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An ethical review of the impacts of artificial intelligence in distance education

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Abstract: Artificial Intelligence (AI) in Distance Education (DE) is rapidly transforming educational paradigms, raising ethical questions and contradictions that demand systematic analysis. Although previous research has addressed specific aspects of the ethical implications of AI in education, there is still a lack of comprehensive understanding of the dimensions involved. This study conducted a systematic review of 90 academic publications between 2018 and 2024 was carried out in order to map and categorize the main ethical dimensions of AI in DE. From this set of productions, we examined the temporal evolution of ethical concerns and their inter-relations in the field. Seven ethical dimensions were identified with varying prevalence: privacy and data protection (34.4%), algorithmic bias (25.6%), personalization (22.2%), equity and access (21.1%), academic integrity (15.6%), transparency (10%), and co-responsibility (7.8%). The results show a change in the ethical discourse, with an expressive increase in publications - from five articles before 2020 to thirty-five in 2023, reflecting a theoretical transition to the challenges of praxis. By addressing the ethical implications of AI in DE, the study provides relevant inputs for educational policy makers, technology developers and educators, proposing practical guidelines for the ethical qualification of AI in virtual learning environments.
Keywords: artificial intelligence; distance education; privacy and data protection; algorithmic bias; personalization.

1 Introduction

The integration of Artificial Intelligence (AI) in Distance Education (DE) has enhanced opportunities such as learning personalization, process automation and predictive data analysis, while raising ethical challenges. Recent studies highlight the benefits of AI in intelligent tutoring and curriculum adaptation (Vieira *et al*., 2024; Queiroz *et al*., 2024), but also alert to critical issues related to privacy, algorithmic bias and access equity (Durso; Arruda, 2022; Sá *et al*., 2024). The emergence of generative artificial intelligence (IAGen) further amplifies the contradictions, because although it

enhances creative and automation processes, it raises concerns about authorship, transparency and academic integrity (Miao; Holmes, 2024; Bond *et al*., 2024). Thus, systematically understanding the ethical dimensions of AI in DE is essential to guide pedagogical practices, institutional policies and regulatory frameworks.

Artificial Intelligence (AI) has been increasingly incorporated into educational processes, raising both expectations and concerns about its impacts. Despite its ability to optimize tasks and personalize learning, AI also presents significant challenges, especially when its algorithms are trained with large volumes of data without rigorous curation. The absence of such control results in the reproduction of social biases and the perpetuation of educational inequalities (O'Neil, 2016; Noble, 2018; Benjamin, 2019), which reinforces the need for a critical and reflexive approach to its forms of use (Selwyn, 2019; Luckin; Holmes, 2016; Unesco, 2021, 2023). This compulsive and disorganized lack of control can fall into an egocentric and little emancipatory hyperconnection of contents (Williamson; Piattoeva, 2019).

The integration of Artificial Intelligence (AI) in Distance Education (DE) has transformed the global educational paradigm, offering new opportunities, but also raising significant ethical challenges that require an in-depth analysis. As a result, the use of AI-based technologies in educational environments has raised critical and contradictory questions about the ethical implications in online educational contexts (Alahmed *et al*., 2023). Generative artificial intelligence (IAGen or IAG) in pedagogical practices, for example, announces challenges and technological contradictions to the preservation of ethical values. In this context, Miao and Holmes (2024) explain that IAGen consists of a technology capable of producing new contents, such as texts, images, videos, music and even software code, from the statistical analysis of existing patterns in large volumes of data, going beyond the simple curation of information available on the web.

Despite the growing scope of research on AI in education, there is a significant gap in the systematic understanding of the ethical implications specific to the context of distance education (Dakakni; Safa, 2023). As noted by Holmes *et al*. (2021), most researchers in educational AI are not adequately prepared to address the emerging ethical issues in this field. This gap becomes even more critical when we consider that the decisions made today about how to use AI in online education can have lasting impacts on educational equity and the development of students' skills.

Although previous studies have addressed specific aspects of ethical concerns, such as data privacy and algorithmic bias[1], there is still a gap in the literature regarding a comprehensive analysis that systematically synthesizes and categorizes the different ethical dimensions involved (Barnes; Hutson, 2024; Huang, 2023). Given this absence, this study presents a debate around ethical principles that must be respected by all social actors in the life cycle of IAGen systems. In this context, it is important to seek inspiration from discourses and educational practices capable of transforming the innovative power of AI into an inclusive language of human fullness and happiness in DE. Since in IAGen, the dimensions of semantics and imagination are limited and even manipulative discourses within the complex contradictions of human existence (Lee; Qiufan, 2022).

This study aims to develop a systematic understanding of the ethical implications of AI in distance education, through the analysis of 90 academic publications published between 2018 and 2024. Specifically, it is intended to answer the following questions: (a) what are the main ethical dimensions identified in the literature on AI in distance education? (b) How have these ethical dimensions evolved over the period? (c) what ethical principles should be pursued throughout the lifecycle of the AI management system? (d) What are the main gaps and opportunities for future research in this field, in terms of digital capital in DE?

After this introduction, the study advances to an analysis of the field of DE and IAGen, with the objective of mapping and contextualizing the current discussions that underlie this research. The methodology of the systematic analysis conducted is then detailed. The fourth section exposes the results, quantitative and qualitative, which serve as a basis for an in-depth discussion on their theoretical and practical implications. In the conclusions, the findings are summarized and directions for future research are proposed. The central objective of this course is to review the marginal conception of DE and confront its comfortable linearity with the existence of AI,

[1] Biases are systematic distortions that influence the way we perceive, judge and decide in various situations. They may arise from factors such as selection distortion, where sampling can result in non-representative groups, and information distortion, which occurs when the available information is not accurate or complete. Algorithmic bias happens when systematic errors in machine learning algorithms produce unfair or discriminatory results. Often reinforces existing socio-economic, racial and gender biases. Link: https://www.ibm.com/br-pt/think/topics/algorithmic-bias.

challenging the area to rethink categories such as space, time and historical consciousness itself[2].

As highlighted by Conte and Martini (2019), understanding the educational phenomenon in the technological era requires a hermeneutics of the human sense, in which ethics is manifested as openness to others and responsibility for shared existence. This phenomenological perspective extends the reading of AI not only as a technique, but as an expression of a language of being in the educational space. Our analysis contributes significantly to the field by providing systematic mapping of the ethical dimensions of AI in distance education. Through the identification and categorization of seven main ethical dimensions and their respective values and principles, this study not only clarifies the state of knowledge, but also lays a solid foundation for the development of more robust ethical frameworks for the implementation of AI systems in remote educational contexts.

2 Theoretical horizons of ethics and human agency facing performativity in the age of AI

In the age of AI, interaction and coexistence between humans and systems become shaping elements of the ecosystem of public service, production and commerce, social practice, learning and everyday life. In this dynamic, establishing the learning and necessary capacities for pedagogical work to understand and ensure human-centered interaction in coexistence with AI is a priority for the theoretical and practical frameworks of a performative pedagogy that adds expressive and human value (Conte, 2021). In this approach focused on human expressiveness, it is also required that Generative Artificial Intelligence (IAGen) be used to ensure transparency and explainability, as well as openness to learn from each other and (co)accountability in human work. As IAGen becomes increasingly sophisticated and widely used, one of the main dangers is its potential to compromise the development of intellectual abilities and human expressiveness (Miao; Cukurova, 2024; Unesco, 2021; Conte, 2021).

> If technologies interfere directly in the performative language and in all dimensions of human activity, because they carry socio-cultural

[2] Ability to understand the past in its relationship with the present and the future, recognizing the historicity of human actions, social structures and cultural experiences as a continuous process, built by narratives that are (re)interpreted over time, so that humanity remains with a need to explore, to insist and to grasp.

> representations and beliefs; thus, humanity's architecture is inseparable from expressive and technical gestures, intersubjective relationship and communicative experiences. It is necessary to experience the digital culture in the performative work of knowledge with others, to face hypercomplex reality. (Conte, 2021, p. 1).

As Conte, Matindingue and Sperb (2025) point out, digital webs and artificial intelligence networks can favor a more inclusive learning ecology, provided they are anchored in co-authoring and reciprocity principles. This perspective broadens the notion of digital inclusion, articulating it to the ethical dimension of co-responsibility and knowledge sharing. The protection and strengthening of human agency should be a fundamental principle in the design of curricula, AI educational programs and epistemologies of praxis. In this direction, Habowski and Conte (2019) argue that digital technologies, when critically and creatively inserted, can act as aesthetic mediations of learning, promoting emancipation rather than alienation of the subject. This view supports the need to understand the ethics of AI as care with the interventionist and creative power of the human.

In this sense, the AI competency framework for education subjects seeks to stimulate the intrinsic motivation of the human condition to grow and learn as subjects of possibilities and autonomy in contexts where sophisticated AI systems are increasingly integrated. Critical AI skills, as proposed by Miao and Cukurova (2024), can guide teachers and students to understand the unique value of socio-cultural interaction and co-creative work produced by them that should not be replaced by AI results. By developing expressive and sensitive capabilities for a human-centered involvement with AI, the framework aims to prevent students and educators from becoming addicted or dependent on AI, promoting awareness of behaviors that maintain (co)human responsibility for high-risk decisions.

In the context of DE, digital inclusion is often presented as a democratizing advance. However, this view can be superficial when it does not consider the structural challenges, such as unequal access to Digital Information and Communication Technologies (TDIC), critical training of students and the impact of screens on sociability. The massive use of digital resources, without adequate mediation, can compromise human interaction and the development of socio-emotional capacities, essential for the integral formation of students. In addition, there is a growing tension between digital technologies and traditional school cultures. Excessive exposure time to screens can replace orality and human contact, reducing spaces of collective

construction of knowledge in the contexts of DE and in schools. This dynamic has motivated the recent ban on the use of mobile phones in classrooms and school yards, an attempt to mitigate the negative effects of hyperconnectivity on (dis)attention and learning.

Another worrying aspect is the low reading rate among Brazilian children, youth and teachers. Studies show that more than half of children do not have a reading habit, which directly impacts academic writing and critical education. Therefore, it is essential to rethink the strategies for using AI and TDIC in education, promoting a balance between technological innovation and development of cognitive and social skills.

In this scenario, the criticism emerges that subjects in EaE can strip themselves of meaning in their actions, due to the effective procedure promoted by IAGen. The DE, then, can be configured as non-freedom, expression of a submission to the technical apparatus that, while extending comforts of life, intensifies the productivist logic of work. Thus, digital technologies are not neutral: they circumscribe an entire culture and project a historical totality, establishing a world of its own in which human agency runs the risk of being reduced.

In this humanistic diapason, we can verify that an IAGen approach centered on the human being holds expressiveness and criticality to promote fundamental ethical and practical principles, helping to regulate and guide the praxis of humanized knowledge and interests throughout the life cycle of AI systems and mysteries. The existing literature on ethics in educational AI can be categorized into four main strands.

The first focuses on privacy and data protection issues, with recent studies highlighting the risks associated with extensive collection and use of student data (Labba; Atitallah; Boyer, 2022). The second examines equity and access issues, with particular attention to the impacts of algorithmic bias on marginalized populations (Froehlich; Weydner-Volkmann, 2024). The third focuses on the tension between personalization and autonomy of the student. In this regard, recent studies demonstrate an interesting dichotomy: while personalization through AI can significantly improve learning outcomes (Alahmed *et al.*, 2023), students express preference for keeping AI in a supportive role, preserving the centrality of human interaction (Rienties *et al.*, 2024a). Finally, the fourth strand refers to the approach of values and principles of AI ethics in education (Unesco, 2021).

The ethics of AI is approached as a systematic normative reflection, based on holistic framework, comprehensive, multicultural and evolving values, principles and interdependent actions. In this sense, ethics, as a dynamic basis for the evaluation and normative orientation of AI technologies, refers to human dignity, well-being and harm prevention, based on the ethics of science and technology (Unesco, 2021). In coherence, ethical issues related to AI systems concern all stages of the life cycle of such systems, ranging from research, design and development to implementation and use, including maintenance, operation, trade, financing, monitoring and evaluation, validation, end of use, disassembly and termination. In the long run, AI systems can challenge humans' sense of experience and capacity for action, which raises additional concerns about human self-understanding, social, cultural and environmental interaction, autonomy, capacity for action, value and dignity (Unesco, 2021).

In IAGen's ethical framework for education, respect, protection and promotion of human rights, fundamental freedoms and human dignity are essential values throughout the life cycle and AI systems. Human dignity is related to the recognition of the intrinsic and equal value of every human being, regardless of race, color, ancestry, gender, age, language, religion, political opinion, nationality, ethnic origin, social, economic or social, birth condition, disability or any other reason. In this perspective, reliability and integrity are essential to ensure that AI technologies incorporate the values recognised and accepted by humans (Unesco, 2021, 2023):

a) Environmental and ecosystem prosperity: All actors involved in the life cycle of AI systems must comply with international legislation, as well as applicable national laws, standards and practices, created as a precaution, as well as for the protection and restoration of the environment and ecosystem, contributing to sustainable development.

b) Ensure diversity and inclusion: throughout the life cycle of AI systems, respect for and promotion of diversity and inclusion must be guaranteed in accordance with international law. This can be done by promoting the active participation of all individuals or groups, regardless of race, color, ancestry, gender, age, language, religion, political opinion, nationality, ethnic or social origin, economic, social or birth status, disability and or any other reasons.

c) Living in peaceful, just and interconnected societies: the value of living in peaceful and just societies points to the potential that AI systems have to contribute,

throughout their life cycle, to the interconnection of all living beings with each other and with the natural environment. Thus, the notion of interconnected human beings is based on the knowledge that each person belongs to a greater whole, which thrives when all its constituent parts are able to prosper. This value requires that peace, inclusion, justice, equity and interconnectivity be promoted without segregating, weakening human freedom and autonomous decision-making, or threatening coexistence between humans, other living beings and the natural environment (UNESCO, 2021).

The choice of methods for implementing AI systems must be justified on ethical principles to meet the following assumptions (Unesco, 2021):

a) Proportionality and not causing harm: (a) the chosen AI method must be appropriate and proportionate to achieve a certain legitimate objective, (b) it must not violate fundamental values related to human rights; and (c) should be appropriate to the context and based on rigorous scientific grounds. In scenarios where it is understood that decisions have an irreversible impact or may involve life-and-death decisions, then the final human determination must be applied.

b) Security and protection: unwanted damage, vulnerabilities to attacks (security risks) must be repressed and, at the same time, problematized during the life cycle of AI systems to ensure human, environmental and ecosystem safety. In this sense, it is necessary to ensure the development of sustainable frameworks for privacy protection of access data that promote the formation and validation of AI models.

c) Fairness and non-discrimination: AI actors shall make every reasonable effort to minimize and avoid reinforcing or perpetuating discriminatory or biased applications and outcomes, throughout the life cycle of AI systems, to ensure fairness in such systems. Thus, an effective solution must be available against discrimination and biased algorithmic determination.

d) Sustainability: the continuous assessment of human, social, cultural, economic and environmental impacts of AI technologies should be carried out with full knowledge of the implications of such technologies for sustainability.

e) Right to privacy and data protection: Privacy, an essential right to protect human dignity, autonomy and capacity for action, must be respected, protected and promoted throughout the life cycle of AI systems. The data protection frameworks/frameworks should refer to international principles and standards of care

regarding the collection, use and disclosure of personal data and the exercise of rights by data subjects, while ensuring a legitimate purpose and a valid legal basis for the processing of personal data, including informed consent.

f) Human supervision and determination: the decision to cede control in limited contexts remains of human beings, because they can use those systems to make decisions and act, but an AI system can never replace responsibility and accountability (accountability) human endings. As a rule, life and death decisions should not be transferred to AI systems.

g) Transparency and explainability: Transparency and explainability of AI systems are essential prerequisites to ensure the respect, protection and promotion of human rights, fundamental freedoms and ethical principles. The lack of transparency may impair the ability to effectively challenge decisions based on the results produced by AI systems and thus infringe the right to a fair trial and an effective remedy. On the one hand, transparency aims to provide appropriate information to the respective recipients, information that allows their understanding to foster confidence. On the other hand, explainability means making intelligible and providing information about the outcome of AI systems referring to comprehensibility about the input, output and operation of each building block of algorithms. Thus, AI actors must commit to ensuring that the algorithms developed are explainable.

h) Responsibility and (co)accountability: AI actors must respect, protect human rights and fundamental freedoms, promoting the protection of the environment and ecosystems while assuming their respective ethical and legal responsibilities. In this sense, responsibility and ethical accountability for common decisions and actions based on the IA system should always be attributable to the corresponding actors in the life cycle of these systems. As a result, appropriate mechanisms for oversight, impact assessment, audit and due diligence, including protection of whistleblowers, should be developed to ensure human (co)accountability in the forms of AI use and systems.

i) Digital awareness and literacy: public awareness and understanding of AI technologies and the value of data should be promoted through open and accessible education, inclusive engagement, digital skills and ethical training in the uses of AI, media and information literacy. An ethical impact assessment is required to identify and

assess the benefits, concerns and risks of AI systems, as well as risk prevention, mitigation and monitoring measures.

In addition to learning new skills, we can infer that for the operationalization of values and ethical principles, states should encourage research initiatives on the ethical and (co)responsible use of AI in education, teacher training and learning, in order to increase opportunities and mitigate the challenges and risks involved in this area. In this sense, the data provided for the acquisition of knowledge, collected during the student's interactions with the AI system, may not be subject to derogatory views of culture, dissemination of prejudices and stereotypes, misappropriation or criminal exploitation, including for commercial purposes. This approach leads us to a reflection on the need for curricula of ethical uses in AI for all levels. At this point, the online courses and digital resources of AI ethics education need to be developed in a collaborative perspective (Unesco, 2021, 2023; OECD, 2021), taking into account the diversity of environments and the accessibility of formats for cultural plurality and people with or without disabilities. As AI becomes a cornerstone of innovation in DE, institutions need to address its ethical implications to coordinate fair, inclusive and (co)responsible ways of use.

3 Methodological approach

This study adopted a systematic literature review approach to examine the ethical implications of the use of AI in DE. The methodology was structured to ensure an analysis of recent research and conjectures in this rapidly evolving field. A systematic search was carried out in multiple databases, including Google Scholar, Scopus, ACM Digital Library and IEEE Xplore. The research was selected for its scientific relevance and affinity to the areas of education, digital technologies and artificial intelligence. The Google Scholar platform offers a broad overview of academic literature; Scopus ensures coverage of indexed and peer-reviewed journals; ACM Digital Library focuses on computer science and educational technology research; and IEEE Xplore aggregates engineering studies, computing and applications of IAGen.

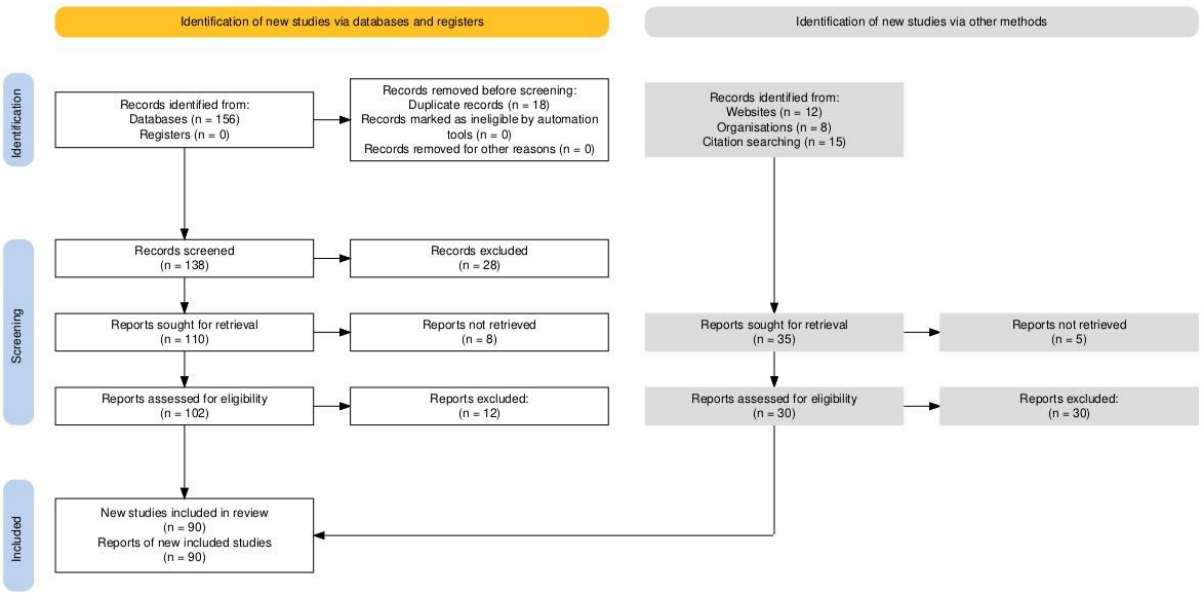
Search queries included combinations of key terms such as "artificial intelligence", "machine learning", "distance learning", "distance education", "ethics" and "ethical implications". These terms were strategically selected to cover three central dimensions of research: digital technologies ("artificial intelligence" and "machine

learning"), the educational context ("distance learning" and "distance education") and the moral and normative issues associated with its use ("ethics" and "ethical implications"). The combination of these terms allowed to identify studies that connect the development and application of IAGen to the context of DE, as well as the ethical debates that emerge from this interaction and positioning in the field.

The 2018-2024 cut was defined precisely by the growth of personalization and automation via AI, but also by the emergence of global ethical debates (Dogan; Dogan; Bozkurt, 2023; Amin; Ismail; Sivakumaran, 2025). To capture recent developments and reflect on trends in the area, we focus efforts on literature published between 2018 and 2024. This time frame was defined considering the exponential growth of research on AI in the field of education in recent years, ensuring the inclusion of contemporary studies of the most relevant technological, pedagogical and ethical changes.

As inclusion criteria were considered publications in peer-reviewed journals or conference proceedings, written in English, focused on the ethical aspects of the use of AI in DE, presenting an original research and case studies or comprehensive reviews. Similarly, exclusion criteria were chosen focusing on technical aspects of AI without addressing the ethical implications, discussion of AI in education in a broad manner without specific reference to DE and unpeer-reviewed work (e.g.: blog posts, opinion articles), as shown in Figure 1.

Figura 1 – Systematic literature review diagram



Source: The authors (2025)

The initial search resulted in a large number of potentially relevant articles. 156 articles were identified, of which a significant portion revealed relevance in relation to the objectives of this review. This significant volume demonstrates the growth of academic interest on the subject and reinforces the need for a careful screening. Two independent reviewers examined the titles and abstracts of the articles in light of the previously defined inclusion and exclusion criteria, and any discrepancies were resolved together with a third reviewer. Subsequently, the full texts of the selected articles were evaluated for eligibility, resulting in 90 studies included in the final set of this review.

In addition, a data extraction form was organized to collect relevant information from each included study. The data extracted included study characteristics (authors, year, country, type of publication), research methodology, AI technologies discussed, ethical issues identified, proposed recommendations, main findings and conclusions. Using a qualitative approach, we performed a thematic analysis of the extracted data to identify recurring themes and patterns among the studies. This process involved the coding of data, grouping similar codes into categories and synthesizing these categories into broad themes related to the ethical implications of AI in DE.

To ensure the reliability of the findings, we evaluate the quality of the included studies using established criteria such as: credibility, transferability, reliability and confirmability. The studies were not excluded based on this evaluation, but the strength of the evidence was considered in the synthesis of the results. We then synthesize the findings of the studies in a kind of reverse engineering, in order to offer a panoramic view of the current state of knowledge on the ethical implications of AI in DE. This synthesis contemplated the identification of areas of consensus, conflicting evidence and gaps in existing research, allowing to outline the critical panorama of the theme.

Theoretically, AI emerges as a promise of educational improvement made available to the subject or the DE system for consultation, interaction and continuous use. However, in practice, its application has focused predominantly on communication for technical learning and data management. Therefore, a central challenge emerges: the technical and economic logic that underlies AI in contemporary society limits the pedagogical and sociocultural potential of educational activity in DE, or is it possible to align it with a set of critical, humanistic, ethical and creative actions?

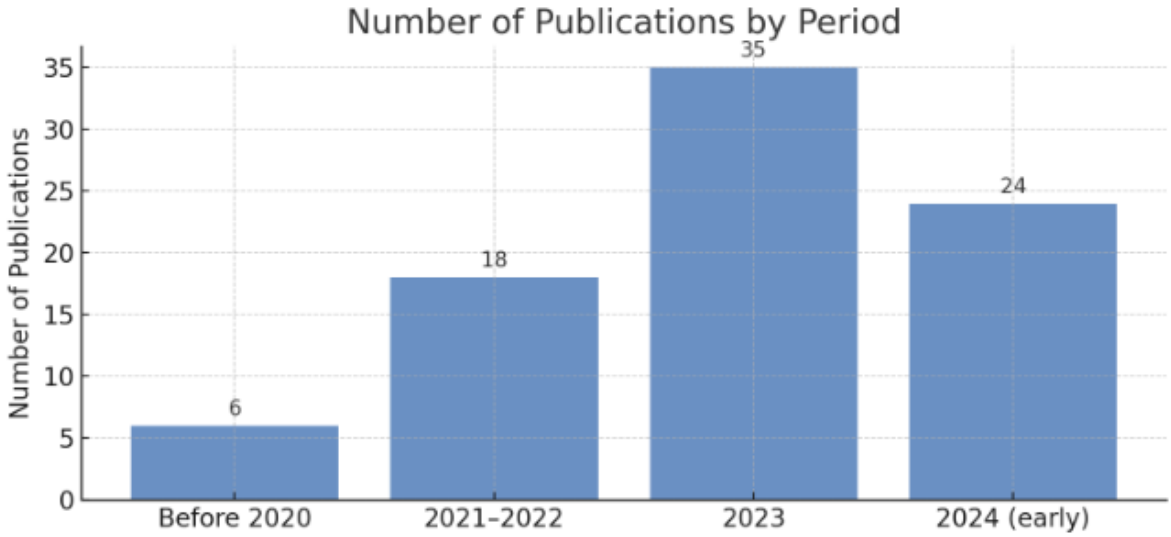
We recognize potential limitations in the methodology, including the possibility of not having captured relevant studies through our search strategy and the subjectivity inherent to thematic analysis. To mitigate these limitations, we employ multiple reviewers, carry out thorough cross-checks and keep an audit record of our decision-making process throughout the review. This methodology is designed to provide a rigorous and transparent approach to synthesize the current literature on the ethical implications of AI in DE, forming a solid basis for our analysis and recommendations.
What we lack, before the advancement of AI in DE, is to question if the current educational reforms are not neglecting the recognition of the other. This recognition occurs both in face-to-face interaction and in the digital environment, in speech, in sensitive listening and requires the construction of bonds, as well as a truly inclusive and equitable school space. Education must form subjects capable of dialogue, living together and assuming (co)responsibility for the collective. Without this critical insertion, the recognition of the other's space in intercultural dialogue via AI becomes superficial and ineffective.

4 Results and discussions

The systematic evaluation of 90 articles on the ethical implications of AI in DE revealed significant patterns, both in relation to the temporal evolution of the research and the main ethical concerns identified. This section presents the results organized into three main areas: (1) publication time trends, (2) major ethical issues, and (3) emerging methodological approaches.

The temporal analysis of publications shows a significant growth in research interest, with a significant increase from 2020: in 2023 there was the largest number of publications (35 articles, 38.9%); in 2024 (until the beginning of the year) there are already 24 articles (26.7%); the period 2021-2022 presented 18 articles (20%); publications prior to 2020 were relatively scarce, indicating that this is an emerging research area. This pattern of growth suggests an academic response to the rapid adoption of AI technologies in distance education, particularly accelerated by the context of the global pandemic.

Graph 1 - Time trend of publications



Source: The authors (2025)

In relation to the themes, aligned with the discussed literature, seven main ethical concerns were revealed, with different levels of attention.

a) Privacy and Data Protection (34.4% of articles): this is the most frequently discussed ethical concern (Labba; Atitallah; Boyer, 2022), focusing on the collection, storage and use of student data; includes concerns about surveillance and monitoring in online environments; compels us to need robust data protection frameworks.

b) Algorithmic Bias and Equity (25.6% of articles): refers to concerns about discriminatory outcomes in AI-based learning systems, impact on marginalized student populations, need for diverse and representative training data and justice issues in the automated evaluation (Froehlich; Weydner-Volkmann, 2024).

c) Personalization and Adaptability (22.2% of articles): the focus on the tension between the benefits of personalization and privacy concerns, the role of AI in creating adaptive learning experiences, the impact on student autonomy and agency and balance between automation and human interaction (Alahmed *et al.*, 2023; Rienties *et al.*, 2024a).

d) Equity and Access (21.1% of articles): concern is related to the digital divide and technological infrastructure, socio-economic barriers for AI-enhanced learning, need for inclusive design and implementation, and concerns with global accessibility (Unesco, 2021, 2023).

e) Academic Integrity (15.6% of the articles): challenges related to fraud detection based on AI; questions about plagiarism and originality of scientific papers; balance between vigilance and trust; and, impact on evaluation design.

f) Transparency (10% of the articles): need for explainable AI in educational contexts; understanding of AI decision-making processes; communication with stakeholders; and (co)responsibility in automated systems (Unesco, 2021, 2023).

g) (Co)accountability (7.8% of articles): (co-)accountability for AI-based decisions, the role of human oversight, institutional governance frameworks and legal and regulatory considerations (Unesco, 2021, 2023).

Graph 2 – Ethical issues

Source: The authors (2025)

The question of (co)responsibility emerges as one of the great ethical challenges in DE[3] before the rise of Artificial Intelligence. Considered one of the greatest challenges of human civilization, AI imposes reflections on the risks to (extra)human life in the present and future. In this context, (co)responsibility presents itself as an essential principle for both research and contemporary educational

[3] DE faces a profound change in the forms of relationship with knowledge, increasingly captured by the logic of algorithms, instantaneity and productivity, to the detriment of reflection and ethics. The problem lies in the permissiveness of AI creators, who do not have mechanisms to ensure an ethical-responsible use or impose adequate sanctions. The psychoanalyst Maria Rita Kehl illustrates this concern by stating: Social networks [as well as AI] are no-man's land. I don't know how long it can last like this. It's not going to sustain that. Available at: https://www.facebook.com/share/v/1Ea7x7ey1F/.

practices, especially in the interactions mediated by DE and AI (Jonas, 2006; Coyne, 2021).

The DE, based on the autonomy of the subject, presupposes the ability and commitment to take responsibility for oneself, for others and for the world, including nature (Jonas, 2006). Educating for a sense of belonging to humanity becomes indispensable, rescuing ethical values in the interaction with AI, the risk of producing automated texts disconnected from the human sense and the absence of tradition in Brazilian research on ethical education in this emerging field. Thus, the ethics of (co)responsibility is interlinked to human development in its totality and singularity, aiming at the common good of the humanities.

The investigation revealed several emerging trends, as highlighted below.

a) Integration of stakeholder perspectives (Stakeholders): there is an increasing emphasis on including the voices of students and teachers, promoting a multi-stakeholder approach to the development of ethical frameworks and collaborative solutions (Labba; Atitallah; Boyer, 2022; Holmes *et al*., 2021).

b) Policy and Governance: greater attention has been given to regulatory frameworks and the development of institutional guidelines, focusing on ethical standards specific to educational contexts (Franqueira *et al*., 2024; Luckin; Holmes, 2016).

c) Practical implementation: there is a transition from theoretical concerns to practical solutions, including the development of ethical evaluation platforms and responsible AI action strategies in educational contexts (Vieira *et al*., 2024; Williamson; Piattoeva, 2019).

In addition, the analysis revealed research gaps and future needs, highlighting:

a) Empirical studies: there is a lack of quantitative research on ethical impacts, longitudinal studies on the implementation of AI and comparisons between different educational contexts (Bond *et al*., 2024; Dakakni; Safa, 2023).

b) Standardization: there is a need for common ethical frameworks that guide the implementation of AI consistently (Nguyen *et al.*, 2023; Unesco, 2021, 2023).

c) Cultural considerations: research on cultural differences in AI ethics is limited, and it is necessary to study the cultural values that influence the implementation of AI in education (Sá *et al*., 2024; Holmes *et al*., 2021).

This review highlights the complex and evolving nature of ethical considerations in DE, updated by the advancement of science and technology, mobilizing efforts in the permanent revolution by AI. The systematic examination of 90 publications between 2018 and 2024 reveals a significant evolution of debates and notable increase in publications from 2020. The analysis identified seven main ethical dimensions, highlighting data privacy (34.4% of studies), followed by algorithmic bias (25.6%) and personalization of education (22.2%), indicating an awareness of the ethical complexities associated with implementing AI in remote educational environments (Labba; Atitallah; Boyer, 2022; Dakakni; Safa, 2023).

The significant increase in publications between 2020 and 2024 reflects a fundamental change in the perception of the ethical implications of IAGen in DE. As demonstrated by Dakakni and Safa (2023), around 85% of students have engaged with digital technologies from IAGen, often without fully understanding the ethical implications - a trend reinforced by the global pandemic context, which has accelerated the adoption of digital technologies from DE.

The temporal analysis also reveals a transition from theoretical discussions to more practical concerns about implementation and governance. In this diapason, the need for a well-designed framework for engagement with AI ethics in education is invoked, combining a multidisciplinary approach with robust guidelines (Holmes *et al*., 2021; Unesco, 2021; Miao; Holmes, 2024). This evolution reflects a maturation around the contradictions of the field, moving from conceptual issues to practical challenges in implementing AI ethics.

The emergence of privacy debates as the most frequently discussed ethical concern (34.4% of articles) reflects the fundamental tension between data-based personalization and students' privacy rights. Along these lines, Huang (2023) emphasizes that the widespread adoption of AI in education is increasing the collection and use of student data, necessitating a multi-stakeholder approach to privacy protection. This vision aligns with the proposal of Labba, Atitallah and Boyer (2022) on edge computing solutions that maintain the quality of data analysis while preserving users' data locally. This approach represents a promising technical way to integrate privacy concerns without compromising the educational benefits of AI.

The significant attention to algorithmic bias (25.6% of articles) and the quest for equity project a growing awareness about the potential of AI in perpetuating or

exacerbating existing educational inequities. In this sense, an interdisciplinary approach is advocated to combat biases in AI systems emphasizing the need for technical methods and continuous evaluation based on internationally accepted ethical values and principles (Barnes; Hutson, 2024; ELB Learning, 2024; Unesco, 2021). This concern is particularly relevant in light of the research by Froehlich and Weydner-Volkmann (2024), on social identity threat in distance education, highlighting how AI systems can inadvertently reinforce educational disparities. Thus, the intersection between algorithmic bias and educational equity emerges as a critical challenge that requires continuous attention (ELB Learning, 2024; Unesco, 2021).

The analysis of 90 publications showed seven main ethical dimensions, with emphasis on privacy and data protection (34.4%), followed by algorithmic bias (25.6%) and personalization (22.2%). The emphasis on privacy reflects the tension between massive data collection and the right to student protection, requiring robust regulatory frameworks (Huang, 2023; Labba; Atitallah; Boyer, 2022). The algorithmic bias points to risks of perpetuating inequalities in vulnerable populations, requiring greater diversity in data sets and continuous audit mechanisms (Froehlich; Weydner-Volkmann, 2024; Barnes; Hutson, 2024).

Personalization emerges as a central benefit, but also as a paradox: while studies report gains in engagement and performance (Alahmed *et al*., 2023), there is evidence that students prefer AI on auxiliary paper, preserving the centrality of human interaction (Rienties *et al*., 2024a, 2024b). At the same time, dimensions such as equity and access (21.1%) and academic integrity (15.6%) reinforce that structural barriers - such as technological infrastructure, teacher training and curricular updating - still compromise the ethical and effective adoption of AI in DE (Sá *et al*., 2024; Franqueira *et al*., 2024).

These findings confirm that the field moves from conceptual debates to practical concerns, mobilizing international guidelines that advocate transparency, (co)responsibility and protection of human agency (Nguyen *et al*., 2023; Unesco, 2021, 2023). Our analysis reveals a constitutive tension in the literature related to personalization (22.2% of the articles). While Alahmed *et al*. (2023) highlight the potential of AI in enhancing learning experiences through personalization, Rienties *et al*. (2024a; 2024b) report that students prefer AI to work as an assistant rather than replace human instruction. This dichotomy suggests the need for a balanced

implementation that leverages AI capabilities, while maintaining meaningful human interaction in the learning process. The resolution of this paradox emerges as a central challenge for the future of distance education mediated by IAGen.

The results also allow to problematize the paradoxical condition of subjects in ET: at the same time that they benefit from personalization and automation, they may be captured by an instrumental rationality. In this sense, the IAGen reveals itself as a device that extends efficiency, but also threatens the human sense of action, shifting the DE to an experience of non-freedom, marked by submission to the technical apparatus.

In other words, the limitations identified in the literature and the challenges in the forms of implementation in the educational field deserve special attention. As noted by Rets; Herodotou and Gillespie (2023), many studies focus on singular implementations, rather than comparative analyses between different contexts, since teachers are intercultural workers in DE. In this regard, Dogan, Dogan and Bozkurt (2023) highlight that most AI applications in DE are purely technical studies that ignore pedagogical and curricular considerations. These limitations suggest the need for a more holistic approach that integrates technical, curricular, pedagogical and ethical aspects. The lack of longitudinal studies on long-term ethical implications represents a significant gap, especially due to the neglect of human (co)accountability for the use of AI in DE.

Table 1 - Visual synthesis - Ethics and AI in DE (2018-2024)

No	Category/Dimension	Trends	Gaps / Needs	Percentage	References
1	*Stakeholders*	Inclusion of students and teachers; Co-creation	Comparative studies	-	Labba; Atitallah; Boyer, 2022; Holmes *et al*., 2021
2	Policy and Governance	Regulatory frameworks; institutional guidelines	Ethical standardization	-	Franqueira, *et al*., 2024; Luckin; Holmes, 2016; Unesco, 2021
3	Practical Implementation, Equity and Access	Practical solutions; ethical evaluation platforms; expansion of the scope of DE; inclusion of diverse audiences	Practical solutions; ethical evaluation platforms; expansion of the scope of DE; inclusion of	21,1%	Vieira *et al*., 2024; Williamson; Piattoeva, 2019; Sá *et al*., 2024; Queiroz *et al*., 2024

			diverse audiences		
4	Data Privacy	Data collection, use and protection; enhanced data-driven personalization; real-time feedback	Risks of surveillance, misuse and leakage of student data	34,4%	Huang, 2023; Labba; Atitallah; Boyer, 2022
5	Algorithmic Bias	Discriminatory results; equity; more efficient recommendation algorithms; support for automated assessments	Discrimination against minority groups; perpetuation of educational inequalities	25,6%	Froehlich; Weydner-Volkmann, 2024; Barnes; Hutson, 2024
6	Customization	Adaptation of learning paths; increased engagement and performance	Risk of excessive dependence on AI; reduction of autonomy and student agency	22,2%	Alahmed *et al*., 2023; Rienties *et al*., 2024a, 2024b
7	(Co) Accountability and Transparency	Definition of institutional governance protocols; human supervision; governance; curatorship of IAGen	Gaps in human supervision, accountability and specific legislation	7,8 - 10%	Jonas, 2006; Coyne, 2021; Unesco, 2023
8	Academic Integrity	Support for evaluation processes; detection of plagiarism	Dilemmas about authorship, originality and ethical use of IAGen	(15,6%)	Miao; Holmes, 2024; Bond *et al*., 2024

Source: The authors (2025)

The results show that the ethics in the application of AI in DE is multidimensional and constantly evolving. There is a growing maturation of the field, with emphasis on privacy, algorithmic bias and personalization of teaching. At the same time, gaps persist in longitudinal studies, ethical standardization and cultural considerations. The summary presented allows the reader to quickly understand the challenges and opportunities of the ethical implementation of AI, reinforcing the need for integrated approaches that combine stakeholder participation, regulation, pedagogical practices and human (co)responsibility.

The visual framework synthesizes emerging trends, research gaps and ethical dimensions of supporting and (co)creating AI in DE. It is observed that ethics in this context involves multiple layers: the integration of stakeholders, policy and institutional governance, practical implementation and cultural factors. The dimensions of data privacy, algorithmic bias and personalization of education stand out as predominant

concerns, reinforcing the need for ethical, regulatory and culturally sensitive approaches. This summary provides the reader with a clear and condensed view of the knowledge produced in the area, highlighting the evolution and ethical challenges in educational environments mediated by IAGen.

5 Conclusion

The systematic analysis of the ethical implications of AI in Distance Education reveals a significant evolution in the field, evidencing the growing awareness about the ethical challenges arising from the integration of AI in remote educational environments. Between 2018 and 2024, 90 publications were analyzed, observing a jump from five articles before 2020 to thirty-five in 2023, reflecting the relevance and urgency of the topic.

Seven main ethical dimensions were identified: privacy and data protection (34.4%), algorithmic bias (25.6%), personalization (22.2%), equity and access (21.1%), academic integrity (15.6%), transparency (10%) and accountability (7.8%). This mapping provides a solid foundation for understanding emerging priorities and concerns in the application of AI in DE. Theoretically, the results contribute to digital educational ethics, showing how ethical concerns evolve with large-scale technological implementation. The prevalence of privacy issues and algorithmic bias highlights the need to update traditional ethical frameworks for the challenges of the digital age. The findings have implications for multiple stakeholders. For educational institutions, it is recommended: (i) robust data protection policies; (ii) algorithmic bias assessment systems; (iii) governance frameworks balancing personalization and privacy; and (iv) clear protocols of academic integrity and digital education.

For educational technology developers, the need to incorporate ethical considerations from design to implementation and evaluation of systems is highlighted. For educators, the importance of continuous development in digital (co)responsible literacy is emphasized. The study presents limitations that point to future research: (i) longitudinal studies on the evolution of ethical implications in DE; (ii) empirical investigations on ethical frameworks and (co)responsibility; (iii) comparative research between cultural and socioeconomic contexts; (iv) Analysis of the intersection between IAGen ethics and educational intentionality; and (v) robust methodologies and mixed cycles, greater inclusion of voices of all participants and interdisciplinary collaborations

in digital multiliteracies. This work not only clarifies the current landscape of ethical concerns, but establishes observations to support future practices and research. The future of DE mediated by IAGen will depend on the ability to critically assess, throughout the life cycle of systems, the values and ethical principles recognized in national and international frameworks, adapting them to local contexts.

The analyses indicate that experiences in higher education can build trust and foster a culture of (co)responsible adoption of AI, promoting cooperative, transformative and equitable educational practices. However, communication challenges with society persist. The teachers of DE should inspire confidence, promoting (co)responsible interactions and investigative curiosity in the form of curatorship of IAGen, to make theoretical-practical interventions. The systematic review demonstrates that, although AI brings significant benefits to DE, such as personalization, automation and data analysis, its implementation still lacks consistent ethical references. The predominance of privacy concerns and algorithmic bias indicates the need to update regulatory frameworks, strengthen data protection policies and adopt mechanisms for monitoring educational equity. From a practical point of view, the results suggest clear recommendations: (i) continuing teacher training in digital ethics; (ii) institutional policies for governance and academic integrity; (iii) development of technical frameworks that incorporate transparency and explainability; and (iv) inclusion of multiple stakeholders in the decision-making process (Sá *et al*., 2024; Queiroz *et al*., 2024).

The ethics of AI in DE, especially in the context of IAGen, should be understood as a field in co-creation, in which technological advances need to be balanced with the appreciation of human dignity and cultural diversity. The future of DE will depend on its ability to combine innovation, regulation and criticality, ensuring that artificial intelligence is an instrument for enhancing justice, equity and quality in education. Only an ethical and collaborative pedagogy will allow to balance technological advances with the appreciation of humanities and diversities, being IAGen in DE a field of sciences in co-creation. This commitment requires the normative application of social sciences and law, guiding public policies in an inclusive and (co)responsible way.

Still, education needs critical debates about how IAGen impacts forms of organization, coexistence and presence in the world. Questions such as epistemological, ethical and political pressures of AI on languages and pedagogical

uses remain open. Pedagogical policies and practices should minimize the risks and negative impacts, ensuring cultural inclusion and new inspirations to act in co-creation, because we are part of the solution. A critical and reflexive approach articulates IAGen, educational processes in DE and citizen formation. In line with Conte and Martini (2019), the contemporary ethical-educational challenge requires the reconstruction of meanings in the dialogue between technique and humanity, while Habowski and Conte (2019) point out that creativity is the way in which technology can become a formative experience and not merely an automation of learning.

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