

Artificial Intelligence Readiness in Brazilian Schools: A Nationwide Survey of Teachers and Educational Challenges

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Abstract

Artificial Intelligence (AI), particularly Generative AI, has emerged as a transformative force in education, with the potential to personalize learning, support inclusion, and improve teacher productivity. Brazil has begun to address this through initiatives like the Brazilian AI Plan (PBIA 2024-2028) and the National Digital Competence Framework for Teachers, yet no official curriculum defines how AI should be integrated into basic education, leaving a gap between policy and classroom reality. This study surveyed 346 Brazilian basic education teachers nationwide to assess AI readiness across three dimensions: Teaching and Learning with Digital Technologies, Digital Citizenship and Professional Development, contextualized with data from the 2024 Brazilian School Census, IBGE, OECD, and international experiences (Canada, Hong Kong). The results show strong enthusiasm: 97.3% of teachers recognize at least one educational benefit, especially interactive material creation (80.6%), lesson planning (80.2%), personalized assessment (68.6%), and inclusive practices (65.5%). More than 80% want continuous AI training, preferring practical, collaborative online courses. However, the main barriers remain: inadequate training (43.4%), poor

infrastructure and internet access (43.0%), lack of technical support (41.9%), and limited time (34.5%), confirmed by national disparities in school connectivity and equipment. Rather than resistance, the findings reveal a disconnect between AI policy and school conditions, mapping the structural and governance challenges for the equitable adoption of AI in Brazilian schools.

Keywords

Artificial Intelligence, K-12 Education, Brazilian Schools

1 Introduction

New technologies tend to prioritize the Global North in their development and application, a pattern that persists with Generative Artificial Intelligence (GAI) [1]. In education, GAI offers notable benefits along with risks that must be carefully weighed [8]. For teachers, it supports the creation of teaching materials and instructional design [2]–[5], [8], and assists with administrative tasks such as the drafting of proposals and recommendation letters [8]. It also enables automated assignment correction with instant feedback [2]–[4], [8], generates visual content to clarify complex concepts [2], [4], and produces personalized texts and activities based on student performance [2], [4], [5]. However, the effectiveness of these applications remains debated, as GAI models show inconsistent accuracy and quality across tasks [2], [5]

For instance, GPT-4 achieves only 77% accuracy in programming tasks [2], and performs unsatisfactorily in advanced mathematics [5]. Models also embed biases

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reflecting their training data [2], [5], [8], compounded by low interpretability [2], [5]. Because GAI output synthesizes training data rather than producing genuine innovation, a “pseudo-imagination” [2], its classroom use risks generic results that discourage creativity and authenticity [2], while complicating efforts to distinguish student- from AI-generated work and raising academic integrity concerns [2], [8].

Beyond academics, GAI lacks the emotional communication that human teachers can provide [3]. A growing preference of students for AI interaction risks weakening student-teacher relationships and educators' ability to identify emotional and pedagogical needs [3]. Taking this into account, our study examines AI education in Brazil, a country facing significant barriers to technology access, ranking 51st among 127 economies in a global connectivity index [6]. These barriers stem from structural inequalities; e.g., [7] found a strong correlation between internet speed and wealth, with the greatest disparities in Rio de Janeiro, where connectivity in favela regions lags far behind the rest of the city. Such inequalities predate AI but tend to intensify as it integrates into society.

Given Brazil's technological inequalities and the potential impact of GAI's on K-12 education, understanding the perceptions, concerns, and expected benefits of Brazilian educators is essential information that also informs the broader Latin American context, given Brazil's position in regional development [9]. Therefore, we propose a quantitative study investigating the opinions of K-12 teachers about AI and GAI in Brazil, exploring their expectations, perceived impacts, and implementation challenges. To our knowledge, this is the first nationwide survey that identified classroom teachers' actual needs regarding AI use.

2 Methodology

The Brazilian Ministry of Education published the **Framework of Teachers' Digital Competencies** [10], structured into three dimensions and ten competencies to support teachers' continuous professional development on digital technologies in K-12 education. “**Teaching and Learning with the Use of Digital Technologies**” covers pedagogical practice, curation and creation, data analysis, and inclusive practice areas well aligned with AI-based technologies. “**Digital Citizenship**” covers responsible, safe, and critical use, addressing data privacy and technology's impact on student well-being. “**Professional Development**” covers continuous professional development, communication and collaboration, and use of digital resources for management.

We adopted this framework as the conceptual basis for assessing teachers' perceptions of the topic. Accordingly, a 35-item quantitative questionnaire was developed to systematically investigate the thematic dimensions defined by the framework. These elements were also derived from an initial questionnaire based on a literature

review, which was initially administered to four educators from different regions of the country, leading to the final version of the material, which can be accessed in the Final Form – Artificial Intelligence in the Classroom²

Data were collected from October 28, 2024 to 2025, using an online form (Google Forms), with the aim of a wide reach across different regions of Brazil. The sample consisted of 346 teachers from various regions. Considering the total population of approximately 2.4 million active teachers in Brazilian basic education, according to the 2024 School Census [10], this provides a confidence level of 90% with a margin of error of 5%.

2.1 Sample

Understanding the characteristics of the sample is essential to interpret the data in context and to recognize the potential limitations of the study. Regarding the age range of the participants, the most representative group is between 45 and 54 years old, which corresponds to 33.3% of the sample. This is followed by the age group 35 to 44 (27.7%) and the age group 55 to 64 (21.4%). In parallel, the 2024 School Census [10] indicates that approximately 35% of Brazilian teachers are between 40 and 49 years old. Another relevant aspect concerns the length of experience in the field of education. The majority of the participants (44.2%) have more than 20 years of experience, followed by 28.1% with 11 to 20 years of experience. Additionally, 12.4% reported having 6 to 10 years of experience, while 10.1% are in the range of 1 to 5 years. The least represented groups are those with less than 1 year of experience (1.7%) and those who do not directly work in education (3.5%).

The sample also provides information on the level of education at which professionals work. Approximately 29.5% of the respondents are associated with high school, 27.1% work in Elementary School I (grades 1–5), and 16.7% in Elementary School II (grades 6–9). These data help to understand the diversity of educational contexts represented in the study. We also analyze the affiliation of the institutions with the government. Public schools in the state represent the majority of the survey responses, accounting for 37.6% of the total, followed by public schools in the municipal district at 28.7%. In third place are private institution educators, comprising 17.1% of respondents. The participation of professionals affiliated with federal public schools is 9.3%, while those working in universities represent 3.5%. Furthermore, 3.8% of the participants reported working in other contexts.

3 Results and Discussions

The findings show that 97.3% of educators are interested in the potential of AI for teaching and learning, although effective implementation faces challenges such as teacher training, infrastructure, and technical support. Most educators report only basic AI knowledge (80.3%),

² <https://forms.gle/aTRJ4LE257EugDR56>

limiting their use beyond simple tasks. Still, more than 80% want continuous AI training, preferring online courses with videos, quizzes, and collaborative spaces that indicate openness to learning but a need for structured, practical materials, since generalist courses often lack applicability to each teacher's context and subject area.

We observed that most of the respondents have limited knowledge on the subject: approximately 69.4% reported having a basic understanding, 9.7% stated that they had only heard about the topic, and 1.2% indicated not knowing at all. In contrast, 17.8% reported having advanced proficiency, and 1.9% considered themselves experts. Next, aligned with the competencies of the first dimension, we analyze the participants' perceptions about the potential benefits of AI in teaching. In this question, respondents who recognized the potential of AI could select multiple areas in which it could contribute, while those who did not identify benefits selected only that single option. Taking this into account, 97.3% of the participants indicated at least one positive aspect among those listed.

The options cited most frequently were the creation of interactive content (80.6%) and lesson planning (80.2%). Other benefits mentioned included personalized assessment (68.6%), the possibility of inclusion (65.5%), and the identification of student learning difficulties (47.7%). The study also revealed that teachers are interested in using AI for the analysis of educational data, perceiving it as a valuable resource for pedagogical practices.

In this regard, 79.8% of the participants highlighted the identification of learning trends as the main benefit. In the field of inclusive practices, 71.3% pointed to the promotion of personalized learning strategies, while 70.9% recognized the importance of integrating assistive technology resources. Other benefits mentioned include the creation of collaborative learning environments (60.5%) and the monitoring of student progress, with a focus on identifying areas that require special attention (53.5%). Only 0.8% stated that they do not believe in the potential of AI to promote inclusion.

Moving on to the second dimension, digital citizenship, the results indicate that 78.3% of educators consider it essential to promote students' education on ethical issues related to AI, recognizing this aspect as crucial for the critical use of these tools. Furthermore, 73.6% emphasized the importance of teaching students how to critically evaluate AI-generated information.

Other aspects were also widely highlighted by the participants. Among them, 70.2% emphasized the importance of reflecting on technological dependence and its impacts in the classroom. Furthermore, 64.3% considered it essential to ensure that teachers receive adequate training in ethics and safety in the use of AI. Finally, 61.2% stressed the need to ensure transparency in decisions made by AI systems, as well as in the identification and mitigation of their biases.

Regarding the responsible use of AI by students, both inside and outside the classroom, 39.1% of teachers reported that students demonstrated some knowledge of the topic but did not use these tools frequently. Meanwhile, 22.5% indicated that students actively use AI in their daily academic activities. In contrast, 13.6% reported that most students do not use AI in their practices.

The third dimension refers to professional development. In this area, 79.8% of teachers highlighted the importance of facilitating access to online platforms and learning materials about AI. Furthermore, 72.5% indicated that the provision of courses and content tailored to individual levels and knowledge needs is relevant. Other important aspects include the suggestion of courses and training aligned with the professional trajectory (65.5%), the promotion of collaboration and experience exchange between educators (65.1%), and the possibility of using AI for performance analyses to identify areas for development (57.4%). Only 0.4% of the respondents do not believe that AI can contribute to continuous professional development.

However, the majority of respondents (50.8%) stated that they have not participated in any AI courses in education but are interested. Another 25.2% reported having participated in more than one training session, while 23.6% attended a single course and 0.4% expressed no interest. Teachers also recognize that AI can facilitate communication and collaboration, as well as support professional development. The main highlight was the use of AI to locate and share teaching materials available online, indicated by 72.1% of the respondents. Other benefits mentioned include facilitating the creation and participation in educator groups (68.6%) and supporting the co-creation of digital resources and educational content.

Regarding the level of support and encouragement for the use of AI, the majority (31.8%) believe that the school offers some encouragement, but it is still insufficient. Another 26.4% indicate that the school leadership and the school community are aware but do not promote its use, while 26.0% report that there is no significant technology-oriented culture. Only 13.0% reported strong leadership support, and 2.8% were unable to respond.

4 Discussion

Regarding inclusion, the study indicated that respondents recognize the potential of AI as an ally in creating teaching materials that are more accessible and compatible with the diverse needs of students, with the content personalization proposal widely acknowledged in other studies [2], [8]. According to the 2024 School Census [10], special education enrollments exceeded 2.1 million, representing an increase of 58.7% in the past five years. This growth reinforces the need highlighted by study participants for the creation of interactive content (80.6%), personalized activities (84.1%), and the

development of accessible resources (81%), demonstrating the importance of inclusive strategies 'supported by technologies such as AI.

To contextualize this scenario, we can analyze student-to-class ratios from the 2024 School Census [10] and teacher working hours, according to the OECD's Education at a Glance 2024 report [11]. National data indicate that the average number of students per class is 15.4 in early childhood education, 20.9 in the lower grades of primary education, 25.9 in the upper grades, and 28.9 in secondary education. These numbers show that class sizes tend to increase with the education level, requiring teachers to manage greater diversity, and, consequently, leaving less time to address individual student needs.

Beyond AI's benefits, it is essential to understand the practical obstacles to its implementation. The lack of technical support, reported by 41.9% of the participants, is a significant barrier, reflecting the shortage of school personnel able to assist with computers, projectors, digital whiteboards, and internet connectivity. These challenges extend beyond training to structural problems that limit technology adoption. The 2024 School Census [10] indicates that 85.9% of basic education schools have broadband internet access.

However, the Connected Education program [12], which evaluates connection quality, reveals regional disparities: In São Paulo, part of the Southeast, the region with the best indicators, only 4,964 of 19,006 schools have adequate-speed connections with satisfactory measurement devices, a 26.1% connectivity rate. Other infrastructure data from the 2024 School Census [10] reinforce these limitations: only 70% of schools have multimedia projectors and around 21% have digital whiteboards, restricting real-time projection of content, including AI-generated materials. Approximately 56% of schools have desktop computers, with even lower availability of laptops and tablets, preventing practical, teacher-supervised activities exploring AI tools.

Finally, this study relies on self-selected, self-reported survey data; the reported 90% confidence level should be interpreted with caution given the non-probability sampling design. Additionally, since most respondents report only basic AI knowledge, their perceptions may not fully reflect AI's actual classroom impact, and no independent measure of AI competence or learning outcomes was collected.

5 Conclusions

In our view, the expression "AI for all" means that every individual, regardless of geographical location, financial resources, or prior knowledge, should have access to AI and its benefits. Taking this into account, we sought to understand how this principle translates to the reality of Brazilian K–12 education and, most importantly, to listen to those who will directly face the challenges and opportunities in classrooms: teachers themselves. Our

findings reveal that enthusiasm for AI is not enough on its own: turning "AI for all" into reality requires coordinated action, continuous teacher training, infrastructure investment, and public policies that address the structural and socioeconomic disparities that still shape Brazilian schools.

6 Partnership and Data Availability

This survey was conducted by UTFPR-CP, InteliGente Project, and Instituto Significare. The complete report is available at <https://doi.org/10.48550/arXiv.2512.23834>.

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