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Artificial intelligence and learning environment: Human considerations

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Abstract

Background: Artificial intelligence (AI) has created new opportunities, challenges, and potentials in teaching; however, issues related to the philosophy of using AI technology in learners' learning have not been addressed and have caused some issues and concerns. This issue is due to the research gap in addressing issues related to ethical and human needs, and even values in AI in learning have become more obvious.

Objectives: This study investigates how human-centered artificial intelligence (HAI) can help learners in a learning environment. In this regard, this article by developing key considerations of HAI in helping students tries to help implement or shift it in the future in learning environments.

Methods: To better understand the key considerations of HAI, qualitative methods and interview techniques were applied in this study. In this regard, 18 samples were interviewed from two groups of experts and faculty members in the fields of technology and computer science and social and humanities sciences. The thematic content analysis method was used to analyse qualitative data.

Results and Conclusions: The results show that AI attempts to integrate ethical and human values in the process of design, development, and research in the fields of recognising and dealing with negative emotions, targeted emotional nature, and access to fairness and justice. It also shows significant promise in understanding feelings and emotions in a learning environment.

Implications: Although AI has been studied in other contexts, HAI has not attracted much attention from researchers. Hence, this study has made worthwhile contributions to the literature as it has specifically focused on HAI in education. In addition, it can resolve some scientific community considerations regarding technological concerns in the field of AI. Furthermore, this article can increase social satisfaction with the use of AI by considering ethical considerations in the learning environment and can particularly benefit researchers, educators, and AI specialists who are involved in the study of HAI applications.

KEYWORDS
artificial intelligence, human-centered artificial intelligence, learning, students

1 | INTRODUCTION

Research in learning sciences and neuroscience provides fundamental insights into the complexities of learning, primary learning processes, and appropriate solutions to further refine learning. Applying such new insights into human learning in learning environments requires a much deeper understanding of human cognition. One of the most flexible educational tools for human cognition is the use of artificial intelligence (AI) techniques to bring new vitality to education (Huang & Yubao, 2020; Yilmaz et al., 2023). AI pertains to the capability of computer systems or machines to perform tasks that typically demand human intelligence (Kaplan & Haenlein, 2019). Today, the impact of AI on the field of education is also gaining momentum (Dai & Ke, 2022; Sharadgah & Sa'di, 2022; Yilmaz et al., 2022), and the education industry offers tremendous potential for the use of AI (Rouhiainen, 2019; Sing et al., 2022).

By harnessing AI's capabilities, instructors can efficiently analyse data from various sources, facilitating learners' progress and enabling higher-quality teaching activities (Chen et al., 2020; Yilmaz et al., 2023). The integration of AI into learning environments offers opportunities to tailor educational experiences to individual needs and foster more effective learning. However, although AI can significantly improve human performance (Yang et al., 2021), concerns arise regarding the human considerations and ethical implications of unique algorithms, such as perpetuating bias, discrimination, and injustice in learning environments (Akgun & Greenhow, 2021).

To address these concerns, Human-Centered Artificial Intelligence (HAI) has emerged as an approach that incorporates human conditions, values, and ethical principles in AI algorithms (Li & Gu, 2023). HAI is an effective approach that systematically considers AI algorithms through humanistic situations (Li & Gu, 2023). This integration of HAI fosters a learning environment that is focused on human and ethical considerations while improving AI's role in teaching and learning. In this regard, established HAI research institutes, like those in Stanford University, Berkeley, and MIT, emphasise the importance of addressing the potential risks and ethical dilemmas associated with AI development (Xu, 2019). In addition, despite the global recognition of AI's potential to enable human performance (De Laat et al., 2020; Garg & Sharma, 2020), there remains a lack of scholarly attention on HAI in education systems (Rudovic, 2020).

For this reason and considering the ongoing debates and concerns surrounding the principles and values involved in AI development and use (Ulnicane et al., 2021), this article aims to contribute to the ongoing discourse surrounding the responsible and ethical use of AI in educational contexts. The insights derived from this study can inform educators, researchers, and policymakers about the human considerations of AI in educational practices, ultimately shaping a more equitable and conscious approach to technology-enhanced learning environments.

2 | LITERATURE REVIEW

2.1 | Exploring the intersection of emotion, ethics, and technology

The study of emotions, despite being a topic of interest for classical philosophers like Aristotle, experienced a period of neglect throughout the nineteenth and twentieth centuries. Recently, however, there has been a resurgence of interdisciplinary interest in understanding emotions (Sunderland, 2014).

Traditionally, emotions have been viewed as subjective judgements that challenge rationality and ethics (Sunderland, 2014). However, an increasing number of researchers across disciplines argue that emotions play a central role in ethical reasoning (Schein & Gray, 2018). Ethics, a branch of philosophy dating back thousands of years, explores questions of justice, virtue, fairness, good and evil, and right and wrong (Heim, 2019). This perspective is reflected in non-western cultures and low socioeconomic countries, where ethical systems are based on caring, purity, authority, and loyalty rather than solely on harm prevention (Zakharin & Bates, 2021).

Several scholars propose that emotions are necessary for ethical judgements (Nichols, 2004). Prinz (2007) suggests that emotions can directly produce ethical judgements without requiring an independent appraisal of action's ethical relevance. Similarly, Lomas (2019) argues that emotions have a form of rationality, linking embodied feelings to cognitive judgements of right and wrong. As such, ethicists emphasise the importance of considering emotions in ethical evaluations, particularly concerning technologies (Desmet & Roeser, 2015).

Traditionally, ethical inquiries aspire to establish universal theories or principles that can be applied universally, regardless of context (De Jaegher, 2021; Marková, 2016). Underlying this aspiration is the assumption that theories and principles of ethics can actually be disentangled from contingencies and abstracted in some form devoid of context, time, and space (Daston, 2018). However, these canonical approaches to ethics, often grounded in Western philosophy, have been challenged by scholars from Asian and African perspectives (Birhane et al., 2022). They argue that these traditional approaches overlook the cultural, historical, and contextual factors that shape ethical understandings. As a result, marginalised philosophies and moral systems are often excluded from ethical discussions (Jafari & Alamolhoda, 2023).

Contemporary ethics has been categorised into three subareas to address criticisms of traditional approaches: deontology, which focuses on actions guided by moral principles (Kant & Schneewind, 2002); the teleological approach, which emphasises the consequences of actions (Merrill, 2012); and the virtue model, which considers the motivations behind actions (Ananny, 2016). These frameworks parallel the ethical dimensions of technology, including codifying ethical rules (Computer Ethics Institute, 2011), anticipating ethical concerns (Barrett et al., 2012), and examining the values and beliefs of technologists (Flanagan et al., 2008).

In practice, technology ethics are influenced by institutional codes, professional cultures, technological capabilities, social practices, and individual decision-making (Ananny, 2016). Although there is no consensus on how to hold technologies accountable, understanding their characteristics enables discussions about responsible standards and people. New technologies require ethical critiques that consider their forms, power, and meanings to keep these aspects flexible and open for debate. In this context, because AI has penetrated into all aspects of life, especially the field of education (Pedro et al., 2019), the discussion of AI in education has become more prominent.

2.2 | Artificial intelligence in education

AI is a broad discipline that involves a fusion of 'computer science, cybernetics, information theory, neurophysiology, psychology, philosophy, linguistics, and other disciplines' (Bin & Mandal, 2019) (Table 1). AI can be defined as 'computing systems that are able to engage in human-like processes such as learning, adapting, synthesising, self-correction and use of data for complex processing tasks' (Popenici & Kerr, 2017). AI has many branches and sub-branches, such as machine learning (ML), deep learning, and natural language processing (NLP) (Lu, 2018). ML is the scientific study of algorithms and statistical models that computer systems use to perform a specific task without being explicitly programed (Mahesh, 2020). In addition, NLP is built on semantic analysis, which extracts context and meaning from textual input (Basha et al., 2023).

TABLE 1 Selected definitions of AI.

Definition	Source/ year
AI is a constellation of various technologies that work together to assist machines to sense, comprehend, act, and learn with a level of intelligence that compares to that of humans.	Mhlanga, 2022
AI is as the science and engineering of problem-solving with technological innovations, such as machine learning and neural networks.	Wang, 2020
AI is essentially a computer system that reproduces human cognition using data, which is accessed from a variety of different sources/ systems to take decisions and learn from the resulting patterns.	Hassani et al., 2020
AI refers to machines' ability to learn from experience and adjust to new inputs.	Duan et al., 2019
AI refers to a broad class of technologies that allows a computer to perform tasks that generally require human cognition, including adaptive decision-making.	Tambe et al., 2019
A broad discipline with the goal of creating intelligent machines, as opposed to the natural intelligence that is demonstrated by humans and animals.	Benaich & Hogarth, 2019

In education, AI supports and enhances learning environments by employing intelligent tutoring systems, intelligent agents, and intelligent collaborative learning systems (Salas-Pilco et al., 2022). As stated by Yilmaz et al. (2022), when studies on AI in education are examined, the number and diversity of research on AI in education have increased in the last 10 years. This technological revolution can bring magnificent transitions in education, thereby benefiting all stakeholders, including students, teachers, administrative staff, and institutions (Gholizadeh et al., 2022; Montebello, 2018). AI possesses a broad range of applications across various domains. NLP models can be employed for text interpretation and generation, particularly in the context of learning materials. Image processing techniques facilitate facial recognition, handwriting recognition, text analysis, and image manipulation. creative content can be useful for systems that produce novel forms of photographs, music, artwork, or stories (Niemi et al., 2022; Roschelle et al., 2020; Yilmaz et al., 2023).

In this regard, AI can improve education by providing numerous benefits such as automatic curriculum creation, personalised engagement with students, interactive teaching, smart content, improved learning outcomes, simplified administrative tasks, and so on (Gupta & Bhaskar, 2020; Yilmaz & Yilmaz, 2022). This reveals that AI has the potential to revolutionise education in many ways. Yilmaz et al. (2023) explored different resources that provide several options for learning and educational services, which can expand the scope and diversity of usage through the creative input of both teachers and students as follows:

- *Personalised learning and feedback*: AI enables students to create customised learning environments that are tailored to their needs. Customised content, materials, and environments can be generated by analysing each student's learning needs and individual differences (Baidoo-Anu & Ansah, 2023; Lo, 2023; Ruiz-Rojas et al., 2023; Yilmaz & Yilmaz, 2023).
- *Intelligent tutoring*: AI can also facilitate the creation of intelligent teaching systems that offer real-time feedback and guidance, assisting students in mastering complex subjects. These systems provide additional support, content, and materials as needed, adapting to the student's progress. Moreover, they can generate exercises and quizzes suitable for the student's proficiency level, delivering instant feedback and promoting comprehensive learning (Li et al., 2023; Yilmaz et al., 2022).
- *Content and material creation*: Content and material creation plays a pivotal role in creating content and materials by generating educational resources like e-books, videos, audio materials, images, presentations, quizzes, and interactive simulations. This saves educators time and resources and ensures the production of high-quality, engaging content (Küchemann et al., 2023; Li et al., 2023).
- *Assessment and evaluation*: It may aid in assessment and grading by automating consistent and objective evaluation of assignments and assessments, thereby alleviating the workload of educators (Fergus et al., 2023; Lo, 2023).

- *Knowledge and skills development*: It can analyse students' speech and writing, providing feedback that helps improve their language and writing skills (Kasneci et al., 2023; Shidiq, 2023).
- *Guidance and counselling services*: These can be used to make career recommendations for students based on their interests or goals by analysing student performance and offering feedback to teachers and counsellors, assisting them in providing tailored guidance. It can even determine students' intelligence levels, generating test results based on their interests and learning styles, enabling more suitable suggestions for students' academic and career ambitions (Akiba & Fraboni, 2023).

This reveals that Integrating AI in educational settings can significantly improve student development by tracking, evaluating, and creating personalised plans (Popenici & Kerr, 2017). These algorithms can identify students' challenges in real-time, providing tailored support and enhancing learning experiences. Although AI can to create learning opportunities and meet diverse needs, it is crucial to address ethical considerations that have been largely overlooked in AI development and implementation (Rudovic, 2020).

2.3 | Human-centered artificial intelligence in learning environment

HAI is about building intelligent systems to understand expectations (and often in terms of culture and value) and human needs and help humans understand them. Achieving HAI provides a research programme that fundamentally improves our scientific understanding (Riedl, 2019). In fact, HAI requires observing humans as individuals with different experiences, needs, wants, ambitions, interests, irrational decisions, and stylization in specific cultural contexts (Auernhammer, 2020). In this regard, HAI in learning has not yet been considered in research. For example, Kolchenko (2018), in a study aimed at replacing teachers with AI, concluded that the desire to have better learning experiences, a better understanding of the required educational context, and the presence of experienced teachers are factors that are preferred over the use and replacement of AI. Xu (2019), in a study that examines HAI from the perspective of human-computer interaction, points out that the third wave of AI can be characterised by technological advancement and application alongside a human-centered approach. The results show that the first two AI waves failed because they left human needs unsatisfied, whereas the third wave of AI is beginning to meet human needs and provide a positive User Experience (UX) for a variety of scenarios. UX encompasses the holistic experience and interaction between an individual and a system, considering numerous aspects that extend beyond mere 'human interface' or 'usability' factors (Berni & Borgianni, 2021). In this regard, it seems that the functional aspect of AI is represented in the world mirror (Duong et al., 2019; Garg & Sharma, 2020; Sharadgah & Sa'di, 2022) and the ethical aspect due to infancy has been neglected.

As Auernhammer (2020) stated, AI systems and technologies, such as ML, NLP, expert systems, and robotics, have evolved over the last 80 years since Alan Turing proposed the Turing-Test, and in this evolution, two distinct philosophical perspectives have emerged in how humans and computers should interact. These are the 'rationalistic' and 'design' perspectives. From a rationalistic perspective, the term AI encompasses the theory and development of computer systems that mimic human abilities and perform tasks that require human intelligence. AI research focuses on mathematical and technological advancement. The design perspective views AI as a problem-solving tool that advances people's capabilities and improves human conditions. The design perspective focuses on the interaction or involvement of humans with computers. This perspective sees human thought and physical embodiment as inseparable. In this regard, for AI to be helpful to humans and for humans to use this technology in their learning process, AI systems must communicate at a level that humans are comfortable with and familiar with (Auernhammer, 2020). In other words, instead of forcing humans to argue about how AI systems work, HAI helps us understand how to discuss, communicate, and cooperate in this learning.

The philosophical perspective of design is considered in this study. The design perspective shows that AI as a tool to improve human capabilities faces several prominent issues (Markauskaite et al., 2022). Based on this perspective, ethical questions concerning AI encompass several topics. For example, Jobin et al. (2019) identified the following overarching ethical principles in AI: transparency, justice and fairness, non-maleficence, responsibility, and privacy. In addition, Heidarzadeh and Panjeh (2022) consider the most important frameworks extracted about ethics in AI to include accountability and responsibility, transparency, justice and non-discrimination, respect for individuality and independence, bias, and altruism. In addition, Wei and Niemi (2023) stated that HAI can advance justice and fairness in education, learning, and reshaping education. In this regard, transparency refers to information about how AI-based tools make a decision and the reasoning underlying the decisions (Ananny & Crawford, 2018). Transparency involves providing access to the datasets and workflows inside a deployed AI system to end-users. Accountability refers to the obligation and ethical responsibility of AI designers and developers for the creation and implementation of AI systems (Diakopoulos, 2016). By providing interpretable AI decision-making processes and accessible explanations, developers can foster increased user understanding, leading to greater adoption and continued use of AI systems. Fairness is defined as the absence of algorithmic bias (Yang & Stoyanovich, 2017). Fairness is the requirement that all users are treated equally and without prejudice. (Riedl, 2019). An intelligent system that has a model of—and can reason about—social and cultural norms for the population with which it interacts can achieve the same effect of fairness and avoid discrimination and prejudice in situations not anticipated by the system's developers.

On the other hand, Latif et al. (2022) stated that the use of AI for emotions raises many concerns, which motivates the need to identify basic principles and guidelines that address issues arising from the use

TABLE 2 Comparison of emotion detection and measurement technologies from speech, facial expressions, and text.

Emotion detection technologies	Name	API/SDK	Requires internet	Information returned	Difficulty of use	Free software
Speech	Beyond Verbal	API	Yes	Temper Arousal Valence Mood (Up to 432 emotions)	Low	No
	Votakuri	SDK	No	Happiness, neutrality, sadness, anger, and fear	Medium	Yes
	EmoVoice	SDK	No	Determined by developer	High	Yes
	Good Vibrations	SDK	–	Happy level, relaxed level, angry level, scared level, and bored level	Medium	No
Facial expressions	Emotion API	API/SDK	Yes	Happiness, sadness, fear, anger, surprise, neutrality, disgust, contempt	Low	Yes (Limited)
	Affectiva	API/SDK	Yes	Joy, sadness, disgust, contempt, anger, fear, surprise	Low	Yes, with restriction
	nViso	API/SDK	No	Happiness, sadness, fear, anger, surprise, disgust, and neutral	-	No
	Kairos	API/SDK	Yes	Anger, disgust, fear, joy, sadness, surprise	Low	Yes, for personal
Text	Tone Analyser	API	Yes	Emotional, social, and language tone	Low	No
	Receptiviti	API	Yes	See	Low	No
	BiText	API	Yes	Valence (Positive/Negative)	Low	No
	Synesketch	SDK	No	Six basic emotions	Medium	Yes

of AI technology on human emotions to ensure that human conditions are not exploited or manipulated. In addition, Yang et al. (2021) stated that considering that HAI is based on human emotions and rethinking human reflective judgements, human emotions, and consequences should be the main concern. Garcia-Garcia et al. (2017) discussed ways of recognising emotions and stated that emotions can be recognised through speech, facial expressions, and text (Table 2).

Table 2 shows that depending on the type of information to be collected, different types of sensors. For instance, to read someone's facial expression or body language, we need a camera or a device that allows us to capture images and track the human body. Along these lines, there are also devices that allow us to track the user's eyes, which, in the end, means that we can know what the user is looking at, for how long, and so forth. If we wish to analyse someone's voice, we need a microphone. To read things, such as someone's heartbeat or muscle activity, we need more invasive tools, electrodes placed on the part whose electrical activity we are going to measure, with all this connected to a controller, such as a computer or a Raspberry microcontroller.

An examination of pertinent research reveals that numerous studies have been conducted on the enhancement of human performance through AI in education, and the current discourse on AI primarily revolves around its potential to enhance human performance (Yang et al., 2021; Yilmaz et al., 2023). Within the purview of these studies, multiple research initiatives have been implemented. However, considering the great developments in the last one or two years regarding HAI in education, it is understood that new research is needed on the HAI model and its applications in learning environments. In this regard, various researchers, due to the novelty nature of HAI model's examines the use among educational systems. (Eynon & Young, 2021; Latif et al., 2022; Li & Gu, 2023; Schmidt, 2020; Wei & Niemi, 2023).

Ntoutsi et al. (2020) highlight the importance of structuring HAI programmes around values, ethical principles, and human conditions. However, they argue that there is still a limited understanding of ethical aspects in AI, particularly those related to emotional dimensions. This knowledge gap has resulted in the absence of a specific framework to guide and address the emotional aspects of AI, leading to confusion among educators and researchers seeking to improve learning and teaching processes. Developing such a framework would contribute to a more comprehensive approach to HAI implementation in education. Therefore, by conducting this study and the response to human considerations, it is expected to get in-depth information and details on emotional and ethical aspects to help administrators design and implement specific scenarios and strategies from now on. In addition, this study seeks to enrich the current body of literature by concentrating on the application of HAI within educational environments, providing a unique perspective on the human considerations of AI in the context of learning and teaching. In addition, this study is expected to foster further discussions and collaboration among researchers, educators, and policymakers to promote the responsible and ethical integration of AI technologies in the field of education. In line with the main purpose of the research, the following research questions were sought to be answered.

- How can AI in the educational system respond to human considerations?
- How can HAI help improve the learning environment?

3 | METHODOLOGY

This section provides information about the research model, participants, data collection tool, and data analysis.

3.1 | Research model

This study examines the experiences and perspectives of faculty members and experts who use AI for learning purposes. For this reason, a qualitative approach was used in the research. Qualitative research provides an in-depth understanding enough is not known about a social phenomenon and a problem that has not been clearly defined (Mbaka & Isiramen, 2021). Thus, we attempted to determine the perspectives of faculty members and experts regarding the use of HAI in the educational environment. In this regard, qualitative data were obtained through a semi-structured interview form developed by the researcher.

3.2 | Participants and process

The study was conducted with 18 participants, including faculty members (F) and experts (E) in the field of AI at Iranian universities. The study included 10 faculty members and 8 experts who voluntarily participated and responded to the data collection tool. The participants who took part in the study had experience between 2 and 17 years. As the research topic is both in the field of AI and ethics and philosophy of technology, participants from both IT science and socio-human domains were selected. From this viewpoint, the faculty members and experts participating in the research are experienced. The criterion for participating in the research for social-humanities specialists is to have teaching experience using technological tools (such as eye tracker, augmented reality, virtual reality, etc.), content production experience, and teaching experience in the field of AI and its use. The selection criteria for participants among IT professionals included holding workshops, seminars, and courses related to ML, speech processing, and data mining. A total of 18 participants were involved in this study and were coded as P1-P18 (Table 3).

Within the research scope, we examined the perspectives of faculty members and experts on human and ethical considerations in AI. For this purpose, after preparing the data collection tool (interview protocol), the researcher first sent the interview protocol to each of the faculty members and experts via e-mail. The time and place of the interviews were determined by the interviewees. The required data were collected for 10 h. The average interview time was 30 min. Finally, the participants' views on human and ethical considerations in AI became clear.

3.3 | Data collection tools

The data collection process involved using a form consisting of open-ended questions, usually in one-to-one interviews. The

TABLE 3 Participant's (Expert/faculty member) demographic information.

Participant code	Participant (E or F)	Gender	Specialisation	Experience with AI (year)	Interview duration	Universities and centers involved
P1	F	Female	Computer	14	17	Shahid Beheshti University
P2	E	Male	Computer	9	23	Sharif University
P3	F	Female	philosophy	5	39	Shahid Beheshti University
P4	F	Male	Computer	13	45	Sharif University
P5	E	Male	Education	3	30	Shahid Beheshti University
P6	F	Male	philosophy	4	32	Kharazmi University
P7	E	Female	IT	8	41	Sharif University
P8	F	Male	Education	6	23	Tehran University
P9	F	Male	philosophy	2	29	Tehran University
P10	E	Male	IT	11	18	Amirkabir University of Technology
P11	E	Male	psychology	8	27	Tehran University
P12	F	Female	philosophy	7	35	Shahid Beheshti University
P13	E	Male	Education	8	42	Shahid Beheshti University
P14	F	Female	IT	12	30	Sharif University
P15	E	Female	sociology	5	48	Tehran University
P16	F	Male	Computer	17	28	Amirkabir University of Technology
P17	E	Female	psychology	5	25	Shahid Beheshti University
P18	F	Male	sociology	7	43	Kharazmi University

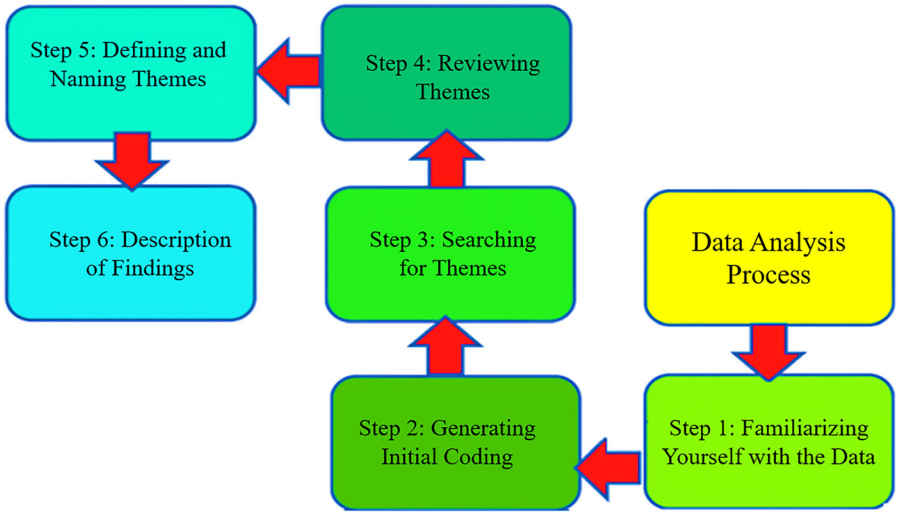

FIGURE 1 Data coding process.

semi-structured questions were prepared by reviewing the literature. Subsequently, the manuscript was submitted for evaluation by two experts in the field of educational technology. The essential considerations were revised on the basis of minor suggestions provided by the experts who validated the form. Questions in the form were developed to determine the perspectives of faculty members and experts on human and ethical considerations in AI. The questions used to explore the perceptions of faculty members and experts were similar. However, some changes in some questions were made based on their background. For example, experts were asked about their experiences and the introduction of intelligent tutoring systems and conversational systems in learning platforms. While faculty members were asked about their observations of the use of HAI applications in the educational environment. we tried to act on the basis of a comparison of the findings of previous studies and a review of areas that have not yet been sufficiently explored in the field of AI. In this regard, the following three questions were asked:

- For AI, what does it mean to be good and how can it be a good ethical agent?
- Regardless of the functional aspect, how can AI help the learning environment?
- What factors fall under the umbrella of ethics in AI?

After the questions were included in the questionnaire form and the semi-structured form was created, the form was sent to the faculty members and experts who were asked to answer the form in person. The results of the content analysis made in line with the questions in the form and the answers given to these questions are given in the findings section of the article.

3.4 | Data analysis

Qualitative data obtained from the 18 faculty members and expert participants were subjected to content analysis. This method allowed for the identification of key themes, patterns, and insights within the collected data, enabling a comprehensive exploration and interpretation of the faculty members' and experts' experiences and perspectives (Yilmaz & Yilmaz, 2023). Based on the faculty members' and experts' responses to each research question, the researchers extracted sub-themes related to human and ethical considerations in AI. Then, they clarified the sub-themes. The human and ethical considerations in AI were examined by gathering the opinions of faculty members and experts through open-ended questions. As this data analysis process continued, the researchers moved from an inductive to a deductive stance to determine a final set of three categories that remained throughout the analysis (Merriam & Tisdell, 2015). Figure 1 and Table 4 shows the data coding process.

For research reliability purposes, the qualitative data collected from the analysis process were coded by one researcher and cross-checked by a second encoder. The agreement between the two coders was assessed by calculating the percentage of codes assigned to the same category (Miles & Huberman, 1994). The coding reliability was 78%, indicating a strong agreement between the two coders. For this purpose, in addition to the researchers, another person with experience in the field of research and coding was asked to conduct the coding process of some interviews.

4 | RESULTS

This section presents the results of the study categorised according to the following major themes: recognising and dealing with negative emotions, targeted emotional nature, and access to fairness and justice in learning environments. These considerations are presented below.

4.1 | Recognising and dealing with negative emotions

The aspect of recognising negative emotions was related to the awareness and recognition of negative emotions, such as frustration, anxiety, and impatience. According to most participants, negative

TABLE 4 Categories and sub-categories.

Categories	Sub-categories
Recognising and Dealing with Negative Emotions	Awareness of human emotions and feelings
	Regulating emotions in crisis and stressful situations
	Using text or opinion mining, audio, and video to recognise emotions
	Increasing the power of emotional intelligence in the learning environment
	Tracking and quantifying hidden indicators of inner emotions
	Eliminate or reduce negative experiences
	A better understanding of emotional reactions
Targeted Emotional Nature	Necessity and appropriateness of educational goals through the recognition of emotions
	Helping learners achieve specific learning goals
	Ensuring the adaptation of emotions to the culture and human conditions of learners
	Awareness and recognition of unstated or implicit goals
	Correct understanding of a learner's intent
Access to Fairness	Reducing discrimination among learners based on race, ethnicity, and colour
	Avoiding bias due to the multicultural nature of the educational environment
	Preventing biased training data
	Giving equal opportunities to different groups of learners
	Expanding the contextual factors in the analysis of ethical decision-making processes

emotions, such as fear, frustration, anger, boredom, sadness, shame, guilt, and embarrassment should be removed with the help of AI. For example, through facial recognition, this issue can help teachers understand students' emotions (anger, sadness, etc.) towards the lesson content and help solve this problem. The following excerpts from the participants support this view:

> "The educational designers should not only think about the development of learners but also increase the positive aspects of learners' experiences, such as happiness, and limit or eliminate the negative aspects of their experience, such as anger and sadness, through AI programmes and achievements" (P16, E).
> "For example, Little Trees Technology in Hong Kong evaluates students' emotions while working in the classroom. The software used facial expressions to determine the emotional state of happiness, sadness, anger, disgust, surprise, and fear of each student" (P2, E).

An expert who was also a researcher stated:

> "To avoid the dependence of emotions on culture and context, we used a two-dimensional arousal-valence space in the electroencephalogram (EEG) method, which showed both active and inactive emotions and the positive or negative emotions of the learners"(P4, E).

Participants felt that emotional states may be the result of lesson content or interactions with students; therefore, AI designers and educators should understand these states and use existing examples to develop other examples. One faculty member described their experience as follows:

> "AI software helps teachers to understand students' reaction and their psychological behaviour to a particular subject such as curriculum, where an example of recognising emotions can be the eye tracker device" (P8, F).

Most of the participants believed that AI (for example, eye tracking, little trees, etc.) can be suitable for displaying symbolic aspects of emotions (fear, frustration, anger, boredom, sadness, shame, etc.). This gives teachers the opportunity to develop a comprehensive understanding of learning by recognising emotions and considering the interactions and situational nature of learners in AI systems.

4.2 | Targeted emotional nature

The targeted emotional nature refers to the recognition of unstated or implicit goals in the form of learners' emotions through a complete data set containing human faces, speech emotions, and the content of the conversation between the AI system and the human. Participants stated that through various methods, such as text categorization, latent intent or purpose is automatically detected. Text classification is the operation of sorting text documents (such as curriculum content or tweets, Facebook comments, direct messages, online reviews, or more) into predefined text categories using machine learning algorithms. Participants reported that they gained a lot of insight into the learners' feelings through this approach. A participant announced

the nature of the collaboration for such an activity in the university environment and said:

> "The universities can analyze a huge volume of messages received from stakeholders and in this way, identify people who want to receive counselling services or are facing a problem" (P13, F).

Furthermore, it was notable that AI-related software can track what has happened to the system outputs, learner statements, and previous content, thus satisfying the intent of the learner. In fact, AI attempts, through personal reflection on students activities, previous knowledge and skills, and students' academic performance to recognise the learner's intent and help the learner achieve educational goals. According to Participant No. 7:

> "Given the current situation, this system can decide how to give the best emotional response to the user to achieve the desired goal to achieve educational results" (P7, E).

Some participants reported challenges mainly related to misjudging learners by AI and noted that AI may misjudge a learner's emotions and give an incorrect answer based on their statements and facial expressions and this was reported by Participant No. 9:

> "The designers and educational technologists in the future should design AI systems that receive their instructions and goals from humans and note that misunderstandings about human purpose can lead to the failure of learning outcomes" (P9, F).

Another participant claims that:

> "A reason for the failure of AI design in this area may be that humans have common knowledge about each other in doing things. In contrast, AI systems do not have this common knowledge and cannot understand everything literally like humans" (P18, E).

According to the participants, this is the reason why HAIs, rather than replacing human capabilities have been used to enhance them, developing the human aspects of AI.

4.3 | Access to fairness and justice

One of the positive aspects of the AI successes among participants was promoting educational fairness and justice. Fairness and justice are related to the conscious effort to collect data and create checks in systems to prevent biased systems behaviour. According to participants, fairness in the AI process can be one of the options considered to fill educational gaps in the absence of promoting educational justice for students. For example, although one expert voiced concerns due to the abuse and systemic dangers of using AI, he states that:

> "AI actors should focus on diversity and equality in the educational system and provide the possibility to appeal decisions" (P4, F).

This intervention in AI to prevent racial, minority, and colour discrimination in educational systems was also confirmed by participant No. 14:

> "In AI systems (i.e., designing them), the context and capacity for human intervention and monitoring should be a necessity. This can happen through technical solutions, such as standards or explicit normative encoding" (P14, F).

The participants believe that better inclusion of civil society, mediating structures, or other relevant stakeholders in an interactive manner and increased attention to the distribution of common benefits help strengthen public confidence in AI to reduce discrimination. Therefore, the issue of HAI can be very useful in reducing abuse and negative aspects and ensuring fairness in the learning environments. One expert asserts that:

> "Chatbots can be very effective in increasing access to justice. Of course, this can only be achieved when proper design principles are used." (P15, E).

Also, an educational technology expert says that:

> "One example of such a tool is Woebot, which, in order to achieve educational justice, when other students can hire and talk to a psychologist, can immediately achieve emotional relief through this type of chatbot" (P10, E).

Various participants emphasise that AI is prone to bias and can suffer from a lack of fairness. These consequences are important when used for critical decisions, such as judgements about students. However, it requires a continued and concerted effort to address such issues, because misreading an individual's emotions can cause severe consequences in specific scenarios.

All these aspects necessitate the development of an AI-based model that exemplifies a comprehensive understanding of human considerations within learning environments (Figure 2). This model should consider various factors, to create an positive learning experience. By acknowledging the diverse array of human variables, although, this model may only consider some aspects of HAI, it will help to make and change it in the future.

Although this study highlights three key aspects in Figure 2, it is essential to recognise that the discourse on HAI models is still evolving and has not been standardised at the international level.

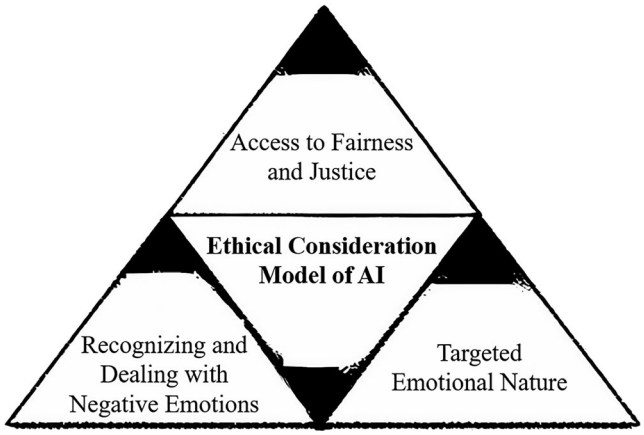

FIGURE 2 Ethical consideration model of AI in the learning environment.

Several models are currently being explored and debated in the realm of HAI, as evident in the works of Ntoutsi et al. (2020), ÓhÉigeartaigh et al. (2020) and Wirtz et al. (2019). These ongoing discussions demonstrate the complexity and diversity of perspectives on the topic, necessitating further research and collaboration to establish a comprehensive and shared understanding of HAI models on a global scale. One of the reasons is the issue of geographical location or cultural difference, which causes the type of difference in ethical considerations (Auernhammer, 2020; Teye et al., 2022). Non-western cultures and low socioeconomic countries have different ethical systems (Jafari, 2023; Zakharin & Bates, 2021). Therefore, it is necessary to ensure that the applied models of AI are guided in such a way that they correspond to the cultural and moral values of the future society. On the other hand, HAI has been a complex, multi-dimensional discussion and is dependent on the development of this technology (Horvatić & Lipic, 2021; Jarrahi et al., 2022). As a result, in dealing with this issue, we should move from a reactive approach to an active and forward-looking approach.

5 | DISCUSSION

In recent years, the application of AI has rapidly expanded across various domains, and the education sector has also shown significant potential to benefit from the effective integration of AI (Yilmaz et al., 2023). However, although AI can significantly improve performance (Yang et al., 2021), concerns have been raised regarding human considerations and ethical implications in learning environments (Akgun & Greenhow, 2021). Therefore, for educational institutions to fully capitalise on the benefits offered by HAI, the positive aspects of HAI must be actively incorporated into learning experiences. The present study aimed to explore the views of a range of experts and faculty members regarding the state of human considerations and the ethical implications of AI within an educational context. In this regard, the findings obtained from the research are discussed below.

According to the topics raised by the participants, in response to the research question, an essential dimension or goal of exploring HAI in learning and shaping ethical models is to enable AI to respond to negative and inactive emotions, such as students' impatience and frustration. By recognising and responding to negative emotions, AI systems can adapt their teaching methods to better suit individual learning styles and needs. When the literature was examined, it was seen that emotions play a crucial role in the learning process. By leveraging AI technology to detect and address these emotions, educators can tailor their teaching strategies to optimise student engagement and comprehension. The findings of Poria et al. (2019) showed that incorporating HAI in learning environments could help address negative and inactive emotions. Auernhammer (2020) has shown that the HAI proactive approach not only enhances the effectiveness of the learning process but also promotes emotional intelligence and well-being among students. In this case, Park et al. (2019) found that HAI can support students who lag behind other students because of their learning background and are anxious or confused. When the results were analysed in general, it can be said that a crucial objective of incorporating HAI in learning environments is its ability to detect and respond to negative emotions, such as impatience and frustration. The current literature reinforces the importance of emotions in the learning process, emphasising the benefits of leveraging AI technology to detect and address these emotions. In this direction, it can be concluded that using the HAI in learning environments can revolutionise the educational experience, offering a more personalised, emotionally, and humanistic approach that can benefit all learners.

Another important aspect, recognising the students' goals, is often not known in the system and is hidden and must be inferred from the actions taken by the students. The results reveal that AI systems have traditionally faced challenges in deciphering learners' unspoken goals, and the development of HAI seeks to enable AI to detect these subtle objectives. The findings of observed that there are various research results that automatically infer students' goals is important for informing and supporting students and learning. In addition, numerous studies have examined the efficacy of HAI in recognising these goals, highlighting the significance of understanding and addressing learners' implicit objectives to enhance educational outcomes. Min et al. (2016) showed that by recording the interaction effects of tracking more than 100 users who interacted with a game-based learning environment for teaching high school science, the LSTM model significantly surpasses other models in identifying the target. Wong et al. (2021) revealed that understanding students' implicit goals and minimising negative goals is crucial, making it important to identify their implicit and unspoken goals to improve learning outcomes. It can be said that these results support the results of our research. Therefore, it can be stated that by equipping AI systems to detect these unspoken objectives, educators can better understand their learners' needs and provide tailored support, leading to improved learning experiences and outcomes.

The third important aspect is to ensure fairness and accessibility in learning environments using HAI. The research findings showed that one key aspect is the ability of HAI to offer alternative

communication channels and anonymous counselling services. As Kaluarachchi et al. (2021) stated, the main problem in intelligence research goes back to students' concerns, such as justice, privacy, and fairness. However, as the results show, HAI has emerged as a promising avenue to address disparities and bridge gaps for individuals with disabilities or those who hesitate to disclose personal issues. Yilmaz et al. (2022) found that to solve these problems experienced by students, it is important to provide personalised advice and guidance to the student using AI technologies (SMIT), and it is possible for the teacher to follow and guide each student individually and to provide instructional support when needed. Yan et al. (2020) introduced SILVA as a tool to identify situations in which unfairness occurs in an extensive dataset of students. This indicates that chatbots and conversational systems can be helpful for disabled people to communicate with other students or for survivors of sexual assault who, for various reasons, hesitate to disclose their stories to teachers or other people and engage with the person's feelings to help the person. On the basis of these results, it can be stated that the integration of tools such as chatbots and conversational systems within educational settings can play a crucial role in facilitating communication and delivering support to students. The use of HAI represents a significant step towards building a more equitable and accessible educational landscape that prioritises the diverse needs and experiences of all learners.

Although the it is seen that the findings in the literature on the effects of HAI use on students' learning process and results are generally similar to the results of our study. However, participants stated that none of the educational institutions (private and public) has practically employed or even attempted to test the HAI tools as a course or as practical experience in the process of teaching and learning. Based on the interviews, there appears to be resistance from teachers and educational stakeholders regarding the implementation of new technologies in the education sector. In this regard, Sezer and Yilmaz (2019) found that a fundamental prerequisite is the acceptance of new technologies, especially AI, by its users. For this purpose, they explored the development of an AI acceptance scale in their next study (Yilmaz et al., 2023), which was specifically designed to evaluate the acceptance of AI applications within an educational context. The scale was developed on the basis of the established Unified Theory of Acceptance and Use of Technology (UTAUT) model. Recognised for its robustness and comprehensive nature, the UTAUT model elucidates the acceptance and utilisation of technology (Venkatesh et al., 2012). Furthermore, it is noteworthy that these technologies are still in their early stages of development. On the other hand, the existence of equipment, software, and hardware facilities in the field of new technologies are other factors that contribute to the HAI not being implemented in the process of learning and education in educational institutions. Therefore, it is essential to continue studying the potential implications of these technologies and work closely with developers, educators, and stakeholders to ensure successful integration into the education sector.

Although this research is conducted in a small university community, these findings can be applied globally, and this study at the local level cannot make us irrelevant and indifferent to the global level. This assertion is primarily based on the understanding that certain phenomena, behaviours, and reactions to new technologies tend to be consistent across different communities, cultures, and educational systems (Hassanpour et al., 2023; Yilmaz et al., 2023). This consistency of human attitudes and behaviours towards new technologies across various communities justifies the global applicability of findings from small-scale studies on technology adoption in education. While acknowledging its limitations, this study provides valuable insights and contributes to the global discourse on technology adoption in education. However, the ideas on how to use these new technologies in learning environments are different (Jafari et al., 2022). The attitude of some interviewees towards new technologies was not positive, and this factor created fear. A factor that the UTAUT model can facilitate. The findings of Yilmaz et al. (2023) suggest that the UTAUT model can provide valuable insights into user acceptance, offering a theoretical framework to guide the successful integration of emerging technologies across various domains. In this connection, participants believed that the acceptance of HAI in learning environments can lead to identifying at-risk students as soon as possible and providing timely intervention based on teaching and learning experiences. Although AI systems now help develop technology by providing personal lessons to students based on their knowledge and interest in a particular field, the human-centered approach to AI allows teachers to identify the correct information about students and, based on that, provide better experiences for students and accelerate the response process. in this way, studying how HAI can be used in learning environments can be the future direction of research in this field. This necessitates the creation of new models and methods for the research and development of HAI in learning and the validation of HAI techniques in learning programmes. Such modelling can reflect human-centered strategies that are sensitive to values and ethics. This not only helps us understand our intellectual blind spots but also creates new spaces for design and research.

6 | CONCLUSION

Increasing the application of AI in different fields has led to different expectations and benefits in terms of accuracy, efficiency, and optimization. Especially in the field of education, there are always many unanswered questions and challenges. Although AI systems have been influential in the educational sphere, they have largely overlooked human factors. The emergence of HAI seeks to rectify this oversight by introducing a more human-centered approach to AI systems. In this regard, our goal is to identify and understand the critical issues related to human considerations of learning in AI. Drawing from the conceptual framework established through research (Figure 2), a set of HAI domains in learning is proposed to gather essential information about emotions within such environments.

Our findings echo current significant research on the importance of HAI in educational contexts. Specifically, incorporating HAI in learning environments can help address negative emotions and

provide tailored support to learners, which aligns with existing research highlighting the role of emotions in the learning process. This proactive approach not only enhances the effectiveness of the learning process but also promotes emotional intelligence and well-being among students. Moreover, our research emphasises the importance of identifying implicit learner goals, which can enhance AI systems' ability to deliver targeted guidance. This comes from the fact that AI systems have traditionally faced challenges in deciphering learners' unspoken goals. This focus on implicit goal recognition builds upon previous studies that have paved the way for a more effective and impactful educational journey for students across various contexts and settings. Furthermore, ensuring fairness and accessibility through HAI aligns with contemporary research on inclusive education. By leveraging tools, such as chatbots and conversational systems, HAI can bridge gaps for individuals with disabilities and provide communication channels that prioritise anonymity and inclusivity. This integration of HAI represents a critical step towards creating an equitable educational landscape.

Our research contributes to the growing body of knowledge emphasising the importance of HAI in educational settings. The results of this framework represent insights that can be used to improve students' learning. Integration of HAI into learning environments can improve emotional awareness and response, identify unspoken learner goals, and promote fairness and accessibility. By addressing these human considerations in AI-driven educational systems, educators can leverage HAI to enhance the learning process, ultimately leading to better educational outcomes.

This study faced several limitations that should be considered when interpreting its findings. One significant limitation pertains to the selection of participants from a specific course, which introduces potential bias in the results. Because the experts and faculty members interviewed were chosen on the basis of their involvement in this particular course, the study's findings may not be representative of the broader population. To enhance the validity of the results, future investigations could involve participants from different universities. Furthermore, This research reflects the results of universities in Iran. Therefore, there is another limitation due to the country-specific nature of the dataset (Jang et al., 2022; Yilmaz et al., 2023). Cultural variations may constrain the generalisation of the study's outcomes. In addition, the use of interviews, while valuable for capturing in-depth insights, may not have fully reflected all relevant aspects of the phenomenon under investigation. Additionally, the study was conducted within the context of higher education, which means that the findings may not be applicable to other educational levels or settings. Further research is needed to assess the relevance and applicability of these results to other educational contexts, ensuring a more comprehensive understanding of the phenomenon across diverse learning environments.

6.1 | Recommendations

There are several important recommendations for practitioners and future researchers who need to study and apply HAI to improve the quality of teaching and learning. First, map out the Learning Trajectory not only on performance but also use the learner's feelings and emotions as a basis for learning, and based on the systematic analysis of the present study, consider three basic principles of HAI. Second, for further research, 'how to organise HAI-based learning activities so that teachers can support students' feelings and emotions as much as possible' and 'how to make teachers aware of HAI' are ideas that researchers can continue to implement. Third, to assess the long-term impact of HAI on teaching and learning outcomes, future studies could conduct longitudinal research that tracks the progress and development of students over an extended period. By examining the sustained effects of HAI interventions, researchers can gain valuable insights into the efficacy and scalability of these approaches. Yilmaz et al. (2023) are developing the scalability of this approach. Finally, practitioners and researchers can further explore the integration of ethical reflection and decision-making processes within HAI frameworks. By incorporating ethical considerations into the design and implementation of AI systems, educators can ensure responsible and transparent practices that prioritise the well-being and autonomy of learners. By expanding on these suggested directions, practitioners and researchers can advance the field of HAI and contribute to the continuous improvement of teaching and learning practices through innovative and ethical AI applications. Finally, it can be said that this paper emphasises the state of ethics in AI, which helps to better understand the many challenges of this topic.

AUTHOR CONTRIBUTIONS

Esmaeil Jafari: Conceptualization; investigation; writing – original draft; methodology; writing – review and editing; resources; funding acquisition; validation; visualization; software; formal analysis; project administration; supervision; data curation.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

CONSENT FOR PUBLICATION

I consent to have this article published.

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