

**ASSISTIVE TECHNOLOGY AND SCHOOL INCLUSION: MEDIATION AND
AUTONOMY IN QUESTION**

**TECNOLOGIA ASSISTIVA E INCLUSÃO ESCOLAR: MEDIAÇÃO E AUTONOMIA
EM QUESTÃO**

**TECNOLOGÍA DE ASISTENCIA E INCLUSIÓN ESCOLAR: MEDIACIÓN Y
AUTONOMÍA EN CUESTIÓN**

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ABSTRACT: This article aims to contribute to the inclusion of students with disabilities, based on the analysis and discussion of two cases in which mediation in the use of Assistive Technology (AT) enhanced learning and the constitution of autonomy. We used field diaries built during school meetings and school records as data sources. Diaries allow accessing oral narratives that spontaneously emerge in school life. The first case portrays the difficulty of a boy with a physical disability in using his wheelchair. The second case refers to communicative interaction of a boy with Autistic Spectrum Disorder. The way in which the child appropriates AT, signifies their daily experiences, constitutes their relationship with objects, and with others, enables building movements towards autonomy. The process, however, depends on the mediation in the interaction with culturally created elements and with social subjects.

KEYWORDS: Assistive technology. Mediation. Autonomy. Historical-cultural theory. Inclusion.

RESUMO: Este artigo tem como objetivo contribuir para a inclusão de alunos com deficiência, com base na análise e discussão de dois casos em que a mediação no uso de Tecnologia Assistiva (TA) potencializou a aprendizagem e a constituição da autonomia. São utilizados diários de campo construídos ao longo de reuniões na escola e registros escolares como fontes de dados. Os diários permitem acessar narrativas orais que emergem espontaneamente no cotidiano escolar. O primeiro caso retrata a dificuldade de um menino com deficiência física, no uso de sua cadeira de rodas. O segundo caso refere-se à interação comunicativa de um menino com Transtorno do Espectro Autista. O modo como a criança se apropria da TA significa suas vivências cotidianas e constitui sua relação com os objetos e com os outros, possibilita que movimentos em direção à autonomia sejam construídos. O processo, porém, depende da mediação na interação com elementos culturalmente criados e com sujeitos sociais.

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PALAVRAS-CHAVE: *Tecnologia assistiva. Mediação. Autonomia. Teoria histórico-cultural. Inclusão.*

RESUMEN: *Este artículo tiene como objetivo contribuir a la inclusión de estudiantes con discapacidad, a partir del análisis y discusión de dos casos en los que la mediación en el uso de Tecnología Asistiva (TA) potenció el aprendizaje y la constitución de autonomía. Los diarios de campo elaborados durante las reuniones escolares y los registros escolares se utilizan como fuentes de datos. Los diarios permiten acceder a narrativas orales que emergen espontáneamente en la vida escolar diaria. El primer caso retrata la dificultad de un niño con discapacidad física para usar su silla de ruedas. El segundo caso se refiere a la interacción comunicativa en un niño con trastorno del espectro autista. La forma con la que el niño se apropia de la TA, significa sus vivencias cotidianas y constituye su relación con los objetos y con los demás, permite construir movimientos hacia la autonomía. El proceso, sin embargo, depende de la mediación en la interacción con elementos creados culturalmente y con sujetos sociales.*

PALABRAS CLAVE: *Tecnología de asistencia. Mediación. Autonomía. Teoría histórico-cultural. Inclusión.*

Introduction

A child with disabilities faces very great daily challenges with regard to their cognitive and emotional development. How the child will face these challenges depends on the relationships they establish with themselves, with their family and with their school.

The Brazilian scenario, despite the advances, has not been very favorable for most children with disabilities. The Policy of Special Education in Brazil is organized, from the 21st century, prioritizing schooling in the common class. Students with disabilities should be offered specialized educational care (SEC) in multifunctional resource rooms or specialized educational care centers. However, recent studies point to serious problems: it is estimated that more than half of children and young people targeted for special education (which would be about two million) are still out of school; about 60% of those who have access to regular school would not be having access to the SEC, despite the legislation; about 1/4 of the public students targeted by special education would be enrolled in special classes and schools, with no guarantee that they are being educated; the precarious conditions of training and working conditions in the SEC would not be able to respond to the differentiated needs of so many children with disabilities (MENDES, 2019).

Being aware of this precarious reality is important to broaden the look and understand the context of these students and their families, as well as the difficulties faced by teachers.

Equally important is that, within this scenario, it is possible to recognize advances, even if punctual, so that renewed perspectives can be built. Based on these considerations, this article aims to contribute to the inclusion of students with disabilities, based on the analysis and discussion of two cases in which mediation in the use of AT enhanced learning and the constitution of autonomy.

Mediation and autonomy are the key concepts used to problematize the use of AT, situated from some conceptions, namely: i) the social model of disability, which problematizes the conception of disability and disease; ii) the conception of learning, based on the interaction and action of the learner subject; iii) the understanding of accessibility as a physical, cognitive, affective, sensory and cultural fact, which will prevent or allow the subject to encounter the experience.

The social model of disability, unlike the explanations that attributed disability to divine punishment or that emphasized biological deficit (medical model), focuses on the barriers that people with disabilities encounter in society. It situates disability as a difference and not as an abnormality and emphasizes the oppression and exclusion to which people with disabilities are subjected, offering theoretical and political instruments that allow not to reduce disability to the private sphere and family care (BISOL; PEGORINI; VALENTINI, 2017; SANTOS, 2008). The social model, therefore, raises the question of how to change the organization of society so that the reality of human difference can be accepted (DINIZ; BARNES, 2013).

The historical-cultural theory attributes to the subject the protagonism of his life in articulation with the social, cultural and historical process. In this sense, Vygotsky points out that the superior psychological functions are of a cultural nature, that is, they constitute as a result of a qualitative transformation during the internalization process. In interactions, social (interpsychological) exchanges are signified by the subject at the intrapsychological level, and this process is fundamental to provoke learning, that is, the subject creates himself/she in social interactions (VYGOTSKY, 2004).

Finally, it is important to situate accessibility in order to include and, at the same time, go beyond the issue of removing barriers and using instruments and objects. For Mainardi (2017), accessibility is a physical fact, but it is also a cognitive, affective, sensory and cultural fact that will prevent or allow the subject to encounter with experience. For the author, accessibility "[...] it makes the person freer to access a situation, more willing to live a new experience in a situation, to share their own way of apprehending a reality, of proposing to others freely and responsibly [...]" (MAINARDI, 2017, p. 79).

The following is the analysis and discussion of the two cases, which aim to emphasize the interactions (especially in the school context) that favored the movements towards the constitution of autonomy. These are two situations in which the use of AT is essential for the inclusion of these two students in basic education.

Methodological process

This is a qualitative research, based on the natural environment, focusing on the process, based on the follow-up of cases (BOGDAN; BIKEN, 2003). As a data source, field diaries were used, built up throughout observations in a meeting between school and family, of each case presented, and three meetings of teachers (class councils) in which the discussion around these students was present. The schools belong to the municipal school system of a city in the interior of Rio Grande do Sul. Additional information, such as age or clinical picture, was later confirmed in school records. For analysis, field diaries were considered as records of oral narratives, open, which emerge spontaneously by those involved, in a daily situation in the school environment. According to Rushton (2001), narrative accounts of experiences have become a viable way for research in education, since they provide elements to understand the challenges, joys, perceptions of teachers and children about daily school life. The narratives, through this bias, constitute the context for constructing meaning for school experiences. They also allow capturing the richness, indetermination and complexity that mark the school context.

Case 1: Mark and Lightning McQueen

The first case to be presented and discussed is about Mark (fictitious name). It is intended to illustrate how the mediation established by the teacher can be fundamental to create the necessary conditions for a child with disabilities to benefit from the school space, relationships with colleagues and AT resources.

Mark is an intelligent, sensitive and humorous child. Since the age of two, Mark has faced a degenerative disease that leaves him without the strength to walk, handle objects, hold his head, and cause respiratory complications.

At the age of 6, Mark faced the challenge of entering the 1st year of elementary school. His parents feared possible difficulties in school adaptation. Among their concerns were the accessibility of the school building, the acceptance of colleagues and the adaptation

of a monitor to advise Mark on school activities, hygiene and any complication in his state of health during school.

However, one difficulty that surprised them was Mark's resistance to his motorized wheelchair after the first day of school. The surprise was great because the boy was already well adapted to the use of the chair in the Children's School and in other family and social spaces in which he circulated. Vehemently, Mark went on to insist on being carried in his lap to the living room and sit in classes similar to his classmates. He refused that resource which, months before, he used with resourcefulness in family environments.

The use of AT is intended to compensate for limitations imposed by the disability, in order to increase the possibilities of participation. In the case of a motorized wheelchair, the child is otherwise only possible on an adult's lap. With his chair Mark could approach some group of classmates, move around the classroom, go to the school yard and, as he already did in the Children's School, took part in some adapted games with the other children.

However, Mark joins a new group: the school is new, his classmates don't know him, he doesn't know anyone. The issue of autonomy moves to the background. Remembering that the perception of the child differs from the perception of the adult, we can raise the hypothesis that trying to be accepted by the group, becoming as "equal" as possible, gained relevance for him, more than the concrete benefits of using the wheelchair for his mobility. From his perspective, the wheelchair brought more shame than being carried up to his class. He would rather be uncomfortable, more dependent on parents, the monitor and the teacher than use an object that caught the attention of others so much.

Technically, the ATs are developed to reduce the impact of environmental barriers on the subject's participation in valued social situations, allowing people with disabilities to access, operate, move and act in their physical and social environment (PAPE; Kim; WEINER, 2002). However, as can be observed in the case of Mark, the meanings attributed to the AT have an important impact on the use that the disabled person will be able or not to make in the concrete situations of their life. It is important to remember that, at 6 years old, the child already has a clear perception of his body and the body of the other. The social group acquires greater relevance, in addition to the family group. The child seeks references in his peers and expects recognition. The child is susceptible to the differences that others make and what they make themselves, which makes the place of difference more difficult to sustain.

The ATs are socially associated with deviation, abnormality. The unwanted attention they attract can threaten the sense of belonging to the group, something extremely delicate in

childhood and adolescence. In this way, they end up being a mark or an additional sign of deviation. Thus, although they bring greater independence in school activities, they can be rejected for threatening or complicating relationships with colleagues (HEMMINGSSON; LIDSTRÖM; NYGÅRD, 2009). Mark, fortunately, can count on a creative and attentive teacher, who soon realized the complexity of the situation: on the one hand, the importance of using the wheelchair for mobility, a certain degree of autonomy and comfort of the boy; on the other hand, the way the chair ended up becoming a negative mark of difference, as a catalyst for Mark's difficulties in dealing with his disability in front of colleagues and the difficulties of colleagues dealing, in turn, with a boy their age but who had such significant physical vulnerability.

Teachers play a fundamental role in child development, since, in this complex environment that is the school, they are responsible for mediating the relationship of the child with others. In a historical-cultural perspective, it is about its role of mediation in the interaction with culturally created elements and with social subjects (SILVA; ALMEIDA; FERREIRA, 2011). Thus, it can be considered that the proposals, attitudes and actions of the teacher can be decisive for the maintenance of difficulties or for the opening of new possibilities for a child to be and be in school.

Mark's teacher developed a series of activities about a cartoon in vogue at the time: Cars (2006). Lightning McQueen is the central character who faces many challenges and overcomes them with courage and help from friends. The teacher explored the plot, the characters, proposed texts, drawings and role-playing games. Then, in an inspired and inspiring move, he offered Marcos the chance to resignify his wheelchair: the teacher presented him with Lightning McQueen stickers and asked if he wanted them in his wheelchair. The parents understood the strategy and supported the proposal, helping the child decorate their chair with the stickers.

Two days later Mark went to class on his chair, which is no longer called a "wheelchair". Mark went on his Lightning McQueen. The teacher proposed that Mark allow his classmates to try driving Lightning McQueen. Colleagues quickly discovered, to his intense satisfaction, that it's not easy, that it needed practice, and asked how Mark learned to drive so well.

The teacher's mediation provided an opportunity for a re-signification of the wheelchair. Mediation is not a simple action, an act or any proposal. It is an interposition capable of provoking transformations. There is an intentionality that promotes development (MARTINS; RABATINI, 2011).

The other possible meanings do not erase the place of difference, of the limitations imposed by the disability, but allow to leave the imprisoning place of shame, incapacity, inferiority. The difference enters the scene, but also the ability (to direct), the aesthetics, the playful. Once different subjects circulate in the school that bring with them their social marks of gender, class, ethnicity, history, singularity, culture, etc., conceptions of the human being and the world coexist. Therefore, in school there is a vast possibility for the construction of new meanings:

This statement is possible as long as it is assumed that the interpersonal relationships engendered in the classroom convey more than scientific knowledge: they are pregnant with values, preferences, emotions, concepts and prejudices. As a result, they result in processes other than transformations in terms of learning what constitutes an object of knowledge: they result in the constitution of unique characteristics of subjects who actively participate in what happens there (ZANELLA *et al.*, 2004, p. 95).

In the case of Mark, the AT that allowed greater mobility for the boy was a resource already used before entering the first year of Elementary School, in a school and family environment. However, when faced with the new group of colleagues, in an unknown school situation, the affective and emotional aspects linked to acceptance and belonging made Mark withdraw from using his wheelchair. Therefore, it is not the resource, the AT by itself, that guarantees the autonomy of a subject. In Mark's case, a whole movement of resignification was necessary, mediated by language, by the other, by the adult on the scene: the teacher, in her decisive role. This movement allowed him to come back to being a six-year-old who can benefit from a motorized wheelchair, and who can (with the help of adults) sustain his place of difference for himself and for his peers. .

Throughout the school year, Marcos faced several significant challenges both in terms of social interactions and in managing his severely physically disabled body. His motor limitations required other adaptations and resources in addition to the wheelchair, and his vulnerable health condition ended up demanding periods of time away from the classroom. The issue, therefore, is not easily reduced to one scene – the challenges for the family, for the school community and for the student with a disability are many.

The teacher's role is central, but also in this aspect it is important to create a support network. In the case presented, the interventions carried out were located mainly in the classroom, in direct actions of the teacher through the pedagogical resources that she was able

to mobilize in favor of Marcos and his interaction with his colleagues, and it was possible to partner with parents, who understood and supported the proposal.

However, in other situations, the broader support of the school community must also be considered, as the school experience is not limited to what happens inside a classroom. The broader collective spaces and moments, in which students with disabilities are called upon to interact with students of other age groups and with other educational agents, also need to be the focus of attention. In this sense, the classroom teacher, the student and their family need to count on the support of the entire school community so that they can think about access, permanence and success in the school trajectory.

Case 2: Luke and the communicative intention

The second case to be presented and discussed is about Luke (fictitious name). Communicative interaction is one of the difficulties of people with Autism Spectrum Disorder (ASD). They may present changes in the use, form or content of the language. In the following case, the processes of interaction and autonomy that are established from a specific AT are discussed, that is, with the support of communication boards. The use of alternative communication prioritizes the processes of understanding and production of meanings, aiming to create opportunities for interaction with others and, therefore, reducing isolation and social exclusion (PASSERINO; AVILA; BEZ, 2010; PASSERINO; BEZ, 2010; PASSERINO; BEZ, 2010; 2013). According to Barbosa and Fumes (2016), it is essential that common room and SES (Specialized Educational Service) teachers know the characteristics of students with ASD to plan interventions and activities that contribute to their development and learning.

Luke is a sensitive and active 4-year-old boy. He was diagnosed with autism at age 3 and does not communicate orally. He frequently exhibits stereotyped movements and rarely initiates communicative interaction. When she attended kindergarten, accompanied by several professionals, the speech therapist introduced the use of the board for augmentative and alternative communication (AAC). Luke easily appropriated this resource, showing interest and understanding. A few weeks after starting to use the communication board, the mother reported that, using it, Luke started an interaction informing her that he was in pain and indicating the place where he had pain. This situation had never happened before. The mother was happy and emotional, realizing how her son was exploring the possibilities of communication and making meaningful use of AAC.

It is possible to look at this situation in depth. What can one observe? Before the appropriation of this AT resource, Luke often remained oblivious to what was happening around him. Lucas constituted himself as an intentional agent when he began to manifest something of himself. At first it was his pain, but soon came his desires to eat, play, walk, among other things, and the search for the support of another person to achieve his intention. For Tomasello (2003), understanding the other as an intentional agent is fundamental in the process of development and communication. When the child perceives the other as an intentional agent, who can establish the bond of interaction and communication, there is a leap in communicative and interactional possibilities. Communication intentionality is observed when Luke manages to have a goal and act to meet it. By informing the mother about her pain, she evidences her understanding of the other and that this other can support her in her goals. A world of possibilities is constituted for Luke from the moment he appropriates the communication board and sees others as interlocutors.

The understanding of communicative intentionality is intertwined with two of Vygotsky's concepts: mediation and internalization. Internalization in the cultural-historical perspective refers to the transformation of what was in the social (interpsychological) plane to the individual (intrapyschological) plane, in a movement of appropriation or internal construction (VYGOTSKY, 2004). In Luke's case, the mediation, through the use of the board for AAC, enabled internalization, and, consequently, led him to the condition of communicating about himself to his mother, in the search for an action that would give him comfort. A triadic interaction is observed here, that is, it refers to the coordination of interaction between subjects and objects. The child perceives the other as an intentional agent equal to himself, and the interactions thus become richer. In this process Luke can have active choices among the available behaviors, he chooses what he wants to pay attention to, what he wants and what he wants to communicate. Thus, it is observed that internalization is a process that requires participation, interaction in social practices with production of meaning, and the Higher Psychological Processes (HPP) are being constituted in the interaction and mediation with the instruments and signs.

The teachers' narrative also emphasizes a situation that Luke experienced at the age of 7, already appropriate and making use of the communication board in different situations and interlocutors. On her first day of class, with a new class and teacher, the following situation occurs: in the initial activity, the teacher invites everyone to sit in a circular format for a presentation activity. The teacher starts the activity by singing a song with guitar accompaniment. At the end of each verse sung, a student is invited to say his name, following

the order in which they are seated in a circle. Luke observes what is happening and when he understands the activity he leaves the circle and goes toward his backpack. The teacher looks a little apprehensive, but continues to interact with the group and observe Luke. In a few minutes he returns to his chair with his communication board in hand. When it comes his turn to say his name, he shows the board and points to the letters, forming his name. The teacher, happy and thrilled, understands the bliss of that moment, acts as intermediary by reading the name to her colleagues and takes the opportunity to talk about the different possibilities of communication. In addition, the teacher can see how she could articulate Lucas' future participation in other activities.

In conceptual terms, in the situation described above, Luke's communicative intentionality is identified, in addition to shared attention and active participation in the interaction. Shared attention for a child with autism is something significant because, according to Bosa (2002), it implies the coordination of attention between subjects in order to share experience through an event or an object. It is considered the most advanced stage of intentionality.

In addition to shared attention, in this example, the presence of active participation is identified, which is configured when the interaction is voluntary, that is, Luke did not wait to be demanded by the teacher. According to Passerino (2005), active participation is not something so simple, there are previous movements, such as passive participation, when the individual participates, but only observing. A second level, defined as reactive participation, occurs when the child participates only when the teacher or other mediator calls for or provokes participation. In the situation presented Luke is already autonomous, observing, creating solutions and participating actively.

One can also think about the mediation process, in this example, the role of the teacher, the importance of knowing when to intervene, when to provoke, when to observe and give space to perceive the subject's intentionality. It is important to highlight that, according to Vygotsky (2004), HPPs are the result of mediation, which is a process of intervention of an external element in a subject-object relationship. It is still worth noting that mediation works in the zone of proximal development (ZPD), that is, what the individual is building, in the process of appropriation, but which needs mediation for its internalization process.

Internalization puts self-regulation into action, in which evolutionary movements and transformations reduce the power of the contingencies of the environment, giving more strength, increasing the role of the subject in intentionality, in the regulation of his conduct, in his interaction and cognitive activity. Self-regulation is constituted from exchange,

interactions, or, in other words, it is only conquered from the inside out, within the exchanges, constituting the possibility of autonomy for the subject. Autonomy is not individualism or separateness, but interdependence, an achievement that is established through interaction with the other. This process requires the teacher to become the guide, the provocateur, so that the child begins his movement of awareness and voluntary control towards autonomy, which is essential for cognitive development.

Final considerations

The use of ATs in a school environment undeniably brings benefits for learning and development. What we sought to argue and illustrate, from the two cases presented in the present work, is that these benefits do not arise automatically or from external determinations to the person with disability. The way in which the child appropriates the AT means and re-signifies their daily experiences and constitutes their relationship with objects and with others (family members, teachers, colleagues), which will be decisive for the AT to have meaning in their concrete life.

Among the contributions that the analysis of the first case offers, the importance of the teacher's sensitivity as a mediator in the interaction with culturally created elements and with social subjects stands out. Mark had an initial loss of autonomy, in terms of mobility, as he was no longer able to use a wheelchair that was already part of his life dynamics, when he came across a new school situation that brought him emotional difficulties. It is essential, therefore, to pay attention to the meanings attributed to ATs, as they will have an impact on the use that the person with a disability will or will not be able to make of the resources made available to them. In the case presented, the teacher's mediation played a central role in the re-signification of the wheelchair, which obviously does not erase the place of difference and limitations posed by the disability, but generates other possible places for the subject in his/her relationship with the others.

The second case presented helps to establish points of attention in the use of ATs in the school context. The board for AAC used by Luke allows the child to be seen by teachers as a subject capable of communicative intentionality, while allowing the child to perceive the other as an intentional agent as well. Mediation, through the use of the board, provides opportunities for coordination between subjects and objects, acquiring a status that goes far beyond its concrete operational benefit. It becomes an indispensable element for the

achievement of autonomy and self-regulation in the interaction with the other, an essential process, as already mentioned, for cognitive development.

Future research may highlight the importance of investing in training for the use of AT beyond the technical aspects, that is, emphasizing the need to articulate different knowledge and areas of knowledge to benefit the learning individuals.

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