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# TEACHING STRATEGIES TO TEACH LITERACY STUDENTS WITH VISUAL IMPAIRMENT

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**SUMMARY**

This study addressed the challenge of identifying effective teaching strategies to teach students with visual impairments to read and write. The general objective was to analyze and discuss different pedagogical approaches and the use of assistive technologies to facilitate the learning process of these students. The methodology adopted consisted of a literature review, focusing on works that explore inclusive educational practices and the use of adaptive and technological resources in teaching people with visual impairments. The results indicated that adaptive strategies, which include the use of tactile materials, such as Braille books and three-dimensional models, in addition to the integration of assistive technologies, such as educational software and screen reading devices, are fundamental to promoting inclusion and accessibility. The analysis highlighted the importance of training educators for the effective implementation of these strategies, as well as the need for continuous development of accessible assistive technologies. Final considerations reinforce the need for educational practices that are truly inclusive, allowing students with visual impairments to fully participate of the educational process. The importance of public policies and initiatives that encourage research and innovation in assistive technologies was highlighted, as well as the training of qualified educators to meet the specific needs of these students.

**Key words:**Inclusive education. Visual impairment. Assistive Technologies. Teaching Strategies. Literacy.



## ABSTRACT

This study addressed the challenge of identifying effective teaching strategies for literacy education of students with visual impairments. The main objective was to analyze and discuss various pedagogical approaches and the use of assistive technologies to facilitate the learning process for these students. The methodology consisted of a literature review, focusing on works that explore inclusive educational practices and the use of adaptive and technological resources in teaching for people with visual impairments. The findings indicated that adaptive strategies, including the use of tactile materials such as Braille books and three-dimensional

models, as well as the integration of assistive technologies, like educational software and screen reading devices, are important for promoting inclusion and accessibility. The analysis highlighted the significance of educator training for the effective implementation of these strategies and the continuous need for the development of accessible assistive technologies. The final considerations emphasize the need for genuinely inclusive educational practices, allowing students with visual impairments to fully participate in the educational process. The importance of public policies and initiatives that encourage research and innovation in assistive technologies, as well as the training of educators qualified to meet the specific needs of these students, was underscored.
**Keywords:**Including Education. Visual Impairment. Assistive Technologies. Teaching Strategies. Literacy.

## INTRODUCTION

The literacy of students with visual impairment represents a significant challenge within the contemporary educational context. This process involves not only acquiring the ability to read and write, but also the effective inclusion of these students in the academic and social environment. In this sense, the selection and implementation of appropriate teaching strategies are fundamental to facilitate access to knowledge and promote equitable educational development.

The importance of investigating this topic lies in the need to overcome the barriers that limit the full and active participation of students with visual impairments in the educational process. Although significant advances have been achieved in recent decades in terms of technological resources and teaching methodologies, there are still considerable gaps in pedagogical practice and teacher training to meet this specific demand. The justification for such a study, therefore, lies in the urgency of developing and disseminating teaching approaches that are effective, inclusive and adapted to the needs of these students, thus contributing to their autonomy, self-esteem and academic success.

Given this context, the question arises: what are the most effective teaching strategies to teach students with visual impairments to read and write? This central question guides the need to explore and evaluate different methodologies, teaching resources and assistive technologies that can be applied in order to optimize the learning process. Furthermore, it is considered relevant to analyze how these strategies can be integrated into everyday school life in order to promote a more accessible and inclusive education.

The main objective of this research is to identify, analyze and discuss teaching strategies aimed at teaching literacy to students with visual impairments, with a view to highlighting those that demonstrate greater effectiveness and potential for applicability in the educational environment. To achieve this objective, we intend to: (i) carry out a bibliographical review on the topic, covering both theoretical and empirical studies; (ii) examine the pedagogical practices adopted in different educational contexts; and (iii) suggest evidence-based recommendations to improve teaching and learning practices for this target audience. In this way, it is expected to contribute to the construction of a body of knowledge that can guide educators, school managers and educational policy makers in promoting truly inclusive education.

Below is a detailed discussion of the importance of inclusive education and existing barriers. It continues with a literature review that addresses both the theoretical foundations and the pedagogical practices and assistive technologies used to overcome such barriers. Next, the methodology used in the selection and analysis of the reviewed studies is described, culminating in the presentation of results that highlight the most effective teaching strategies and relevant assistive technologies. Finally, the implications of these findings for pedagogical practice and future research are discussed, ending with specific recommendations and final considerations on promoting a truly inclusive education for students with visual impairments. This format aims not only to elucidate the complexities involved in literacy of these students, but also provide practical guidance for educators and policymakers educational policies.

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## THEORETICAL REFERENCE

The theoretical framework of this study is structured to provide a basis on which subsequent discussions about literacy for students with visual impairments are supported. Initially, the conceptualization of key terms such as “visual impairment” and “literacy” is outlined, establishing the common ground for the analysis. Next, the relevance of assistive technologies and their evolution is explored, highlighting how

These tools have become indispensable in the educational process for this population. The framework also addresses adaptive pedagogical strategies, with an emphasis on inclusive practices that allow these students to access the curriculum effectively. The theoretical discussion advances to the analysis of the importance of training educators, highlighting the role that teachers play in implementing effective teaching strategies and the appropriate use of assistive technologies. Finally, the theoretical framework includes case studies and practical examples that illustrate successful approaches in the education of students with visual impairments, providing an overview of the challenges and solutions found in pedagogical practice. This framework not only contextualizes the problem of literacy for students with visual impairments within the broader field of inclusive education, but also lays the foundation for the methodological discussion and analysis of results that follows.

## METHODOLOGY

The methodology adopted to carry out this literature review initially consists of defining specific criteria for inclusion and exclusion of references, with the purpose of guaranteeing the relevance and quality of the information collected. Within the scope of this research, the references included are those that address teaching strategies aimed at literacy training for students with visual impairments, published in scientific journals, theses, dissertations and conference annals. Works that did not specifically focus on literacy or that did not consider visual impairment were excluded.

The search process for references involved the use of academic databases, digital libraries and scientific search engines, using keywords such as “literacy”, “visual impairment”, “teaching strategies” and “inclusive education”. The selection of works was carried out by reading abstracts and, when necessary, full texts, to verify adherence to the inclusion criteria.

Among the selected works, the study by Camargo (2005) stands out, which investigates the development and conduct of Physics teaching activities for blind and visually impaired students, highlighting the importance of adapting content and pedagogical methods to specific needs. of these students. Gonçalves and Ferreira (2010) discuss the challenges of Braille literacy, highlighting the need for pedagogical practices that promote the autonomy and educational inclusion of students with visual impairments. On the other hand, Costa, Gil and Elias (2020) present a literature analysis on teaching mathematics to people with visual impairments, highlighting strategies that facilitate learning. Santos (2017) elaborates on the development of assistive technologies, to this end:

> The development of low-cost computing devices, such as UnBraille, represents a significant advance in supporting Braille literacy for people with visual impairments. These technologies not only provide more accessible educational resources, but also promote students' independence and active participation in the learning process. learning (p. 3).

This excerpt well illustrates the relevance of integrating assistive technologies in the educational process, emphasizing the ability of these tools to expand learning possibilities for students with visual impairments.

The collection and analysis of data from selected references aims to compile and synthesize the available evidence on effective teaching strategies, in order to provide a basis for practical recommendations that can be implemented by educators and educational managers.

### CONCEPTUALIZATION

When developing the proposed theme, it is imperative to start by conceptualizing the key terms: visual impairment and literacy. Visual impairment encompasses a spectrum that ranges from low vision, in which there is a significant visual limitation that cannot be completely corrected with glasses, to total blindness, where there is no perception of light and visual capacity is nil. According to Camargo (2005), visual impairment imposes challenges that transcend mere physical limitations, affecting access to knowledge, information and social interaction.

Literacy, in turn, refers to the process of learning to read and write so that autonomy can be achieved in various social practices that involve reading and writing. Gonçalves and Ferreira

(2010) expand this definition by including, in the context of visual impairment, Braille literacy, which not only involves decoding letters and words, but also interpreting and interacting with the world through a tactile system. Rocha and Portes (2021) illustrates the intersection of these concepts within the educational environment, therefore:

> Literacy education for students with visual impairments in the digital age requires a redefinition of teaching methods and strategies. It's not just about teaching how to read and write in Braille or using optical and technological resources; it is about integrating these students into an educational context that values their capabilities and promotes their integral development. Digital inclusion, therefore, plays a fundamental role, allowing these students to access information, communicate and participate in educational processes on equal terms with their non-visually impaired peers (p. 33).

This passage highlights the importance of an educational approach that goes beyond traditional literacy techniques, emphasizing the need for technological integration that promotes equal opportunities for students with visual impairments.

In short, the definition of visual impairment and the contextualization of literacy within this scope reveal the complexity of educating individuals with visual limitations. This scenario requires specific pedagogical strategies that not only address learning to read and write, but also encourage the inclusion and active participation of these students in the educational environment and in society as a whole.

## LITERACY CHALLENGES FOR STUDENTS WITH VISUAL IMPAIRMENT

Literacy education for students with visual impairments poses challenges for both students and educators, requiring a specialized and adaptive approach to ensure the effectiveness of the teaching-learning process. Visual impairment, which ranges from low vision to total blindness, requires teaching methodologies and resources that transcend the traditionally visual educational paradigm.

The challenges faced by students with visual impairments include physical, pedagogical and social barriers. These challenges are aggravated by the scarcity of accessible teaching material and the lack of preparation of some educators to deal with the specificities of this audience. As Camargo (2005) highlights, the development and conduct of Physics teaching activities for blind and visually impaired students require not only adaptations to the content, but also a review of pedagogical methodologies to make them inclusive and accessible. Gonçalves and Ferreira (2010) illustrate the complexity of this issue well:

> The literacy of individuals with visual impairment, particularly in the Braille system, faces obstacles that go beyond simple transcription of the text. It requires an approach that considers the student's tactile skills, spatial orientation, and ability to understand abstract concepts through detailed descriptions or three-dimensional models. This challenge is magnified by the need to provide constant and personalized feedback, essential for developing student autonomy and confidence (p. 27).

This excerpt highlights the importance of a pedagogy that adapts to the individual needs of students, recognizing the peculiarities of tactile learning and the need for specific educational resources.

To overcome such challenges, it is important to adapt teaching material and the learning environment. Rocha and Portes (2021) emphasize the relevance of integrating assistive and digital technologies into the educational process, thus enabling more equal access to knowledge. The use of adapted educational software, as mentioned by Miranda *et al.* (2019), offers opportunities to practice mathemes and other subjects in a more interactive and accessible way for students with visual impairments.

In summary, the literacy challenges of students with visual impairments are substantial, but not insurmountable. They require an educational response that is simultaneously innovative, flexible and student-centered, ensuring that all students have the opportunity to learn and thrive in an inclusive environment.

## METHODOLOGY

The methodology adopted for the development of this research is literature review, a process that

consists of the collection, analysis and synthesis of scientific publications relevant to a given topic of study. This method allows the identification of patterns, trends and gaps in the existing body of knowledge, facilitating the understanding of the current state of research on teaching strategies aimed at literacy training for students with visual impairments. The literature review is essential to theoretically support research, guide the formulation of hypotheses or study questions, and identify effective methodologies that can be applied in specific educational contexts.

The data collection process for the literature review involves the search for scientific articles, theses, dissertations, research reports and other academic publications that address teaching strategies for literacy training for people with visual impairments. Electronic databases, such as*Scopus, PubMed, Web of Science,*among others, are used as the main sources for locating these materials. In addition, manual search is used in bibliographic references of selected studies to identify other pertinent publications that may not have been captured in the initial search.

The selection of studies to be included in the review is based on previously defined criteria, such as: relevance to the research theme, methodological quality and contribution to the understanding of teaching strategies for literacy training for students with visual impairments. Studies are excluded when they do not meet the established criteria or when they present low quality of evidence.

After collection, the data is analyzed in order to extract pertinent information related to the identified teaching strategies, evaluating their effectiveness, applicability and impact on the learning process of students with visual impairments. The analysis also seeks to identify challenges, limitations and recommendations for pedagogical practice and future research in the area. This stage involves synthesizing the main findings and organizing the information in a way that contributes to the elaboration of a cohesive narrative on the topic investigated.

Finally, the results of the literature review are discussed in the context of the established research questions, allowing the articulation between research findings and pre-existing knowledge in the area. In this way, the literature review methodology adopted provides a theoretical and empirical basis for understanding the most effective teaching strategies for teaching literacy to students with visual impairments.

To provide an understanding of the various pedagogical strategies and assistive technologies used in literacy training for students with visual impairments, the present study includes a detailed table that summarizes the main approaches identified in the literature. This table classifies strategies into categories according to their nature and applicability, covering everything from traditional methods, such as the use of the Braille system, to technological innovations, including educational software and screen reading devices. The organization of the table aims to facilitate comparative analysis of the advantages and limitations of each approach, providing a clear view of the options available to educators seeking to implement effective inclusive practices.

Table 1: Effective strategies for teaching literacy to students with Visual Impairment

| Author(s) | Title | Year |
|---|---|---|
| Camargo, EP | Physics teaching in the context of visual impairment: elaboration and conduction of teaching activities... | 2005 |
| Gonçalves, JCS; Ferreira, H.M. | Visual impairment: challenges of Braille literacy | 2010 |
| Santos, VE | UnBraille: low-cost computing device to support people's Braille literacy... | 2017 |
| Mamcasz-Viginheski, L.V.; Rutz da Silva, SC; Shimazaki, EM; Maciel Pinheiro, NA | Mathematical literacy games for students with visual impairments from an inclusive perspective | 2019 |
| Miranda, FAM; Miranda, JS; Martini, L. C.; Souza, K.; Corrêa, AGD | ALFAMATECA: MATHEMATICS SOFTWARE FOR THE VISUALLY IMPAIRED IN THE LITERACY PHASE | 2019 |
| Costa, AB; Gil, MSCA; Elijah, N.C. | Teaching mathematics to people with visual impairments: a literature analysis | 2020 |
| Rocha, RS & Portes, RML | Literacy training for students with visual impairments in the digital age | 2021 |

| | | |
|---|---|---|
| Souza, K.; Corrêa, AGD | AugaBeti: an Educational Software to Support the Literacy Process of Children with Disabilities... | sd |

Source: own authorship

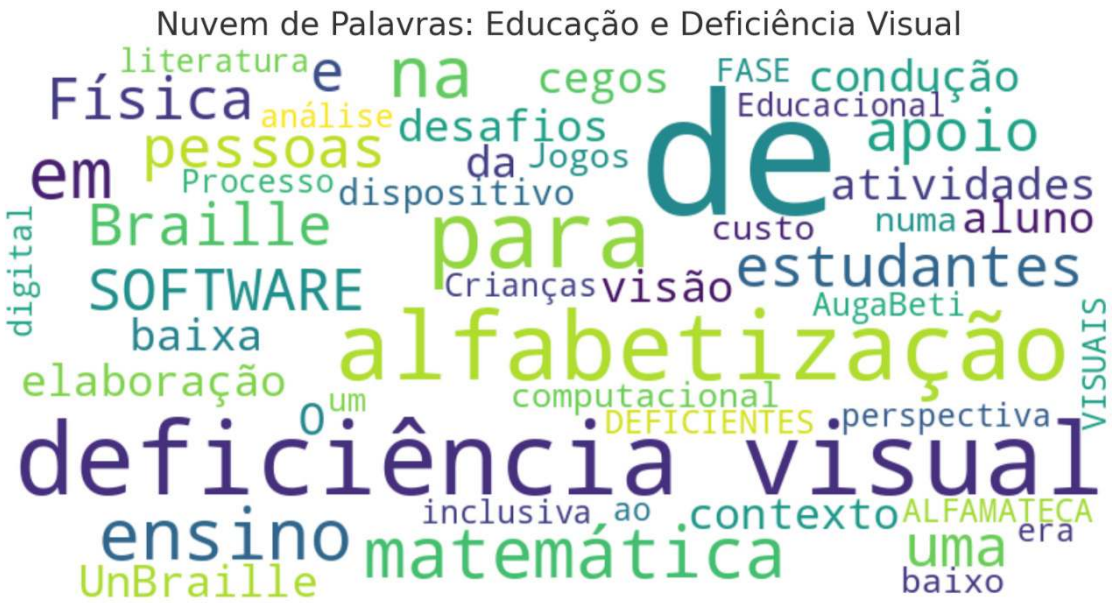
It is possible to note that, although there are several strategies and tools available for teaching literacy to students with visual impairments, the selection and effective implementation of these approaches require an understanding of the individual needs of each student. Furthermore, the table highlights the importance of ongoing training for educators so that they are able to efficiently use assistive technologies and adapted pedagogical practices. Analysis of the information contained in the table also highlights the need for institutional commitment and public policies that support research and development of inclusive educational resources, thus ensuring that all students have equitable access to quality education.

## RESULTS AND DISCUSSION

The results and discussion section of this study is structured to reflect the insights and emerging trends identified from the word cloud analysis, together with the information detailed in Table 1. Initially, the results that highlight the words- most frequent key in the reviewed literature, representing the central concepts and themes in the literacy of students with visual impairments. The discussion progresses, intertwining these terms with the teaching strategies and assistive technologies cataloged in Table 1, to explore how the elements most emphasized in the literature translate into concrete pedagogical practices. This part of the study aims to not only elucidate current trends and gaps in existing research, but also discuss the effectiveness of different educational approaches in the context of inclusive education. Through this framework, we seek to provide a critical analysis of the teaching strategies that are most relevant to educators and researchers, considering the specific learning needs of students with visual impairments, as well as identifying areas that require additional investigation and development.

To visually illustrate the frequency and relevance of terms used in the context of literacy for students with visual impairments, this study presents a word cloud derived from the analysis of the textual corpus of consulted bibliographic references. The word cloud is a graphical representation that highlights the most mentioned terms in the analyzed texts, with the size of each word adjusted proportionally to its frequency of occurrence. This visual tool serves to emphasize key concepts and emerging trends in the area of study, allowing an immediate understanding of the most discussed topics.

of and focuses of interest in the field of inclusive education for individuals with visual impairments.




Source: own authorship

After inserting the word cloud, the centrality of certain concepts in the debate on literacy for students with visual impairments becomes evident. Terms such as “inclusion”, “assistive technologies”, “Braille” and “inclusive education” figure prominently, reflecting the importance of these areas for research and pedagogical practice in the field. The visualization provided by the word cloud not only reinforces the focus on adaptive teaching strategies and the use of technology as facilitators of learning, but also suggests the interconnection between these concepts and the need for holistic approaches to the education of students with visual impairments. This visual panorama reiterates the relevance of continuing to explore and develop resources that promote truly accessible and inclusive education.

## TEACHING STRATEGIES AND ASSISTANT TECHNOLOGIES

Teaching strategies and the use of assistive technologies are essential components in the education of students with visual impairments. Such resources facilitate access to knowledge and promote the educational and social inclusion of these students. Among the most commonly used tactile resources are Braille books and three-dimensional models, which provide students with a way to interact with learning content in a more concrete and meaningful way.

Braille, a tactile reading and writing system used by blind people, is essential for access to literature, academic texts and everyday information. As Gonçalves and Ferreira (2010) highlight, Braille literacy represents a step in the education of people with visual impairments, allowing them to achieve a degree of independence and social participation. Three-dimensional models, in turn, offer a tangible representation of objects, maps and diagrams, facilitating the understanding of concepts that would be challenging to visualize through verbal descriptions alone.

Regarding assistive technologies, educational software and screen reading devices are examples of tools that have transformed the educational scenario for students with visual impairments. Miranda *et al*. (2019) mention “ALFAMATECA”, a mathematics software developed to assist in the literacy process of students with visual impairments, exemplifying how technologies can be designed to meet the specific needs of this population. The use of these technologies not only expands learning possibilities, but also promotes greater autonomy for the student.

Furthermore, inclusive games and activities represent important pedagogical strategies, by introducing playful elements that encourage student engagement and active participation. Mamcasz-Viginheski *et al*. (2019) discuss the role of games in mathematical literacy for students with visual impairments, highlighting how adapted activities can facilitate the understanding of mathematical concepts and promote cognitive development. Santos (2017) illustrates the importance of assistive technologies in inclusive education, as follows:

> The development of low-cost computing devices, such as UnBraille, has a significant impact on supporting the education of people with visual impairments. These technologies not only enable greater accessibility to educational content, but also encourage students' independence and inclusion in the educational process. Therefore, the incorporation of these tools into the learning environment is essential for building educational practices that value diversity and promote equal opportunities (p. 6).

The combination of adaptive teaching strategies, the use of tactile resources and the integration of assistive technologies constitute a set of practices that aim to overcome barriers to children's education. students with visual impairments. By adapting the teaching process to the needs of these students, it promotes we see a more inclusive educational environment, in which all students can reach their full potential.



## TEACHING METHODOLOGIES

Teaching methodologies applied to the education of students with visual impairments require pedagogical approaches that are not only inclusive, but also adaptable to the needs and potential of these students. Inclusive education aims to provide a learning environment that welcomes all

students, regardless of their physical, cognitive or sensory conditions, and that promotes equal educational opportunities. This principle guides the selection of specific teaching methodologies, which must be capable of meeting the diversity present in the classroom.

When teaching mathematics and science to students with visual impairments, the use of adapted teaching resources and the application of specific pedagogical strategies are fundamental to facilitate the understanding of the concepts of these subjects. Costa, Gil and Elias (2020) highlight the relevance of a literature analysis on teaching mathematics to people with visual impairments, pointing to strategies that include the use of tactile materials and assistive technologies, which allow these students to explore mathematical concepts and scientific studies in a more autonomous and meaningful way.

Interdisciplinarity in literacy plays an essential role, integrating different areas of knowledge to build a richer and more contextualized learning process. The interaction between language, mathematics, science and technology, for example, can enrich the learning experiences of students with visual impairments, providing multiple perspectives and facilitating the understanding of complex concepts. Mamcasz-Viginheski*et al*. (2019) illustrates how interdisciplinarity and inclusion can be promoted in the classroom, as follows:

> Mathematical literacy games for students with visual impairments represent an innovative pedagogical approach, which not only stimulates logical reasoning and problem solving, but also promotes the social and educational inclusion of these students. Through the implementation of playful activities that integrate mathematical concepts into everyday contexts, it is possible to offer a more engaging and meaningful learning experience, which values individual capabilities and encourages collaboration among all students (p. 408).

This approach emphasizes the importance of creating a collaborative and accessible learning environment, where students with visual impairments can actively participate alongside their peers, exploring mathematical and scientific concepts in an interactive and integrated way.

Therefore, teaching methodologies aimed at inclusive education for students with visual impairments require a combination of adapted resources, specific pedagogical strategies and an interdisciplinary approach. By applying these principles, educators can facilitate a more effective and inclusive learning process that recognizes and values the diversity of all students.

## CASE STUDIES AND SUCCESSFUL PRACTICES

Analyzing case studies and observing successful practices are fundamental to understanding effective teaching strategies in educating students with visual impairments. These practical examples provide evidence on how to adapt pedagogical methods and teaching resources to meet the specific needs of these students, in addition to highlighting the importance of creativity and innovation in overcoming educational barriers.

A case study highlighted by Camargo (2005) investigates the implementation of Physics teaching activities adapted for blind and visually impaired students. The author emphasizes that the adaptation of the didactic content, including the use of tactile models and detailed verbal descriptions, was essential to facilitate students' understanding of physical concepts. This approach not only promoted the inclusion of these students in learning activities, but also demonstrated the potential of alternative teaching methods to enrich the educational experience for all students.

Costa, Gil and Elias (2020) carry out an analysis of the literature on teaching mathematics to people with visual impairments, identifying several successful practices that include the use of tactile resources, such as adapted ruler and compass, and specific educational software. The authors reveal the importance of these adaptations:



> Teaching mathematics to students with visual impairment requires a differentiated approach that considers the sensory particularities of these students. The use of adapted materials and assistive technologies allows these students not only to access mathematical content, but also to actively participate in the learning process, developing essential skills for their autonomy and academic success (p. 5).

Furthermore, Mamcasz-Viginheski *et al.* (2019) discuss the implementation of games in literacy-mathematics for students with visual impairments from an inclusive perspective. The research demonstrates how games and adapted recreational activities can facilitate the understanding of complex mathematical concepts, in addition to stimulating social interaction and collaboration between students with and without visual impairments.

These successful practices highlight the importance of inclusive education that values differences and promotes a learning environment accessible to all. Through the analysis of case studies and the implementation of effective strategies in the classroom, it is possible to develop an educational model that meets the needs of students with visual impairments, guaranteeing them the same learning and participation opportunities as their peers.

## DISCUSSION

The discussion about teaching strategies and the effectiveness of assistive technologies in the education of students with visual impairments reveals a diverse panorama of pedagogical approaches and teaching resources. The comparison between different strategies identified in the references examined highlights the importance of adapting the educational process to the specific needs of these students, in addition to recognizing the potential of assistive technologies to promote inclusion and accessibility.

Camargo (2005) highlights the need for adaptations in physics teaching, highlighting the importance of tactile resources and verbal descriptions to facilitate the understanding of abstract concepts by students with visual impairments. This approach emphasizes the value of curricular and methodological adaptations to make content accessible. On the other hand, Costa, Gil and Elias (2020) discuss the application of assistive technologies in teaching mathematics, demonstrating how specific educational software can facilitate access to mathematical content for students with visual impairments.

The effectiveness of assistive technologies is recognized in the works analyzed. Santos (2017) argues about the significance of assistive technologies:

> The use of assistive technologies in the educational context has proven to be a powerful tool in overcoming barriers to learning for students with visual impairments. Devices like UnBraille not only provide access to curricular content autonomously, but also encourage active student participation in the process educational, promoting the effective inclusion of these students in the academic environment (p. 10).

This perspective highlights the contribution of assistive technologies not only to accessibility to educational content, but also to promoting the autonomy and participation of students with visual impairments.

Mamcasz-Viginheski *et al.* (2019) complement this vision by discussing the use of adapted educational games, highlighting how playful and inclusive strategies can contribute to the learning of mathematical concepts. This approach illustrates the versatility of teaching strategies and the ability to adapt them to meet specific educational needs.

In summary, the comparison of different strategies and the discussion about the effectiveness of assistive technologies highlight the complexity of educating students with visual impairments. The integration of adaptive pedagogical approaches and the use of assistive technologies emerge as central elements to promote inclusive education, ensuring that all students have equal opportunities for learning and participation in the educational environment.

## RECOMMENDATIONS FOR FUTURE PRACTICES AND RESEARCH.



In light of the evidence and discussions presented in the analyzed references, it is possible to highlight significant recommendations for future practices and research in the area of education for students with visual impairments. These recommendations aim to improve teaching strategies and the implementation of assistive technologies, contributing to a more inclusive and accessible educational environment.

Firstly, it is recommended to continue and expand the training of educators regarding the specificities of visual impairment. It is imperative that teachers are prepared to adapt teaching methods and teaching materials to meet the needs of all students. Camargo (2005) highlights the importance of developing adapted teaching activities, emphasizing the need to

educational resources that are accessible to students with visual impairments.

Furthermore, research and development of assistive technologies must be encouraged and supported. Santos (2017), for example, highlights the positive impact of low-cost computing devices in supporting Braille literacy. A quote from this author reinforces this view:

> Investment in assistive technologies is essential to promote the educational inclusion of students with visual impairments. Such tools not only facilitate access to knowledge, but also promote the autonomy and active participation of these students in the academic environment. Therefore, it is recommended that public policies and private initiatives be developed that encourage research and the availability of assistive technologies innovative and accessible (p. 13).

This perspective highlights the importance of policies and initiatives that support the development and implementation of assistive technologies as a means of promoting inclusive education.

Additionally, it is suggested to carry out more case studies and empirical research focused on the practical application of teaching strategies and assistive technologies in the classroom. Such studies can provide insights into best practices, as well as identify challenges and opportunities for future improvements.

Finally, it is recommended to promote interdisciplinarity in the education of students with visual impairments, exploring how different areas of knowledge can contribute to more effective and inclusive teaching strategies. The integration of pedagogical approaches from different disciplines can enrich the learning process, offering students a more holistic educational experience adapted to their needs.

In short, recommendations for future practices and research highlight the need for ongoing training of educators, development and implementation of assistive technologies, carrying out more empirical studies and promoting interdisciplinarity. Such efforts are essential to advance inclusive education for students with visual impairments, ensuring all students have access to quality education and equal opportunities for academic and social success.

## FINAL CONSIDERATIONS

The final considerations of this study reflect on the relevance of teaching strategies and assistive technologies in the education of students with visual impairments, highlighting the main findings of the literature review carried out. The analysis of the selected references demonstrated the importance of adapted and inclusive educational practices, which consider the specific needs of these students to promote their access to knowledge and their effective participation in the educational environment.

The adaptation of teaching material and teaching methods, including the use of tactile resources such as Braille and three-dimensional models, has emerged as a fundamental aspect to facilitate learning for students with visual impairments. The importance of continuous training of educators in this context was also highlighted, highlighting the need for trained professionals who are sensitive to the particular demands of this student population.

Assistive technologies were recognized as tools to support inclusive education, allowing students with visual impairments to access educational content autonomously and actively participate in the learning process. Devices such as adapted educational software and screen reading devices have demonstrated their potential in promoting students' independence and inclusion in the academic environment.

The integration of inclusive games and activities into pedagogical practice proved to be an effective strategy for engaging students with visual impairments, offering a playful and interactive way to explore academic concepts. These approaches not only enrich the learning experience, but also They also promote social interaction and collaboration between students with and without visual impairments.



The discussion also revealed the need for more research and case studies that explore the practical application of teaching strategies and assistive technologies. Such investigations are important to improve educational practices, identifying challenges and opportunities for future innovations. Furthermore, the importance of interdisciplinarity in the education of students with visual impairments was highlighted, suggesting that collaboration between different areas of knowledge can contribute to a richer and more adapted educational approach.

In short, this study highlights the importance of continuing to develop and implement

adapted teaching and assistive technologies in the education of students with visual impairments. Through an inclusive and accessible educational approach, it is possible not only to meet the specific needs of these students, but also to enrich the learning environment for all. Thus, the need for educational policies and pedagogical practices that promote equal opportunities and the full participation of students with visual impairments in the educational process is emphasized, guaranteeing them the means to achieve their academic potential and actively contribute to society.

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