Artificial Intelligence and Labor Vulnerability: Promoting Responsible AI Use, with a Focus on Teacher Protection

Author info:

Leandro César Mol Barbosa
Federal University of Minas Gerais, Av. Pres. Antônio Carlos, 6627 - Pampulha,
Belo Horizonte - MG, 31270-901, Brazil.
Email: leandro.mol@ifmg.edu.br
Phone: +55 (31) 99791-2739

Eucidio Pimenta Arruda
Federal University of Minas Gerais, Av. Pres. Antônio Carlos, 6627 - Pampulha,
Belo Horizonte - MG, 31270-901, Brazil.
Email: eucidio@gmail.com
Phone: +55 (31) 98779-3900

Corresponding author:

Name: Leandro César Mol Barbosa

Institutional Address: Federal University of Minas Gerais, Av. Pres. Antônio Carlos,

6627 - Pampulha, Belo Horizonte - MG, 31270-901, Brazil.

Phone: +55 (31) 99791-2739

E-mail: leandro.mol@ifmg.edu.br

ABSTRACT

The perspectives of Artificial Intelligence on teaching work provoke new debates in the field of education, due to its potential for pedagogical transformation. The way AI can affect the work of teachers, if not carefully assessed, brings uncertain consequences, which may exacerbate the vulnerability of these professionals. This study aims to define pathways for the responsible use of AI, with a focus on protecting teaching workers in conditions of vulnerability, without neglecting its benefits for formal education. To achieve this, contradictions existing between AI and teaching work in recent literature were identified and discussed. As a result, measures were proposed such as the development of explainable AIs for education, the use of diversified databases and ethical frameworks for training, recognition of local adaptations, establishment of clear guidelines by institutions, focus on teacher and Artificial Intelligence cooperation, and investment in infrastructure and training.

Keywords: Artificial Intelligence; Teaching Work; Vulnerable Work.

1. Introduction

The recent development of new generative production possibilities, particularly after the availability of access to OpenAI's ChatGPT, has fueled new discussions regarding the interaction between educators and Artificial Intelligence (AI) (Arruda & Arruda, 2024). Unlike other technological applications, AI brings forth new questions due to its apparent ability to emulate human rationality in cognitive functions (Filgueiras, 2023), with the potential to produce personalized interactions resembling human ones (Farrokhnia et al., 2023). The power of machine learning provides an enhanced capacity for data analysis, with a sense of infinite and autonomous aggregation of information (Lee, S., 2023) not fully experienced by humanity before.

Given the potential of AI, new debates become relevant regarding its use and possibilities concerning teaching work. Although much of the literature focuses on evaluating the benefits and risks of technology on education (Chen & Lin, 2023; Kousa & Niemi, 2022; Grácia & Sancho-Gil, 2022), approaches directly addressing the vulnerability of teaching work and how it may be affected by AI are still in their early stages. From these issues, we observe there is an important problem to be debated: understanding the implications of AI in daily teaching life, both in terms of possible changes in their profession and the impact on pedagogical practices.

Like other new technologies and scientific developments, we believe AI may eventually impact the living conditions of teachers, their social security, intellectual appreciation, and possible contractual ties (Arruda & Arruda, 2024). We also believe that potential negative effects from AI may be related to deficiencies in guidance for technology development and implementation. This includes not only aspects of educational and governmental policy but also the lack of knowledge regarding its use. Despite this, we consider it possible to apply AI in teaching work ethically and responsibly.

This study aims to discuss pathways for the responsible use of AI, focusing on the protection of teaching workers under vulnerability conditions, without losing benefits for formal education. To achieve this, we chose to conduct an investigation of recent literature to recognize contradictions

expressing the relationship between AI and teaching work and subsequently map and discuss means to solve or mitigate them.

2. Theoretical Review

Although the vulnerability of teaching work is not a new research topic, possessing a relatively mature field of debate (Kelchtermans, 2006; Hargreaves, 1992), political, economic, and social changes often bring forth new aspects that require further examination. The concept of the vulnerability of teaching work is largely grounded in the perception of work precariousness. According to Silva and Gutiérrez (2020), precariousness is related to the loss of labor rights and the deterioration of workers' living conditions. This leads to increased social insecurity, as pointed out by Trujillo, Saavedra, Mardones, and Hernández (2022).

In education, precariousness can stem from various factors inherent in the way teaching work is inserted or perceived in society. One can highlight the dual workday, precarious salary policies, the absence of a career plan, or even the intellectual devaluation of teachers (Moura, Oliveira, Oliveira, Baptista, & Aveiro, 2023). Engaging in temporary contracts also qualifies as one of the central factors of precariousness, as it serves as a means to curtail rights, depriving individuals of career progression and reducing wage gains (Nauroski & Bridi, 2019).

In a broad concept, we will extend here the sense of vulnerability to encompass broader issues, not only linked to the material precarity of work but also considering symbolic precarity (Fanizzi, 2023). The symbolic precarity, not being an explicit element of the cycle of intensified neoliberal reforms from the 1990s onwards, is not frequently addressed in debates. Thus, added to the factors of vulnerability, the exhaustive work processes, with intensified efforts to ensure greater efficiency in work (González-Calvo, 2020), as well as the accumulation of diverse and competing tasks in the exercise of the role (Cancian, Pasini, Malacarne, & Soligo, 2022).

Such issues can unfold in environments of devaluation, with insufficient infrastructure for the full realization of teaching activities, such as the lack of materials, financial resources (Fanizzi, 2023; Cancian et al., 2022), or a high number of students per class. It is noteworthy that, even immersed in this environment, a large portion of vulnerable workers feel compelled to pursue continuous qualification, not only to improve their teaching standards but also due to the demands imposed by emerging new forms of school management (Moura et al., 2023), in which less prepared teachers may be at risk.

2.1.Artificial Intelligence and Teaching Work

The presence of AI in the educational sphere has increased intersections between this technology and teaching work. Discussions revolve around issues such as the total or partial replacement of the teacher (Mujiono, 2023), support for improving teaching effectiveness (Lin, 2022), and optimization of teacher time (Ahmad, Alam, Rahmat, Mubarik, & Hyder, 2022).

The debate over teacher replacement by AI gains momentum due to its processing, storage, and knowledge transmission capabilities, which far exceed human proficiency (Lee, S., 2023). However, there are criticisms of adopting simplistic perspectives that relate these technologies to a

mere information transfer process in the school environment. This view constitutes a pedagogically misguided approach (Pila, 2023), especially when disregarding socially constructed knowledge.

Such aspects lead to teacher replacement always being linked to problems capable of frustrating endeavors of this kind. This is because when interacting with students, teachers can emotionally engage with them, making them feel connected to the learning environment (Mujiono, 2023). Teachers can adapt to situations that deviate from existing standards (Lee, S., 2023), as well as nurture students' social and emotional development, instilling in them essential life skills (Pila, 2023), such as empathy and emotional intelligence.

Given that the replacement of teachers by AIs is still inconsistent, discussions tend to focus on the possibilities of increasing teaching efficiency. In this sense, AI can be used in various ways, in a context where it is proposed that AI and teachers are capable of complementing each other's weaknesses (Chan & Tsi, 2023). In this regard, the concept of Learning Analytics (LA) stands out, which uses data collection and analysis about students to improve understanding of educational performance, facilitate decision-making processes for teachers, and meet students' needs (Ahmad et al., 2022; Salas-Pilco, Xiao, & Hu, 2022). Consequently, teachers can provide more accurate services, implement more appropriate practices, and proceed with more personalized interventions (Lin, 2022).

Of all the possibilities opened by AI in education, personalization is possibly the most impactful. This can occur throughout the entire educational process, involving the determination of specific content, personalized assessments, and individualized feedback (Mujiono, 2023). Such a model is seen as a departure from the "one-size-fits-all" approach, which provides the same education to all students, to a reality where education is tailored to their individual levels, offering real-time customization (Ahmad et al., 2022). It is a student-centered strategy that can promote different learning paths based on students' backgrounds, progress, and academic interests, allowing them to progress at different levels and speeds (Tkachenko, 2023).

Although personalization brings many apparent benefits, it is important to emphasize that it is also subject to criticism. According to Lee, S. (2023), the nature of knowledge linked to artificial intelligences tends to converge to a midpoint, meaning that the desired results are averages obtained through mass training. This implies that, although the paths of learning may differ, the expected outcome is the same, causing personalization to focus on the mean rather than the outcome. Such a configuration highlights the inability of AI to accommodate aspects different from those it was trained on. This could impact, for instance, with a further suppression of creativity.

In addition to personalization, another important point lies in the potential to optimize teachers' time and effort. This is possible because AI is competent to perform administrative activities that, in one way or another, are or were part of teaching duties. These activities include verification, grading, enrollment, assessment and data analysis, processing requests, among others, which can be automated with AI support (Ahmad et al., 2022; Pila, 2023; Chan & Tsi, 2023).

Moreover, applications of Generative Artificial Intelligence are capable of autonomously creating content, including texts, images, and videos (Pila, 2023), as well as engaging in conversations with students in Dialogue-Based Tutoring Systems, capable of teaching specific topics (Lee, S., 2023; Arruda & Arruda, 2024). Assessments can be automated in various ways,

either through automatic scoring, evaluation of presentations, classification of written assessments, among others (Salas-Pilco, Xiao, & Hu, 2022). In this context, some authors argue that the time gained from optimizing teacher tasks can be directed towards expanding activities with students (Ahmad et al., 2022; Mujiono, 2023; Pila, 2023; Chan & Tsi, 2023).

2.2.Ethical and practical challenges in the use of AI by teachers

The integration of AI into teaching brings with it ethical and practical challenges that demand careful reflection for a better implementation of the technology. While the literature highlights significant positive potential in an idealized view of AI capabilities, a more cautious perspective is warranted. It is important to note the solutionist view that has formed around the topic (Davies, Eynon, & Salveson, 2021), capable of overlooking relevant aspects necessary for evaluating the use of the technology. For example, issues such as the lack of digital inclusion in underdeveloped countries (Filgueiras, 2023) and the contrasting need for teacher preparation for the implementation of advanced technologies in education (Salas-Pilco, Xiao, & Hu, 2022) may pose barriers of complex solution.

In addition to teacher preparation, it is important to emphasize ethical issues related to AI. Among these, data privacy stands out, as it is threatened by extensive data collection (Mujiono, 2023) that is stored and used for unforeseen purposes. Another problem is the lack of transparency in the information processing. AI often behaves like a black box, lacking explanations about the unfolding of the analysis (Kousa & Niemi, 2022). Consequently, there is no traceability of the decisions it provides in support of teachers. Another concern is algorithmic bias, which refers to biased judgments from AI training using big data (Filgueiras, 2023). These biases can perpetuate gender, race, and other types of social discrimination (Salas-Pilco, Xiao, & Hu, 2022; Gaskins, 2023), increasing the need for teacher supervision

Another point worth highlighting is the demand for surveillance by teachers regarding the use of AI, especially Generative AIs. Since they can create content that appears human-created (Tkachenko, 2023), students may use them for unethical purposes, violating academic integrity (Chan & Tsi, 2023). In this case, it is important for teachers to be aware of the potential risks of applied technologies, the security issues related to them (Tkachenko, 2023), as well as their intrinsic limitations (Mujiono, 2023).

3. Methodology

This study focuses on proposing pathways for the responsible use of AI in education, prioritizing the protection of teaching professionals under conditions of vulnerability. To achieve this, a qualitative study based on a review of recent literature on Artificial Intelligence linked to the teaching profession was proposed. The study was conducted in three stages: article selection, identification of contradictions, and discussion of possible approaches for the responsible use of AI within the teaching profession.

For article selection, a search was conducted in the Web of Science database - Core Collection using the descriptors and boolean indicators presented in Figure 1. The descriptors were initially based on the literature review, tested, and expanded with the aim of broadening the scope of analysis. The search was restricted to the title, abstract, and keywords of articles. As the focus was

on recent literature, the search was limited to the beginning of 2022, encompassing articles published until February 2024. This period encompasses the recent advancements in Generative Artificial Intelligence, which are responsible for opening new possibilities within the field of analysis.

Figure 1 - Descriptors and boolean indicators used in the search
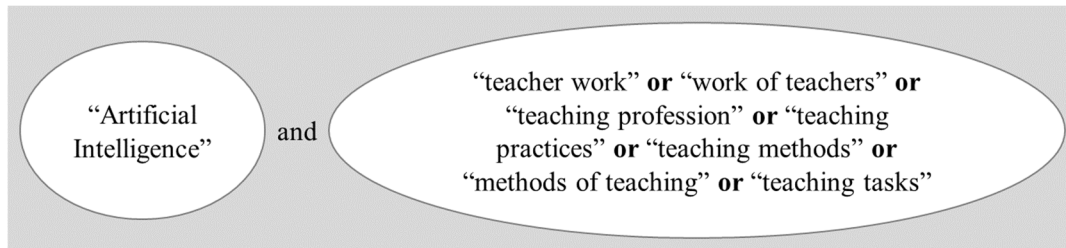
The research yielded a total of 185 valid results. Subsequently, a review of the titles and abstracts of the articles was conducted to select only those pertinent to the study. The selection criteria considered the following questions: (1) Is the article focused on the relationship between Artificial Intelligence and teaching work? (2) Does its content demonstrate relevance to discussing teachers in situations of vulnerability? Articles discussing the teaching of Artificial Intelligence, editorial presentation materials, and any others not pertinent to the two questions posed were excluded from the analysis. Using these terms as a reference, 28 articles were selected for the study.

Based on the selected articles, data collection and analysis were initiated, involving the extraction of excerpts that represented or explained potential contradictions between AI and vulnerable teaching work. For this study, we defined a "contradiction" as uses of AI or situations provoked by its use that, while they may present potential benefits in a generalist view, also represent possible threats to teachers in more vulnerable situations. A total of six contradictions were identified, based on 266 excerpts. Their verification was largely conducted restricted to the collected material, with comparison to supplementary literature only made when contradictions were not readily apparent. In cases of the use of complementary literature, these were duly indicated in the results section.

With the identified contradictions at hand, the discussion phase commenced. This phase aimed to explore ways to solve or mitigate the identified contradictions, with the objective of proposing alternatives or precautions to be taken for the more responsible use of AI, while preserving its benefits for formal education.

4. Results

As observed in the literature, there is no single way in which Artificial Intelligence (AI) relates to teaching work. AI, in its interactions with educators, can play different roles, whether these involve task substitution, teacher mediation, or complementary assistance (Vera, 2024). Consequently, the systematic review of articles has revealed contradictions linked to how certain uses and perceptions of AI may influence teaching work. This topic is dedicated to their presentation.

Contradiction 1: Confidence in the use of pedagogical approaches not fully developed and their complications for teaching work conditions.

The desire to harness new technological potentials in education may stimulate the use of approaches that still lack further development (Vera, 2024). In a context where it is argued that traditional teaching methods do not align with students' technological reality (Dąbrowicz-Tlałka, 2023), opting for AI usage emerges as an ideal solution. Such a move adds to pressures on institutions and teaching bodies to ensure faster and more productive advancements, assigning to the latter the responsibility for careful reflection on how teaching practice should change to incorporate technology (Ritter et al., 2023). However, unplanned, or insufficiently planned approaches can bring ethical pressures on teachers to the fore, related to data security, privacy, or the use of automated approaches (Lin, Huang, & Lu, 2023). Under these conditions, its usage can lead to controversial decision-making (Slimi & Carballido, 2023) or increase teacher anxiety, especially when the AI system behaves opaquely (Hopcan, Türkmen, & Polat, 2023).

Contradiction 2: The idealization of an AI-based education superior to that of the teacher, which considers the benefits of technology but not unique and irreplaceable human aspects.

It is not uncommon to find reports that some aspects of AI-based education are equal to or surpass education delivered by a teacher. For Lee, H. (2023) and Leng (2024), applications such as ChatGPT can provide instant feedback with 24/7 accessibility. According to (Alharbi & Köprülü, 2024), AI programs are capable of drawing more factual conclusions as they are free from human emotions. For Lee, S. (2023), from the perspective of teaching as a homogenization process, AIs can be more accurate and effective than human teachers since they have infinite capacity for information storage and processing.

Although the application of AI can bring real benefits to education, such as in the case of personalization (Boubker, 2024), isolated perspectives that reduce the role of the teacher to mere information transmission (Ghamrawi, Shal, & Ghamrawi, 2023), which can be carried out at any time by the machine (Leng, 2024), should be viewed with caution. This is because they divert attention from the unique particularities of human-led education, which encompass authentic aspects that cannot be replaced by AI (Walter, 2024), such as motivation (Shaik et al., 2022), empathy (Alharbi, & Köprülü, 2024), trust, and the development of deep connections (Ghamrawi, Shal, & Ghamrawi, 2023). These perspectives, when presented in isolation, render the profession more vulnerable, as they devalue teaching activity and the capabilities of the teacher.

Contradiction 3: Improvement of teaching quality with loopholes for unethical behavior and academic dishonesty.

An important contradiction lies in the fact that the use of AI can enhance the quality of teaching while providing loopholes for unethical practices. The enhancement of teaching quality may be associated with various applications based in personalization of educational experiences focusing on students (Boubker, 2024), Intelligent Tutoring Systems (ITS) with natural language (Lee, S., 2023), adaptive learning (Ahmad et al., 2022), among others. However, amidst this potential, concerns arise that if not properly addressed can negatively impact teaching work. These are issues of algorithmic biases, stemming from the training of AI with massive datasets, which may yield biased results and reproduce prejudices (Vera, 2024), thus increasing the need for vigilance on

the part of teachers. Furthermore, the ability to mimic a human brings with it new possibilities for student misconduct, rendering traditional assessment methods unviable (Lee, H., 2023) and requiring more thorough verification conduct from the teacher, who must be prepared to handle such situations.

Contradiction 4: Reduction of Apparent Workload and Expansion of Hidden Work.

The reduction of teaching workload is a recurrent issue in several of the analyzed studies (Lee, H., 2023; Leng, 2024; Shaik et al., 2022; Alharbi, & Köprülü, 2024; Lin, Huang, & Lu, 2023; Slimi, & Carballido, 2023; Ahmad et al., 2022). AI can be utilized, for instance, to automate some administrative tasks, freeing up teachers to dedicate more time to teaching and student guidance activities (Ahmad et al., 2022). However, upon reviewing complementary literature, teachers appear to offset algorithmic decisions with unaccounted-for hidden work (Sperling, Stenliden, Nissen, & Heintz, 2022). This issue, when viewed from the perspective of teacher vulnerability, can create two distinct and concerning situations. In the first scenario, the reduction of teaching workload may not serve to expand student support actions but rather as a means to address needs arising from the educational market, such as cost reduction and increased student-to-teacher ratios. This condition may contribute to greater instability in employment relationships, especially in private educational institutions. In a second scenario, the apparent reduction of formal work and increase in hidden work may lead to friction and contribute to increased teacher burnout and anxiety.

Contradiction 5: Encouragement of Self-Education and Reduction of Teacher-Student Interaction.

One of the concerns arising with the advent of AI in education is the potential dependency that its improper use may engender among students (Walter, 2024). The convenience of self-education can serve as an enabler of this condition, causing students to rely on AI models as their primary source of information, negatively impacting the development of critical thinking. The rapid and efficient acquisition of relevant information can lead to both a decrease in the quantity and quality of human interactions (Lee, H., 2023).

If observed, the substitution of interactions with teachers by AI can have significant impacts on teaching work, including the diminishing role of the educator and loss of leadership (Ghamrawi, Shal, & Ghamrawi, 2023). The lack of student interaction in virtual environments can raise concerns among teachers (Lin, Huang, & Lu, 2023), given a potential devaluation of their work. Furthermore, concerns about being reduced to technological facilitators can already be observed, with particular emphasis on the fear of losing control over students, in addition to reducing their work to mere monitoring and troubleshooting of systems (Ghamrawi, Shal, & Ghamrawi, 2023). Such a reduction in workload, besides being demotivating, has the potential to diminish the need for specialization among teachers, thereby weakening their ties to educational institutions in the face of reduced qualification requirements.

Contradiction 6: Expansion of access to quality education and insufficient infrastructure and qualification aspects.

As noted in the literature, an expansion of access to quality education has been attributed to advances in AI. This is because, through its applications, any student can receive assistance in completing their tasks to a global standard of quality (Vera, 2024). While this issue may be

interpreted as a relief for the teacher, who could utilize AI as an extension of their teaching capacity, new concerns emerge regarding the infrastructure and qualification required for this.

It is known that teacher vulnerability may be accompanied by environments with greater resource scarcity. Simultaneously, the costs of AI-based applications and tools pose a barrier for some educational institutions, which may become an impediment to their utilization (Alharbi & Köprülü, 2024). The global inequality in access to connection devices and broadband exacerbates this issue (Lin, Huang, & Lu, 2023). This causes teachers to feel less comfortable with technology due to their low familiarity (Hopcan, Türkmen, & Polat, 2023) and makes discrepancies even more pronounced in teaching work. The lack of teacher qualification can pose a problem as it is necessary to understand AI systems, their potentials, and limitations, in order to make the most appropriate decisions (Vera, 2024; Walter, 2024). The lack of knowledge generates fear and insecurity among teachers (Walter, 2024).

5. Discussion

The contradictions highlighted in the presentation of the results demonstrate complex challenges that need to be addressed for a responsible integration of AI into teaching work. In this topic, we discuss ways in which these contradictions can be resolved or mitigated. The aim is to provide ways to greater protection for teachers in vulnerable conditions, starting with pedagogical approaches.

The effect of using new pedagogical approaches based on AI still lacks empirical substantiation. Supported by the desire to apply new technological potentials (Vera, 2024), their adoption is still immersed in a solutionist aura (Grácia & Sancho-Gil, 2022), emphasizing the need for careful reflection that goes beyond the pressures of the educational market and considers the conduct of independent experiments. Such experiments must recognize that even a successful technology must be adapted to reduce the potential vulnerabilities of teachers.

The need for recognition of improvements applies to the problems of lack of transparency in much of AI (Kousa & Niemi, 2022), whose algorithms' data processing methods are unintelligible to humans, and the programming to which they are subject is largely confidential. This lack of clarity hampers its application. For example, in an automated assessment situation, the unknown criteria used by an AI can undermine the teacher's confidence (Adams et al., 2022). In this sense, Explainable AI emerges as more suitable solutions for implementation (Lin, Huang, & Lu, 2023), as they are capable of alleviating some of the pressure on teachers, who would otherwise need to blindly trust decisions based on algorithms.

The regulation of data usage is also a prominent issue in society (Vera, 2024), and has the potential to positively influence the ethical use of AI, including in new pedagogical approaches. The implementation of guidelines for AI usage has already been recognized by several developed countries, such as the United States and the European Union (Slimi & Carballido, 2023), but it is still far from being a widespread practice.

Regarding the idealization of AI as superior entities to teachers, it is an increasingly prevalent discourse that warrants deeper understanding. Such discourse may hold marketing appeal or not, with the risk of being used as propaganda. We emphasize that effective teaching involves

more than the mere transmission of information and requires the cultivation of social interaction, emotional intelligence, and critical thinking. However, AI lacks the ability to replicate such qualities and unique nuances of teachers (Ghamrawi, Shal, & Ghamrawi, 2023). Thus, there is a greater opportunity in the cooperation between teachers and AI. In this sense, AI and its resources are considered useful tools for teaching, but they do not constitute an alternative to the role of the teacher (Boubker, 2024). With this approach, concerns about possible devaluation of teaching work can be reduced. This is because technology is used from an augmentation perspective, with task division and reciprocal interaction (Molenaar, 2022).

With respect to the opening of loopholes for ethical problems and academic dishonesty, it is important to emphasize that the use of AI in the classroom should be fair, so that none of the students are in a position of advantage or disadvantage (Walter, 2024). However, solving the problem of potential algorithmic biases goes beyond the isolated competence of the teacher, involving the developers themselves during the AI training process, where the use of diversified datasets and vigilance for the implementation of ethical frameworks are ways to mitigate the problem. According to Lin, Huang, and Lu (2023), better results can be achieved when the architecture of AI solutions is focused on the development of inclusive systems. This condition can reduce pressures on teachers, increase their confidence, and allow for a more appropriate use of technology.

In reference to the new possibilities of academic dishonesty, it is important for educational institutions to clearly communicate their expectations so that students understand the boundaries of what is allowed and what is not allowed (Walter, 2024). From the perspective of the teacher, qualification becomes important so that they understand the systems, their limits, and their most appropriate uses (Vera, 2024). Additionally, qualification can provide teachers with more effective and less exhausting means to combat academic cheating, making their work less burdensome.

The apparent reduction of teachers' workload through AI technologies brings with it dilemmas that need to be thoroughly debated. For example, the decrease in administrative workload (Ahmad et al., 2022), or evaluative processes (Salas-Pilco, Xiao, & Hu, 2022), can be used in environments with a shortage of teachers to expand the capacity to provide education and reach a greater number of students (Arruda & Arruda, 2024). On the other hand, it can also be used to reduce contractual costs, leading to a precariousness of the relationship that the teacher maintains with the educational institution. This, in addition, reduces interaction between students and teachers.

In the first scenario, it is understood that the use of AI should be linked to a comprehensive educational development policy. This policy includes teacher training for better understanding and utilization of technology. Additionally, it involves the development of appropriate infrastructure for its integration (Su & Yang, 2023). In the second scenario, the precariousness of employment relationships and the reduction of teacher-student interaction for the sole purpose of increasing private gains should not be seen as viable alternatives to quality education. In this case, it is necessary to develop a system of checks and balances by regulatory bodies.

Furthermore, concerning the reduction of the teaching workforce, it is important to emphasize the need for vigilance by educational institutions and teachers. This is because the

hidden work carried out to compensate for the adoption of AI should not be underestimated or ignored.

Regarding the reduction of teacher-student interaction and the increase in dependence on AI, it is important for institutions to encourage more appropriate forms of using this technology. By using AI as a "training partner" that does not diminish the role of the teacher (Walter, 2024), the institution can obtain advantages. This approach can expand teacher pedagogical alternatives, while maintaining characteristics appropriate to teaching, such as empathy and human connection (Alharbi & Köprülü, 2024). Furthermore, it can minimize the loss of teacher leadership (Ghamrawi, Shal, & Ghamrawi, 2023). Such a process does not imply expanding the focus of teaching on the teacher but rather reaffirming their role as the primary subject capable of focusing teaching on students.

The prospects of expanding access to quality education that AI carries with it can bring benefits for reducing the vulnerability of teaching work. AI is cited, for example, for its potential to reduce educational inequalities by reinforcing teachers' capacity (Kucirkova & Gray, 2023). However, it is important to recognize that the different local needs imposed on them may cause the same technology that works effectively in one situation to be ineffective in another. For example, in lower-income countries, access to quality internet is only available to part of the population (Leng, 2024). Additionally, the costs of tools may also hinder free access to the benefits of AI (Alharbi & Köprülü, 2024), as well as the lack of adequate devices (Lin, Huang, & Lu, 2023). Thus, there is a need to adapt AI usage strategies to the conditions of locations where infrastructure vulnerability is higher. In these cases, AI applications should be based on the use of minimal resources with proven higher returns. Furthermore, external financing and the use of partnerships for AI incorporation should be considered (Alharbi & Köprülü, 2024), if not to solve the problem, at least to mitigate it as much as possible. Finally, it is worth noting that such initiatives should be accompanied by adequate teacher training to enhance their acceptance of technology and to stimulate the development of new skills, such as a more critical understanding of AI, its limitations, and benefits (Walter, 2024).

6. Conclusion

This study aimed to outline pathways for the responsible use of AI, focusing on the protection of teaching professionals in vulnerable conditions, without neglecting the benefits of AI for formal education. To achieve this, a review of recent literature was conducted to identify the main contradictions surrounding the application of AI and teaching work. Six contradictions were identified, encompassing issues such as deliberate trust in approaches that are not yet fully developed, idealization of AI as superior to teachers, unethical uses of technology, workload reduction, decreased teacher-student interaction, and increased access to quality education.

As a result, it was possible to identify important areas of action involving various stakeholders, including technology developers, educational institutions, regulatory and governmental authorities, as well as researchers. Concerning the developers, important points were raised, such as the need for the development of Explainable AIs focused on education, to provide transparent decisions that can be questioned by teachers. The need to use diversified datasets during AI training for education, as well as the use of ethical frameworks, to make systems more inclusive and reduce algorithmic biases, was also emphasized. Additionally, the importance for developers to

recognize the need for adaptation of their applications according to local differences was highlighted.

With respect to the institutions, the need to focus on applications that encourage cooperation between teachers and AI, rather than tools that position AI as an alternative to teaching work, was emphasized. Similarly, when adopting a particular application, surveillance over the generation of hidden work, which may unduly increase the teaching workload, was considered positive. Clear instructions by institutions regarding technology usage expectations were also noted as necessary to mitigate academic dishonesty, as well as the need for teacher training in AI usage.

In terms of regulatory bodies, the development of guidelines for data protection in locations where they have not yet been established is highlighted. Furthermore, responsible authorities need to establish policies to support qualification in AI, as well as to act in establishing adequate infrastructure, checking the possibility of financing and partnerships if necessary. It is also necessary to establish a system of checks to protect teachers from contract precariousness due to AI adoption.

In the field of research, the need to develop independent experiments was recognized. These should consider possible adaptations to reduce negative effects of technology on teachers.

As a limitation, this study was conducted over a short period, spanning only two years and two months. This period may be considered short in some research contexts. However, its use is justified by the timeliness and dynamism of the discussions surrounding the topic, where issues addressed in earlier periods have taken on new forms due to technological advancements, notably Generative AI.

Finally, as a proposition for future studies, we emphasize the need for empirical investigation into the mechanisms through which AI usage affects contracts between teachers and institutions. Furthermore, we propose conducting local studies to delve into the technological adaptation needs to meet specific demands.

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