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Distance education (DE) in professional and technological education (EFA): gaps and contemporary proposals

ARTIGO

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Abstract
At the same time, Distance Education (DE) has Digital Information and Communication Technologies (DICT) as its technological basis for the development of education in all locations, including those less favored in terms of offering courses and programs with great flexibility at all levels and in all modalities. From this perspective, vocational education in distance learning in Brazil has been enhanced with the creation of the Open University of Brazil (UAB) system, enabling the Federal Institutes of Education to offer technical courses in this modality. This article aims to discuss the relevance of Professional and Technological Education in Distance Education (DE), pointing out the use of virtual learning environments (VLE) and active methodologies for sharing systematized knowledge. Regarding the methodological aspects, it used a qualitative approach, through bibliographical and documentary research. It can be inferred that distance education is a useful strategy for access to basic and higher education.
Keywords: AVA. Cyberculture. UAB

A educação a distância (EaD) na educação profissional e tecnológica (EPT): lacunas e proposições contemporâneas

Resumo
Contemporaneamente, a Educação a Distância (EaD) tem nas Tecnologias Digitais da Informação e Comunicação (TDIC) suas bases tecnológicas para o desenvolvimento da educação em todos os locais, inclusive, para aqueles menos favorecidos no tocante à oferta de cursos e programas com grande flexibilidade em todos os níveis e modalidades. Nessa perspectiva, a educação profissionalizante em EaD potencializou-se a partir dos anos 2000, possibilitando inclusive que os Institutos Federais de Educação pudessem ofertar cursos técnicos nessa modalidade. O artigo tem como objetivo discutir a pertinência da

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Educação Profissional e Tecnológica na Educação a Distância (EaD), apontando o uso de ambientes virtuais de aprendizagem (AVA) e metodologias ativas para o compartilhamento de conhecimentos sistematizados. No que diz respeito aos aspectos metodológicos, contou com abordagem qualitativa, mediante pesquisas bibliográficas e documentais. Em síntese, sustentamos que a EPT EaD se constitui como profícua estratégia de acesso ao ensino básico e superior.
Palavras-chave: AVA. Cibercultura. UAB.

1 Introduction

Undoubtedly, the integration of Digital Information and Communication Technologies (DICT) into teaching and learning processes has proven increasingly efficient, solidifying new habits within the global and Brazilian educational landscape. This has had significant implications for innovations in both how we learn and what we need to learn. In this context, the present research aims to discuss the relevance of Professional and Technological Education (PTE) in Distance Education (DE), through the use of Virtual Learning Environments (VLE) for the sharing of systematized knowledge.

The relevance of investigating this object lies in its multidimensional nature, considering each level, format, or modality of education. It is recognized that the use of technology in teaching and learning processes has unique characteristics. For instance, the reality of a higher education institution presents singular attributes depending on whether it is private, municipal, state, or federal, and these specificities must be taken into account to address the institutional context. Therefore, we focus our analysis on Professional and Technological Education (PTE) in the modality of Distance Education (DE), guided by the central question: what are the unique attributes of Professional and Technological Education in DE?

Due to technological expansion and the high consumption of technology, New Digital Information and Communication Technologies (NDICTs) have positively and intensely impacted teaching and learning processes, making them more productive and efficient across all educational levels and modalities (Azevedo, 2017). On the other

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hand, when technological resources are applied inadequately in school environments, they can negatively affect the quality of learning. Consequently, we identify the urgent need for well-defined technological resources capable of promoting interaction and supporting the sharing of meaningful learning (Araújo; Junior Filho, 2022).

The justification for this investigation lies in the constant advances of information and communication technologies, which demand curricula capable of integrating the use of microcomputers and the internet, grounded in technological development. This process transfers to schools a new model of knowledge sharing, modifying traditional teaching methods and reshaping the very concept of the classroom.

The incorporation of NDICTs into teaching and learning processes has become a requirement at all educational levels and modalities. Living in an increasingly connected networked society, as proposed by sociologist Castells (1996), and within a new culture deeply integrated into the technological environment—termed “Cyberculture” by Lévy (1999)—demands new and flexible ways of teaching and learning, as well as new means of constructing and apprehending knowledge. In this context, both labor and education are rapidly transforming, requiring new forms of production and learning.

In light of the above, we understand that the use of NDICTs in school settings—specifically in Professional and Technological Education—is a strategic tool to ensure quality education, in line with the proposals contained in each course's Political-Pedagogical Project.

Thus, we hypothesize that the transformations in the world of work, driven by digital technologies, are also demanding changes in Professional and Technological Education. This educational modality must urgently incorporate virtual learning environments as strategies for developing the new competencies required by a digitally mediated job market, regardless of whether the course is offered in person or via DE. All these forms of learning bring new knowledge and innovations, and there is no doubt

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that new information and communication technologies have brought significant and positive changes to education (Kenski, 2007).

2 Methodology

Regarding the methodological approach, this study adopts a qualitative research perspective, characterized by a set of interpretative techniques aimed at describing a complex system that cannot be translated merely into numbers. This type of research seeks to explore intrinsic aspects of social phenomena. According to Gil (2022), qualitative research is inherently tied to the object of study, as it is built upon the dynamics and exploration of the problem, describing and decoding meanings without concern for the quantification of phenomena, since its main goal is to understand the event in its given context.

As for its objectives, our investigative intent led us to conduct a bibliographic and explanatory type of research, aiming to identify factors within digital culture that determine, influence, or contribute to the success or failure of students in Professional and Technological Education. This includes understanding dropout as one of the indicators for analyzing student engagement in training programs. According to Gil (2022), this format represents one of the most complex and delicate forms of investigation, as it requires deep understanding and knowledge of reality, seeking to explain the reasons and causes behind phenomena.

Regarding technical procedures, bibliographic research was used, as this author states that its main advantage lies in the researcher's ability to cover a wide range of phenomena with greater scope than what could be achieved through direct questioning of subjects. From this perspective, bibliographic research is grounded in a methodological process of multiple dialectical possibilities, identifying resources that can be constantly reviewed, adjusted, and confronted by divergent ideas. It emphasizes critical dialogue, aiming for epistemological validity that can question different viewpoints. Broadly speaking, it is characterized as a basic research

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methodology, being a *conditio sine qua non* for any academic inquiry, structured on the tripod: reading/analysis/interpretation—whether the material is printed or digital.

Specifically, we consulted databases available through the Integrated Search Portal (SIBI-USP); the Digital Library of Theses – USP; the Brazilian Digital Library of Theses and Dissertations (BDTD); Google Scholar; Scielo; and various institutional repositories from Brazilian public universities. We examined scientific articles, books, theses, and dissertations using the following descriptors: Distance Education (DE) in Professional and Technological Education (PTE); challenges in PTE-DE; and the relationship between DE and PTE.

Finally, we synthesized the studies most closely aligned with our guiding question, giving preference to those published in the last five years. However, we did not strictly limit the time frame due to the scarcity of studies addressing these two educational modalities simultaneously.

Additionally, we employed documentary research, which, according to the same author, is a "rich and stable source of data" that neither incurs high costs nor requires direct contact with research subjects. It allows for an in-depth reading of primary sources. This method is very similar to bibliographic research but differs in that it uses materials that have not yet undergone analytical treatment and can be reinterpreted according to the research objectives. In fact, it is a method that is underutilized both in education and in other areas of the social sciences (Lüdke; André, 1986).

3 Results and Discussion

We highlight that the history of Professional and Technological Education (PTE) in Brazil has been shaped by theoretical and political tensions, reinforcing educational dualism. This dualism assigns an asymmetrical structure to education: a comprehensive curriculum aimed at citizenship for the wealthier classes, and

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technical-vocational training for the working class, serving the needs of the labor market (Albuquerque Junior; Borges; Araujo, 2024).

The conceptual systematization of technology and its implications for professional and technological education constitutes a complex endeavor. It requires the selection of a philosophical framework under which these categories can be grounded, based on the paradigm referenced—as proposed by Lima Filho and Queluz (2005). Accordingly, we adopt two foundational relationships identified by these authors for conceptualizing technology in PTE: the relationship between labor and education, and the relationship between labor, science, and technology. In this sense, Distance Education has become a crucial tool for promoting opportunities, offering a range of options for individuals to receive training, complete basic or higher education, among other pathways that can foster personal and professional advancement (Albuquerque Junior; Silva, 2017).

Regarding the relationship between labor and education, as discussed by Lima Filho and Queluz (2005), labor is understood as a central category of human formation, encompassing both ontological and historical dimensions. These dimensions involve contradictory processes of construction and alienation of social subjects. Therefore, labor can be seen as a source of knowledge production and appropriation.

As for the relationship between labor, science, and technology—based on the same authors' framework—scientific and technological development is connected to the advancement of the science of productive labor. Thus, technology should be understood not merely as applied science but as a socially constructed, culturally complex foundation that guides human life production, with significant implications for both labor and education.

Technology, as approached in this context, refers to the totality of everything that human beings are socially capable of creating—across all fields, historical periods, forms of use, and applications (Kenski, 2012). That is, technology is not limited to machines or techniques but encompasses a broad range of tangible and intangible elements that facilitate everyday life.

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In this sense, given the vast array of technologies present in our daily lives, education is expected to draw on this diversity to address contemporary challenges in human development. This includes the use of spreadsheets, word processors, simulators, artificial intelligence, and various educational software tools—alongside internet-connected computers and many other digital resources commonly used in teaching practices.

According to Paes (2024), within the Brazilian context, the establishment of the Open University of Brazil (UAB) and the widespread access to the internet represent a watershed moment for this educational modality, significantly increasing its visibility and recognition through the offering of higher education courses. Additionally, 2007 marked the launch of the Open School System of Brazil for technical courses, which was later transformed into the e-Tec Brazil Network in 2011. These initiatives laid the foundation for integrating New Digital Information and Communication Technologies into the Brazilian Educational System.

In this way, all of this technology permeates education and is necessarily present in Distance Education (DE), in accordance with Decree No. 9.057/2017, which defines DE as an educational modality characterized by the didactic-pedagogical mediation of teaching and learning processes through the use of information and communication technologies. It involves qualified personnel, access policies, monitoring, and assessments aligned with the Political-Pedagogical Project, among other elements. It also includes educational activities developed by students and educators located in different places and times (Brazil, 2017).

Undoubtedly, Distance Education today is predominantly carried out through internet-based mediation. In this regard, Maia and Mattar (2007) state that DE is currently in its third generation, marked by the availability of fully online courses using computers, hypertexts, hypermedia, and the internet. Nevertheless, it is a prerequisite that students possess the necessary skills and competencies to navigate Virtual Learning Environments (VLEs), where such courses are developed.

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In this context, Professional and Technological Education at a distance (PTE-DE), as a privileged space and time for integrating work, education, science, and technology, must be well-structured to avoid several challenges. These include lack of investment and insufficient alignment with labor market demands, which can result in inadequate infrastructure and severely compromise the quality of educational outcomes. From this perspective, Thiesen (2011) points out that contemporary concepts of curricular time and space are undergoing changes, recognizing and encouraging contexts that promote the democratization of information via the internet, rooted in economic globalization.

Despite the recent expansion of Professional and Technological Education offerings within federal and state education systems, public investment in this area remains insufficient—especially when compared to nations with higher or comparable levels of development to Brazil. According to the 2024 Educational Census by INEP, only about 13% of Brazilian high school students are enrolled in vocational training programs, whereas in developed countries, this figure averages around 40% (Brazil, 2025).

From this standpoint, financial shortcomings may compromise both course quality and student training. Furthermore, digital exclusion generates digital asymmetries between those who have access to technology and those who do not, seriously undermining the quality of workforce development in Brazil.

Undoubtedly, the inequalities in access to technology in Brazilian schools represent a complex and multifaceted issue that impacts the quality of education and students' learning opportunities. These disparities are evident in the lack of internet access and digital equipment, the uneven quality of technological infrastructure, and the diverse levels of teacher training for the use of technology (Gaviraghi; Yamin, 2023).

In alignment with this scenario, the first general competence of Basic Education, as defined by the Base Nacional Comum Curricular (BNCC – National Common Curricular Base), emphasizes the importance of valuing and utilizing

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knowledge historically constructed within the physical, social, cultural, and digital realms. This competence aims at fostering students' understanding and interpretation of reality, enabling them to continue learning and to contribute to building a plural, just, democratic, sustainable, and inclusive society (Brasil, 2018).

In fact, the competence in question highlights the necessity of critically, meaningfully, reflectively, and ethically understanding and utilizing ICTs (Information and Communication Technologies) in various social practices—including educational contexts. It involves communicating, accessing, and disseminating information; producing knowledge; solving problems; and exercising agency and authorship in both personal and collective spheres. From this perspective, Lorenzet, Andreolla, and Paludo (2020, p.1) assert that:

> Recently, there has been an unprecedented expansion in the history of federal Professional and Technological Education in Brazilian society; Professional and Technological Education is directly integrated with and influenced by the pattern of accumulation, which has evolved throughout history; students believe in Professional and Technological Education as a means to advance the conditions of their lives; Professional and Technological Education must be democratized, with an egalitarian and unrestricted character, and it must be provided under dignified conditions in order to promote human emancipation (Lorenzet, Andreolla, and Paludo, 2020, p.1).

In turn, Law No. 9.394, dated December 20, 1996, in its Article 4, item XII, establishes it as a duty of the State, with regard to public education, to ensure digital education. This includes providing all public educational institutions at the basic and higher levels with high-speed internet connectivity that is suitable for pedagogical use; developing competencies aimed at digital literacy for youth and adults; creating digital content; fostering communication and collaboration; ensuring cybersecurity; and supporting problem-solving skills (Brasil, 1996). In this regard, ensuring the right to digital education requires the urgent incorporation of digital tools and resources into educational practices. These tools should enhance and expand the roles of teaching and learning, creating collective spaces of mutual development for the formation of a

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digital culture—not merely as users of technology, but as critical agents in its application.

Strictly speaking, schools and educators have the autonomy to identify the most appropriate ways to integrate various technologies and multiple methodological approaches of digital education into their pedagogical projects and practices. This is due to the fact that each specific teaching and learning context requires the mediation of the teacher, who, as a subject of the practice, must make decisions based on theoretical-methodological, technical-operational, and ethical-political criteria. Furthermore, it is essential that educators expand and learn to master various forms of interpersonal and group communication, including audiovisual and telematic communication (Moran; Masetto; Behrens, 2000).

In this regard, we emphasize the emerging transformation of teaching practices within the context of digital education, which increasingly demands from teachers the ability to deal with the vicissitudes of science and technology—particularly in the fields of computing and telecommunications, also known as knowledge technologies. Accordingly, digital education should be consolidated as a curricular component in both primary and secondary education, with a focus on digital literacy, particularly in areas such as computing, programming, robotics, and other digital competencies.

Faced with the challenges of ensuring access to the right to digital education, we emphasize that teachers require appropriate training and support so that they may achieve the paradigmatic shift that digital education demands. This shift involves the capacity to propose the construction and sharing of knowledge, rather than the mere transmission of information. In this sense, changes in didactic and methodological stances may lead to the assignment and reconfiguration of new tasks and responsibilities, positioning the teacher as a subject of transformation within the social system.

It is important to highlight that technical vocational education in Brazil has historically been grounded in structural dualities aimed at maintaining a purely

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technical formation, lacking integration with scientific education and the overall development of students (Frigotto, 2010; Kuenzer, 2000). However, in 2010, a document titled *Conceptions and Guidelines for a New Institutional Framework* was ratified, referring to the Federal Network of Professional and Technological Education of the Federal Institutes. This document outlined new perspectives and functions for this educational modality, promoting the idea that education should be aligned with a commitment to the integral development of working citizens across all levels and modalities.

On this basis, Ciavatta (2005) proposes that formal educational institutions undertake an integrated formation, suggesting a formative commitment aligned with a conception of integration that aims to make the human being—fragmented by the social division of labor between manual execution and the acts of thinking, directing, or planning—whole and complete. In summary, although such an expanded notion of integration might be considered a utopian idealization of holistic education, it calls for a broader commitment to formation. In practice, this implies eliminating the reduction of education to mere preparation for operational and simplified labor, disconnected from other bodies of knowledge rooted in its scientific-technological origins and historical-social appropriation.

Among various methodological strategies for integrated pedagogical practices in Professional and Technological Education, we highlight the Problem-Based Learning (PBL) methodology due to its integrative potential. PBL has proven effective particularly because it allows students to engage with real-life situations experienced by professionals—an important aspect in the context of Professional and Technological Education.

We agree that PTE fosters competencies beyond the transmission of knowledge for technical practice or knowledge formalized by science. It should also involve students in the culture of the learning communities to which they belong and promote the understanding of the scientific foundations underlying their professional

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fields (Santos, 2024). Therefore, this complex responsibility requires multiple pedagogical and technological approaches in the teaching-learning process.

We note that, in the Brazilian context, PBL has been underutilized in distance education settings for professional and technological training (Cordova; Baade; Santos, 2022). At the outset, we are not suggesting that PBL is not being widely implemented in DE and hybrid education for PTE, as further studies using other investigative methods would be required to reach more accurate conclusions. However, it is fair to state that more scientific dissemination is needed regarding the projects being carried out—if indeed they are—since this remains an unresolved issue.

It is worth noting that the evolution of digital technologies has mitigated the sharp divide between in-person and distance learning modalities. In both formats, the presence of technology is imperative as part of the educational process. In light of this, Law No. 14.533, dated January 11, 2023, which establishes the Política Nacional de Educação Digital – PNED (National Digital Education Policy), proposes the enhancement of standards and the improvement of public policy outcomes concerning the Brazilian population's access to digital tools, resources, and practices, with a focus on the most vulnerable populations. Within this framework, it recommends structured and consolidated articulation among programs, projects, and actions developed by different levels of government, sectors, and areas of public administration.

When analyzing Law No. 13.005, dated June 25, 2014, which approves the Plano Nacional de Educação – PNE (National Education Plan) for the period 2014–2024, we observe the absence of clear goals concerning distance education. This omission clearly disregards the potential of this educational format to promote Digital Education—a relevance that became especially apparent during and after the COVID-19 pandemic. As such, we note only four modest and scattered references to Distance Education throughout the law, effectively rendering invisible possible avenues for fostering a heterogeneous, ethical, sustainable, democratic, and inclusive education across all social segments.

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Through DE, Professional and Technological Education programs are being reorganized to flow across multiple platforms—most notably, Moodle—given that this LMS (Learning Management System) is user-friendly for students and easily managed by instructors, offering a wide variety of resources that can be explored to promote transformations in the educational environment and, consequently, impact society as a whole (Vasconcelos; Ferrete; Lima, 2020).

The global digital transformation, driven by emerging technologies such as Artificial Intelligence (AI), has placed DE in a prominent position in the democratization of access to knowledge (Battestin, 2024). In this context, PTE via DE faces significant challenges in building an educational system capable of responding to the demands of the contemporary labor market. Nonetheless, obstacles remain to be overcome, such as the legal requirement that 50% of the workload in DE teacher education programs occur in person—an impediment to the expansion of DE.

3.1 Teaching challenges

It is firmly asserted that in their professional practice, teachers must rely on active methodologies, as these are teaching strategies designed to foster learner participation in the learning process, aiming to develop student autonomy and agency (Konageski; Batista, 2024). In this sense, it is a cognitive prerogative that the educator mediates knowledge through diverse forms of language—verbal, oral, visual-motor, sign language (Libras), written, bodily, visual, auditory, and especially digital—enabling expressiveness and the sharing of information and experiences in different contexts, thereby generating meaning and mutual understanding.

Tardif (2002) classifies teachers' knowledge into four categories: professional knowledge (rooted in the sciences of education and pedagogical ideology), understood as the set of knowledge transmitted by institutions responsible for teacher education; disciplinary knowledge, derived from various fields of knowledge organized into disciplines—social knowledge selected by higher education institutions and

incorporated into teaching practice; curricular knowledge, referring to the set of discourses/goals/content/methods recognized as models of literate culture; and experiential knowledge, which emerges from and is validated by professional experience, drawing on individual and collective learning related to know-how and being.

It is evident that education professionals must appropriate digital tools, incorporating them into their pedagogical practice while also revisiting their attitudinal, didactic-curricular, pedagogical, specific, and contextual knowledge (Saviani, 1996). In this regard, when students understand themselves as subjects with socially constructed histories and knowledge—formed through interactions with others—the school's potential as a formative space is reinforced, guiding students toward conscious, critical, and participatory citizenship. In this light, we support Therrien's (1995) argument that experiential knowledge—originating from the everyday practice of the profession—can reflect both the dimension of instrumental reason, involving practical know-how and techniques, and the dimension of interactive reason, allowing for interpretation, judgment, decision-making, and the adaptation of pedagogical praxis to complex situations.

Regarding teacher education, Tardif and Lessard (2014) argue that the more a body of knowledge is developed, formalized, and systematized—as is the case with scientific and contemporary knowledge—the more it reveals the need for continuous improvement. This is due to the long and complex nature of learning processes, which require proper formalization and systematization.

Indeed, DE in PTE will require a specific modus operandi and, consequently, specific training. Teachers will need to develop their classes based on active methodologies, which aim to foster proactivity and reasoning connected to real-world contexts. There is a wide array of such methodologies, including: problem-based learning; project-based learning; flipped classroom; hybrid teaching; gamification; maker learning; design thinking; team-based learning; the constructivist spiral; learning

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stations; peer learning; case studies; and simulations that enable active learning, among many others (Marques *et al*., 2021).

In applying Problem-Based Learning (PBL), Cordova, Baade, and Santos (2022) argue that this methodology contributes to constructing meaningful, contextualized, and comprehensive learning across different fields of knowledge. In this regard, Pereira Júnior, Bispo, and Pontes (2022) highlight that PBL enables learning rooted in real problem-solving, promoting the development of critical thinking and problem-solving skills—essential competencies for addressing the emerging challenges of 21st-century citizenship.

Similarly, Oliveira (2024) observed that integrating maker culture into the curriculum provided students with a rich and engaging learning experience, positively impacting the development of skills and competencies essential to Professional and Technological Education. The study emphasized the importance of adopting innovative approaches to enhance teaching, research, and outreach activities, preparing students for the technological challenges of the 21st century.

In fact, many educators are currently engaged in continuing education initiatives, aiming at pedagogical improvement, alignment of teaching practices with institutional goals, and the effective use of educational technologies (Almeida; Cavalcante; Lemos, 2020).

In summary, the relevance of considering the study of teaching practice as a dynamic and complex process, laden with values, becomes evident. It is essential to recognize the plurality and heterogeneity of teachers' knowledge, especially the merit of experiential knowledge, which emerges as an intrinsic core of professional practice. This type of knowledge represents an effort to transform external relationships with knowledge into internal relationships with one's own practice. In this context, experiential knowledge is continuously reinterpreted and subjected to the certainties constructed in lived experience and daily teaching practice.

In light of the above, we highlight Gauthier's (1998) classification of teaching knowledge into: disciplinary knowledge, referring to the understanding of the subject

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to be taught; curricular knowledge, which concerns the transformation of disciplines into teachable programs; educational sciences, linked to specific professional knowledge not necessarily attached to pedagogical action; pedagogical tradition, related to the knowledge of how to teach, which is adapted through experiential knowledge and validated by pedagogical action; experiential knowledge, stemming from private judgments that consolidate a personal jurisprudence; and pedagogical action, which articulates with experiential knowledge when made public and tested in practice. In short, educators capable of integrating technology into their teaching must continuously adjust their training, due to the frequent innovations in this field.

Educators must be aware of both limitations and possibilities in order to plan professional development that addresses technological gaps. It is unacceptable that, in the 21st century, a teacher does not know how to use educational games, online quizzes, digital platforms, and other technological tools. Gauthier (1998) emphasizes that, unlike other professions, teaching has taken longer to reflect upon itself, and today, educators are required to deepen their understanding of both their potential and their gaps in order to effectively engage in ongoing academic and professional development.

According to the author, teachers who are well-grounded in theoretical-methodological, technical-operational, and ethical-political foundations are better equipped to face two main obstacles: a profession without knowledge and knowledge without a profession—challenges historically embedded in the field of pedagogy. The first, a profession without knowledge, refers to an overemphasis on scientific knowledge, neglecting the role of experience and culture in the comprehensive training of teachers. Working with human beings requires consideration of a wide range of factors, including ethical, democratic, legal, and inclusive principles, all of which are increasingly demanded by contemporary society and the rapid pace of change—requiring us to constantly rethink the theoretical foundations of teacher education (Oliveira; Araujo, 2021).

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The second challenge, knowledge without a profession, is rooted in the educational sciences and refers to knowledge produced and disseminated in academic centers. However, much of this knowledge has been developed without regard to the concrete conditions of teaching practice across various levels, modalities, formats, and contexts. Therefore, the author proposes a profession constructed through knowledge—viewing teaching as the mobilization of multiple principles and a substantial repertoire that can be used to respond to the real demands of the teaching-learning process.

In this context, we reaffirm the urgency of incorporating digital education across all levels and modalities of teaching through digital literary, artistic, and scientific literacies, framed by a human rights perspective. This involves fostering critical educational approaches that position digital education as a powerful tool for creating interdisciplinary projects rooted in creativity, critical thinking, and autonomy. Consequently, the “digital turn” has (re)directed numerous aspects of professional practice, (re)configuring how digital tools are accessed, stored, processed, disseminated, and managed, in response to the increasing incorporation of digital technologies into contemporary society (Pereira; Dantas, 2025).

Based on this discussion, we highlight the advances of DE in Professional and Technological Education, particularly the institutionalization and expansion of distance learning programs within the Federal Technical Education Network; the implementation of DE-based subjects in in-person programs; the growing transformation of institutional campuses into DE learning centers; and the increasing diversity in methodological approaches (Neto *et al*., 2021). Nevertheless, the authors acknowledge areas that require improvement, including the need for stronger DE management units, increased hiring of qualified personnel, dedicated funding for research and extension activities, and educational policies aimed at reducing resistance to this modality.

In light of the above, we advocate for the creation of specific career pathways with professionals permanently hired through public competitive examinations.

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Currently, DE is treated merely as a strategy rather than as an independent product that demands its own legislation and institutional framework, considering its specificities.

Regarding teaching knowledge for working with technologies, we support ongoing professional development, given the daily emergence of innovations and the rapid evolution of the Internet of Things. Thus, public authorities must invest significantly in achieving high-quality DE provision—especially in teacher training—since critical literacies are urgently needed to ensure individuals are capable of navigating a wide variety of texts, discourses, and contexts. Consequently, the inseparability of DE and PTE must be fostered within the school environment through dialogic and inclusive practices that cultivate in students the constant desire to learn in order to teach, and to teach in order to learn (Agazzi; Buzzi; Marques, 2025).

4 Final Considerations

With diligence, and in response to the guiding question, we underscore the relevance of Professional and Technological Education (PTE) within Distance Education (DE), given that the teacher no longer holds exclusive ownership of knowledge and instead places the student as the central actor. In this pedagogical model, the teacher acts as a mediator and facilitator of the student's teaching-learning process. Consequently, with the support of multiple digital technologies, learning can take new directions through engaging and challenging moments, consolidated in pedagogical practices that respect each individual's uniqueness in acquiring attitudinal, procedural, and conceptual knowledge.

With regard to the specific attributes of PTE via DE, teachers require continuous professional development to adequately handle new tools. Teacher education, therefore, becomes a *sine qua non* condition for preparing human resources to use technology effectively—representing a significant challenge in

building ethical, inclusive, heterogeneous, multidimensional, democratic, and holistic learning pathways.

Based on the above, we can infer that not only is distance education deeply implicated in the appropriation of New Digital and Information Communication Technologies (NDTICs) and in the emergence of innovative learning models—more active and engaging for both students and teachers—but also that face-to-face education is being pressured to innovate. This convergence leads both modalities toward a hybrid conception, incorporating learning mediated by digital technologies and promoting in-person spaces for collaboration and the sharing of active learning experiences.

In the field of PTE, where the relationship between labor and education is being profoundly reshaped by digital technologies, we dare to affirm that any professional training program—regardless of its axis or technological area—that fails to incorporate learning strategies oriented toward Digital Education may be considered obsolete for the training demanded by the current world of work. This is particularly evident when we observe the emergence and rapid expansion of transformative technologies such as Artificial Intelligence. Such an omission reflects a deficit in the commitment to the intended integrated and comprehensive education.

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