ific Journal O Saber.
ISSN: 2675-9128. Sao Paulo-SP.

Year III, v.3, ed. 1, Jan./Jul. 2023. DOI: 10.51473/ed.al.v3i1.580| submission: 08/14/2023 | accepted: 08/16/2023 | published: 08/28/2023

ASSISTANT TECHNOLOGY IN EDUCATION: Promoting a Culture of Inclusion in Brazilian Public Schools

Markelen Dutra[1]

SUMMARY

This article proposes a contemporary analysis of Assistive Technology in Education and its direct relationship with the promotion of a culture of inclusion in the school context. The methodological paths followed were bibliographic review analysis; analysis of contemporary social facts and also, with interviews with experts who work on innovation and assistive technology projects. We sought to bring to the fore a contextualization of the social fact relating to the Brazilian school context regarding the use and application of Assistive Technology in Specialized Educational Assistance (AEE) in Brazilian public schools, as well as analyzing data and information from the Brazilian Institute of Geography and Statistics (IBGE) which, through the census, analyzes the social context of people with disabilities, high abilities/giftedness and singularities. In this effort, the article discusses academic analyzes in order to try to understand some paradoxes that arise in the convergence of information. Through an academic perspective, the investigations focused on the most basic concepts regarding Assistive Technology, as well as bringing up social and pedagogical issues and also presenting the technology called Colibri, which presents itself as an alternative to breaking through existing obstacles to a digital and social inclusion of people with disabilities in Brazil. **Keywords: assistive technology, school inclusion, special education, social inclusion.**

ABSTRACT

This article proposes a contemporary analysis of Assistive Technology in Education and its direct relationship with the promotion of a culture of inclusion in schools. The methodological paths followed were those of the bibliographic review analysis; analysis of the contemporary social fact and also, with interviews with experts who work in innovation projects and assistive technology. We sought to bring up a contextualization of the social fact related to the Brazilian school context about the use and application of Assistive Technology in Specialized Educational Assistance (AEE) in Brazilian public schools, as well as to analyze data and information from the Brazilian Institute of Geography and Statistics (IBGE) which, through the census, analyzes the social context of people with disabilities, high abilities/giftedness and singularities. In this eagerness, the article discusses through academic analyzes in order to try to understand some paradoxes that are installed in the convergence of information. Through an academic perspective, the investigations were of the most elementary concepts about Assistive Technology, as well as brought up social and pedagogical issues and also presents the technology called Colibri, which presents itself as an alternative to break with existing obstacles to a digital and social inclusion of people with disabilities in Brazil.

Keywords: assistive technology, school inclusion, special education, social inclusion.

1. Introduction

In contemporary society, there are extensive studies on the advances and countless benefits of technologies in different areas: business; of health; education; of sport; of culture; among others. With the development of Digital Information and Communication Technologies (TDICs) and greater access to mobile devices, the population is increasingly approaching such resources. In this sense, it is also pertinent to understand how technology has enabled and supported inclusion digital of people with deficiency. The present work aims to present the benefits and challenges of assistive technology for this audience, especially those with severe motor impairment of the upper limbs, in order to support the process of accessibility to the digital world: internet access; digital information and mobile devices, elements that are so important to ensure communication; access to information and social coexistence and interaction. And also, bring up a current debate about the challenges of implementing assistive technology in education, seeking a relationship with Brazilian digital culture and school inclusion.

1 Master's student in Emerging Technologies in Education; Specialist in Technology in Education, Neuropsychopedagogy, Business Pedagogy, Higher Education Teaching Management, Strategic People Management. Graduated in Pedagogy; Bachelor's degree in Psychology (in progress).

The methodology of this work uses a bibliographical review, in order to collect a theoretical framework on digital inclusion and assistive technology with a focus on research on the functionalities of a device, which is a mouse that works through head movements for people with severe motor disabilities. This device, whose name is Colibri, captures intuitive head movements to control the pointer of the *Mouse* with precision and that benefits access to *Internet* in its varied functionalities, the use and application of computers and mobile devices, minimizing efforts and simplifying their use. Also, information will be collected through interviews about the use and application of Colibri. This information collection was carried out together with the consultants, who provided a knowledge framework for understanding and validating hypotheses regarding implementation challenges in the context of inclusive education. Videos and User Guides were used, found on the manufacturer's website, materials that supported the theoretical framework regarding the technology in question, providing elucidation on the possibilities and difficulties of handling, activation and interaction by users.

The new WHO Global Report on Assistive Technology, released in 2022, highlights that almost 1 billion adults and children with some type of disability are excluded from access to technical aids or assistive technology. In total, there are more than 2.5 billion people lacking resources such as wheelchairs, hearing aids or applications to aid communication and cognition (WHO, 2022). This exclusion can occur for a number of reasons, such as the lack of assistive technology in certain regions or countries, the lack of knowledge or financial resources to acquire these technologies, or the lack of access to these technologies for different types of people with disabilities. For example, in the school context there are assistive technology resources that are designed for people with visual or hearing impairments, but are not suitable for people with mobility disabilities. To combat this exclusion, it is important that public initiatives, non-profit organizations and companies work together to develop accessible and inclusive assistive technologies and ensure that all people with disabilities can benefit from these technologies, regardless of their geographic location or socioeconomic conditions. Based on this understanding, it is important to bring to the forefront and at the level of academic discussion, knowledge about the benefits of assistive technology resources and the challenges of its implementation in education. In short, the exclusion of people with disabilities from the use and application of technology is a complex issue that requires a holistic and collaborative approach. Therefore, studies and analyzes are necessary to understand this contemporary social fact.

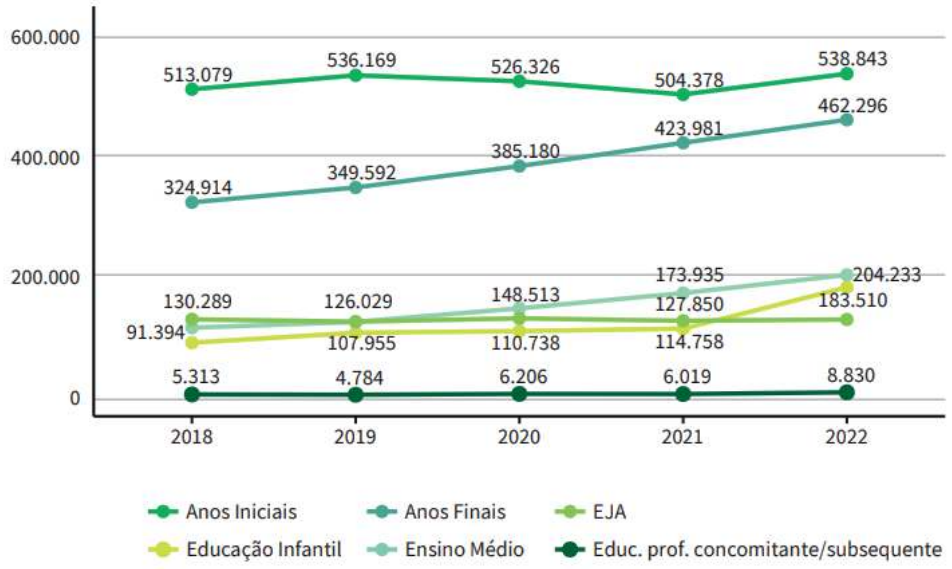
2 Inclusive Education in Brazil

According to the World Health Organization (WHO), around 15% of the world's population lives with some type of disability. In Brazil, in 2019, there were 17.2 million people aged 2 years or older with at least one of the disabilities studied, representing 8.4% of the population in this age group. They were in 14.5 million households, 19.8% of the total. On average, the proportion was higher among people aged 60+ (24.8%) than between those aged 2 and 59 (5.1%). People with disabilities had a more feminine profile (9.9%) than masculine (6.9%), more black or brown people (8.7%) than white people (8.0%) (IBGE 2019).

In the last decade, according to the School Census, there has been a substantial increase in the demand for Specialized Educational Assistance (AEE). When talking to professors and experts in the sector, they are unanimous in stating that this demand will increase even more in the coming years, they point to the fact, mainly, of the global increase in life expectancy and the population with some type of disability, in addition to the greater availability and access to information by the family, as well as the continuous improvement of diagnostic processes in relation to disorders, syndromes and their comorbidities.

Data from the School Census in Brazil (INEP, 2019) portray this reality when it shows the progressive number of enrollments of students with disabilities, disorders or high abilities in common or exclusive special classes, according to each stage of education – Brazil – 2018-2022.

Graph 1 - Enrollment of students with disabilities, disorders or high abilities in common or exclusive special classes, according to each stage of education in Brazil (2018-2022)



Source: INEP/School Census, 2022.

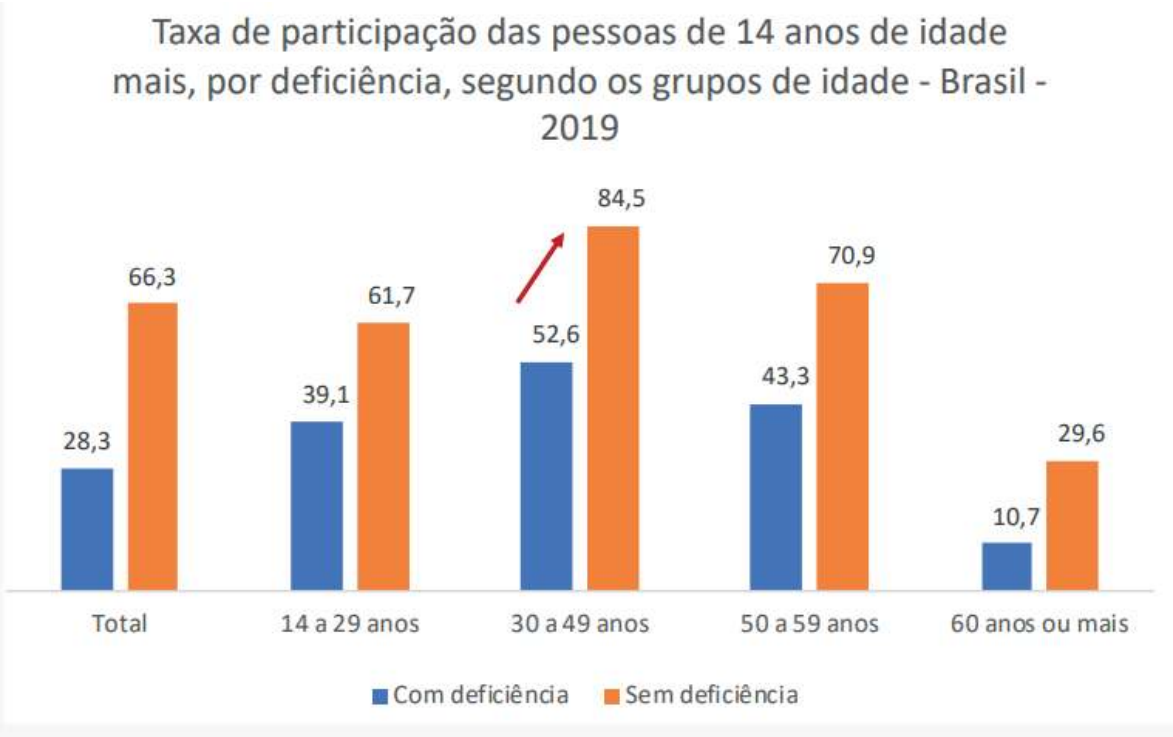
Data from the School Census in Brazil (INEP 2022) shows that the number of enrollments in special education reached 1.5 million in 2022, an increase of 29.3% compared to 2018. The largest number is in elementary education, which concentrates 65.5% of these enrollments. When evaluating the increase in the number of enrollments between 2018 and 2022, it is clear that early childhood education is the one that grew the most, an increase of 100.8%. The graphs on inclusive education in Brazil (INEP, 2022) provide substantial data that, increasingly, children and young people with disabilities are included in mainstream schools.

Graph 2 - Evolution of special education enrollments in early childhood education by place of service - Brazil (2010-2020).

Source: Inep/School Census, 2022.

Contrary to data from the 2022 School Census, the analysis of IBGE data from 2019 reveals that people with disabilities in Brazil are less educated, have greater difficulty accessing the job market and have lower income. The compilation points to several inequalities experienced by this group, which comprised 17.2 million people in 2019 or 8.4% of the population.

Graph 4 - Percentage of people in the workforce in relation to people of working age.



Source: IBGE, National Health Survey, 2019.

Agência Brasil, after analyzing the data, states that the difficulty that begins in education and intensifies in the job market, because while 66.3% of people without disabilities are within the force, whether employed or looking for a vacancy, this participation drops to 28.3% in the case of those who have some condition. According to IBGE (2022), this is due to the fact that people with disabilities generally have less specialized and lower-paid occupations, in addition to a series of prejudices.

In this direction, the distinction between integration and inclusion is a good start for analyzing the evolution of enrollment of people with disabilities in common classes and the lack of participation in workforce groups. Mantoan (2015) draws attention to the difference between the words: integration and inclusion, because despite having similar meanings, they are used to express different insertion situations and are based on divergent theoretical-methodological positions.

> The use of the word integration refers more specifically to the inclusion of students with disabilities in regular schools. (...) through school integration, the student has access to regular education classrooms. (...) offers the student the opportunity to move through the school system – from regular classes to special education – in all its types of special school services: special classes in regular schools, itinerant teaching, resource rooms, hospital classes, teaching home and others. (...) Inclusion implies a change in educational perspective, as it not only affects students with disabilities and those who have difficulty learning, but everyone else, so that they are successful in the general educational stream. (Mantoan, 2015)

Given the above, it is increasingly latent to reflect on inclusive education, as a bridge to equal opportunities and rights. According to Kleina (2015), an inclusive school requires review and expansion of educational practices that go beyond traditional pedagogical work, addressing not only learning difficulties arising from disability, but all students, offering equal learning opportunities to all.

Indeed, when thinking about inclusive education and educational opportunities for all, technology resources nology assume a leading role when providing new forms of access to learning and information, a bridge of access to information and communication resources with life in society. The Global Report on Assistive Technology (WHO, 2022) suggests that availability, safety and effectiveness be ensured, alongside accessibility to these means.

Therefore, it is undeniable that, over time, technology has gained more and more prominence in contemporary society, it is present everywhere and at school, as happened in a not so distant time, it has not been left out. . Technology goes hand in hand with supporting everyday life with tools developed to simplify and provide access to the daily routine, from the simplest to the most complex. If it is true that "whether with the teacher or with the students, technologies have contributed to the construction of

knowledge" (Leite, 2022), it is pertinent that we ask ourselves whether this technology is also available to students with disabilities.

According to Kleina (2012, p.32), it is essential in special education:

> (...) While the use of technology in education can still be discussed, in special and inclusive education its use is mandatory, as many students depend on this medium to learn. Therefore, when we combine the application of technology in special education, we are giving students the possibility of demonstrating their potential, learning, interacting and actively participating in our society.

Thus, Assistive Technology aims to provide people with disabilities with greater independence, quality of life and social inclusion, through expanding their communication, mobility, control of their environment, learning skills, work and integration with the family, friends and society, as it improves their functional capacity, allowing and increasing their participation and inclusion in all areas of life. Still from this perspective, according to Besch (2017), AT promotes the expansion of a deficient functional ability or enables the performance of the desired function that is prevented by circumstances of disability or aging. The definitions of assistive technology and assistive products differ depending on their purpose and scope. For example, some countries have developed their own definitions to specify legal measures, classify products or facilitate communication (WHO, 2022). When researching the topic of Assistive Technology in our country's official documents, we found the terms: assistive technology, technical aids, support technology. In Brazilian legislation, the term "technical aid" is used when it comes to guaranteeing Brazilian citizens with disabilities access to resources designed to improve their functional skills (BESCH, 2017). For the Technical Aid Committee (CAT), the expressions "assistive technology" and "technical aid" are understood as synonymous, as our official legislation still contains the term "technical aid". The same author highlights another important point about the terminology found in the documentation produced by CAT, which is the indication of the use of the expression Assistive Technology always in the singular, as it refers to an area of knowledge and not a specific collection of products (BRAZIL – CAT, ATA V, 2009). Correctly using the term in the singular helps to understand the scope of this concept. According to the Global Report on Assistive Technology, "everyone is likely to need assistive technology during their lifetime, especially as they age" (WHO, 2022). According to the same report, assistive technology is also a means of exercising human rights. The United Nations Convention on the Rights of Persons with Disabilities recognizes this. Requires States to provide the necessary assistive technology to enable persons with disabilities to exercise their rights to education, work, leisure, participation in the cultural life of the community, etc., and freedom of opinion and expression. Unicef Executive Director Catherine Russell said there are 240 million children with disabilities. Without the right to essential products to progress, they are affected at individual, family and community levels. The head of the agency stated that without access to assistive technology, children with disabilities will continue to miss out on education, remain at greater risk of child labor and subject to stigma and discrimination,that undermine your confidence and well-being.

The evolution of technologies focused on supporting and helping people with motor limitations to use computational and digital resources such as the internet, contributes significantly to improving the quality of life and the inclusion of people with disabilities in society. It is known that there is a great effort on the part of professionals in creating adapted subjects and in the search for assistive technology resources to seek autonomy and social interaction for students with cerebral palsy, quadriplegia or moderate to severe impairment of the upper limbs to access of them to the school curriculum and the development of learning, as, in general, some of these students will never be able to hold a pencil or pen, or even develop a form of writing or language. Allowing these students to access computers and cell phones, Alternative and/or Augmentative Communication software without using their hands, may be the only learning option for some of them. Overcoming these difficulties is one of the purposes of Assistive Technology, seeking these resources is the role of the school and the public initiative. An example of assistive technology in favor of these students' learning, the Colibri device[two], the head mouse thatallows people with moderate to severe impairment of the upper limbs, without using your hands, control your cell phone, tablet and computer just by moving your head and blinking your eyes.

2 Trademark registered by TiX Assistive Technology – Available at: https://tix.life/tecnologia-assistiva/colibri-mouse-de-cabeca/. Accessed on: April 22, 2023, at 6:31 pm.

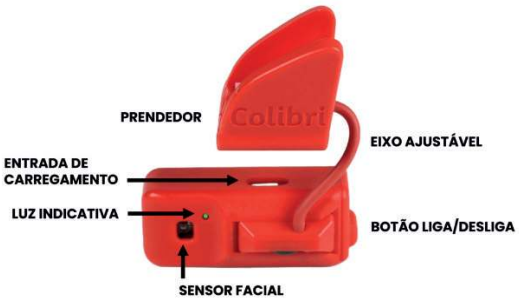


Figure 1 – Assistive technology: head mouse.
Source: Tix Assistive Technology, SD

Colibri assistive technology is designed to help people with disabilities access computers and cell phones, to overcome the limitations they face in their daily lives, allowing them greater independence and social inclusion. Equipped with sensors, which can be attached to glasses or clothing on the head, in order to control the mouse pointer. The hummingbird operates via technology *bluetooth* and with high-performance rechargeable microbattery. According to the *site* From the manufacturer, Colibri was created to support and allow access to information, communication and the use of technological resources, for people with a level of severe impairment of upper motor functionalities such as: quadriplegia, cerebral palsy, stroke sequelae, among others.

Figure 2 - Colibri Functionality Diagram

Source: Prepared by the author, 2023.

In the description on the manufacturer's website, the Colibri is small, light and wireless. Inside it, there is a sophisticated motion sensor, a facial gesture detector and a rechargeable battery. It also has an indicator light and beeps for signaling and canbe adjusted to the peculiarities and characteristics of each individual, for this, the company created an application capable of thoroughly customizing the operation of the device so that it adapts to each person.

These support resources have a much greater objective for students with disabilities, as when used they can break down prejudices, sensory, motor or cognitive and communication barriers that limit or prevent access to information or knowledge that can be acquired; It can also promote access to the school curriculum and active and autonomous participation in pedagogical projects. With the help of technical solutions adapted to the individual needs of each student, autonomy, independence and full participation in school activities can be promoted in the learning challenge, which, without these technological resources, would be restricted or non-existent.

Therefore, it can be concluded that AT resources are powerful tools to promote the inclusion and participation of students with disabilities in schools, especially in Brazilian public schools, with common classes, where the largest number of enrollments is concentrated, mainly in Specialized Educational Assistance (AEE) services.

The use of assistive technology in public schools can also help to reduce the educational barriers and difficulties faced by students with disabilities, but also qualify them for the job market, allowing them to develop their skills and competencies in a more efficient way. more efficient. Based on this assumption, when interviewing one of the consultants from the company that provides Colibri and questioning him about the scope of this product for educational purposes, he informed that this assistive technology resource is part of the portfolio of the TiX Literacy Educational Program (PETL) – a set of assistive technology solutions and educational services - sold to public education networks. According to PETL consultants, this set of educational solutions is in several municipal and state education networks throughout Brazil, but to effectively implement it in the public schools where they operate, continued training of teachers and professionals who work directly in AEE is necessary. so that they can use technical solutions in an appropriate and personalized way for each student. In addition to the products that help students access computing resources and mobile devices, he also highlighted that it is necessary to guarantee the accessibility and interoperability of educational software and augmentative alternative communication that integrate these Assistive Technology resources that make up this set of solutions, which guarantees the continuity of learning and support for students with disabilities at all stages of school education.

3 Final Considerations

After the studies and analysis of the data demonstrated here, it is necessary to paraphrase Mary Pat Radabaugh (1993), when she states that: "for people without disabilities, technology makes things easier. For people with disabilities, technology makes things possible." In fact, access to appropriate assistive technology can mean the difference between enabling or denying an education for a child, participation in the workforce for an adult, or the opportunity to maintain independence and age with dignity for an older person. Access, use and application of Assistive Technology empowers, provides autonomy, empowers individuals and guarantees the acquisition of rights.

It was evident, then, that investing in assistive technology can contribute to the promotion of a culture of inclusion in Brazilian public schools, as it makes possible equal educational opportunities, the expansion of communication and interaction with the social world, access information and knowledge, when it allows students with disabilities to use computational resources with the same objective as their colleagues: searching the web, constructing texts, tabulating information and even communicating. Students with disabilities, like their colleagues, would use the computer as a technological tool applied both in the educational and social context, being able to benefit from technology for learning. Both at school and in the job market, people with disabilities need to be part of the social world, make use of new technological tools in order to qualify, but also have access to multiple ways of organizing, expressing and acquiring the knowledge they have built. .

4 References

(n.d.). Source: https://agenciabrasil.ebc.com.br/radioagencia-nacional/direitos-humanos/audio/2022-09/ibge- - people-with-disabilities-have-lower-income-and-less-education

Bersch, M. L. (2023). Source: Assistiva Tecnologia e Educação: https://www.assistiva.com.br/tassistiva.html#top Costa, D., & Martins, G. (2022).*Adaptive Educational Platforms: personalized learning in digital culture.*Curitiba: Letter and Form.

Freire, P. (2019).*Pedagogy of Autonomy.*Rio de Janeiro: Peace and Land.

Freire, T. (September 21, 2022).*Brazil Agency*. Source: Agência Brasil: https://agenciabrasil.ebc.com. br/radioagencia-nacional/direitos-humanos/audio/2022-09/ibge-pessoas-com-deficiencia-tem-menor-income-e-less-education

Gómez, Á. I. (2015).*Education in the digital age: the educational school.*Porto Alegre: I think so.

Guedes, A., Rudi Birgman, G. m., Savioli, C., & Motta, J. (2020).*Education for an exponential world.* Belo Horizonte.

Hummel, E. I. (2015).*Assistive Technology: inclusion in practice.*Curitiba: Appris. Kenski, V. M. (2012).*Education and technologies: the new rhythm of information.*Campinas: Papirus.

kleina, C. (2012).*Assistive technology in special education and inclusive education.*Curitiba: InterSaberes.
Leite, B. S. (2022).*Digital Technologies in Education: from training to application.*São Paulo: Physics Bookstore.
Mantoan, M. T. (2021).*School Inclusion: what is it? Why? How to make? .*São Paulo: Summus.
WHO. (May 16, 2022).*news.un.org*. Source: United Nations: https://news.un.org/pt/story/2022/05/1789172
Sancho, JM, & Hernández, F. (2006).*Technologies to transform Education.*Porto Alegre: Artmed.