EmRede
Revista de Educação a Distância

UniRede

EmRede, v.12. 2025

CRITICAL REFLECTIONS ON PRACTICES AND POTENTIAL OF ARTIFICIAL INTELLIGENCE IN PROFESSIONAL AND TECHNOLOGICAL EDUCATION

Marcello Ferreira

Universidade de Brasília (UnB), Brasília, Distrito Federal, Brasil.
marcellof@unb.br

Andrei Simão de Mello

Serviço Nacional de Aprendizagem Comercial (Senac), Porto Alegre, Rio Grande do Sul, Brasil.

andreisimao@yahoo.com.br

Daylane Soares Diniz

Secretaria de Estado de Educação do Distrito Federal (SEEDF), Brasília, Distrito Federal, Brasil.

daylanesoares@gmail.com

Abstract: This study analyzes perceptions, uses and challenges of AI-mediated teaching in Professional and Technological Education based on content analysis of responses to a questionnaire by 308 teachers from an autonomous social service. The analysis revealed potential for pedagogical personalization and innovation, although ethical, technical and formative limitations persist, highlighting the need for critical training for critical and emancipatory use.
Keywords: Professional and Technological Education; Artificial Intelligence; Digital Information and Communication Technologies.

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

EmRede
Revista de Educação a Distância

UniRede

REFLEXÕES CRÍTICAS SOBRE PRÁTICAS E POTENCIALIDADES DA INTELIGÊNCIA ARTIFICIAL NA EDUCAÇÃO PROFISSIONAL E TECNOLÓGICA

Resumo: Este estudo analisa percepções, usos e desafios do ensino mediado por IA na Educação Profissional e Tecnológica a partir da análise de conteúdo às respostas a um questionário por parte de 308 docentes de um serviço social autônomo no RS. A análise revelou potencial para personalização pedagógica e inovação, embora persistam limitações éticas, técnicas e formativas, destacando a necessidade de formação crítica para um uso crítico e emancipador.
Palavras-chave: Educação Profissional e Tecnológica; Inteligência Artificial; Tecnologias Digitais da Informação e Comunicação.

REFLEXIONES CRÍTICAS SOBRE LAS PRÁCTICAS Y EL POTENCIAL DE LA INTELIGENCIA ARTIFICIAL EN LA EDUCACIÓN PROFESIONAL Y TECNOLÓGICA

Resumen: Este estudio analiza las percepciones, los usos y los desafíos de la enseñanza mediada por IA en la Educación Profesional y Tecnológica, basándose en el análisis de contenido de las respuestas a un cuestionario de 308 docentes de un servicio social autónomo. El análisis reveló potencial para la personalización e innovación pedagógica, si bien persisten limitaciones éticas, técnicas y formativas, lo que pone de relieve la necesidad de una formación crítica para un uso crítico y emancipador.
Palabras clave: Educación Profesional y Tecnológica; Inteligencia artificial; Tecnologías de la Información y la Comunicación Digital.

Received on: 09/05/2025

Accepted on: 03/09/2025

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

EmRede
Revista de Educação a Distância
UniRede

1 INTRODUCTION

Artificial Intelligence (AI) is understood as a set of technologies designed to develop systems capable of performing functions previously restricted to human cognition, such as language models, visual pattern recognition, decision-making, logical reasoning, and problem-solving. Its evolution across all fields—and particularly in formal or informal education—has occurred gradually, with research directly linked to advances in mathematical studies and computational technology since the 1950s. In the educational field, AI has been progressively incorporated, contributing to the personalization and modulation of teaching, leveling prerequisites, diversifying approaches, materials, methods, and resources, and offering more precise and effective evaluative instruments and indicators (Gomes, 2010; Ferreira et al., 2024).

AI enables and catalyzes — with relative directionality, acceleration, and accessibility — personalized learning trajectories, adapting to each student's pace, style, and interests, as well as suggesting relevant content based on their history and levels of skills and competencies. With AI, targeted and potentially more effective instructional approaches become possible, capable of identifying knowledge gaps and promoting improvements in teaching materials (Marihama; Massa; Moran, 2024). These occurrences, however, are markedly amplified and qualified within the context of cyberculture, where cyberspace is the environment connecting knowledge, practices, and subjects, fostering the development of collective intelligences. In this environment, hyperconnections and interactions mediated by Digital Information and Communication Technologies (TDIC) support the collaborative construction of knowledge and anticipate many dynamics intensified by the presence of AI in education.

Despite its undeniable virtues and evident qualities, access to and progress in AI occur unevenly among nations, economic groups, and social segments. Embedded in the dynamics of contemporary capitalism, where neoliberal logic accelerates productive processes, amplifies, and sharpens inequalities, prioritizing consumption expansion often at the expense of worker exploitation and expropriation.

The determinations and contradictions of the model of development, distribution, and access to technology reproduce those typically entangled in the prevailing societal model. Critique, therefore, requires the counterposition of all (inter)agents, traversing their internal logics and consequential aspects. It is within this framework that we can isolate — for a detailed and pertinent analysis — a

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

sample of enormous relevance in the context of Brazilian educational segments: Professional and Technological Education (EPT). This niche involves a significant number of Brazilians, especially children of workers in adverse socioeconomic conditions, as well as connections with social movements at the interface of education, technology, and work (Cordão; Moraes, 2017).

A foundation to support this opposition can be found in the notions of liquid modernity developed by Zygmunt Bauman (2001; 2011). In this concept, the melting of human relationships is assumed, which, marked by ephemerality, come to accept as rationality—that is, as a condition of existence and efficiency—the continuous replacement of knowledge and professionals based solely on economic criteria. Furthermore, it rests on the migration from the logic of work as an ethical principle to the aesthetics of consumption and is reflected in the planned obsolescence of knowledge and the instability of competencies demanded by the market. Finally, the individualization of societies and the promotion of competition and the extermination of the other hinder the formation of supportive and collaborative learning communities, accentuating inequalities and dehumanizing relationships (Mill; Ferreira; Ferreira, 2018).

Considering, therefore, the liquidity established in the use and development of AI in educational processes based on TDIC, this study is dedicated to analyzing how AI-mediated teaching is shaped and what the main challenges and qualified possibilities are in EPT. The problem is justified by the importance of critically investigating AI's presence in the field of vocational education, especially in light of the competencies required by an increasingly dynamic and digitally mediated world of work. It is essential to understand the transformations imposed by AI and their impacts on the subjects involved, opening spaces for reflection and transformative intervention. Thus, this study aims to analyze perceptions, uses, and challenges of AI-mediated teaching in EPT, considering historical aspects from a critical-emancipatory perspective.

To this end, the objectives are: a) to identify how EPT teachers conceive, perceive, and use AI to assist learning; b) to understand the potentialities and curricular challenges faced by educational systems, teachers, and students; and c) to critically analyze the intersections between AI use and the socioeconomic dynamics structuring technical and vocational education. Methodologically, the research involves analyzing the perceptions of teachers from one of the autonomous social services (Sistema S—a network of professional training institutions funded by payroll contributions in Brazil) operating in the state of Rio Grande do Sul.

Through a questionnaire, the study investigated how these teachers use AI in their pedagogical

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

practices, addressing challenges, training, and perceptions regarding its effectiveness in student learning. As results, from an approach that recognizes the tensions and contradictions of this phenomenon, it is expected to provide subsidies for teacher training and curricular development in institutions linked to EPT, referencing a contextualized and critical vision capable of challenging the limits of practices embedded in technical rationalities and contributing to the construction of increasingly collective and emancipatory alternatives in the educational, technological, and workforce training fields.

This text is organized into four main sections. The first addresses the theoretical framework and conceptions about the role of education and technology in teacher training. The second presents the methods used in the research, including the procedures and instruments applied. The third discusses the results obtained, analyzing teachers' perceptions regarding the integration of artificial intelligence in professional and technological education, as well as the identified challenges and potentialities. Finally, the fourth section offers general considerations, highlighting implications of the findings, limitations, and suggestions for future studies.

2 THEORETICAL AND HISTORICAL FRAMEWORKS

In Brazil, EPT is structured based on principles that go beyond technical training. Its institutions aim to prepare individuals for productive life through the development of professional competencies essential for performing diverse occupations. Although historically associated with operational functions and intended for the less privileged social strata, its focus has broadened: contemporarily, it seeks to train individuals capable of acting with innovation, creativity, autonomy, and teamwork, aligning with present social and productive demands (Cordão; Moraes, 2017).

More than transmitting technical knowledge, EPT is committed to the democratization of knowledge — which is increasingly associated with the adoption of TDIC — and particularly AI — in teaching-learning processes (Vicari et al., 2022). Learning in EPT must be meaningful and contextualized, incorporating the use of TDIC in a way that develops problem-solving and project management skills. The authors argue that, in opposition to the traditional teaching model centered on theoretical lectures and memorization, this educational modality should promote more dynamic learning integrated with students' realities. This integration contributes to creating a more attractive learning environment and, complementarily, detailed monitoring of student performance, enabled by

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

personalization that allows teachers to identify students' difficulties more precisely, facilitating more effective interventions (Barbosa; Moura, 2013).

Silva (2023) expands this view by stating that EPT, inspired by the concept of omnilaterality, must consider the human being in their entirety. It is through the individual's action upon nature, aiming to transform it according to their needs and values, that the individual themselves is transformed. This perspective reinforces the need for an EPT that unites work and education as interdependent dimensions of human development; in other words, integral training beyond mere acquisition of technical and operational knowledge, which has undergone pressures and changes over time.

2.1 Brief History of Professional and Technological Education (PTE)

Education as preparation for social and economic life presupposes learning to participate productively in work (Dewey, 2007, p. 61). This conception is even more significant in EPT, whose nature is preparation for the world of work as a central educational principle—not merely an economic activity but a fundamental right of the citizen. However, this commitment has not always been central in its history — which, incidentally, is marked by different orientations and diverse interests (Cordão; Moraes, 2017).

EPT in Brazil has a history deeply marked by different phases, reflecting social needs and public policy guidelines. From the colonial period, when it emerged aiming to prepare the poorer strata to work in sugar production, to recent reforms highly based on technologies and markedly entrepreneurial competencies, it has played an essential role in the country's educational formation.

The systematization closest to current educational organizational models can be dated to 1809, with the creation of the Colégio das Fábricas (Factories College), a public initiative aimed at training apprentices (Cordão; Moraes, 2017). Years later, during Nilo Peçanha's government, the Escolas de Aprendizes de Artífices (Schools of Apprentices and Artisans) were established, an important advance by providing free basic vocational education. It is also important to note that, at that time, its character was assistentialist, aimed at promoting subsistence for certain social groups.

From 1927, with the mandatory inclusion of vocational education in educational institutions, and in 1930, with the creation of the Inspetoria do Ensino Profissional Técnico (Inspectorate of Technical Vocational Education), EPT shifted from an assistentialist perspective to a model focused

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

on national development, especially aligned with the country's industrial demands, so that the market became the main demander and, to some extent, the guide of PTE (Cordão; Moraes, 2017).

With the Capanema Reform (1942–1946), the Organic Laws of Brazilian Education were implemented, establishing the National Services of Commercial and Industrial Learning (Senac and Senai—autonomous institutions that provide vocational training funded by industry contributions), reorganizing industrial, commercial, and secondary education, and strengthening agricultural education (Fonseca, 1986). These changes addressed not only market needs but also valued the human and technical training of workers.

During the military dictatorship, Law No. 5,692/1971 (Brazil, 1971) began regulating what was then first and second levels of education, making the integration of the then-called vocational education into secondary education mandatory. According to Cordão and Moraes (2017, p. 46), this measure represented "[...] one of the most resounding mistakes of the military governments in the educational field," an obligation imposed in a decontextualized manner, without adequate physical, technological, pedagogical, or human infrastructure in schools. The measure prioritized a technicist vision aimed at the rapid training of cheap labor and deepened the educational duality between technical education and preparatory education—that is, preparatory for higher education entry—reinforcing social inequalities.

In the 1990s, Brazil experienced intense social and economic transformations marked by globalization, accumulation of financial capital, and alignment with the global political economy (Coelho, 2013). This context drove profound changes in education, especially with redemocratization and the enactment of the current Law of Guidelines and Bases of National Education (LDB), which, in its Article 3, emphasizes the relationship between education, work, and social practices, recognizing this connection as a fundamental part of educational action (Brazil, 1996).

Markedly in recent decades, neoliberalism has shaped vocational education with a focus on training flexible labor adjusted to the demands of an increasingly globalized market. Although this model expanded access to EPT, it limited its transformative potential, reinforcing social marginalization by reproducing inequalities, since neoliberal educational policies tend to prioritize immediate employability over critical training and the construction of a more just and egalitarian society (Saviani, 2012). Thus, PTE came to be seen as a solution to the shortage of qualified personnel, ignoring inequalities and precarious working conditions, perpetuating social exclusion.

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

Moreover, it became a political asset that, in some way, seeks a correction (merely moral in effect) of the glaring educational deficit produced, especially in the public sphere; it is, therefore, an action with partially reparative intentionality that, as such, sharpens class distinctions and subservience to economic models based on exploitation, expropriation, and reaffirmation of class conditions. It is within this scope that the incorporation of AI into PTE represents a new phase, intensifying the already historic alignment between professional training and market demands.

2.2 Artificial Intelligence (AI) and Professional and Technological Education (PTE)

AI is a field of computer science focused on developing intelligent systems that can perform tasks that typically require human intelligence. In PTE, AI has established itself as a significant tool for personalizing teaching, offering adaptive learning platforms that adjust content to each student's pace and style. This customization allows for the creation of individualized learning paths, promoting more effective and engaging education (Ferreira et al., 2024).

Despite the horizon of possibilities, significant challenges remain. The integration of AI in education requires substantial investment in technological infrastructure and teacher training. Furthermore, there is a risk that AI could reinforce a technicist approach to education, prioritizing the development of specific skills at the expense of a broader, more critical education. Therefore, the adoption of AI must be guided by a pedagogical vision that values comprehensive human development and social emancipation (Gomes, 2010).

Such innovations in pedagogical practices promise to make teaching more dynamic and interactive, fostering student autonomy and engagement. However, it is essential to consider that technology, by itself, does not guarantee effective learning. Its use must be integrated into a pedagogical proposal that promotes critical thinking and active knowledge construction. As Bauman (2011) warns, in liquid modernity, social relationships become fluid and fragmented, which can weaken the bonds between teachers and students, essential for a meaningful educational process.

Applied to the educational field, this perspective reveals an education that is increasingly individualized and focused on developing skills demanded by the market, often neglecting the human and social dimensions of education. In this context, AI can be a tool that reinforces this trend, offering personalized learning platforms that adapt to each student's pace but may also isolate them in their educational journey.

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

In this vein, Mill, Ferreira, and Ferreira (2018) propose the concept of "digital ubiquity," which refers to the constant and integrated presence of digital technologies in all aspects of life, including education. This ubiquity can promote more flexible and accessible learning but also brings challenges, such as the need to develop digital literacy and the ability to critically discern information.

Lévy (1999) proposes cyberspace as an environment conducive to the construction of collective intelligence, where individuals can collaborate and share knowledge. In this sense, AI can be a powerful tool to enhance this collaboration, enabling the creation of virtual learning communities where students and teachers can interact and learn together.

Faced with these tensions, it is necessary to reflect on the foundations of an education that is both technological and humanistic. It is not about rejecting technology but about using it critically and consciously, ensuring that it serves comprehensive human development and the construction of a more just and democratic society. For this reason, active methodologies emerge as important strategies to promote more participatory and meaningful learning, where the student is the protagonist of their own educational process.

The discussion on the effectiveness of AI in EPT covers issues of equity and access. Although AI can offer personalized learning opportunities, it is crucial to ensure that all students, regardless of their socioeconomic background, have access to these technologies. Otherwise, AI could widen the educational gap between rich and poor, reinforcing existing social inequalities.

Thus, it is imperative to adopt a critical approach when implementing AI in education, considering not only its technical and pedagogical benefits but also its social and ethical implications. This requires a broad and democratic debate involving educators, students, families, and society as a whole to define the directions of an education that is truly inclusive and emancipatory.

Furthermore, with TDIC, the teacher's role undergoes significant transformations. They are no longer the sole holders of knowledge but have become mediators and facilitators of the learning process. This new role demands new skills, such as the ability to curate relevant content, guide students in their research, and foster collaborative and autonomous work.

However, for this transformation to be effective, teachers must receive adequate training. This training should not be limited to the technical use of tools but should also address the pedagogical and ethical implications of using AI in education. Teachers need to be prepared to critically reflect on their practice and make informed decisions about how to best use technology to promote student learning.

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

Vicari et al. (2022) emphasize that, despite efforts to integrate TDIC into EPT, many teachers still feel unprepared to use these technologies effectively. This is due not only to a lack of technical training but also to the persistence of a traditional teaching model that values content transmission over active knowledge construction. Therefore, it is essential to invest in continuing education policies that help teachers develop the necessary skills to act in this new educational context.

3 METHODOLOGY

The research reported in this article can be characterized, in terms of its approach, as qualitative and quantitative. It is qualitative because it is based on the analysis of teachers' perceptions and experiences, seeking to understand the meanings they attribute to the use of AI in their pedagogical practice. It is quantitative because it uses statistical data to characterize the profile of the respondents and identify trends in the use of AI.

Regarding its objectives, the study is descriptive, as it aims to record and analyze the characteristics of a specific phenomenon—the use of AI in EPT—without intending to establish cause-and-effect relationships. The research is also a case study, as it focuses on a specific context: an autonomous social service in Rio Grande do Sul.

The sample was defined based on accessibility and convenience criteria, comprising 308 teachers from the institution who voluntarily agreed to participate in the research. The questionnaire, used as a data collection instrument, was administered online and consisted of 28 questions, including both closed-ended and open-ended questions.

The questionnaire is composed of closed-ended and open-ended questions. For the closed-ended questions, a quantitative analysis of the data was performed using descriptive statistics. For the open-ended questions, a qualitative analysis was conducted based on Bardin's (2011) content analysis. This technique involves a set of procedures for analyzing communications, aiming to obtain, through systematic and objective description of the message content, indicators that allow for the inference of knowledge regarding the conditions of production/reception of these messages.

Based on the categorized discursive responses, a content analysis was performed, which allowed for the identification of the main themes and categories emerging from the teachers' discourse. These categories were then analyzed in light of the theoretical framework, seeking to understand the meanings attributed by the teachers to the use of AI in their pedagogical practice.

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

This methodology aims to achieve the research objectives by providing a detailed and contextualized view of the use of AI in EPT, considering both the teachers' perceptions and the objective conditions in which this use occurs.

3.1 Research Environment

The research site is an autonomous social organization located in the state of Rio Grande do Sul, which is part of the Sistema S (S System). This institution offers a wide range of vocational and technological education courses in various knowledge areas.

For the research, four professional profiles were consulted: full-time teachers, part-time teachers, technical specialists, and pedagogical coordinators. This diversity of profiles allowed for a more comprehensive view of the use of AI in the institution.

The use of AI in the research institution has been consolidating as a pedagogical strategy to enhance student learning. The institution has invested in teacher training and the acquisition of technological resources to ensure that all students have access to these technologies.

4 RESULTS AND DISCUSSIONS

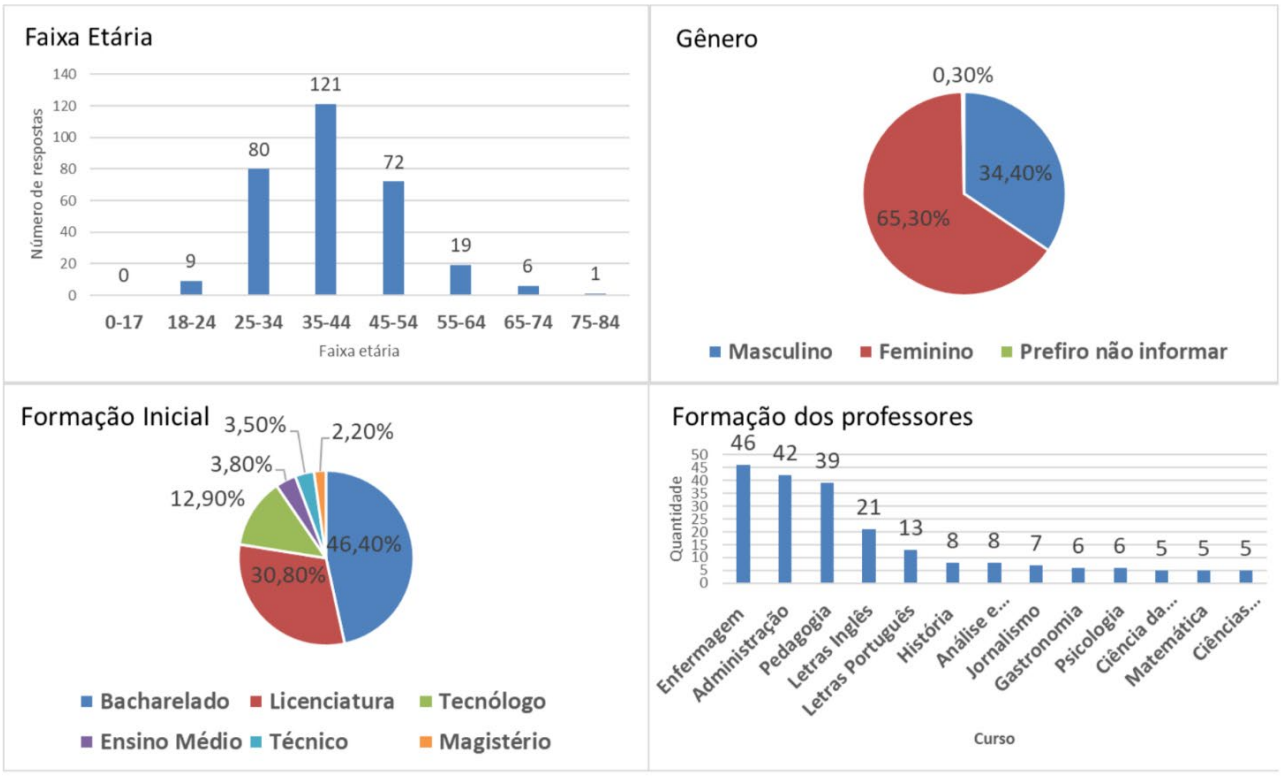
The majority of respondents are female (65.30%), with a predominant age range between 31 and 50 years (77.90%). Regarding academic background, there is a diversity of training areas, with a predominance of degrees in education, management, and technology.

The analysis of initial training reveals a predominance of licentiate degrees (45.50%), followed by bachelor's degrees (34.40%) and technology degrees (20.10%). This diversity of backgrounds reflects the multidisciplinary nature of EPT, which encompasses various knowledge areas. Details are shown in Figure1.

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

EmRede
Revista de Educação a Distância
UniRede

Figure 1 – Profiles of respondent teachers (undergraduate degree).

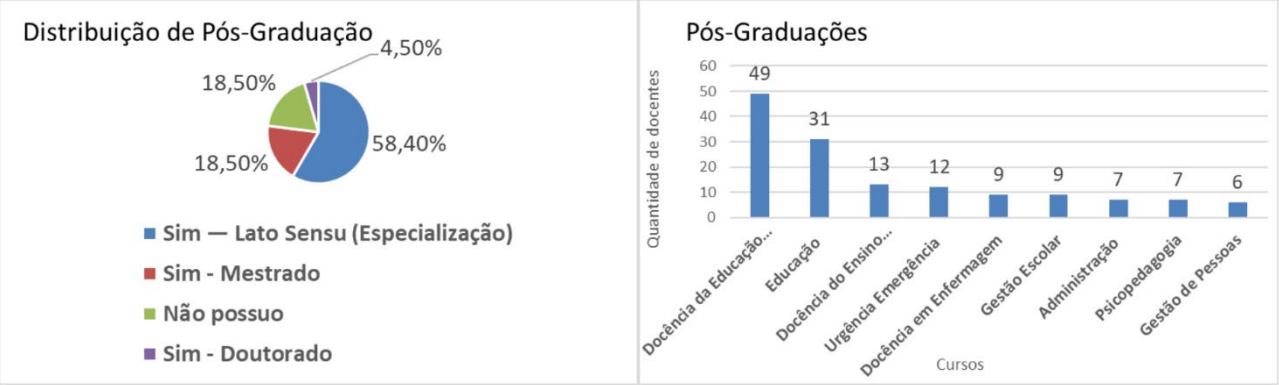


Nota: In the "Teacher Training" chart, respondents could indicate more than one undergraduate course, so the total sum exceeds 100%.
Fonte: Authors.

The analysis of the undergraduate courses in the investigated sample (Figure 1) reveals a diversified number of 83 programs and predominance of Nursing (46), Administration (42), and Pedagogy (39). The diversity of programs, including areas such as Computer Science, Psychology, Gastronomy, and Law, highlights the institution's flexibility in encompassing different fields of knowledge, an aspect relevant when considering the use of AI in VET, as it offers significant potential for personalization and adaptation of pedagogical resources to each student's style (Gomes, 2010). The variation in the faculty profile reflects the adaptability and innovation necessary for the effective implementation of AI in a multifaceted curriculum. In this sense, as in the case of initial programs, one can report significant diversity in postgraduate programs, as illustrated in Figure 2.

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

Figura 2 – Profiles of respondent teachers (postgraduate degree).



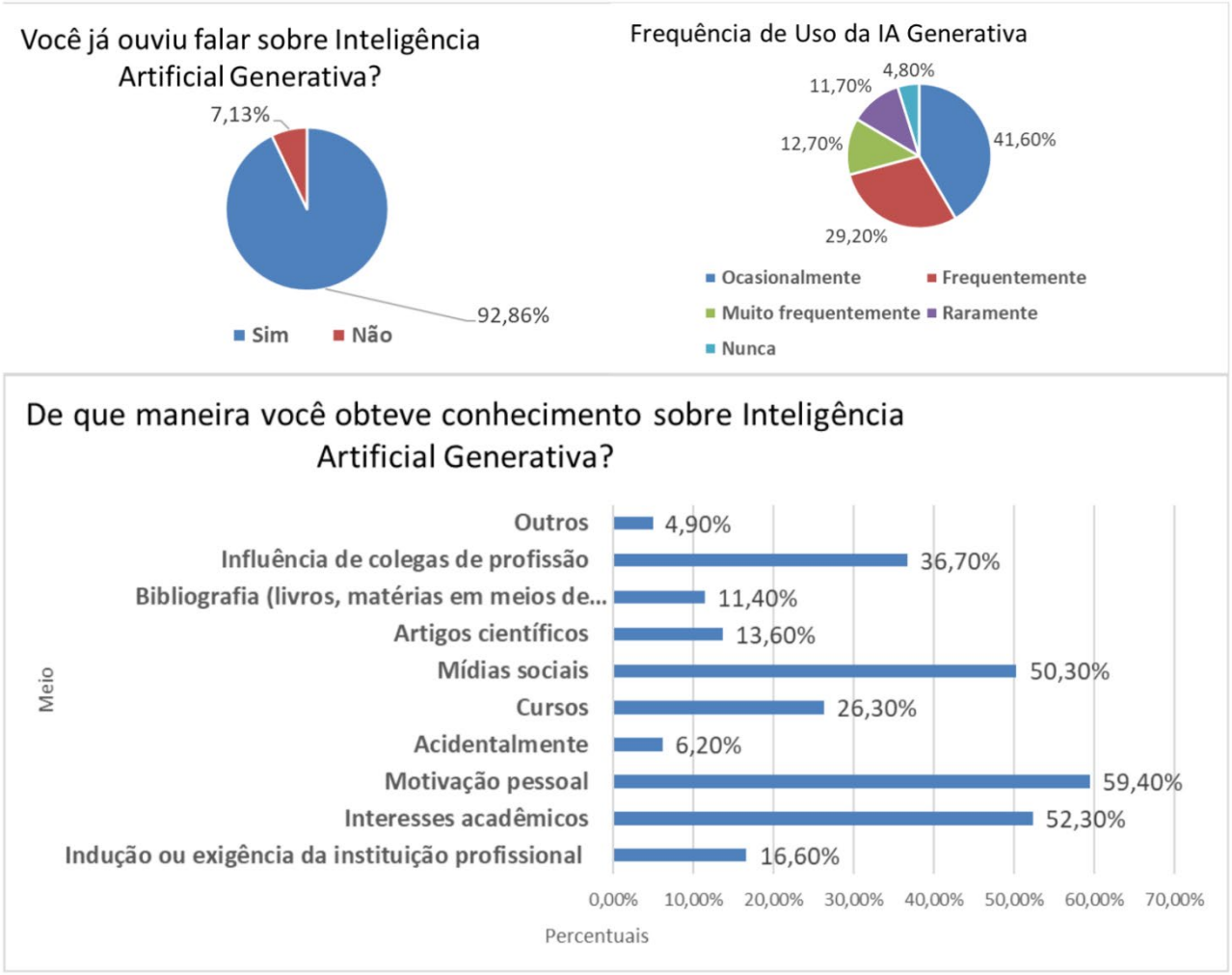
Note: The research revealed 140 distinct programs in postgraduate education.
Fonte: *Authors.*

A análise das áreas de pós-graduação dos professores (Figura 2) revela forte ênfase em especializações relacionadas ao ensino, com destaque para Docência da Educação Profissional e Tecnológica (49) e Educação (31). A diversidade também engloba amplos interesses e competências, o que sugere um campo fértil para a implementação de IA. Em relação à distribuição geográfica (envolvendo 50 municípios), revela-se que todas as regiões do estado estão contempladas na amostra, com maior concentração em Porto Alegre (39 ou 12,66%). Outras cidades com grande presença de professores incluem Gravataí e Rio Grande, com 19 (6,17%) cada, seguidas por Santa Cruz do Sul (18 ou 5,84%), Pelotas e Santiago (ambas com 17 ou 5,52%). Tais distribuições são relativamente proporcionais à distribuição populacional e de oferta de formação profissional e tecnológica no RS.

Quando questionados em relação ao conhecimento de IA Generativa e às respectivas fontes, a maioria relatou conhecer (93,00%), sobretudo a partir de mídias sociais e artigos científicos (Figura 3). Isso sugere, em parte, que a publicação de materiais pela instituição é uma boa estratégia para a disseminação de informações, mas, ao mesmo tempo, há forte tendência na complementação da busca por outros meios. Quanto à frequência de uso, 53,30% dos professores ainda a utiliza de maneira esporádica (ocasionalmente ou raramente), com 4,30% indicando nunca tê-lo feito, o que pode ser um reflexo da resistência natural à implementação de novas tecnologias, especialmente quando há precariedades na formação ou de infraestruturas para a sua utilização consistente.

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

Figura 3 – Percepções acerca do conhecimento em IA e fontes utilizadas.



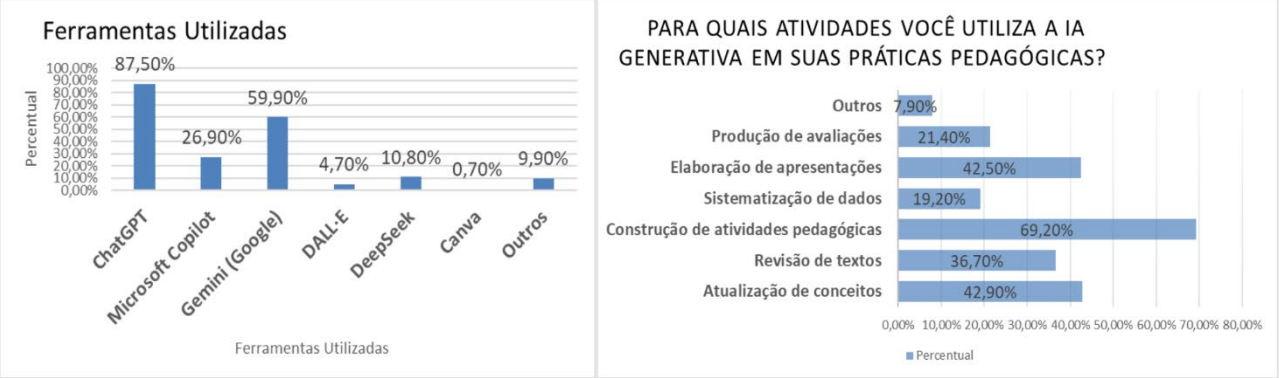
Note: In the graph "In what way […]", the respondents could list more than one option.
Sources: Authors.

The responses regarding the activities in which Generative AI is used in pedagogical practices reveal a diversified application of the technology, with teachers highlighting its use mainly in the construction of pedagogical activities (60.20%), support for the development of concept updates (40.90%), and preparation of presentations (42.50%). These activities indicate a pursuit of teaching personalization and time optimization. As for the tools, it was observed that the most recurrent options include ChatGPT (87.50%), Gemini (59.90%), and Microsoft Copilot (26.90%), which provide support for the generation of teaching materials and for monitoring student performance, as illustrated in Figure 4.

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

EmRede
Revista de Educação a Distância
UniRede

Figure 4 – Most frequently used AI tools and their applications.



Note: In the graphs, respondents could list more than one option.
Sources: Authors.

The analysis also revealed that 76.60% of teachers have access to adequate technological equipment, such as computers and specific software. Regarding the devices used, the results indicate that teachers prefer to use personal computers (52.74%), followed by smartphones (38.82%) and tablets (8.42%) on a smaller scale. This preference for more robust devices suggests that more intensive activities with AI require sophisticated processing or usability capabilities.

Regarding the average weekly time spent using AI, respondents' feedback indicated that 25.32% use the technology sporadically, with a frequency of 1 to 3 hours per week, suggesting still incipient adoption. Direct use with students was less common (50.64%), with many teachers exploring its potential in complementary or support activities (49.35%). These data indicate that, despite growing interest, teachers are still in an adaptation phase, which may require more training or technical support to integrate AI more consistently and effectively into their classes.

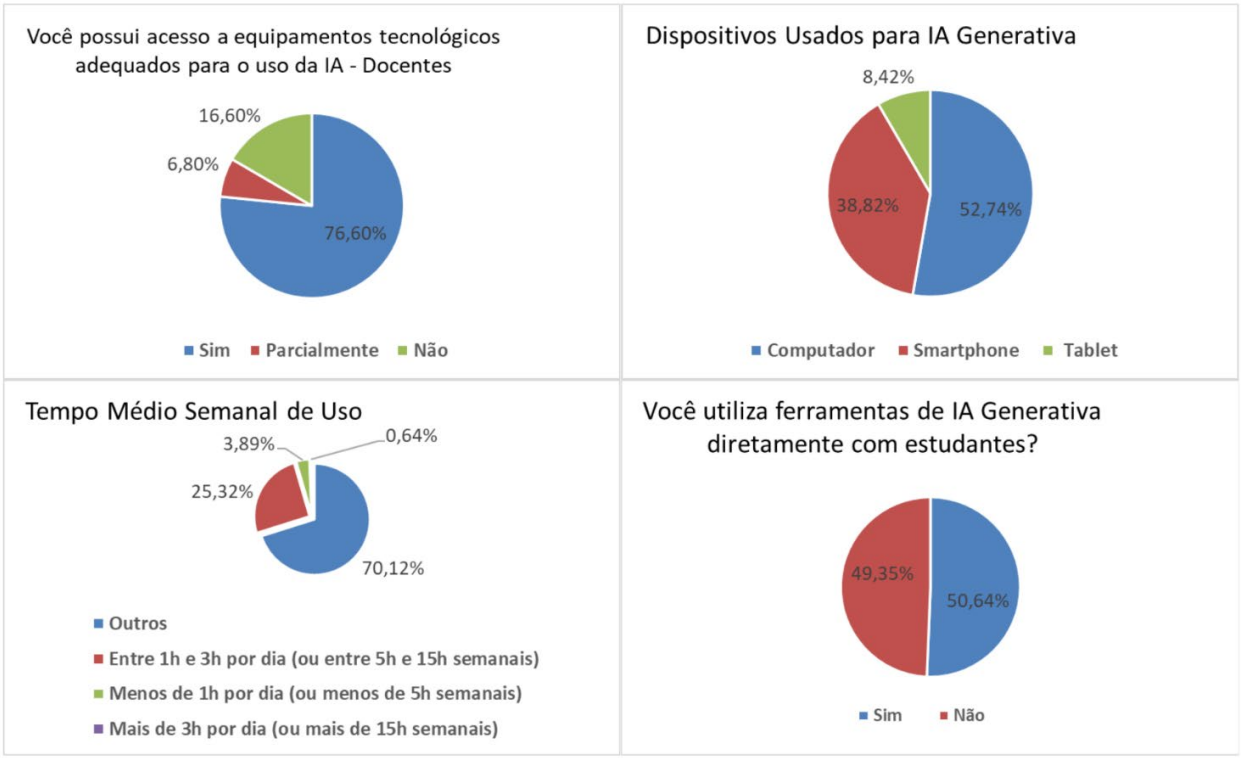
Sporadic use also highlights the need for greater investments in teacher training and in the development of pedagogical practices centered on innovative technologies. This aims to expand the use of AI, promoting benefits for students and optimizing teaching practices. Furthermore, adapting the school environment to teachers' preferences, especially regarding available resources, is fundamental for more efficient technology integration.

Additional comments in open-ended questions also reflected inadequate technological infrastructure in many institutions, as well as limitations of free versions of AI platforms. These factors, identified in quantitative analyses, were pointed out as relevant obstacles to the effective use of technology, suggesting that, in addition to training, improvements in infrastructure and access to

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

complete versions of platforms are essential to maximize AI's potential in classrooms. These data are systematized in Figure 5.

Figura 5 – Graphs on access, devices used, and AI use in the classroom.



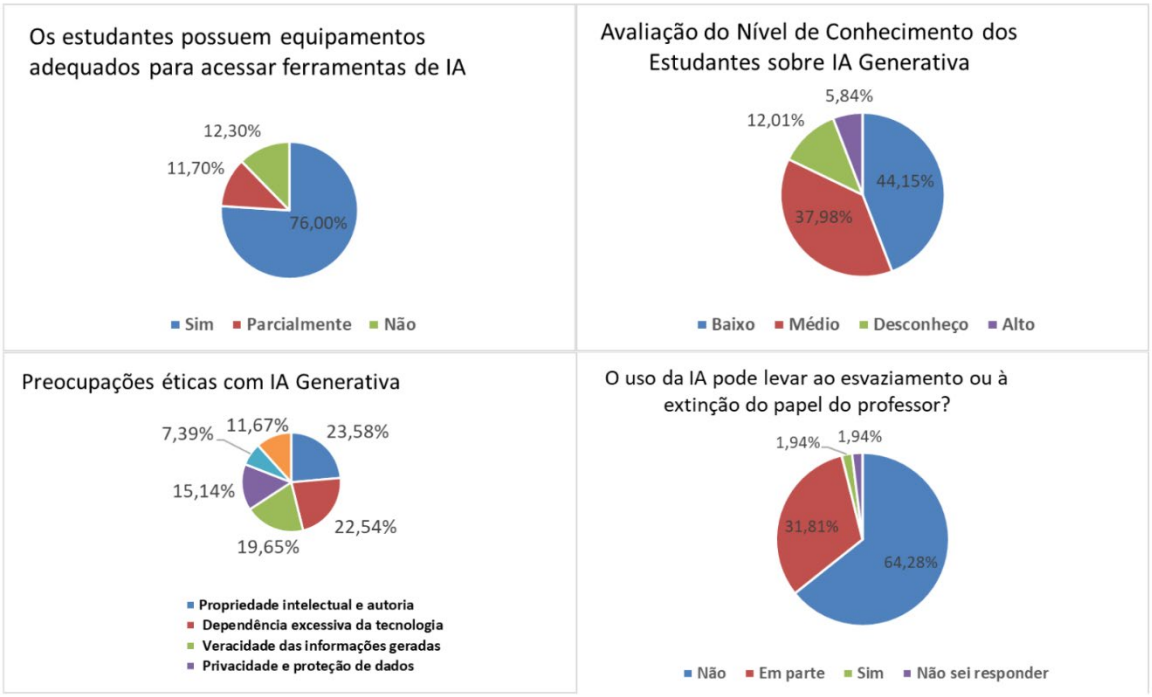
Sources: Authors.

The analysis of students' access to technological equipment for the use of Generative AI tools revealed that 76.00% of students have adequate access to equipment. However, 24.00% of teachers reported partial or inadequate access, which may indicate the presence of challenges in some regions or schools. Regarding the assessment of students' level of knowledge in Generative AI, the responses indicate that, despite growing use, 44.15% of students still present low knowledge of the tools. This data is consistent with the fact that their use in classes is still recent, lacking in-depth training on the technology, which may impact their ability to use it.

Ethical concerns with AI also configured a relevant aspect in the educational context. The growing adoption in various everyday activities can raise questions about privacy, algorithmic bias, and technology dependence. Furthermore, topics related to ethical issues, such as the veracity of information, the risk of plagiarism, and critical student formation, were extensively discussed,

reinforcing teachers' concerns about responsible and conscious use of these technologies. Among teachers, 31.81% expressed concerns regarding the impact on the educator's role, reflecting the fear that technology may replace human interactions (Figure 6).

Figure 6 – Ethical issues and AI use by students.



Sources: Authors.

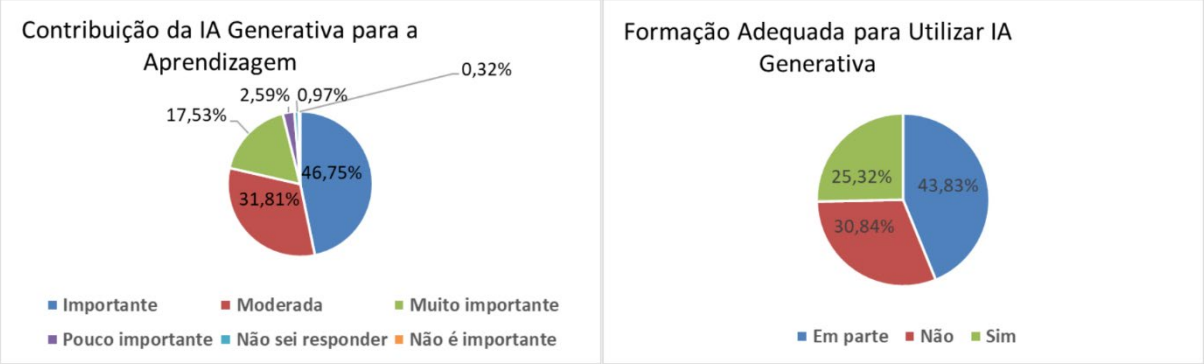
The contribution of Generative AI to student learning has proven to be a valuable tool in the pedagogical process. Approximately 46.75% of teachers recognize its potential to enrich learning, adapting content to students' specific needs. However, 30.84% of teachers still consider that they did not receive adequate training, and 43.83% affirm that the preparation they received was only partial. These data highlight the need for more consistent support and more comprehensive training, so that teachers can effectively explore the benefits of AI in their pedagogical practices.

Among the main difficulties reported in open-ended questions, the lack of adequate technical knowledge to operate AI tools and the complexity in developing effective prompts are frequently mentioned obstacles. Furthermore, the constant evolution of technology and the need for continuous updating were pointed out as additional challenges. These factors reveal that, despite recognition of the advantages of Generative AI, successful implementation depends on continuous teacher training,

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

so that they can overcome these difficulties and maximize the positive impact of this technology on student learning. Figure 7 illustrates the perception in this regard.

Figure 7 – AI contributions to learning and related teacher formation.



Sources: Authors.

The incorporation of AI into the pedagogical practices of the investigated teachers has proven to be a relevant advancement in VET. This technology allows teachers to develop systems that perform cognitive functions, such as creating personalized content and adapting teaching materials to the specific needs of students. However, there is a marked need for training and a more detailed analysis of the availability of adequate technological support in schools.

On the other hand, teachers recognized the potential of Generative AI in personalizing teaching, creating materials adapted to student needs, and stimulating teacher creativity. These aspects contribute to the overall recognition of its positive impact whenever its use is critical, ethical, and conscious. Thus, the qualitative perceptions confirm and enrich the quantitative analysis, revealing a broad understanding of the challenges and opportunities of using AI in vocational education.

The perceptions and comments offered by teachers, collected through the open-ended questions, reveal that, despite the enthusiasm and recognition of the potential of Generative AI to transform pedagogical practices, they also face considerable challenges that corroborate the quantitative data presented earlier. These challenges point to the need for greater investments in teacher training, adequate infrastructure, and continuous support to ensure that the use of AI is fully leveraged in pedagogical practices.

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

EmRede
Revista de Educação a Distância
UniRede

FINAL CONSIDERATIONS

The research results indicate that the integration of AI into VET has transformative potential, evidenced by teachers' willingness to adapt pedagogical practices to students' needs. However, implementation faces important challenges, such as ethical issues involving plagiarism, the reliability of generated information, and the risk of compromising critical reasoning. These concerns intensify in light of the neoliberal context that shapes educational training, prioritizing productivity and efficiency to the detriment of critical education. These are effects of liquid education, which, marked by fragile relationships and the pursuit of immediate results, weakens collective projects and reduces the transformative role of education.

AI, although promising for enabling teaching personalization and task automation, must be understood within its insertion into structural inequalities and the dynamics of contemporary capitalism. When guided by the logic of immediate employability, education tends to reinforce inequalities and diminish its emancipatory dimension. Therefore, teacher education must include not only technical mastery but also critical reflection on the use of technology and its social implications.

Lévy's (1999) conception of cyberspace as an environment for the construction of collective intelligences reinforces the potential of AI in education, as long as it is guided by an ethical and critical approach. Cyberculture, rather than instrumentalizing knowledge, should promote meaningful and collaborative interactions. In this sense, it becomes essential to invest in infrastructure and continuous teacher training, focusing on ethics and intellectual autonomy, so that AI can be incorporated consciously, creatively, and in favor of holistic education.

Future research, whether or not involving statistical validation of the instrument used here or the establishment of additional correlations, may deepen the analysis of teacher training on AI in VET, assessing its effectiveness in promoting reflective and critical pedagogical practices. It is also relevant to investigate how neoliberalism influences teaching practice and how teachers can build critical resistance while valuing more supportive learning communities.

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

REFERENCES

BARBOSA, E. F.; MOURA, D. G. Metodologias ativas de aprendizagem na educação profissional e tecnológica. **Boletim Técnico Senac**, Rio de Janeiro, v. 39, n. 2, p. 48-67, 2013. DOI: https://doi.org/10.26849/bts.v39i2.349

BARDIN, L. **Análise de conteúdo**. São Paulo: Edições 70, 2011

BAUMAN, Z. **Bauman sobre Bauman.** Rio de Janeiro: Zahar, 2011.

BAUMAN, Z. **Modernidade Líquida**. Rio de Janeiro: Zahar, 2001.

BRASIL. **Lei nº 5.692, de 11 de agosto de 1971.** Estabelece as Diretrizes e Bases para o ensino de 1º e 2º graus no Brasil. Diário Oficial da União, Brasília, DF, 11 ago. 1971.

BRASIL. **Lei nº 9.394, de 20 de dezembro de 1996.** Estabelece as diretrizes e bases da educação nacional. Diário Oficial da União, Brasília, DF, 20 dez. 1996.

BRASIL. Ministério da Educação. Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira. **Censo Escolar 2024: ensino médio – matrículas em educação profissional e tecnológica avançam.** Brasília, DF: MEC/Inep, 2025.

COELHO, D. B. Ensino médio integrado à educação profissional: possibilidades de articulação curricular. In: FRIGOTTO, G.; CIAVATTA, M.; RAMOS, M. (Orgs.). **Ensino Médio Integrado:** concepção e contradições. São Paulo: Cortez, 2013.

CORDÃO, F. A.; MORAES, F. **Educação profissional no Brasil:** síntese histórica e perspectivas. São Paulo: Senac São Paulo, 2017.

DEWEY, J. **Experiência e educação**. Petrópolis: Vozes, 2007.

FERREIRA, M. A Física na Escola: um legado da SBF, um patrimônio da educação básica. **A Física na Escola**, v. 21, p. 1-9, 2023.

FERREIRA, M. Os 45 anos da Revista Brasileira de Ensino de Física (RBEF): retrospectiva, análise e novos horizontes. **Revista Brasileira em Ensino de Física**, v. 46, p. e20240182, 2024. DOI: https://doi.org/10.59727/fne.v21i1.66

FERREIRA, M.; COSTA, M. R. M.; CERQUEIRA, E. N. G. M.; SILVA FILHO, O. L. Inteligência Artificial na Educação Superior: avanços e dilemas na produção de textos acadêmicos. **Revista EmRede - Revista de Educação à Distância**, v. 11, p. 1-24, 2024. DOI: http://doi.org/10.53628/emrede.v12

FERREIRA, M.; COSTA, M. R. M.; MILL, D. Reflexões necessárias e urgentes acerca da gestão da EAD no Brasil. **Plurais: Revista Multidisciplinar**, v. 6, n. 3, 28 nov. 2021. DOI: 10.29378/plurais.2447-9373.2021.v6.n3.13242

FERREIRA, M.; DINIZ, D. S.; MELLO, A. S. Conectando saberes: tecnologias digitais como dispositivo no Projeto Horta Mágica e na educação sustentável em uma escola integral**. Dialogia**, [S. l.], n. 54, p. e28002, 2025. DOI: https://doi.org/10.5585/54.2025.28002

FERREIRA, M.; LOGUERCIO, R. Q. A Análise de Conteúdo como Estratégia de Pesquisa Interpretativa em Educação em Ciências. **REVELLI – Revista de Educação, Língua e Literatura da UEG**, v. 6, p. 33-49, 2014.

FERREIRA, M.; LOGUERCIO, R. Q. Análise de Competências em Projetos Pedagógicos de Licenciatura em Física a Distância. **Revista Brasileira de Pesquisa em Educação em Ciências**, v. 16, n. 2, p. 389–419, 2016.

FERREIRA, M.; LOGUERCIO, R. Q. Enunciados em propostas de ensino-pesquisa-extensão em cursos de física a distância: para além dos conteúdos, os discursos. **Ensaio: Pesquisa em Educação em Ciências**, v. 19, p. 1-33, 2017. DOI: https://doi.org/10.1590/1983-21172017190101

FERREIRA, M.; LOGUERCIO, R. Q.; MILL, D. R. S. Diálogos entre competências e currículos: análise em cursos de Física a distância. **Revista Electrónica de Enseñanza de las Ciencias**, v. 16, p. 167-182, 2018.

FERREIRA, M.; SACERDOTE, H.; STUDART, N.; SILVA FILHO, O. L. Análise de temas, teorias e métodos em dissertações e produtos educacionais no MNPEF. **Revista Brasileira em Ensino de Física**, v. 43, e20210322, 2021. DOI: https://doi.org/10.1590/1806-9126-RBEF-2021-0322

FERREIRA, M.; SILVA FILHO, O. L.; PORTUGAL, K. O.; BOTTECHIA, J. A. A.; LIMA, M. B.; COSTA, M. R. M.; FERREIRA, D. M. G.; OLIVER, N. A. D. Formação continuada de professores de Ciências em caráter investigativo, interdisciplinar e com mediação por tecnologias digitais. **RBPG - Revista Brasileira da Pós-Graduação**, v. 18, p. 1-39, 2022b. DOI: 10.21713/rbpg.v18i39.1971

FERREIRA, M.; SILVA, A. L. S.; SILVA FILHO, O. L. Teoria da Aprendizagem Significativa (TAS) e Ensino de Ciências Pela Pesquisa (ECP): Interfaces a Partir de uma Revisão Narrativa de Literatura. **Revista Brasileira de Pesquisa em Educação em Ciências**, v. 22, p. e39001-e, 2022. DOI: https://doi.org/10.28976/1984-2686rbpec2022u11871214

FERREIRA, M.; SILVA, A. S.; SILVA FILHO, O. L.; POLITO, A. M. M.; CARVALHO, C. A. Relação entre teorias de aprendizagem e teorias de educação exemplificada pela tecnologia educacional da pesquisa investigativa. **Revista Educação**, v. 45, p. e38133, 2022a. DOI: https://doi.org/10.15448/1981-2582.2022.1.38133

FONSECA, H. S. **Educação e emancipação social:** contribuições de Gramsci e Freire. São Paulo: Cortez, 1986.

GHEDIN, E.; OLIVEIRA, E. S.; ALMEIDA, W. A. **Estágio com pesquisa.** São Paulo: Cortez, 2015.

GIL, A. C. **Como elaborar projetos de pesquisa**. São Paulo: Atlas, 2010.

GOMES, D. S. Inteligência Artificial: Conceitos e Aplicações. **Revista Olhar Científico**, v. 1, n. 2, p. 234-246, 2010.

LÉVY, P. **Cibercultura.** São Paulo: Editora 34, 1999.

LUDERMIR, T. B. Inteligência Artificial e Aprendizado de Máquina: estado atual e tendências. **Inteligência Artificial: Estudos Avançados**, v. 35, n. 101, p. 85-94, 2021. DOI: https://doi.org/10.1590/s0103-4014.2021.35101.007

MARIHAMA, D. K. À.; MASSA, R. M.; MORAN, J. A relação homem com a máquina: como a Inteligência Artificial pode ajudar nas práticas pedagógicas? **Caderno Pedagógico**, v. 21, n. 6, p. e5080, 2024. DOI: 10.54033/cadpedv21n6-199

MELLO, A. S.; LOPES, T. G. G.; FERREIRA, M. A oferta de contraturnos para o ensino fundamental implantada por um serviço social autônomo. **Revista de Gestão e Avaliação Educacional**, v. 13, n. 22, p. 1-20, 2024. DOI: https://doi.org/10.5902/2318133887284

MILL, D.; FERREIRA, M.; FERREIRA, D. M. G. Gestão da Educação a Distância na universidade pública como campo de disputa: da instituição social à academia líquida. **Revista Brasileira de Política e Administração da Educação**, v. 34, n. 1, p. 143-166, 2018. DOI: https://doi.org/10.21573/vol34n12018.82469

MORÁN, J. M. **Novas tecnologias e mediação pedagógica**. Campinas: Papirus, 2015.

MORÁN, J. M. **O ensino híbrido e os novos papéis dos professores:** desafios e oportunidades. Campinas: Papirus, 2013.

RUSSELL, S. J.; NORVIG, P. **Artificial intelligence:** A modern approach. New Jersey: Pearson Education, 2021.

SAVIANI, D. **Escola e Democracia.** São Paulo: Autores Associados, 2012.

SILVA FILHO, O. L.; FERREIRA, M. Teorias da aprendizagem e da educação como referenciais em práticas de ensino: Ausubel e Lipman. **Revista do Professor de Física**, v. 2, n. 2, p. 104-125, 2018. DOI: https://doi.org/10.26512/rpf.v2i2.12315

SILVA FILHO, O. L.; POLITO, A. M. M.; FERREIRA, M.; COELHO, A. L. M. B. Normatividade e descritividade em referenciais teóricos na área de ensino de Física. **Pesquisa e Debate em Educação**, v. 11, p. 1-33, 2021. DOI: https://doi.org/10.34019/2237-9444.2021.v11.32564

SILVA, C. N. N. A educação profissional e tecnológica e inteligência artificial: um apelo à formação integral ante a antropofagia do ChatGPT. **SciELO Preprints**, 2023. DOI: https://doi.org/10.1590/SciELOPreprints.7708

VICARI, R. M. Influências das Tecnologias da Inteligência Artificial no ensino. **Estudos Avançados**, v. 35, n. 101, p. 73-84, 2021. DOI: https://doi.org/10.1590/s0103-4014.2021.35101.006

VICARI, R. M. Inteligência Artificial e Educação. In: **ANPED – Associação Nacional de Pós-Graduação e Pesquisa em Educação**. 2022. Disponível em: https://pt.scribd.com/document/794833972/Vicari-Inteligencia-Artificial-e-Educacao-ANPED. Acesso em: 23/04/2025.

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

EmRede
Revista de Educação a Distância

UniRede

Appendix (Questionnaire)

Vocational and Technological Education and Artificial Intelligence: critical reflections on practices and potentialities

Dear teachers:

This questionnaire aims to understand the perceptions, challenges, and practices related to the use of Generative Artificial Intelligence in Vocational and Technological Education.

The information collected through this questionnaire will contribute directly to academic research and will be used exclusively for scientific purposes. The responses are confidential and will not be disclosed individually.

We thank you for your collaboration!

Section 1 - Personal Data

1- What is your gender? ( ) Female ( ) Male ( ) Prefer not to say

2- Age:

3- Educational level: ( ) High School ( ) Teacher Training ( ) Bachelor's Degree ( ) Licentiate Degree ( ) Technologist ( ) Technician

4- If technician, bachelor's, licentiate, or technologist, please state which course:

5- Field of knowledge: ( ) Applied Social Sciences ( ) Humanities ( ) Natural Sciences and Exact Sciences ( ) Engineering ( ) Other:

6- Do you have postgraduate education? ( ) I do not have postgraduate education ( ) Yes – Lato Sensu (Specialization) ( ) Yes – Master's Degree ( ) Yes – Doctorate

7- If your previous answer was affirmative, please state the area of your postgraduate education:

8- What is your area of work in education? ( ) Teacher ( ) School Management ( ) Course Coordination ( ) Pedagogue ( ) Other

9- In which municipality do you work?

Section 2 - Knowledge about Generative Artificial Intelligence

10- Have you heard about Generative Artificial Intelligence? ( ) Yes ( ) No

11- How did you obtain knowledge about Generative Artificial Intelligence? Mark the options that apply:

[ ] Requirement or induction from your professional institution [ ] Academic interests [ ] Personal motivation [ ] Accidentally [ ] Courses [ ] Social media [ ] Bibliography (books, chapters, articles, media articles, television programs, and similar) [ ] Influence from professional colleagues [ ] Other:

Section 3 - Use of Generative Artificial Intelligence in Pedagogical Practices

12- Do you use Generative AI tools in your pedagogical practices? ( ) Yes ( ) No

13- If you answered "Yes", which tools do you use? (Mark those that apply)

[ ] ChatGPT [ ] Microsoft Copilot [ ] Gemini (Google) [ ] DALL·E [ ] Others:

14- How frequently do you use Generative AI in your classes? ( ) Very frequently ( ) Frequently ( ) Occasionally ( ) Rarely ( ) Never

15- For which activities do you use Generative AI in your pedagogical practices? (Mark all options that apply)

[ ] Concept updates [ ] Text revision [ ] Construction of pedagogical activities [ ] Data systematization [ ] Preparation of presentations [ ] Production of assessments [ ] Other(s):

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082

16- Do you have access to adequate technological equipment for the use of Generative AI in your professional work? ( ) Yes ( ) No ( ) Partially

17- Which devices do you usually use to access or use Generative AI? (Mark all options that apply)

[ ] Computer [ ] Tablet [ ] Smartphone [ ] Other(s):

18- Estimate the average weekly time dedicated to using Generative AI in your pedagogical activities:

Do you use Generative AI tools directly with vocational and technical education students? ( ) Yes ( ) No

19- Do students have adequate equipment to access Generative AI tools? ( ) Yes ( ) No ( ) Partially

20- How do you assess the level of student knowledge about the use of Generative AI? ( ) High ( ) Medium ( ) Low ( ) I do not know

21- Do you have ethical concerns related to the use of Generative AI? (Mark all that apply)

22- [ ] Intellectual property and authorship [ ] Veracity of generated information [ ] Privacy and data protection [ ] Excessive technology dependence [ ] Replacement of the teacher's role [ ] Other(s):

_____

23- In your opinion, can the use of Generative AI lead to the emptying or extinction of the teacher's role? ( ) Yes ( ) No ( ) In part ( ) I don't know how to answer

Section 4 — Perceptions about the Effectiveness of Generative AI

24- In your opinion, the contribution of Generative AI to student learning can be considered: ( ) Very important ( ) Important ( ) Moderate ( ) Somewhat important ( ) Not important ( ) I don't know how to answer

25- Justify your answer:

Section 5 — Challenges and Possibilities

26- What challenges do you face when using Generative AI in your pedagogical practices?

27- What possibilities do you see in the implementation of Generative AI in vocational education?

Section 6 — Training and Capacity Building

28- Do you feel that you received adequate training to use Generative AI in your pedagogical practices? ( ) Yes ( ) No ( ) In part

29- What type of training do you consider necessary to improve the use of Generative AI in vocational education?

Section 7 — Suggestions and Final Comments

30- What suggestions would you give for the implementation of Generative AI in vocational education institutions?

31- Is there any additional comment you would like to record about the use of Generative AI in education?

32- Other comments and reflections

DOI: http://doi.org/10.53628/emrede.v12i.1137 ISSN 2359-6082