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Accessibility Policy: what people with visual impairment say

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ABSTRACT – Accessibility Policy: what people with visual impairment say.
This study aimed to discuss the national policy of digital inclusion and the
impact of Assistive Technology (AT) on the education and inclusion of vi-
sually impaired people. The analyses anchored to Cultural Studies and to
the opinion of people with impaired vision or blindness indicated advances
and challenges to improve resources and adaptation of TA applications
in order to effect the access to knowledge, mastery and functional use of
resources, in a way to ensure the right to education and to the quality of
school and social inclusion.
Keywords: **Inclusive Education. Assistive Technology. Visual Impairment.**

**RESUMO – Política de Acessibilidade: o que dizem as pessoas com defi-
ciência visual.** O propósito deste estudo foi discutir a política nacional
de inclusão digital e o impacto da Tecnologia Assistiva (TA) para a edu-
cação e a inclusão de pessoas com Deficiência Visual. As análises an-
coradas nos Estudos Culturais e na opinião de pessoas com baixa visão
e cegueira indicaram avanços e desafios para melhoria dos recursos e
adaptação de aplicativos de TA para que se efetivem o acesso ao con-
hecimento, o domínio e o uso funcional dos recursos, de forma que ga-
rantam o direito à educação e à qualidade da inclusão escolar e social.
Palavras-chave: **Educação Inclusiva. Tecnologia Assistiva. Deficiência Vi-
sual.**

Introduction

In the contemporary world, technological transformations have expanded access opportunities to information, communication and education for people with disabilities. Such transformations allow people with visual impairment (VI) the access to knowledge in order to reach the highest levels of schooling, autonomy and participation in the cultural life of their community, which can be named as a digital and social inclusion process.

In Brazil, in recent decades, the inclusion policy of people with disabilities has focused on technologies to eliminate attitudinal barriers, in communication and learning, with resources developed to meet the specific needs of students with visual impairment.

In this sense, the National Policy of Special Education in the Perspective of Inclusive Education (Brazil, 2008), undeniably represented a great political and conceptual advance, especially regarding the understanding of special education as a non-substitutive modality for schooling and the proposal of special educational service, complementary or supplementary to the formation of students with disabilities, global developmental disorders and high skills/giftedness.

According to these political guidelines, special education pervades all levels and modalities of education, from early childhood to higher education, destining to the Special Educational Service the function of identifying, elaborating and organizing pedagogical resources that eliminate the barriers for the full participation of students, through a pedagogical proposal articulated with common education.

From this policy and from the normative guidelines of the Special Education Service (AEE – Atendimento Educacional Especializado) (2011a), the focus becomes the provision of Multifunctional Resources Classes in basic education, with technological resources, as well as the creation of Accessibility Centers in higher education, with a large investment in technology to the access of knowledge and information.

In this conception, by Decree no. 7.611 (Brasil, 2011b), the Ministry of Health defines the AEE as: "[…] a set of activities, accessibility and pedagogical resources organized institutionally and continuously […]" (Brasil, 2011b, art. 2º, §1º). Thus, the National Policy of Special Education recommends the use of Assistive Technology with the creation of multifunctional resources classes of two types: type I classes are constituted of microcomputers, monitors, headphones and microphones, scanner, laser printer, keyboard and keyguard, mouse and switch, laptops, accessible material and pedagogical games, software for alternative communication, manual and electronic magnifiers, reading supports, tables, chairs, cabinets, white board.

Type II multifunctional resources classes, destined to people with visual impairment, are made of the resources of type I classes, plus specific resources to assist blind students, such as: braille printer, braille typewriter, braille reglet[1], punch, abacus, signature guide, accessible

globe, accessible geometric drawing kit, talking calculator, software to make graphic and tactile drawings (Brasil, 2008).

The starting point of this study was based on the concept of network society and information society with access to knowledge, to the process of democratization of information of the Spanish sociologist Manuel Castells (2010). Thus, the evolution of technology, in the aspects of service, communication, scientific or cultural contents, impels this society, and then, the need for people to have access to these tools grows more and more, at which point the digital in/exclusion begins to be discussed.

In this global communication process, the networked society reflects what occurs in traditional society, in which social inequalities include some people and exclude others. Not everyone has access to global networks and, consequently, to everything that involves this process: information, education, economy, government, knowledge, culture and communication. Social networks are in all aspects of people's social lives, including at school. Study groups, shared projects, collaborative research, and communication with teachers are some existing interactions that expand the school space, which today goes beyond physical space, incorporating these visual spaces.

In relation to accessibility in education for people with impaired vision, the studies by Ribeiro (2012) and Petri (2012) discussed the use of AT as methodology to teach blind students and people with low vision. The first author analyzed the use of technology resources, in high school, and the second, in basic education. Both studies pointed out the importance of knowledge relative to technologies, in a computational environment, as a resource for school inclusion of visually impaired people. The results evidenced the teachers' difficulties in accessing information on technologies in a computational environment, the inefficiency of teachers training to work with visually impaired students and poor communication of teachers of regular and resource classrooms.

Thus, we were instigated to investigate the impact of ATs on education and on the inclusion of visually impaired people, as well as to identify the functionality of the resources used, verify the advantages and disadvantages and to analyze the possible strategies of adaptation/adequation in conjunction with users.

Initially, we will show the profile of visually impaired people, their experiences and the domain of technological resources. In a second moment, we will discuss the functionality, advantages and disadvantages of the most used resources, as well as suggestions to adapt these resources and, finally, we will analyze the contributions of technology for the academic and professional lives of visually impaired people in our midst.

Visually impaired people: experience and domain of the AT system

As seen above, ATs stand out as an important knowledge and research area nowadays, being configured as strategical action of the public policy for special education in the last decade. The Brazilian Law of Inclusion (Brasil, 2015) ratifies the Convention on the Rights of People with Disabilities (Brasil, 2008b), which comprises disability as the long-term impediment of physical, mental, intellectual or sensory nature, which, in interaction with one or two barriers, may obstruct their full and effective participation in society in equal conditions with others.

In the core of this Law, Assistive Technology, or technical aid, is defined as products, equipment, devices, resources, methodologies, strategies, practices and services that aim to promote the functionality related to activities and the participation of the disabled person, aiming at their autonomy, independence, quality of life and social inclusion.

To investigate the functionality and the impact of AT resources in schooling and social inclusion, 10 people with visual impairment, blindness and low vision were invited to participate of this study, with diversified profiles, from students to professionals with higher education in the field of technology and information.

In the users' profile, the results point to a general average of 32 years and 6 months, being the age range of the largest group of 30 to 39 years (six people), followed by the group of 20 to 29 years (four people). In relation to the level of education of the users of technology, most of the participants have higher education (6), from which 2 have graduate degrees, 3 finished high school and 1 completed elementary school.

Regarding the professional profile, most participants (8) state that they work; only two people do not. In relation to the type of training and profession, they informed: Pedagogue (4), computer technician (1), student (1), electrical engineer and teacher (1), phone operator (1), radiology assistant (1) and extruder (1). Regarding the condition of disability (blindness or low vision), most (6) informed being blind and 4 reported low vision.

Concerning the aspect of AT concepts: most participants (6) declared knowing AT, and (4) people declared partially knowing it or not knowing at all. Which shows that the terminology AT is not yet fully disseminated among their users, although an expressive number of participants is an educational professional.

The participants showed experience and domain of systems, such as the use of screen readers: 4 have from 10 to 17 years of experience; 4 people between 4 and 6 years; 1 with less than one year and 1 without experience.

Regarding the AT resources used more frequently, data showed that, from the moment in which users with VI start to use the computer

equipped with Dosvox and screen readers, they cease to use resources associated to the Braille system. Such data reaffirm the importance of technology as tool to access information and communication for visually impaired people.

Figure 1 shows that 10 participants use computers with screen readers, and only one uses braille. It is worth mentioning that people with low vision can benefit from screen readers.

Figure 1 – Used Resources
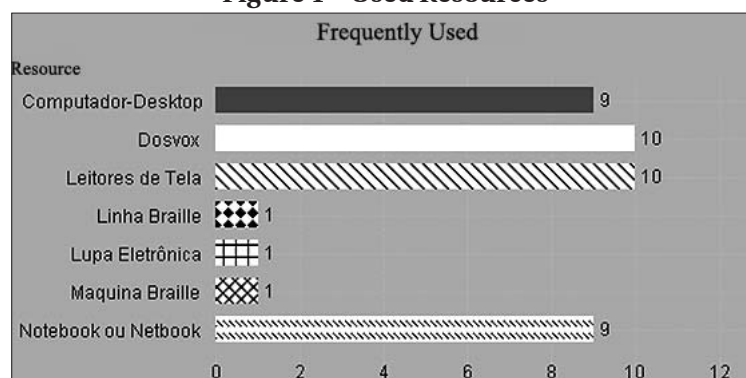
Source: Nascimento (2015, p. 77).

The data shown are significant for the analysis of implementation of the accessibility policy in our country, since, from the National Policy of Special Education in the Perspective of Inclusive Education (Brasil, 2008), the elimination of communication and information barriers in the Multifunctional Resources Classes predicts the provision of computers, screen readers, electronic magnifiers and braille machines in the space of Special Educational Service.

Figure 1 shows that the most used resource has been the computer with the respective screen readers. It is worth questioning: are these resources and the braille machine available for students in common classrooms or only in the resource room? Researches have revealed that the frequency to the resource rooms has been greatly reduced and that the students' access to academic contents is still restricted in the classroom.

We know that a braille line device or electronic display, unavailable in the Brazilian reality, would be enough to provide access to books, magazines and newspapers in every school or professional environments. This is the great challenge for the education of visually impaired people: functional technology, available in the classroom, for all the students who can benefit from it.

Canclini (1997) analyzed the asymmetries in the formation of the Latin American society, the sub-alternity and the production of social and cultural inequalities. Among them, he points the inequality between the possibilities of using the technological innovations in coun-

tries that produce technology and the dependency of South American countries in this sector. He ponders if it is necessary to include, in the decollecting and non-hierarchical strategies of cultural technologies, the existing asymmetries, in their production and use, between central and dependent countries, between consumers of different classes, within a same society (Canclini, 1997, p. 308).

Teachers and students with visual impairment cannot stay on the sidelines of these spaces. If the inclusion provides the effective participation of the visually impaired student in the school community, this subject cannot participate only physically in this community, since, in this way, inclusion would not be effected. AT resources are tools that allow the participation of teachers and students in the virtual environment of the school community. The appropriation of these resources by all teachers and students, with or without disabilities, is fundamental.

Canclini (1995) reports that, although we live in times of heterogeneity (diversity), that is, there is no uniformity within each nation, by the *fluid* nature of information, there are *codes that unite us*:

> We live in a time of fractures and heterogeneity, of segmentations within each nation, and of fluid communication with the transnational orders of information, fashion and knowledge. In the midst of this heterogeneity, we find codes that unite us, or at least permit us to understand each other (Canclini, 1995, p. 61).

It can be interpreted that these *codes that unite us* are the technologies that allow communication between heterogeneous elements, in multiple spaces and times, allowing the approximation and elimination of physical and geographical barriers between people and knowledge, but that show their dilemmas.

One of the main technological dilemmas is that "[...] the more problems technology generates, the more technology you need" (Bauman, 1997, p. 213), which becomes a counterpoint to the expansion of technology in the modern world: this is a critique to the *side effects* brought by technology, always creating a demand for new technologies. And, in our case, these are investments in technologies that are available in the classrooms, so that visually impaired students can participate of them in equal conditions of access to information and knowledge.

In relation to spaces of technology use, the interviewed with higher education relate, according to Figure 2 below, the use for academic formation (8), in news websites (8), social networks and professional activities (7), entertainments, among others (7).

Figure 2 – Using computers for activities
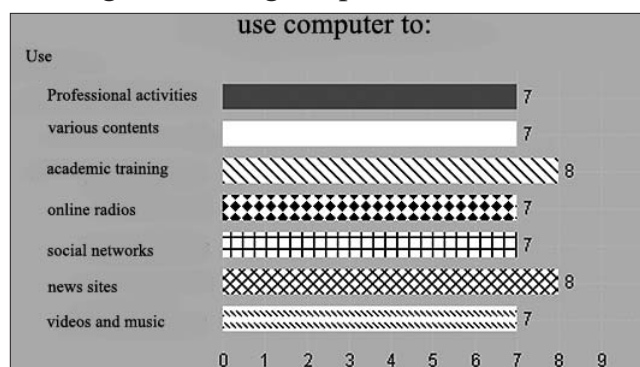
Source: Nascimento (2015, p. 96).

However, the high school and elementary students reported making little use of these resources in the classroom, which makes evident that AT resources are only available in the Special Educational Service.

Functionality of AT resources: advantages, disadvantages and suggestions for adaptations

Visually impaired people need books in accessible formats or digital files that can be recognized and accessed by a screen reading software or other assistive technologies that come to replace them, allowing reading with synthesized voices, characters expansion, different contrasts and braille printing.

In Brazil, the Educational Computing Center NCE/UFRJ (Federal University of Rio de Janeiro) has been developing, since 1993, a software called Dosvox (UFRJ, 2002), available for free, containing a complete system of text editing, games, internet browsers and utilities.

The interviewed indicated the Dosvox as the preferred operating system adopted by people with blindness and low vision. Organized by a menu and applications by category, its access is easy and agile. They consider the incorporation of resources advantageous, such as e-mail (Cartavox), Twitter (Twitvox) and YouTube (Voxnews), however, they request other resources that still do not exist, with direct access to Facebook.

Among the disadvantages pointed about the Dosvox are the robotic voice and the fact that the system is compatible only with Windows, which is paid. The suggestion would be access to Java language and a version compatible with Linux.

Some participants defend the use of NVDA (NonVisual Desktop Access), since the screen readers offer a variety of voices: female, male, hoarser or higher. There are still settings to adjust the reading pace to a more comfortable form to the user.

A little-known screen reader that deserves emphasis is the ORCA. It is little known because it only works on the Linux operational system, which not as used as Windows. However, the emphasis here is precisely because Linux is a free operational system, being widely used in public schools, since, in the last decades, it was a policy of the Federal Government to stimulate the use of the free software by public organs. In this study, only one participant uses ORCA, precisely because this participant is a computer technician, an advanced user, different from the other participants.

In terms of functionality, in the users' opinions, JAWS (screen reader by Scientific Freedom) was considered the one with most benefits, however, they emphasize the economic barrier. They suggest that these programs with higher technology be provided by the MEC or that they have their licenses economically accessible to students with visual impairment.

In this sense, Bauman (2003, p. 98) speaks on the dependency of consuming: in a consuming society, to share the dependency of consumer — the universal dependency on purchases — is the *sine qua non* condition of all individual liberty; above all, the freedom to be different, to have different identities.

Another investigated resource was the MecDaisy, a software developed by the MEC and the UFRJ (Federal University of Rio de Janeiro), which allows reading/listening to books in the Daisy format. This format — Digital Accessible Information System — is a document scanning standard used for the production of accessible books. This is a Federal Government initiative project, with high investments from the Ministry of Education.

The document Consolidation of School Inclusion in Brazil (Brasil, 2016) predicts that the National Education Development Fund (FNDE), through public centers of production of accessible didactic material, develop the Accessible Book Project. This project aims to ensure to students with disabilities, enrolled in public schools of basic education, books in accessible formats, with the implementation of the following actions:

– Financial support to Education Departments to produce pedagogical material in several accessible formats. In 2009, Psychosocial Care Centers (CAPs – Centro de Atenção Psicossocial) received assistive technology and furniture resources, such as: Large braille printer, table scanners, microcomputers, Braille line, braille duplicator, software to produce tactile drawings, among others;

– Development of an accessible digital information system (MecDaisy), which allows to access the text through audio, expanded characters and several navigation features through the structure of the book;

– Provision of 8,568 laptops for blind students, enrolled in the public network of basic education;

– Creation of an accessible digital collection (ADA – Acervo Digital Acessível), a virtual environment destined to the posting of accessible digital materials and the collective production of books in MecDaisy;

– Continuing education of the professionals involved in the production of accessible didactic material in digital format and in braille.

These political actions are essential for the implementation of the policy of accessibility and school inclusion of students with visual impairment. However, in this study, we could not find blind students who had benefited from resources such as laptops or braille lines.

As a main barrier for accessibility to the textbook, the participants pointed out the management of Special Education, economic policy and of the market reserve by textbook publishers. The critique is not destined to the MecDaisy technology, but to the National Textbook Program (PNLD – Programa Nacional do Livro Didático), which does not ensure the presence of works in the daisy format in schools. When the textbook is exchanged, students have no book for many months, at the mercy of commercial interests, excluded from access to knowledge and information, without, however, enjoying equal educational opportunities.

Regarding the disadvantages of the MecDaisy, the users point out: limitation of selected lines for the transfer to the text editor, text fragmentation, changing punctuation and accents, which makes the text edition time-consuming and possible only through manual correction. Users with low vision report that the MecDaisy does not effectively meet their needs, since the books are only sent when the presence of blind students in the school is informed.

They suggest that the MecDaisy should be in Universities, where the volume of books is always greater. The PNLD provision is destined to basic education, so that higher education is excluded from this initiative, compromising the universalization of special services and resources in all levels of education, as predicted by the National Policy of Special Education in the perspective of inclusive education. The assessment of public policies becomes essential, because only the provision of equipment and software is not enough to effect accessibility programs.

The impact of technology on academic and professional life and social inclusion

The contribution of computing to the academic and professional lives and to the social inclusion of visually impaired people has been significant, and the speech of the participants of this study depicts the impact generated in all the spheres of daily life, with greater frequency in academic, professional and access to information activities. A similar impact might be observed for social, cultural and social relationship activities, with little difference.

Hall (2004) shows his conception of identity in which, within the perspective of postmodernity, the subject no longer fits in only one but several identities, *sometimes contradictory or unsolved*:

> This [process] produces the post-modern subject, conceptualized as having no fixed, essential or permanent identity. Identity becomes a 'moveable feast': formed and transformed continuously in relation to the ways we are represented or addressed in the cultural systems which surround us (Hall, 1987). It is historically, not biologically, defined. The subject assumes different identities at different times, identities which are not unified around a coherent 'self' (Hall, 2004, p. 13).

In the interviews, we perceive the *transformations* described by Hall (2004), since being a user of technologies is a factor that composes the identity of these subjects, qualify and affirm them positively when they collaborate so that they are productive individuals, inserted and participating of different sociocultural groups.

The contradictions of a cybernetic and fragmented world are evident in the statements below, which, on one hand, point the benefits and, on the other, list some accessibility barriers. Let us see what visually impaired people say:

> Informatics, in its interfaces with the human cultural collection, represents an important contribution, especially in the scope of formal education and professional performance.

> Regarding social inclusion, I must expose that technology contributes a lot, but, at the same time, it offers barriers to the inclusion of people with visual impairment in society.

> Although technologies are constantly reformulated, what's indeed beneficial, these advances, as a rule, are inaccessible to us, especially when you've got to resort to adaptations, visually impaired people have no access conditions to the World Wide Web.

In this sense, Bauman (1999) shows the contradiction existing between the results of the technology advances, which, on one hand, were made to approach people and, in practice, has been driving people away. The author emphasizes that the creation of a "[…] cyber space of the human world" translates into isolation and indifference, to the extent that:

> […] rather than homogenizing the human condition, the technological annulment of the temporal/spatial distances tends to polarize it. It emancipates certain humans from territorial constraints and renders certain community-generating meanings extraterritorial — while denuding the territory, to which other people go on being confined, of its meaning and its identity-endowing capacity. For some people it augurs an unprecedented freedom from physical obstacles and unheard-of ability to move and act from a distance. For others, it portends the impossibility of appropriating and domesticating the locality from which they have little chance of cutting themselves free in order to move elsewhere (Bauman, 1999, p. 25).

For visually impaired people, to participate of the World Wide Web, of networks and groups that discuss the use and improvement of ATs, or simply to be able to participate fully and with autonomy of social networks might mean not only to eliminate physical and geographical obstacles, but also the freedom of being able to connect and interact in different communities.

Accessibility is a right that ensures the person with disabilities or reduced mobility to live independently and to exercise their rights of citizenship and social participation. The statements below emphasize the importance of technology for academic and professional training, communication and social interaction:

> If it weren't for computer science, it'd be much harder, because my college texts are all online, digitalized; at work, I'm now scanning all the phones books; social networks facilitate my communication with other people, both family and friends, and to be informed about the world.

> Technology (computers and, lately, other equipment such as smart-phones and tablets) contributed to facilitate things for which a blind person had no autonomy. I can say that computing is responsible for allowing me to work and for a great part of my social interactions.

Although the advance of accessibility policies in the area of visual impairment, in other researches conducted, we observed that the reglet is still an instrument widely used in public schools for the writing of blind students. This instrument is not adequate for young children, since it requires fine motor skills, notions of space, and established laterality and reversibility. We have advocated the use of braille machines since early childhood education and the use of braille lines from the fifth year of elementary school as an access opportunity to communication and information.

Final Considerations

To give voice to visually impaired people allowed us to know the resources and applications they use, the functionality of AT resources, the performed activities, communication barriers, facilities and difficulties of available resources, their claims and suggestions. The convention on the right of disabled people preconizes the active participation of these people in the elaboration and assessment of public policies as an essential principle of social inclusion.

The most used AT resources were described, as well as their advantages and disadvantages. Dosvox was appointed as the most used because it is free and easy to operate for beginners in computing, but it has disadvantages in relation to screen readers. The great advantage of Dosvox, which is the ease of use, becomes a disadvantage from the moment that the Dosvox updates are unable to keep up with the evolution of the resources available on the internet, accessible only with screen readers. JAWS was indicated as the best among screen reader systems, from a technical point of view, however, its cost makes it unfeasible for most people with VI. The NVDA, although not appointed as the best

screen reader system, is one of the most used and recommended ones, since it is free.

Regarding the MecDaisy application, with a reading function and reproduction of accessible digital books, was well assessed, appointed as similar to Dosvox. There is criticism regarding the target audience and its dissemination: they suggest the adoption of the resource in higher education and outside the academic environment for access to literature. The greatest criticism is due to the mercantilist conduct of the publishers in relation to the small availability of books in daisy format and the lack of negotiation of the MEC concerning the prevalence of the publishers' economic interests, to the detriment of the guarantee of the right to accessibility of the citizen with specific needs. Another constraint was the nonavailability, by the publishers, to students with low vision, who today constitute more than 80% of visually impaired students included in the general education system.

Regarding textbooks, it can be observed that an accessibility policy has not yet been implemented. For that to happen, the public power must adopt mechanisms to encourage the production, edition, dissemination and distribution of books in accessible formats, including publications of public administration, aiming to ensure to the disabled person the right to access reading, information and communication (Brasil, 2015). In this sense, this article recommends, in the book purchase notices, including the supply and update of library collections in all levels and modalities of education and in public libraries, that public power should adopt a clause preventing the participation of publishers that do not offer their production also in accessible formats.

These are claims in the speech of visually impaired people who participated as consultants in this study. The statements reveal the strong impact that technology exerts on school, professional life and on the social and cultural interactions of these people, as well as the critical view regarding the violation of the right to accessibility and social inclusion.

It is clear that, from the moment that they dominate accessible resources and applications, the use of the braille system is practically null. This factor becomes understandable because AT resources are agile and allow the access to knowledge in real time in the classroom or at work.

We do not intend to minimize the importance of braille, essential for the access to the reading and writing process, whose use should be encouraged from early childhood education, with the provision of the braille machines in the classrooms. However, it is evident that, in this study, the use of computing, specifically in the school context, fills a gap in the communication between the student with VI and the other members of the school community, especially with the teacher, since braille is a system that few have mastered, and it does not allow direct access to textual production of the blind student.

A research by Bruno (2013) considers that the National Policy of Special Education (Brasil, 2008) represents a great conceptual advance regarding: the education of people with visual impairment in common education, ensuring the right to equal opportunities; the expansion of the Special Educational Service; and the democratization of AT resources accessible to visually impaired people in this space.

AT resources are tools that allow the participation of teachers and students in the virtual environment of the school community. The appropriation of these resources by all teachers and students, with or without disabilities, must be the focus of the democratic school that fights for the equal access to knowledge and information. However, we have observed that, not only in the field of education of visually impaired people, but also in relation to other students, these resources are available only in the AEE space and are not present in the classrooms of common education.

Thus, the challenges for the public policy of education are: investing in accessible technology in an inclusive space; promoting the articulation between teachers of Special Education and Common Education; offering AT resources in the classroom, as well as the formation of these teachers for the use of technologies for all disabled people.

Finally, we turn to Canclini (1997), which helps us to reflect on how the dynamics of technological development reshape society, coinciding with the demands of social movements or contradicting them. There are technologies of different signs, each with multiple possibilities of development and articulation with the others. There are social sectors with cultural capital and a willingness to appropriate them, with different meanings: the decollection and hybridization are not the same for people, with blindness, low vision, and other disabilities or not. The meanings of technologies are built according to the ways in which they are institutionalized and socialized. We hope that the administrators of public policies on Special Education take these voices into account.

Note

1 Reglet is an instrument for writing in braille; it consists of a double ruler that opens and closes with the support of hinges in the left corner, whose opening is destined to the paper (with a grammage equivalent or greater than 120), being pinned between the top and bottom of the ruler.

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