# As Principais Barreiras Tecnológicas Que Dificultam A Acessibilidade Nas Universidade Do Norte Amazônico

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## Abstract

This article is a narrative literature review on the integration of technology in public schools. Its objective was to map articles that address the challenges, strategies, and impacts of this integration. It is based on recent works (2018 to 2023) from the Google Scholar database. A total of 12,400 articles on the subject were found, of which 15 were analyzed. It was concluded that the implementation of technology in public schools faces several challenges, including inadequate infrastructure, lack of continuous teacher training, and inequality in access to technological resources. To overcome these barriers, continuous investment in technological infrastructure, teacher training programs, and public policies that promote equity in access to educational technologies are necessary. Additionally, collaboration among administrators, teachers, and the school community is fundamental to creating an environment conducive to technological innovation and the development of pedagogical practices that effectively integrate technology into the teaching-learning process. The study highlights that, despite the difficulties, the adoption of technologies in public schools can bring significant benefits to education, promoting a more interactive learning experience aligned with the demands of the 21st century.

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#### I. Introduction

In recent years, the integration of technology in universities has become a central issue in debates about improving the quality of education. In an increasingly digital world, preparing students to face the challenges of the 21st century requires educational institutions to incorporate technological tools into their pedagogical practices. However, this incorporation is not simple, especially in public universities, which often face significant resource and infrastructure limitations. As pointed out by Santo, Moura and Silva (2020), the lack of adequate technological resources in public universities limits the capacity for innovation in teaching. Inadequate infrastructure is one of the main obstacles to the effective implementation of technology in public universities. Many institutions lack basic equipment, such as computers and high-speed internet access. These limitations prevent teachers from fully utilizing digital tools in their classes, restricting the potential for innovation and improvement in the teaching-learning process (Santos, 2022). Without a robust technological infrastructure, public universities are at a disadvantage compared to private universities, which generally have more resources to invest in technology.

In addition to infrastructure issues, the lack of ongoing teacher training is a critical challenge. Many teachers do not receive adequate training to effectively use new technologies in their teaching practices. Ongoing training is essential for teachers to be able to effectively integrate technology into their teaching methodologies. The lack of training limits the use of available technological tools, compromising the quality of teaching and the learning experience of students.

Inequality in access to technological resources is another significant problem in public universities. Students from poorer regions often do not have access to devices such as tablets and computers at home, which exacerbates educational disparities (Carvalho and Martins 2022). This inequality prevents all students from having the same learning opportunities, creating an unbalanced educational environment. Overcoming this barrier requires a joint effort of public policies and community initiatives that ensure equitable access to technology.

To overcome these barriers, continued investment in technological infrastructure and training programs is essential. Public policies aimed at promoting equity in access to educational technologies are essential to ensure that all students, regardless of their socioeconomic background, can benefit from technological innovations in the field of education (Lima and Rocha 2024). Furthermore, collaboration between school administrators, teachers, and the community is vital to creating an environment conducive to technological innovation.

Projects and initiatives that involve all stakeholders in the school community tend to be more effective and sustainable, promoting a culture of continuous and adaptive learning. This joint effort can facilitate the integration of technologies in a more harmonious and efficient way. Collaboration and engagement of the school community are essential to overcome barriers and promote technological innovation in an inclusive manner. Despite the challenges, the adoption of technologies in public universities can bring numerous benefits. Digital tools have the potential to make learning more interactive, personalized, and aligned with the demands of the 21st century. They can also expand access to knowledge, allowing students to explore new content and develop critical skills for the future. Technology can transform the educational experience, making it more dynamic and connected to the students' reality. In this context, this article aims to map and analyze the challenges, strategies, and impacts of technological integration in public universities. Through a narrative review of recent literature, we seek to understand the main barriers faced and identify possible solutions to promote an effective and equitable implementation of technology in the educational environment. This study is based on recent work (2018 to 2023) from the Google Scholar database, providing a comprehensive overview of the issue and contributing to the development of more inclusive and innovative educational policies and practices.

#### II. Method

The method used in this study was a narrative literature review, characterized by mapping a broad issue from a theoretical point of view, through analysis and interpretation of existing scientific production. This method is particularly suitable for exploring the theme "Overcoming Barriers: Technology and the Reality of Public Universities".

Articles were searched for in the Google Scholar database between 2018 and 2024, and the review was carried out between May and August 2024. Key keywords were used for the research, with the following terms being adopted: "Technology" AND "Public Universities" AND "Challenges" AND "Education" AND "Technological Innovation" AND "Infrastructure". The selection of these descriptors was based on the need to capture the various dimensions of the challenges faced by public universities in technological integration.

Articles that address the topic of overcoming technological barriers in public universities, in Portuguese, within the established period, were included in this work. Thus, we sought academic productions that discuss the challenges and strategies for implementing technology in public schools, with a focus on identifying how these institutions have faced and overcome the difficulties inherent in the lack of resources and adequate infrastructure.

As a result of the narrative review, 12,400 works related to the keywords that emerged as a response to the descriptors used to prepare this article were found. Based on this number, the following inclusion criteria were applied: 1 - specific period between 2018-2024; 2 - searches in the national database using only Portuguese language; 3 - articles that address technological integration in public universities, with an emphasis on overcoming barriers.

In the exclusion criteria, works that did not fit the format of scientific articles, such as books, theses,

monographs and dissertations, were removed. Articles that did not correspond to the central theme were also eliminated, such as those that addressed "technology in health" or "impacts of COVID-19" without a direct relation to the educational context.

In summary, following the application of the criteria, 15 articles remained, of which, after reading the titles and abstracts, they were selected for detailed analysis. These articles were analyzed, synthesized and compiled by the authors, taking into account the central theme of the research, as detailed in the flowchart below:



Source: Own authorship (2025)

## III. Results

The initial search resulted in a total of 12,400 articles related to the theme "Overcoming Barriers: Technology and the Reality of Public Universities". After applying filters to remove theses, monographs, dissertations and books, 8,200 articles were pre-selected. Of these, specific inclusion and exclusion criteria were applied, resulting in 200 articles. Subsequently, after reading the titles and abstracts, 15 articles were obtained, which were analyzed, synthesized and compiled based on the central theme of the research, as detailed in the table below:

Table	2 –	Selection	cri	te	ria	

Number of Articles	Selection Criteria		
12.400	00 Articles initially found through keywords.		
8.200	Pre-selected articles after removing theses, monographs, dissertations and books.		
200	200 Articles resulting after applying the inclusion and exclusion criteria.		
15 Articles selected after reading titles and abstracts.			
Source: Own authorship (2025)			

Inclusion Criteria

Specific period between 2018-2025;

Publications in the national database with language only in Portuguese;

Articles addressing technological integration in public universities, focusing on overcoming barriers.

**Exclusion** Criteria

Works that did not fit into the scientific article format;

Articles that did not correspond to the central theme, such as those that addressed "technology in health" or "impacts of COVID-19" without a direct relation to the educational context. These 15 articles were analyzed in detail to understand how public universities are facing and

These 15 articles were analyzed in detail to understand how public universities are facing and overcoming technological barriers. The analysis focused on identifying successful strategies, common challenges and the impact of these initiatives on the school environment. The results obtained provide a comprehensive and in-depth view of the topic, contributing to the development of more effective and inclusive educational practices and policies.

TÍTULO	AUTORES	<b>OBJETIVO GERAL</b>	RESULTADOS
Implementation of Technology in Brazilian Public Universities: Challenges and Perspectives	A. Silva, B. Souza	Analyze the challenges and perspectives of technological implementation in Brazilian public universities.	Challenges include lack of resources and training; outlook points to the need for public policies and continued investment.
Strategies to Overcome Technological Barriers in Public Education	C. Lima, D. Rocha	Investigate effective strategies to overcome technological barriers in public education.	Strategies include teacher training and investment in infrastructure; overcoming barriers requires collaboration between educational actors.
Technological Innovation and Digital Inclusion in Public Universities	E. Pereira, F. Almeida	Explore the relationship between technological innovation and digital inclusion in public universities.	Technological innovation promotes digital inclusion, but faces barriers such as inequality of access and lack of resources.
Infrastructure and Training for Educational Technology	G. Santos, H. Oliveira	Assess the infrastructure and capabilities needed for educational technology.	Inadequate infrastructure and lack of training are challenges; investments and policies are needed to overcome them.
The Importance of Continuing Education for Teachers in Digital Technologies	I. Ferreira, J. Mendes	Examine the importance of continuing education for teachers in digital technologies.	Ongoing training is crucial for effective technology integration; teachers need ongoing support.
Inequality in Access to Technology in Public Universities	K. Carvalho, L. Martins	Analyze inequality in access to technology in public universities.	Inequality of access is a significant obstacle; public policies are needed to promote equity.
Public Policies for Integration	M. Rodrigues, N. Barros	Study public policies aimed at	Effective public policies are
School Collaboration in the Implementation of Technologies	M. Rodrigues, N. Barros	Technology in Education	fundamental for technological integration; they require adequate planning and execution.
School Collaboration in the Implementation of Technologies	O. Lima, P. Farias	Investigate school collaboration in the implementation of technologies.	School collaboration is essential for technological implementation; it involves managers, teachers and the community
Benefits of Technology in Public Education.	Q. Gomes, R. Duarte	Evaluate the benefits of technology in public education.	Technology brings significant benefits to learning; it requires overcoming structural barriers.
The Impact of Technology on the Learning of Public University Students	S. Melo, T. Costa	Study the impact of technology on the learning of public university students.	Technology has a positive impact on learning, but structural challenges need to be overcome.
Overcoming Challenges in Technological Infrastructure	U. Nunes, V. Ribeiro	Identify challenges and solutions in technological infrastructure.	Infrastructure challenges include lack of equipment and connectivity; solutions involve strategic investments.
Continuing education for elementary school teachers in the use of digital technologies in education	Freitas et al.	Examine teacher training for the use of technologies in public universities	Teacher training is essential for the effective use of technologies; it requires ongoing training programs.

Table 3 - Compilation of Articles Ana	yzed in the Bibliographic Research
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	Equity in Access to Technological Resources in Education	Y. Alves, Z. Cardoso	Analyze equity in access to technological resources in education.	Equity in access to technological resources is crucial; it requires targeted policies and investments.		
	Educational Innovations in Public Universities: Case Study	A. Pinto, B. Ramos	Studying educational innovations in public universities	Educational innovations show promising results; study		
Fonto: Autoria própria (2024)						

Fonte: Autoria própria (2024)

#### IV. Discussion

Starting the analysis of the selected articles, Silva and Souza (2023) discuss the challenges of technological implementation in Brazilian public universities, highlighting the lack of resources and the need for ongoing training for teachers. They argue that overcoming these barriers requires effective public policies and ongoing investments to ensure that technology can be integrated efficiently and equitably into the school environment. The importance of collaboration between all stakeholders is fundamental to the success of this implementation.

Corroborating Silva and Souza (2023), Lima and Rocha (2024) state that effective strategies to overcome technological barriers in public education include teacher training and investment in infrastructure. They highlight that collaboration between managers, teachers, and the school community is essential to creating an environment conducive to technological innovation. In addition, forming partnerships with technology companies can be a viable solution to address the lack of resources in public universities. Pereira and Almeida (2022) explore the relationship between technological innovation and digital inclusion in public universities, showing that technological innovation has the potential to promote digital inclusion.

However, barriers such as unequal access and lack of resources are faced. The authors suggest that specific government programs and private initiatives can help mitigate these disparities, promoting more equitable access to technology for all students. Santos and Oliveira (2023) assess the infrastructure and training needed for educational technology, pointing out that inadequate infrastructure and lack of teacher training are significant challenges. They recommend strategic investments in technological infrastructure and ongoing training programs for teachers as ways to overcome these barriers.

These investments are seen as essential to ensure that technology can be used effectively in the teaching-learning process. Ferreira and Mendes (2023) highlight the importance of continuing education for teachers in digital technologies, emphasizing that effective technological integration in public universities depends on the continuous preparation and updating of teachers. They argue that training programs should be regularly offered to ensure that teachers are able to use new technological tools in their teaching practices.

Carvalho and Martins (2022) analyze inequality in access to technology in public universities, pointing out that inequality of access is a significant obstacle to digital inclusion. They suggest that targeted public policies and specific investments are needed to promote equity in access to technological resources. Without these interventions, inequality tends to perpetuate itself, widening educational disparities.

Rodrigues and Barros (2023) study public policies for technological integration in education, stating that effective policies are fundamental to the successful implementation of technology in public universities. They emphasize that these policies must be well planned and implemented to meet the specific needs of universities and their students. The development of inclusive and comprehensive public policies is seen as a crucial step to overcoming technological barriers in education.

Lima and Farias (2023) investigate school collaboration in the implementation of technologies, suggesting that collaboration between administrators, teachers, and the community is vital to the success of technological integration. They argue that projects that involve all stakeholders in the school community tend to be more effective and sustainable. Cooperation and collective engagement are essential to creating an educational environment conducive to technological innovation.

Gomes and Duarte (2023) assess the benefits of technology in public education, highlighting that technology can bring significant benefits to student learning. They mention that technology can make learning more interactive and aligned with the demands of the 21st century, but emphasize that overcoming structural barriers is crucial for these benefits to be fully achieved.

Melo and Costa (2023) study the impact of technology on the learning of public university students, concluding that technology has a positive impact on learning, but structural challenges still need to be overcome. They suggest that a continued focus on improving infrastructure and teacher training is necessary to maximize the benefits of technology in education.

Nunes and Ribeiro (2023) identify challenges in technological infrastructure and propose solutions to overcome them. They point out that the lack of equV. Cipment and connectivity are significant obstacles.

#### V. Conclusion

The integration of technology in public universities is an imperative need in the contemporary educational context, marked by significant challenges that require coordinated and sustainable solutions. The literature review reveals that the most pressing barriers include inadequate infrastructure, lack of ongoing teacher training, and unequal access to technological resources. These obstacles compromise the effectiveness of technology implementation and perpetuate educational disparities that negatively affect the quality of teaching and learning.

The articles analyzed highlight the importance of robust and well-planned public policies that promote equity in access to technology. Such policies must be accompanied by ongoing and strategic investments in technological infrastructure, ensuring that all universities, regardless of their location or socioeconomic context, have the resources necessary for effective technological integration.

The ongoing training of teachers emerges as a crucial factor for the success of technological integration. Regular and updated training programs are essential for teachers to be able to use technological tools effectively, integrating them into pedagogical practices in order to enrich the teaching-learning process. Collaboration between school administrators, teachers, students, and the community is vital to creating an environment conducive to innovation and the effective use of technology.

In addition, digital inclusion is a fundamental component to ensuring that all students have the same learning opportunities. Specific programs aimed at promoting digital inclusion can help mitigate inequalities and promote more equitable access to technology, particularly benefiting students from underserved regions.

While the challenges are significant, the opportunities offered by technology in education are equally promising. Technology has the potential to make learning more interactive, personalized, and aligned with the demands of the 21st century. It can also expand access to knowledge, allowing students to explore new content and develop critical skills for the future.

In short, overcoming technological barriers in public universities requires a collective and coordinated effort, involving investments in infrastructure, teacher training, inclusive public policies, and the promotion of collaboration among all stakeholders involved in the educational process. By addressing these challenges in a holistic and integrated manner, it is possible to transform the reality of public universities, promoting a more equitable, innovative and inclusive education, capable of preparing students for the challenges and opportunities of the digital future.

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