The Role of Artificial Intelligence in Promoting Accessibility for Students with Disabilities: The Landscape of Inclusion in Vocational and Higher Education

Vitor Gonçalves[1], Leila Araújo-Santos[2]

[1]Polytechnic Institute of Bragança, Portugal
[2]Universidade Federal de Santa Maria, Brazil

Abstract

The inclusion of students with disabilities in Vocational and Technical Education (VTE) faces challenges that go beyond physical barriers and encompass communication and pedagogical limitations. This research investigates the potential of Artificial Intelligence (AI) and digital technologies as strategic tools to promote accessibility at the Federal University of Santa Maria (UFSM). The research was motivated by the need to overcome the still-nascent adoption of these technologies in educational institutions, with a view to the ethical and critical training of teachers and the empowerment of students with disabilities. The central objective was to investigate and systematize innovative pedagogical practices that utilize AI technologies to personalize educational support and adapt content to students' specific needs. Methodologically, the research adopted a mixed-methods (quantitative and qualitative) approach of an exploratory-descriptive nature. Data collection involved a population of approximately 800 students with disabilities (physical or motor, visual, hearing, intellectual, multiple, ASD (autism spectrum disorder), high abilities or giftedness, fibromyalgia and similar conditions) studying at the EPT at UFSM, of whom 45 participated. In the quantitative part, as of December 2025, we characterized the initial landscape of the use of Artificial Intelligence (AI) resources and other digital technologies to promote accessibility for people with disabilities or specific educational needs in Professional and Technological Education and in Higher Education at UFSM. The data reveal low adoption and limited awareness of Artificial Intelligence (AI) tools among respondents. The majority state that they do not use, or have never heard of, specific applications for academic support, such as chatbots, literature review tools, writing assistants, tools for creating visual content and presentations, or tools for adapting teaching materials to improve accessibility. A lack of, or very low, knowledge of the subject predominates, with frequent responses indicating a lack of prior reflection on the impact of AI on accessibility. The study highlights a critical need for digital literacy and institutional support, bearing in mind that, whilst this research aligns with the Sustainable Development Goals (SDGs 4 and 10), it also reinforces the commitment to equity and social justice within the academic environment.

Keywords: *Accessibility; Artificial Intelligence; Digital Technologies; Inclusion.*

1. Introduction

In the last three years, the rapid integration of Generative Artificial Intelligence (GenAI) in education has moved from a peripheral curiosity to a central systemic challenge. Since the public release of Large Language Models (LLMs) in late 2022, the educational landscape has faced an unprecedented disruption. The democratization of Artificial Intelligence (AI) has facilitated access to the production of digital resources and the automation of processes across multiple sectors, including education. The rapid diffusion of a technology with such profound impact has revealed the need for a regulatory framework, but has also raised fundamental ethical questions about its application: where, how, and with what meaning and limits can or should AI be used? International organizations, such as UNESCO, have defined core principles for the responsible use of AI, while the European AI Act has established legal safeguards to protect citizens from abusive uses by companies and institutions.

For students with disabilities in Vocational and Technical Education (VTE), this disruption presents both a risk of further marginalization and a transformative opportunity for inclusion. In this research, we believe we should take advantage of the opportunities it may offer, while minimizing the risks that still haunt its use, usually among certain special audiences.

The inclusion of students with disabilities remains a multifaceted challenge that requires integrated approaches involving effective public policies, innovative pedagogical practices, and the strategic use of assistive digital technologies. Despite institutional advances, barriers related to communication, pedagogy, and technology persist, compromising the access, retention, and academic success of these

students. Data from Portuguese and Brazilian higher education institutions reveal that dropout rates among students with disabilities exceed the general average, largely due to limited digital accessibility and insufficient pedagogical support.
AI is rapidly transforming education, but its effective integration depends less on the tools themselves and more on pedagogical clarity, assessment redesign, and human-centered competencies. This research examines the potential of AI and other digital technologies as strategic tools to promote accessibility at the Federal University of Santa Maria (UFSM). It aims to investigate and systematize innovative pedagogical practices that use AI to personalize educational support and adapt content to specific needs. Furthermore, it seeks to contribute to future teacher training guided by ethical and critical principles, aligning with Sustainable Development Goals (SDGs) 4 and 10 to promote equity and social justice in the academic environment.

2. Theoretical Background

AI has rapidly evolved from a set of specialized computational techniques into a pervasive socio-technical infrastructure shaping how individuals learn, work, and interact, with recent advances in GenAI marking a shift from passive consumption of digital content to active, large-scale production of knowledge, media, and services. Across society, AI systems are embedded in domains such as healthcare, finance, transportation, research and education, enabling data-driven decision-making, personalization, and automation, while also raising critical ethical, bias, transparency, and digital inequality concerns.
In the educational sphere, AI is increasingly aligned with the principles of Inclusive Education and Universal Design for Learning, supporting more flexible, adaptive, and accessible learning environments. For students with special educational needs, particularly those with visual, auditory, cognitive, or motor impairments, AI-powered tools such as intelligent tutoring systems, speech recognition, text-to-speech, computer vision, and real-time captioning are transforming access to content and participation in learning activities. We can also highlight persistent challenges, including the need for robust evaluation of accessibility outcomes, teacher training, ethical safeguards, and equitable access to AI technologies, ensuring that their transformative potential effectively reduces, rather than reinforces, educational disparities.

2.1. The Evolution of AI in Educational Contexts

The integration of AI in education is fundamentally aimed at facilitating personalized learning experiences. By leveraging data-driven insights, AI tools can identify a student's specific knowledge gaps in real time and provide tailored resources, enabling them to progress at their own pace. Historically, educational technology focused on digitized content and learning management systems; however, the shift toward GenAI marks a transition from "tools for consumption" to "tools for production," as Sarah Wang and Shangda Xu discuss on the Andreessen Horowitz (2024) website [1].
The evolution of AI in education can be understood in three overlapping phases [2]:

- Reactive AI and Chatbots (2021-2023): Characterized by the mass adoption of models used primarily as conversational search engines, with a focus on academic integrity and cheating.
- Contextual Generative AI (2024-2025): Introduced Retrieval-Augmented Generation (RAG), enabling institutions to ground AI responses in verified data and mitigate issues such as "hallucinations".
- Agentic AI (2026-Present): AI agents capable of executing complex sequences of tasks, autonomously planning curriculum units, and monitoring student progress in real-time.

But it is commonly accepted that AI should not drive pedagogy; pedagogy should guide AI use. Reflective practice is essential. Short, iterative reflections on classroom AI use help teachers build context-specific evidence and develop metacognitive awareness, which is more valuable than relying on external claims about tools. Additionally, it is estimated that a strong consensus rejects AI detection tools as unreliable and unfair [3]. Instead, the literature emphasizes: (i) process-based assessment; (ii) authentic and oral evaluation; (iii) reflection and transparency in AI use. Frameworks such as the AI Assessment Scale [4] and the “third path” approach [5] propose scaffolded AI integration, in which use is permitted but bounded by learning goals. So, we should be able to understand why we use a particular AI platform or tool, why we chose it over alternatives, the learning goal it serves, and how it strengthens the way you already teach the lesson. In other words, as we move into the era of Agentic AI, the focus must remain steadfastly on pedagogical intentionality rather than technical capability. By prioritizing

reflective practice and process-based assessments, educators can go beyond AI detection and move toward gradual integration.

2.2. Pedagogical Framework: I-TPACK

Traditional models like TPACK (Technological Pedagogical Content Knowledge) focused on the intersection of content and technology. The emergence of AI requires a new dimension: Intelligent-TPACK (I-TPACK), which integrates ethical knowledge and algorithmic literacy into the teacher's core competencies [6].
The transition from TPACK to I-TPACK signifies that technological proficiency is no longer enough; educators must now possess algorithmic discernment. This new layer of "Intelligent" knowledge requires a shift in the teacher's role from a consumer of educational software to an auditor of automated logic. Teachers must now understand how algorithms process information to avoid bias and ensure that AI-generated feedback is pedagogically sound. It involves not only knowing how to use an AI tool but also understanding the underlying data structures that may inadvertently marginalize specific student cohorts. Consequently, professional development must evolve to include ethical troubleshooting, ensuring that when AI acts as an intermediary in the classroom, it does so through a lens of equity and pedagogical rigor that only a human educator can provide.
Furthermore, literacy in the age of AI is being redefined as the ability to navigate "digital plastic" [7], the malleable nature of AI-generated content, where the human role is that of a critical curator and editor. The concept of "digital plastic" highlights a fundamental change in our relationship with information. Because AI-generated content is inherently fluid and prone to hallucination, the modern educator acts as a critical gatekeeper, transforming raw machine output into reliable instructional material. This is particularly vital for inclusive education, where the stakes of AI adoption are highest. While the potential for AI to automate accessibility, such as real-time captioning or text simplification, is immense, its current underutilization underscores a critical implementation gap. Bridging this gap requires moving beyond viewing AI as a productivity shortcut and instead embracing it as a highly malleable scaffold that, when curated correctly, can dismantle traditional barriers to learning.

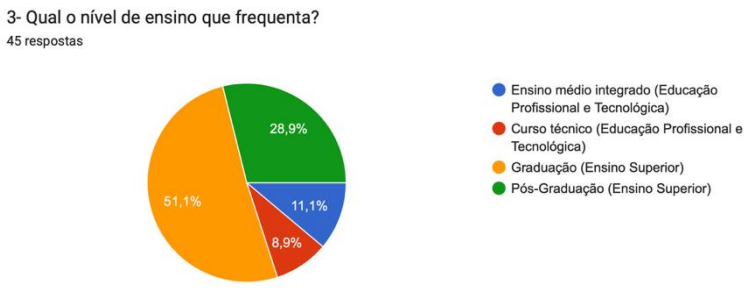
2.3. The Responsible Use of AI in the Educational Context

In the European Union, the main framework comprises documents such as the European Commission's Ethical Guidelines on the use of AI and data in teaching and learning for educators [8], as well as the broader legal framework of the EU AI Act [9]. The educational guidelines (2022, updated in the context of the Digital Education Action Plan) focus on the ethical use of AI by teachers and institutions, promoting principles such as transparency, data protection, fairness, inclusion, and the development of students' critical thinking. These guidelines offer teachers practical support in integrating AI pedagogically, ensuring that students understand both the potential and the risks of these technologies. Complementarily, the AI Act establishes a risk-based legal framework, classifying AI systems and imposing stricter requirements for high-risk applications – including some used in education (e.g., automated assessment). The European model is based on the idea of "trustworthy and human-centered" AI, balancing innovation with fundamental rights, safety, and accountability.
The Framework for the Responsible Development and Use of Artificial Intelligence in Education, developed by the Ministério da Educação do Brasil [10], provides a vital framework for institutional policies in Brazil. It emphasizes that while AI offers opportunities for efficiency, it poses risks of "metacognitive laziness" and requires a fundamental reconstruction of the teacher's role. Responsible use involves ensuring that technologies promote equity and do not reinforce existing social and educational inequalities. This framework establishes guidelines to support the ethical, safe, and inclusive adoption of AI in Brazilian educational systems. The document acknowledges the transformative potential of AI to personalize learning, support educational management, and expand access to education, while emphasizing that its implementation must align with principles such as equity, transparency, privacy, data protection, and respect for human rights. It also highlights the importance of ensuring that AI does not deepen existing inequalities and of promoting accessibility and inclusion, particularly for students in vulnerable situations. Furthermore, the framework underscores the need for continuous training for teachers and school leaders to foster critical, pedagogically grounded uses of AI and to develop digital and ethical competencies. It also proposes adopting governance, evaluation, and monitoring mechanisms to ensure the quality and contextual appropriateness of AI technologies used in education. Finally, the document stresses the importance of collaboration among government,

academia, the private sector, and civil society to promote responsible innovation focused on student well-being and the improvement of teaching and learning processes.
In Portugal, there isn't an "AI education framework" as specific as in Brazil, but there is the national AI Portugal 2030 strategy, which frames the development and use of AI in various sectors, including education [11]. This strategy strongly emphasizes the qualification of the population, digital literacy, and AI training from basic levels to higher education, recognizing education as a central axis for the country's digital transformation. On the ethical and social level, the document also highlights principles such as inclusion, equity, transparency, and respect for fundamental rights, aligning with the European model. It also promotes lifelong learning, professional retraining, and collaboration between academia, the public and private sectors, with the aim of preparing citizens and institutions for a responsible and sustainable use of AI, including in the educational context.
In short, the European Commission presents a normative approach with ethical guidelines, i.e., a strong regulatory component (AI Act). From this perspective, Portugal follows a strategic approach (capacity building, education and innovation), while Brazil follows an applied educational framework, with a direct focus on pedagogical practice.
Being more pragmatic about ethical and responsible use of AI in academic work, guidelines across sources converge on three principles: (i) transparency (disclosing AI use); (ii) process documentation (keeping interaction logs); and (iii) reflection (evaluating AI's impact on learning). These approaches shift the focus from policing to pedagogical accountability [12].

3. Materials and Methods

The research adopted a mixed-methods, exploratory-descriptive approach using both quantitative and qualitative data. The field of study was the UFSM, a Brazilian federal university in Santa Maria, Rio Grande do Sul.
Data collection involved a population of approximately 800 students with disabilities at UFSM from November 27th to December 26th, 2025. This population includes individuals with physical or motor, visual, hearing, intellectual, and multiple disabilities, as well as those with ASD, high abilities/giftedness, and fibromyalgia.
A digital questionnaire was the primary instrument for collecting data, including questions on AI awareness, the frequency of use across various AI categories (e.g., chatbots, literature review, writing assistants), and ethical concerns. The survey also explored the use of assistive technologies with and without AI.
A total of 45 students participated in the quantitative phase, even though they were finishing their classes and were near the Christmas and Summer holidays. This convenience sampling, or accessibility sampling, is a non-probabilistic method that allowed participants to be selected based on their immediate availability and ease of access for the researcher.
The graphic of Fig. 1 refers to the level of education of the respondents: 5 students (11,1%) are Integrated secondary education (Vocational and Technological Education); 4 students (8,9%) Technical course (Vocational and Technological Education); 23 students (51,1%) Undergraduate degree (Higher Education); and 13 (28,9%) are Postgraduate degree (Higher Education).



The quantitative data were analysed to characterize the initial landscape of AI use for accessibility as of December 2025. This involved assessing adoption rates, familiarity with specific tools like ChatGPT, Gemini, and Canva, and the perceived impact of AI on student autonomy.

4. Results

Generally, the data collected from UFSM students reveal a landscape characterized by low adoption and limited awareness of AI tools specifically designed for accessibility and academic support.
Although 95.6% (43 students) had heard of AI and 73.3% (33 students) had already used some AI-based tool or application, only 4.4% (2 students) admitted to having advanced knowledge, 22.2% (10 students) intermediate knowledge, and 57.8% (26 students) basic knowledge about AI and its applications. Even so, 15.6% (7 students) admitted to having no knowledge whatsoever.

The most common types of activities performed using AI tools were: (i) obtaining answers to relatively simple questions (23 students (51.1%)); (ii) searching for and summarizing articles (19 students (42.2%)); (iii) generating images, graphs, or diagrams (17 students (37.8%)); and (iv) creating presentations (13 students (28.9%)).
Regarding the use of AI tools (chatbots and search assistants), despite their low frequency, they are the most used. All other categories of suggested AI tools (tools for searching and reviewing literature; for academic writing and editing; for presenting and creating visual content; for extracting information and interacting with documents; for learning and organizing knowledge; or even for creating activities that meet inclusion and accessibility requirements) showed non-use or lack of awareness rates above 66.67% (30 or more out of 50 students).

Table 1. Frequency of AI Tool Usage among UFSM Students with Disabilities

Tool Category	Most Common Response	Tool most used
Chatbots & Research Assistants	Frequently	Gemini
Literature Search & Review	Rarely	Perplexity AI
Writing & Academic Editing	Rarely	Grammarly
Data Analysis & Visualization	Never	---
Visual Content & Presentations	Rarely	Canva and Gamma AI
Accessibility & Inclusive Adaptation	Rarely	paracasainclusivo.com.br

(0) Never, (1) Rarely, (2) Sometimes, (3) Frequently, (4) Always when I need

Key findings from the quantitative survey include:

- **Awareness vs. Depth:** While most students have heard of AI, their level of knowledge is often classified as "Basic" or "Intermediate".
- **Primary Activities:** Students use AI primarily to obtain answers to simple questions, search for and summarize articles, and create presentations.
- **Specific Accessibility Tools:** There is a stark lack of knowledge regarding specific accessibility tools. Only 5 students admit to using tools such as Be My Eyes and paracasainclusivo.com.br. Most participants (40 students) selected "Never" (Do not use). Nevertheless, 53.3% (24 students) admit that these tools can offer greater autonomy and decision-making power to a person with a disability, and 55.6% (25 students) believe that AI enables a person with a disability to recall or deepen prior knowledge to facilitate the acquisition of more advanced knowledge.
- **Assistive Technology Gaps:** Nine students use traditional assistive technologies (e.g., noise-canceling headphones, screen readers) without AI integration.

5. Discussion

The results indicate that while there is an initial openness to AI tools, their potential to promote accessibility remains largely untapped at UFSM. The high frequency of "Never" responses for specialized academic and accessibility tools suggests that students are currently using AI for general productivity rather than as a tailored assistive resource.
In the context of this research, the most used chatbot and research assistant is Gemini, followed by ChatGPT and CoPilot. This may be because UFSM students are eligible for a 12-month free trial. For literature searches and reviews, the most used tool is Perplexity, but it is rarely used, even though students and researchers at UFSM can get 1 year of free access to the advanced AI research tool Perplexity Pro. In the context of visual content and presentations, as well as accessibility and inclusive adaptation, the most used tools (even rarely) were Canva or Gamma AI and paracasainclusivo.com.br, respectively. This can be explained by a workshop on these three tools that took place the previous month, and some of the participants were probably there.
Despite current low usage, 78% of respondents in the initial abstract findings (and corroborated by survey comments) agree that AI can offer greater autonomy and decision-making power to people with disabilities. However, a significant portion of the participants (e.g., those with ASD) expressed concerns

that AI might "worsen a system that is already extremely flawed" if those developing the AI do not have disabilities themselves, potentially amplifying programmer biases.
Ethical concerns are a major theme. Students reported fears regarding the use of content "without real foundation" (hallucinations) and the "outsourcing of critical thinking". These findings align with the "Slow AI" concept, suggesting a need for a more considered, critical adoption of these technologies in the academic environment.
Finally, institutional role cannot be ignored. This study highlights a critical need for institutional support and digital literacy programs. The lack of prior reflection on the impact of AI on accessibility – as evidenced by frequent "I have not yet reflected on this" responses – suggests that the university must move beyond providing tools to fostering a culture of critical and creative AI use. The UFSM, like many other universities worldwide, has intensified its training initiatives in Artificial Intelligence (AI), ranging from the qualification of trainers to the creation of seminars and training courses for students.

6. Conclusions

This research demonstrates that while AI offers promising tools for personalized teaching and content adaptation, its implementation for students with disabilities at UFSM is still incipient. The gap between AI's theoretical potential to promote accessibility and its current practical application is significant.
Key recommendations based on the findings include:

- **Targeted Training:** Implementing training programs for students and teachers focused on specialized AI accessibility tools.
- **Ethical Framework Adoption:** Using the Framework for the Responsible Development and Use of Artificial Intelligence in Education to guide institutional policies and mitigate risks of bias and "metacognitive laziness".
- **Inclusive Development:** Ensuring that the development and deployment of AI training courses or even AI tools involve the active participation of people with disabilities to avoid the amplification of existing prejudices.

Ultimately, the goal is to transform the pedagogical landscape from one of consumption to one of critical production, ensuring that AI serves as a bridge rather than a barrier to equity and social justice in Vocational and Technological Education.
In this line, the work in progress is planning and developing a training seminar on AI tools for students with disabilities and a training unit on Artificial Intelligence for professionals from the University's Accessibility centers (also open to professors).

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