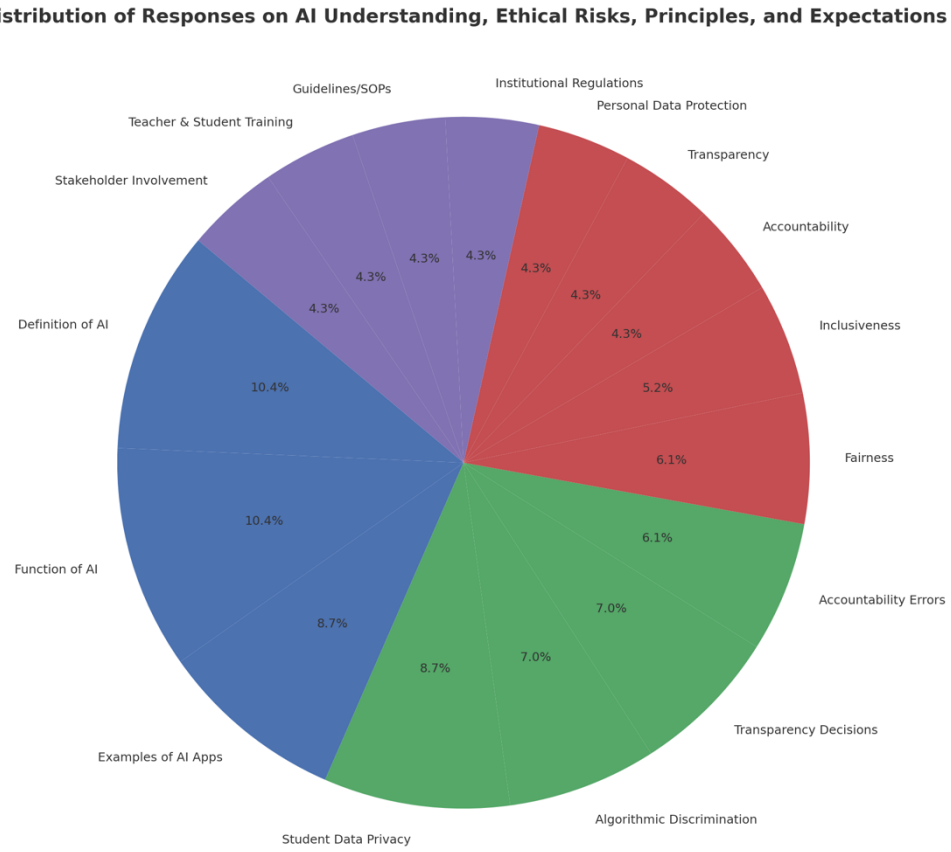

Figure 1. Distribution of Responses Ai

Third, the importance of such ethical principles like fairness (7 %), inclusiveness (6 %), accountability (5 %), transparency (5 %), and protecting the personal data (5 %) was identified, yet, on lower levels as compared to conceptual awareness and perceived risks. These findings show that, despite the recognition of ethical values in AI use, respondents have a low ranking of those principles, which may be a result of low technical knowledge

or practical experience related to ethical values in AI applications. Lastly, 5 % assigned to the expectations of an ethical AI framework regarding institution regulations, guidelines, training and stakeholder involvement. This indicates that respondents also anticipate institutional assistance including policies, standard operating procedures, capacity building and multi-stakeholder co-operation. Nevertheless, they are at relatively low percentages relative to other themes implying that such expectations are as yet not prioritized highly and might need sustained advocacies and policy guidance in order to garner prominence.

All in all, the Likert scale interpretation reveals that indicators with more prevalent measures (=12 and more) are placed in the High condition, especially when referencing the AI conceptual understanding, the moderate ones (=8 and 10) experienced the Moderate perceptions, and lower measures (=7 and less) were placed in the Low scale. This evidence highlights that respondents may be more acquainted with ideas about AI and ethical risks in the short-term but know less about ethical principles and structures in the long-term. As such, policy creation and training must be not only technical skill-building processes but also mandatory awareness building to ensure that the ethical standards and institutional ethics related to AI implementation in education are adhered to.

Table 3. Understanding of AI Concepts

Indicator	Item No.	Mean Score	Interpretation
Definition of AI in education	1–2	3,9	Fairly good understanding of AI definition in the learning context
Function of AI in teaching-learning process	3–4	3,8	Beginning to understand the role of AI for personalization & automation
Examples of AI applications in the classroom	5–6	3,6	Still limited in providing concrete examples of AI use

Table 3 the values across the findings within the concept Understanding AI Concepts indicate that participants have an overall good concept of what AI entails vis-a-vis education, with a mean score of 3,9, regarding the indicator Definition of AI in education. This is an indication that majority of the respondents are relatively conversant with the fundamentals of AI when used in learning contexts. The average mark of 3,8 on the indicator Function of AI in the teaching-learning process shows that the participants are just getting to know why AI can be helpful in personalizing and automating the teaching-learning process. That is an indication of a new understanding of the practical utility of such AI learning uses as personalizing learning materials based on the individual student or automating menial academic procedures. However, the lowest score in this aspect is the indicator of Examples of AI applications in the classroom whose mean score is 3,6. It means that, even though participants have a theoretical knowledge of AI, they still cannot give clear and explicit examples of how AI tools can be introduced into the real classroom environment. The small exposure to the real world applications presents an imbalance between theoretical and practical concerns.

The findings reveal that the participants tend to have the proper conception of what Artificial Intelligence (AI) implies in the educational field. The mean score of the respondents on the indicator Definition of AI in education was 3,9, which indicates that the majority of the respondents are conversant with the fundamental definition and meaning of AI as implemented in teaching and learning experiences. The average score of 3,8 of the indicator Function of AI in the teaching-learning process indicates that the participants are starting to see the potential of AI in facilitating personalization and automation in the education process, i. e. modifying instructional content to suit the needs of the learners or automating routine academic routines. Nevertheless, the smallest mean score (3,6) was obtained with the indicator Examples of AI applications in classrooms, which shows that even having the conceptual knowledge, a significant portion of the participants cannot find any specific and practical facts of AI tools usage in actual learning settings. This is a gap that demonstrates a lack of practical implementation and practical capacity-building activities in the integration of AI (both among teachers and among students). The summary of these findings is provided in table 4 which shows the detailed statistical results of the indicators under the Understanding AI Concepts component.

The findings in the Need for Ethical Principles item show that the participants are very much in agreement regarding the need to incorporate ethical aspects in AI-based educational systems. The similarity of 4,2 on the indicator Fairness, which indicates a high average score, implies that the respondents appreciate the relevance of making sure that AI systems are used in a non-discriminatory way. This is to show that understanding that algorithmic bias is a potential way of disadvantaging certain groups of students without action is taken against

it. The indicator Inclusiveness was rated 4,3, which means that the participants believe AI will be able to support the needs of students, their background, and learning preferences and also focus on how AI can be used to enable equitable access to it, and not strengthen digital divides. The indicator Accountability obtained an average score of 4,4, which highlights the necessity of having clear definitions of responsibility when mistakes, misuse, or unintended consequences are identified in the use of AI. In the same way, the average rating of Transparency was 4,3, which indicated that teachers and learners appreciate AI systems that are easy to understand and interpret, but not to operate as black boxes. The best indicator, Personal Data Protection (4,5) is used to show a great concern about the safety and privacy of the information about students, as the respondents had a concern about the necessity of taking measures to prevent the misuse of data or the attempts to access it unlawfully. All these results indicate the increasing ethical consciousness of the educational stakeholders and the need to establish broad guidelines on the application of AI. Table 5 has provided the detailed statistical results of these indicators.

Table 4. Perceptions of Ethical Risks of AI

Indicator	Item No.	Mean Score	Interpretation
Student data privacy	7–8	4,2	High level of concern regarding student data confidentiality
Algorithmic discrimination	9–10	4,0	Considerable awareness of potential AI bias
Transparency of automated decisions	11–12	4,1	Respondents expect AI to be more open in providing explanations
Accountability for AI errors	13–14	4,3	Very high concern regarding responsibility for AI mistakes

Table 5. Need for Ethical Principles

Indicator	Item No.	Mean Score	Interpretation
Fairness	15	4,2	AI must be fair and non-discriminatory
Inclusiveness	16	4,3	AI should accommodate student diversity
Accountability	17	4,4	Responsibility within AI systems must be clearly defined
Transparency	18	4,3	AI should be understandable by teachers and students
Personal data protection	19	4,5	Very strong need to protect data confidentiality

The scores of Expectations of an Ethical AI Framework dimension show that educators and other stakeholders have high expectations related to the development of a complete ethical framework of application of AI in the educational process. The parameter Institutional Regulations received an average score of 4,4, which depicts that the participants agreed that schools and universities should institutionalize explicit regulations regarding AI utilization. This observation reinforces the significance of the legal and institutional policies in order to make sure that the process of AI implementation in education is properly organized, risk-free, and ethically acceptable. Guidelines or Standard Operating Procedures (SOPs) of AI Use indicator scored a mean of 4,3, which is a high expectation of the provision of technical and procedural guidance. It is considered that such guidelines must assist teachers and students to use AI tools consistently, responsibly, and in accordance with the ethical standards. The greatest mean score 4,5 was recorded in the indicator Teacher and Student Training, which means that building capacity is the priority that is most imminent. Respondents stressed that it is necessary to increase AI literacy of educators and learners to make sure they are able to use AI tools efficiently and comprehend their possible benefits and risks. Moreover, the indicator Stakeholder Involvement was 4,4, which demonstrates that there is a wide acceptance of a multifaceted involvement of different actors in the process of establishing the ethical orientation of AI use in education: teachers, students, parents, administrators, and policymakers. It is considered critical to multi-stakeholder collaboration to make sure that the use of AI is focused on the common educational objectives and values of the community. These indicators were measured in detail and the results can be found in table 6 that summarizes expectations of participants towards institutional governance, practical guidelines, training and collaboration in the creation of an ethical AI framework in education.

Table 6. Expectations for an Ethical AI Framework

Indicator	Item No.	Mean Score	Interpretation
Institutional regulations	20-21	4,4	Need for formal rules in schools/universities
Guidelines/SOPs for AI use	22	4,3	Strong expectation for technical guidance in AI implementation
Teacher and student training	23-24	4,5	Training is highly needed to improve AI literacy
Stakeholder involvement	25	4,4	Strong expectation to involve teachers, students, parents, and related parties

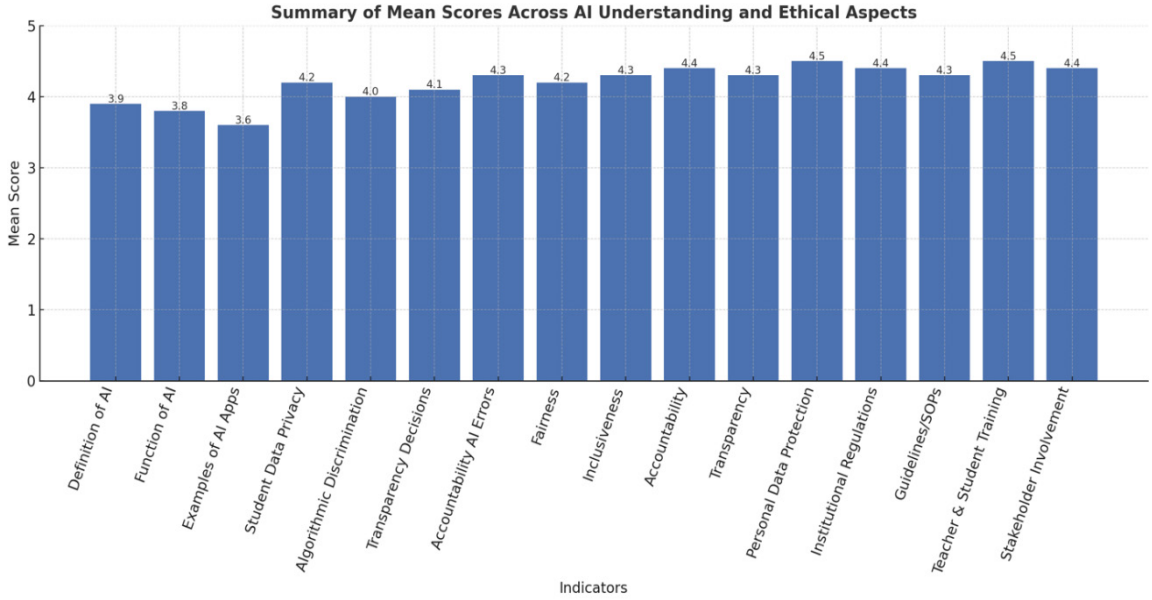

Figure 2. Summary of Mean Scores

DISCUSSION

The findings of this work show that the basic knowledge of the respondents on the topics of Artificial intelligence (AI) in education has attained a fairly high level (mean 3,9). This is notably reflected in their comprehension of what constitutes AI and how it is applied in the teaching and learning process but not so much on giving practical examples on classroom use (mean 3,6). Perceived usefulness and ease of use have been mentioned in Technology Acceptance Model (TAM) to be very important in adopting technology.[25,26,27] This means that there is an explanatory background knowledge as respondents have a general assumption about the technology, but due to limited real-life experiences of its use, they cannot already associate AI to be an easy-to-use and helpful tool. Consequently, a greater emphasis must be placed on experiential forms of learning, including workshops, simulation-based learning and classroom pilot projects in order to transform theoretical knowledge into practice. In terms of ethical risk awareness, the answer was indicative of a considerably high level of concern with several important topics, including student data privacy (mean 4,2), algorithmic discrimination (mean 4,0), transparency of automated decision-making (mean 4,1), and accountability over AI errors (mean 4,3). These findings help confirm the conclusion, expressed by Floridi & Cowls, that the unethical deployment of AI opens the door to the renewed reinforcement of biases, the erosion of trust, and the ill-will toward vulnerable populations, especially students. In this respect, the increased sense of ethical awareness on the part of the respondents benefits the education systems in the form of the initial guard mechanism prior to the full establishment of regulations, where ethical literacy could involve the initial proper behavior attitude.[28,29,30,31]

The paper also notes high expectations related to the incorporation of ethical foundational premises in the implementation of AI, including fairness (mean 4,2), accountability (mean 4,4), and transparency (mean 4,3), inclusiveness (mean 4,3), and protection of personal information (mean 4,5). Such values are similar to the moral principles expressed in the UNESCO Recommendation on the Ethics of Artificial Intelligence in which AI in learning must respect human rights, equity, and sustainable development. The shared local stakeholder expectations and international ethical standards will offer a chance to develop an ethical framework of AI that will be informed internationally but locally pertinent. Of equal significance, the participants indicated their

unmistakable and definite anticipation of formalization of an ethical AI system. Their research brought into the limelight the existence of institutional regulations (mean 4,4), technical guidelines or Standard Operating Procedures (SOPs) (mean 4,3), teacher and student training (mean 4,5), and a multi-stakeholder involvement (mean 4,4). This reveals the importance of a multi-stakeholder governance approach, which contends that ethical AI cannot be implemented by top-down policies but needs the involvement of all the involved parties. This means that in the educational setting, teachers, students, parents and administrators have equal roles in the design of AI, adoption, and monitoring of AI.[32]

Under the consideration of the research scope, these results give a direct answer to the deficit of a systematic approach to the process of the ethical framework of AI in education.[33] Other earlier studies on the subject matter pay little or no attention to ethical, regulatory and socio-cultural aspects of AI adoption whereas this study will take a more comprehensive approach to the issue by incorporating them into the discussion. The uniqueness of the research is that it addresses the VAETAS/Needs analysis in an integrated manner capturing the cognitive perspective, ethico-moral, and structural requirements of the stakeholders in Indonesian education system. This composite lens is valuable to the academic debate about AI and behavioral education in terms of providing a paradigm that can be emulated or modified elsewhere where practicing responsible AI is unrepresentative.[34,35]

As to policy and practice implications of the study, they are numerous. On the one hand, the development of the curriculum must be aimed at introducing AI literacy (technical and ethical) in teacher preparation programs and courses in universities. In this way, no future educators would be left without existing knowledge on how to use AI, and, at the same time with critical understanding of common pedagogical and ethical concerns that AI poses. Second, institutions such as schools and universities must organize a system of regulations and SOPs within their system that would explicitly deal with data privacy, consent and grievance procedures in the event of a problem based on the algorithm being used. Third, because there is a wide gap in training needs, professional development is a priority area to be improved in terms of technical skills, including the use of AI-based platforms, as well as ethical decision-making skills in the adoption of AI.[36,37,38] Fourth, to conduct the successful application of AI to learning, it is imperative to use participatory methods of engagement of teachers, students, parents, and policymakers. Nor can there be doubt that consultation forums, workshops, and feedback systems will aid in the withal that AI adoption may consider local values and needs, as opposed to merely being treated as a technologically driven solution path. Lastly, research and evaluation on an on-going basis is necessary to track the effects of AI tools, especially to report unforeseen effects like biases or inequalities in learning. Future research should also build on the effects assessment that includes technical performance alongside ethical and, even, cultural implications to make the impact of AI in education comprehensive and responsible.[39,40,41]

In spite of the fact this research brings some useful information into the cognitive, ethical, and institutional aspects of the implementation of AI in the educational field, a number of limitations must be admitted. First, the information has been gathered using self-reported questionnaire, which can be prone to social desirability bias or excessive knowledge and awareness of the participants. It is possible that the respondents had positive attitudes towards AI and ethics based on its perceived relevance and not because of their personal experience or knowledge.[42,43,44,45,46] Second, the sample included only educators in the particular regions and education institutions, which can limit the transferability of the results to other settings or countries where digital infrastructure, policy support, or cultural perceptions of AI are vastly different. Third, the quantitative nature of the research, though helpful in determining trends and averages, does not give much information about the underlying qualitative nature of the matter, which can be personal experiences, ethical dilemmas, or institutional impediments determining AI adoption. The use of mixed-method or longitudinal designs by future researchers would investigate these features in more detail. Lastly, the research currently lacks the assessment of the actual application of ethical AI systems or training programs so the actual efficiency of the suggested policies and training courses still has to be tested in the field. It would be possible to overcome these constraints in future studies to support and improve the ethical AI framework presented in the paper.

CONCLUSION

In summary, this analysis shows that although respondents have quite good basic knowledge of the AI in education, several issues have to be addressed in terms of applicating their knowledge to practice and ethical considerations. The way machine ethics and institutional sets continue to receive a robust demand implies that it is a perfect time to derive an ethically grounded context-specific AI ethical framework in Indonesian education. This kind of framework should strike the balance between technological innovation and human values and make sure that AI can improve the educational equity and quality without violating the rights of students and their dignity. The results, therefore, are not only empirical but rather practical since there is something effective to be done based on the findings.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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