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The experience of mediation with learning objects in inclusive classes[1]

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ABSTRACT

The inclusion of students with disabilities still appears in the opinion of teachers as a slow and complex process, permeated by exclusion, stigmas and myths about their learning capabilities. This article aims to present research in the educational area, based on Cultural Historical Theory, which culminated in the development of a learning object and pedagogical activity for teaching science in an inclusive 7th year elementary school class at a public school. The class had 25 students, including two children with disabilities (Down Syndrome and Cerebral Palsy). The methodological procedures used were observation of the school context and an interview with a science teacher. Data analysis made it possible to reflect on the characteristics and potential of children with disabilities. Experience has proven that, with the introduction of learning mediating objects, an equitable and inclusive education for all is possible.

KEYWORDS: School Inclusion; Mediation; Pedagogical Accessibility.

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A experiencia de mediação com objeto de aprendizagem em turmas inclusivas

RESUMO

A inclusão dos estudantes com deficiência aparece ainda na opinião dos professores como um processo lento e complexo, permeado por exclusão, estigmas e mitos sobre as capacidades de aprendizagem. O presente artigo visa apresentar uma pesquisa na área educacional, fundamentada na Teoria Histórico-Cultural, culminando na elaboração de um objeto de aprendizagem e de uma atividade pedagógica para o ensino de ciências em uma turma inclusiva de 7º ano do ensino fundamental de uma escola pública. A turma contava com 25 alunos, entre os quais, duas crianças com deficiência (Síndrome de Down e Paralisia Cerebral). Os procedimentos metodológicos utilizados foram a observação do contexto escolar e a entrevista com professor de Ciências. A análise dos dados possibilitou refletir sobre as características e potencialidades das crianças com deficiência. A experiência comprovou ser possível, com a introdução de objetos mediadores da aprendizagem, uma educação equitativa e inclusiva para todos.

PALAVRAS-CHAVE: Inclusão Escolar; Mediação; Acessibilidade Pedagógica.

La experiencia de mediación con un objeto de aprendizaje en clases inclusivas

RESUMEN

La inclusión de estudiantes con discapacidad aparece en la opinión de los docentes como un proceso lento y complejo, permeado por la exclusión, estigmas y mitos sobre sus capacidades de aprendizaje. Este artículo tiene como objetivo presentar una investigación en el área educativa, basado en la Teoría Histórico Cultural, que culminó con el desarrollo de un objeto de aprendizaje y actividad pedagógica para la enseñanza de ciencias en una clase inclusiva de 7mo año de educación básica de una escuela pública. La clase tenía 25 estudiantes, incluidos dos niños con discapacidades (síndrome de Down y parálisis cerebral). Los procedimientos metodológicos utilizados fueron la observación del contexto escolar y la entrevista a una profesora de ciencias. El análisis de datos permitió reflexionar sobre las características y potencialidades de los niños con discapacidad. La experiencia ha demostrado que, con la introducción de objetos mediadores del aprendizaje, es posible una educación equitativa e inclusiva para todos.

PALABRAS CLAVE: Inclusión escolar; Mediación; Accesibilidad Pedagógica.

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Introdution

Throughout history, the way in which people with disabilities have accessed the school and classroom environment has always been marked by many struggles and slow achievements for the right to education. Kassar (2011) explains that, during the 1930s, public bodies responsible for education began to subject students to assessments to determine whether they were "normal" or "abnormal", with the term "abnormal" being used for a long time to refer to people with disabilities. The "abnormal" students identified were grouped into special classes, in order to make the other classes more homogeneous which culminated in the creation of special classes and schools.

In a slow historical evolution full of political debates, according to Faria Filho and Vital (2000), with the Federal Constitution (1988), Brazilian education achieved important changes, such as being the duty of the state and the family, being implemented through public policies, and constituting itself as a subjective right of the entire community.

The 1990s were marked by the debate in favor of universal social policies, attempts to regulate the economic restrictions of the strong mode of government interference in education. By being a signatory to the World *Conference on Education for All* (in Jomtien, Thailand), Brazil made a commitment to guarantee the universalization of the right to education. As a result of this international movement and the internal political struggle, in 1996, the Law of Guidelines and Bases of National Education began to provide for the mandatory enrollment of children with disabilities in regular schools. Decree 6,571/2008 created Specialized Educational Services as a device for the process of including children with disabilities in inclusive classes (Kassar, 2011).

With the increase in enrollments in regular schools, children and adolescents with disabilities began to occupy physical spaces and make demands, transforming school life with their presence and expectations of a fairer and more inclusive education.

This article aims to present research carried out by the Laboratory for the Production of Learning Objects of the Interdisciplinary Group for Studies on Inclusive Education and Special Educational Needs, linked to the Department of Applied Sciences for Education, of the Faculty of Education of the Federal University of Minas Gerais. The main objective of the research was to analyze the process of learning mediation for science teaching, through the construction and use of a learning object specially built for inclusive classes. The question that guided the study was based on the quality of inclusive teaching and the possibilities of mediating learning objects for pedagogical accessibility.

Human development, as advocated by Vygotsky (1930/2013), is social and occurs through interaction with the environment and access to culture. The path to recognizing the humanization process involves mastering the elements that mediate access to language and culture. In note 22 of the text "The Instrumental Method in Psychology", Vygotsky (1930/2013) states:

> Mastering a psychological instrument and, through it, the corresponding natural psychic function, raises the latter to a higher level, increases and expands its activity, and recreates its structure and mechanism. Natural psychic processes are not eliminated by this, but enter into combination with the instrumental act and functionally depend in their structure on the instrument used (Vygotsky, 1930/2013, p.70).

The expansion and complexity of psychic processes involves the mastery of instruments, whether tools or signs. In the text "The Method of Investigation", Vygotsky (1931/2013) states: "... the relationship between the use of signs and the use of tools; from a logical point of view, both can be considered as concepts subordinate to a more general concept: the mediating activity" (Vygotsky, 1931/2013, p. 93).

The instruments or objects proposed within the teaching and learning process enable the mediating activity that links objective, physical and tangible materiality with the understanding of the content of a given area of knowledge. Thus, they fulfill the function of mediators of learning.

The research in question was conducted in an inclusive 7th grade class in a public school, during Science classes. The research subjects were the teachers and students of the class, including two children with disabilities: João, who has Spastic Quadriplegic Cerebral Palsy and uses a wheelchair, and Vitor, who has Down Syndrome. The names used in this text are pseudonyms to protect the identity of the participants, as per the guidelines of the Research Ethics Committee (CAEE Approval 6008.7516.8.0000.5149). The research was funded by a scientific initiation grant from the Inclusion Support Program (PIPA) of the Accessibility and Inclusion Center (NAI) of the Federal University of Minas Gerais.

Learning and development: the issues of disability

The issues that disability raises in teachers need to be reflected on their specificities in relation to biological aspects, but also social ones.

In the genesis of ontological development, if there are biological impediments, the person will encounter social barriers to face throughout life. Vygotsky (1983/2012) considers that there are two types of disability: Primary Disability, which occurs due to organic brain injuries, organic or chromosomal malformations, and physical or neurophysiological characteristics that interfere with human development, among others; and, in addition to primary disability, we can find Secondary Disability, which results from precarious social development, due to lack of access and not due to biological limitations. Depending on the barriers that the person with a disability encounters throughout life, the primary disability may or may not become secondary.

Regarding Cerebral Palsy, the first clinical record of paralysis occurred between 1843 and 1853, when William Little recorded cases of

children who presented loss of limb movement and spastic crises. Initially, it was called Little's Disease and, later, Cerebral Palsy (Embiruçu, et al., 2015).

A person who has Spastic Quadriplegic Cerebral Palsy, as is the case with João, has paralysis in all four limbs, rigid body tone and involuntary movements (Embiruçu, et al., 2015, p. 42). The scientific term is "Chronic non- progressive encephalopathy" or Cerebral Palsy, the most commonly used term, as it has been popularized.

From a social perspective, people with Cerebral Palsy face numerous barriers. Communication is impaired because alternative means of communication are not adopted from early childhood. Moving around in a wheelchair faces physical barriers to accessing cultural environments and social interaction. The chair is not always comfortable, stable and suitable enough to allow the child to remain in the chair for long periods of time, to see the environment and to exchange experiences. In our opinion, attitudinal barriers are the most perverse, as some teachers initially judge a child to be totally intellectually disabled, and since there is no access to communication, there is no satisfactory response to assessments. Another myth is that children drool, which is also associated with intellectual disability, and it is believed to be a difficulty in motor coordination of the jaw, which makes it difficult to swallow saliva and causes the child to drool or "smile" constantly. Down Syndrome was named after the British physician John Langdon Down. In 1866, Down identified a condition that at the time was called mongolism, due to the association of similar traits with Mongolian groups. In 1958, geneticist Jérôme Lejeune identified the presence of 47 chromosomes in his patients, instead of 46, associating Down Syndrome with genetic issues.

From a social perspective, children with Down Syndrome also face attitudinal barriers, such as the direct association between Down Syndrome and Intellectual Disability. This association can lead to the formation of myths, such as the idea that these people have an

intellectual limit and will not be able to evolve in learning. Some teachers still believe in this limit and ask themselves: to what extent is this child capable of learning? This purely deterministic view uses genetic causes as an instrument to condemn these individuals to having their learning process neglected due to a biologically pre-determined destiny (Streda; Vasques, 2022).

In addition to the biological aspect, it is essential to analyze the various areas of development of children with disabilities, the social and cultural context in which they are inserted, the experiences and access they are provided with, and the attitudinal barriers they face throughout their lives. School can become a place of failure and stigmatization when it presents barriers to students with disabilities, doubting their capabilities, preventing access to knowledge, educational practices, and the appropriation of cultural assets conveyed by the school experience.

Based on Historical-Cultural Theory, Dainez and Smolka (2019) warn that it is necessary to problematize disability or organic injury as "a development condition profoundly affected by social and historical dynamics, which can be transformed in/by the relations and conditions of production of knowledge, practices, and technologies" (Dainez; Smolka, 2019, p.4).

The propositions of the Historical-Cultural Theory aim to analyze people with disabilities based on their experiences and interactions with the environment, taking into account cultural aspects and their history, in order to avoid reductionisms to disability. Dainez considers "[...] brain plasticity as a capacity that is evident in the organic disposition of the species for (trans)formation of meaningful experience into new psychological formations" (Dainez, 2017, p. 2). Therefore, the classroom, as a social space, allows students with disabilities to activate their brain plasticity through access to mediators such as the use of language and cultural instruments, games and play and, especially, access to the symbolic mediation of knowledge through interaction with other classmates.

The Brazilian Law for the Inclusion of People with Disabilities, in its article 27, states that it is the right of people with disabilities to "achieve

the maximum possible development of their physical, sensory, intellectual and social talents and abilities, according to their characteristics, interests and learning needs" (Brazil, 2015, p.12).

From this perspective, it is necessary to create strategies for the development of technical aids so that students with disabilities have access to and learn to deal with concepts and debates addressed in the classroom. The term "technical aids" is similar to the term "assistive technology", both refer to objects that aim to support students in their learning process (Manzini; Santos, 2002).

We chose the term "Learning Object" to place it within the Historical- Cultural Theory, as instruments that fulfill the function of mediatinglearning. It is a concrete and manipulable object, which allows variable and flexible forms of teaching in different contexts and respecting the diversity of students. When creating the object, we took into account not only the specificities of the student with a disability, but also the dynamics of the inclusive class, the need, the interest in the content and the analyses carried out throughout the research to make adjustments throughout the process.

Silva, Carmello and Muzzeti (2020) emphasize that the teacher must propose learning paths that are opposed to the disability. This perspective imposes the need for the school institution to recognize the skills and potential of the student with a disability.

From a historical and cultural perspective, consciousness is formed by the attribution of meaning, when the subject appropriates the work process and activity. By recognizing his/her action, his/her objective, his/her path and the result of this process, the human acquires knowledge of himself/herself, of others and of the context around him/her. In relation to the object that triggers this action – knowledge of oneself, of others and of reality (Souza; Andrada, 2013).

In this context, games and play are useful and necessary resources for psychic development, as stated by Leontiev, a soviet psychologist who,

from the same historical and cultural perspective as Vygotsky, emphasizes the importance of the act of playing as an agent that allows the experience of existing roles in the society in which one lives (Monteiro; Ghedin; Kruger, 2012). The activity of playing allows children to experience and activate new and potential conscious formations, internalize rules, values, ways of being and acting established socially. Mediation, whether symbolic or instrumental, enables the social experience necessary for the formation of concepts and training for learning.

The methodological bases of the research

The methodological procedures of the research were based on an action research methodology, of a qualitative and exploratory nature. Action research is recognized as a methodology that aims to identify the problem from different points of view and encourage "action, reflection, intervention, transformation and the construction of knowledge" (Silva; Oliveira; Ataídes, 2021, p.8).

Within the parameters defined by action research, the study developed sought to act on the problem, rather than just identify it, taking into account the research subjects – teachers, students and researchers – in order to demonstrate that the production of knowledge is not unilateral and aims to contribute to the transformation of school culture by placing students with disabilities as active subjects within relationships. The researcher must be able to position him/herself within the studied environment and actively interact with the research subjects, as the concept of action research foresees the relevance of the interaction between the researcher and the research subjects, in addition to allowing problems and solutions to be better identified (Silva; Oliveira; Ataídes, 2021).

The procedures began with a search for specialized literature on the main aspects of the history of inclusive education in the Brazilian context, the specificities of disabilities, assistive technologies and the role that inclusive education plays in the teaching and learning of people with disabilities. Specialized articles and texts on special education and inclusive

education were collected through searches in databases such as Scielo and Google Scholar, using categories to filter the results, such as: “education”; “learning”; “disability”; “cerebral palsy”; “Down syndrome”; “inclusive education” and/or “special education”. The theoretical foundation of the research was built on the bases of the Historical Cultural Theory, especially with regard to the various stages of the research, from observation of the school context to data analysis.

The observation of the school context aimed to monitor the class in different environments: classroom in different subjects, recess, departure and arrival of students, focusing especially on the learning process of students with disabilities in Science classes. The documents analyzed were the Individual Development Plan (IDP) and the Assessment Report of João and Vitor[4], reports of meetings with parents, reports from the Specialized Educational Assistance (AEE) team and occurrences recorded by monitors.

The interview with the professor responsible for the science discipline, Prof. José Anselmo, was conducted following a pre-established script, although it was not used rigorously. The interview aimed to investigate his perceptions regarding the learning process of students with disabilities, his assessment of the management of the inclusive class and the content he intended to cover in his discipline in the coming months.

The systematic analysis of the data aimed to support the construction of the learning object. The object aimed to be able to address the content taught, fulfilling the function of supporting the learning of all students and, mainly, serving as a pretext for the protagonism and interaction of students with disabilities. It is important that they occupy the role of protagonists of the pedagogical activity and participate in the dynamics in an active way, showing that the “inability” of people with disabilities to learn is a myth and may be responsible for relegating them to a passive role within relationships. The learning object was designed to meet the demands of the Science discipline, specifically the content on the characteristics of

[4] João, Vitor, José Anselmo and other names are fictitious names used to protect the identity of students.

invertebrate groups. Students had prior access to the content to understand the complexity of life forms, science, nature and technology and how Science can contribute to life in society, as recommended by the National Common Curricular Base: "... it is essential that they have the conditions to be protagonists in choosing positions that value personal and collective experiences" (Brazil, 2018, p.343).

The context of the class: attitudinal barriers of exclusion and loneliness

The analysis carried out allowed us to create associations between the events witnessed in the classroom and the reports given by the teacher during the interview. The data communicates itself and dialogues with the references, allowing us to understand the context of the classroom and the attitudinal barriers faced by students with disabilities. Among the records of the observations made, some scenes were transcribed (in reverse) to highlight the difficulties faced by students in the inclusion process:

> In the context of the Portuguese class, the teacher instructs that groups of up to four people be formed. None of the students make any move to include João in their group. While she gives the instructions, Vitor already agrees with his classmates that he will be part of their group and so it happens. Each group receives a sheet to create the comic strips and Vitor does the activity according to the instructions. There is no move by the teacher or his classmates to include João in the groups. During the class, João appears sleepy, grinds his teeth frequently and drools a lot. (Excerpt from the observation record, Portuguese class, 06/19/2023).

The scene explicitly shows the attitudinal barriers experienced by João. Vitor, because he is verbal, manages to fit into the group. In João's case, there is no initiative or invitation from the teacher or his classmates

for him to join the activity groups. According to Goffman (1982), stigma is based on the idea that there is a specific model to which a person must conform in order to fit into a given society. When this person does not meet what his peers expect of him, the suffering caused by stigma begins.

Society is made up of a set of values, instruments and social signs that determine standards of conduct, including the way we present ourselves tothe world. Standards of "normality", "health" and "beauty", despite being questioned, still prevail in our society, solidifying attitudinal barriers that become permanent. People with disabilities are always dealing with expectations created by others regarding their performance in their professional and personal lives. Consequently, stigma, defined as a set of degrading characteristics that the group assigns to those who do not follow the current norm, affects João's life. By not being included in the activity, the idea of incapacity crystallizes, leaving the student with only his disability.

One of the indicators of child mental development is the child's ability to perceive the objective of the activities they perform. When students are not included in group activities and their presence in daily life is limited to remaining at the back of the classroom, without adapted exercises, their learning and possibility of mental development are directly affected (Dainez; Smolka, 2019).

Furthermore, psychic development and knowledge acquisition cannot be viewed solely from a cognitive perspective, since "thought is not an isolated psychic function; it is linked to other functions in a dynamic system" (Sasaki; Sforni, 2021, p. 128). The affective aspect is present in the learning process, since during the activity, in their experience of interaction, the child experiences what is available in the world around them, observes the actions of adults and other children, and internalizes social standards and norms (Silva; Carmello; Muzzeti, 2020). Children with disabilities seek to adapt to these standards, as evidenced in this excerpt from the observation record:

> A monitor, dedicated only to Vitor, arrives in the room and receives the sheet with the boy's activities. He immediately dictates the statements of the exercise. While the monitor speaks, Vitor lowers his head and appears resistant, ignoring the attempts at communication made by the monitor who, noticing his reaction, says: “Okay. So, if you're going to throw a tantrum, you can do it!” At thatmoment, one of the group's colleagues takes the initiative to help him with the activity. The colleague's intervention is quickly accepted by Vitor, who carries out the exercise proposal. (Excerpt from the observation record, Science Class, 06/20/2023).

From the scene mentioned above, it is possible to perceive that there is a relationship between affection (in the sense of “affectation”) and the learning process. We need to note that the way in which the student with Down Syndrome was approached does not seem appropriate to begin carrying out a pedagogical activity. The monitor's reaction to his refusal is to immediately infantilize him, and it is possible to assume the presence of previous conflicts between the two. The intervention of his colleague, a peer with supposedly greater knowledge, triggered a movement in Vitor's Zone of Imminent Development (ZDI) and he finally completed the task. As Aquino and Toassa (2019) state:

> [...] the basic law of development is the difference in the maturation time of the various facets of personality in their distinct properties, an authentic diagnosis must encompass the cycles already achieved, since there are mental processes in the maturation phase and depend on the mediation of more experienced subjects; with this the idea of the Zone of Immediate Development was forged (Aquino; Toassa, 2019, p.10).

The Zone of Immediate Development (ZDI) affects the maturation phase of mental processes and depends on the mediation of more

experienced individuals. In this case, Victor's colleague, by proposing to help him, tunes into his ZDI and triggers his development. During other moments during the observation period, Vitor's interest in establishing his own actions and living the classroom experiences autonomously, like the other students, was noticeable. The Zone of Immediate Development affects brain capacity, especially the "plastic, dynamic and flexible nature of the brain, which presents alternative ways to meet socially produced objectives" (Dainez, 2017, p. 2).

The necessary reflection is how the student sees the content that is being presented to him and whether he can relate the topic discussed in class to a personal meaning, created by him, in a way that motivates him and that can bring interest or meet some need (Sasaki; Sforni, 2021).

During the interview with the Science teacher, the teacher responds that Vitor notices a difference between his activities and those of the class: "[...] when he realizes this, he usually has a lot of resistance to doing what was adapted for him. He wants to do the same activity that the boys are doing" (Prof. José Alselmo, 09/22/2023). Vitor refuses activities such as, for example, the tilted table or exercises with enlarged fonts, simplified resources or different from those used by the rest of the class. However, when Vitor fails in his attempt to read the texts without the font resource, he gives up and returns to his offered exercise. For this reason, the teacher states that he avoids using these types of adaptation, preferring to use the magnifying glass because, in addition to Down Syndrome, Vitor has low vision. A scene reported in the field record, in another discipline, exemplifies one of these moments of frustration for Vitor:

> Vitor asks for his Portuguese book and expresses his desire to participate in the correction of the activity with the class, however, he encounters an impediment when the teacher asks him: "Did you bring your magnifying glass?" – Vitor shakes his head saying no – "But you can't read the book, look at the size of the font!" (says the teacher as she shows

> Vitor the book she is holding in her hand). Vitor insists a little more, but is unable to participate in the correction of the activity with the book. Despite this, Vitor remains active during the class and at several moments asks to speak to make a comment about the content on the board (Daily observation record, Portuguese class, 06/26/2023).

The situation presented highlights the need for adapted exercises and assistive technologies to be in the classroom, available to students who can access them according to their interests, keep up with their peers and feel like they belong to the group.

The development of Higher Psychological Functions, from a historical-cultural perspective, is not linear and does not arise as a direct evolution of another function, but presents itself as a new path, new formations. The constant stimulus to the emergence of new FPS allows the subject to establish his or her place in the world and develop personal characteristics and positions (Linhares; Facci, 2021).

In Vitor's case, despite receiving adapted tasks in most classes and participating in all classroom dynamics, resistance to adaptations needs to be worked on so that the student understands the support of adaptations for their learning.

In João's case, at no point during the entire observation period was it recorded that he received any adapted pedagogical activity or technological support to follow the classes or any guidance from the teachers regarding the content. On the contrary, he remained inside the classroom, always in the back, without any type of inclusion in the activities, no guidance regarding his presence, so that, drowsy due to the medication he was taking, his disability was invisible. In this context, it is noticeable that the two students received different treatments valued by their ability to respond to the teachers and interact with the class. During the observation, there was a moment when:

> [...] The teacher continues to grade the activities and the class starts to get agitated. Several students are talking loudly and having side conversations. The room becomes quite noisy. At one point, João starts to get agitated in his wheelchair and lets out a few screams, while slapping the air and his chest, and frowning, indicating that he is bothered by something. When she sees João's agitation, the teacher calls the class' attention by saying: "Guys, you are talking too loudly and it is bothering João! He is our thermometer. When he gets nervous, we can tell that you are talking too loud!" When she realizes that this intervention was not successful, she turns to João's monitor and asks: "Go out with him for a little while. He is nervous about the noise. He is like a baby, poor thing, he doesn't understand that he has to stay" (in the room). Then João's chair is pushed and he leaves the class with his monitor. They both go to a spot in the courtyard where there is good sunlight and remain there until the end of the class (Excerpt from the observation diary, Portuguese Class 06/27/2023).

Goffman (1982) explains that stigma affects the subject and his/her experience in society in such a way that even the construction of his/her identity is compromised. When the externalization of the subject's real characteristics and qualities is neglected, the formation of a virtual social identity is proportional to the social damage, as Figueirêdo explains:

> The stigmatized person undergoes a process of rupture in their identity: the real identity that would be characterized as the set of attributes that this person presents and the virtual identity, which would be the attributes of inferiority [...], which other people would relate to the stigmatized subject, producing an image of what he or she “appears to be”. However, the construction of the social identity of the person who suffers

> from the Stigma will be constituted on the categories and patterns that the so-called normal group produced, based on the virtual identity (Figueirêdo, 2021, p. 3).

It is important to note that, based on the documentary analysis carried out on João's Individual Teaching Plan (PEI) for the year 2023, there was no evidence that the student had a mental age different from his biological age, that is, that he was a "baby". The set of information allows us to conclude that the teaching staff may not be aware of the student's clinical condition and his learning capacity. The mistake regarding the student's capabilities and academic performance has been recorded by other researchers (Dainez, 2017; Dainez; Smolka, 2019).

It is important to highlight how the Covid-19 pandemic has impacted students' academic performance, especially those with disabilities. In the interview, the Science teacher noted that there was a setback in João's academic and cognitive skills: "[...] during this pandemic, he stopped receiving much stimulation and the lack of stimulation compromised the work that was being done" (Prof. José Alselmo, 09/22/2023).

The above situation raises concerns about the emergence of secondary deficiencies arising from the lack of actions that boost student performance (Dainez, 2017). The lack of access to school activities hinders the formation of higher psychological functions, the construction of their real identity, and interaction with peers. The analyses show that teachers have not been guided and do not know how to deal with João's teaching. The Science teacher in his interview stated: "... João's activity is very different or sometimes it is not, sometimes João is in class just for the sake of being in class, right? In the practical class, for example, the boys sometimes play with him, but often the boys even ignore him" (Prof. José Anselmo, 09/22/2023). The reports show that João is sometimes treated like a baby or completely ignored, not having full access to the benefits that school can offer a student.

Dainez and Smolka (2019) analyzed similar cases of two children with disabilities in a regular public school. The authors noticed that there is a mistaken discourse among teachers that, for students with disabilities, school serves only as a place for socialization, with no contribution to learning.

The Science teacher reports that João has a good relationship with Mr. Jorge, the school's doorman, whose presence makes the student more active and interact differently from other observed contexts:

> Mr. Jorge has been with João since he started school. Since João started school, the person who spent a lot of time with João was Mr. Jorge. And Mr. Jorge..., not that the others don't, but Mr. Jorge has a special affection for João. Because of that, because he took care of him when he was six years old, when he arrived here. So, I think João recognizes that too. I've seen João interact with Mr. Jorge in other spaces besides the school environment and the way he wants Mr. Jorge is very different. The way he seeks Mr. Jorge is different... (Prof. José Alselmo, interview, (09/22/2023).

Within the school context, there are other forms of interaction, perhaps a little more free from expectations, that give the student (as in João's case) the necessary openness to fully express his “different way of being”. It is with the school janitor that João establishes an emotional bond throughout his school career. This bond, although noticed by the teacher, does not seem to be taken advantage of in his inclusion process.

The learning object for teaching Science

The learning object constructed aimed to be an accessible, inclusive and low-tech teaching material, which would serve as a social learning instrument in accordance with the principles of Universal Design: “...design

of products, environments, programs and services to be used by all people, without the need for adaptation or specific design" (Brazil, 2015, art. 3, § II).

We consider, based on the Historical Cultural Theory, that the learning objects proposed in the educational environment can fulfill the function of learning mediating instruments when they provide significant experiences that contribute to the formation of higher psychological functions in all students.

After analyzing the data, a learning object was created – Invertebrate Board and a pedagogical activity was developed focused on teaching science, more specifically on groups of invertebrates, content that is planned and was being taught for the 7th year of elementary school.

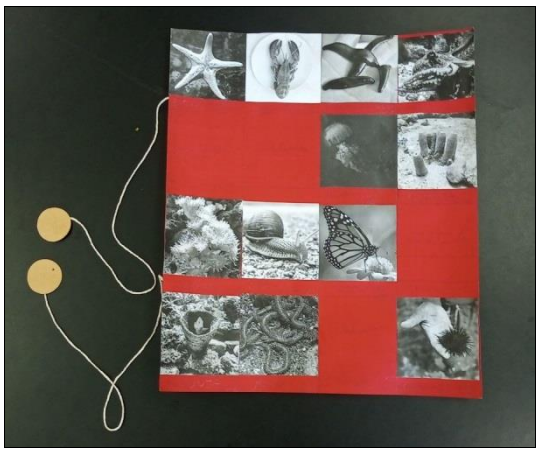
After the observation, the main characteristics of that inclusive class were discussed, the forms of interaction and elements that compromised the inclusion of students with disabilities during classes were identified.

To build the boards, it was necessary to research materials that could meet the needs of the classroom environment: the size, stimuli, shape, type of material, colors, arrangement of images, everything was meticulously planned to allow everyone to see the board, including Vitor who had low vision.

A study was conducted involving the eight groups of invertebrate animals, their main characteristics and which animals belonged to each group. Two animals from each group were chosen and images from freely accessible databases on the internet were located. The first prototype was created on cardboard containing the images printed in black and white.

From this first prototype, it was possible to redefine the size, the quality of the images and which animals would be part of the activity. In the prototype, the measurements of 60 x 68cm seemed to be the ideal size for the 5 boards that would be distributed to the groups.

FIGURE 1: Prototype 1 – Invertebrates board.



Source: LAPOA-GEINE/UFMG Laboratory's Archives (2023).

The prototype was developed based on the creation of a colorful graphic piece sent for printing on coated paper, in real size, to visualize how the images would be located in the space, how the board could be manipulated and whether it would meet the objectives of the content and the interests of the students' age group. This time, two models were printed, one measuring 60x68cm and the other measuring 27x30cm – the smaller size would be kept by the five groups. The existence of different measurements would impact the execution of the dynamic because the larger board, when placed at the front of the room, would allow all the students, including João and Vitor, to see it. The smaller replicas would be kept by each of the five groups and would serve as a reference for the groups to self-evaluate and debate among themselves.

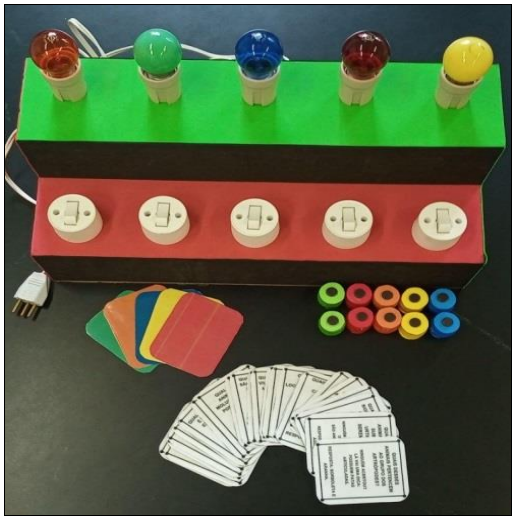
From the beginning of the construction of the object, the raw materials that could be used were discussed, and the selection criteria were: printing quality and durability. The material chosen that met these criteria was PVC, a plastic that allows for a long useful life for printing. Magnets were adapted to the larger board to hold the magnetic cards used by the groups as a way of indicating their answers to the class.

FIGURE 2: Ultimate Board Set

Source: LAPOA-GEINE/UFMG Laboratory's Archives (2023).

The final set consisted of five 27x30cm boards, one 66x60cm board, a deck of 30 cards with questions involving groups of invertebrates and 5 colored cards to draw the groups, identified according to colors (blue, yellow, orange, green and red). In addition to the boards, a box of colored light bulbs was purchased (by internet) for the student João, who would receive instructions on which color to turn on and, when turned on, the group of the corresponding color would answer the question. The researchers expected that by turning on the light bulb with the indicated color, the teacher and the class would notice that João could perform a conscious activity, respond to commands and associate the names of the colors.

FIGURE 3: Box, tokens and decks



Source: LAPOA-GEINE/UFMG Laboratory's Archives (2023).

During the educational activity, João was placed in front of the class and the box of light bulbs. Vitor participated in one of the groups and was in charge of going to the front to place his card on the largest board. The groups were drawn by color, which, with each draw, was indicated to João who, with difficulty and help from the monitor, lit the correct light bulb. Each indicated group answered the question addressed to them. The activity went smoothly, with the participation of the entire class and involvement of students with disabilities.

The teacher was invited to observe the activity at the back of the classroom and evaluate the procedure. In the Science teacher's assessment, the learning object met the expected objectives and allowed the teacher to reflect on other ways and conditions of offering pedagogical accessibility to his inclusive class.

Conclusion

At the end of the research, it was possible to establish an analysis between the planned activities and the actions that were actually carried out and to verify that the research actions can contribute to the understanding of the theme of inclusive education, pedagogical accessibility and the insertion of people with disabilities as autonomous subjects and protagonists of their actions, making them believe in their ability to impact and cause changes in the environment and in the people with whom they live.

From the perspective of educational research, investigative conduct enables education profissionals to find tools to understend the caracteristics, needs and ways of learning of their students, identify the potential and instruments necessery to carry out education basead on equity.

Offering students with disabilities the active role of protagonists in pedagogical activities was intended to help them to appropriate the Science content, contribute to the class's retention of the content, enable interation between students and the learning of the content.

Projects for developing learning objects that include students with disabilities in the classroom can be adopted in schools' daily routines. Actions that make the idea of truly democratized education, accessible to all basic education audiences, more concrete need to emerge through concrete adaptations developed in terms of the concept of universal design, at the service of all.

Learning objects for pedagogical accessibility and alternative communication techniques, among other resources, can mediate the presentation of content in the classroom, so that the entire class can benefit from the mediations that are being offered. Contextualized pedagogical activities and the inclusive organization of learning, which the construction process demands, favor not only the appropriation of knowledge, but also the respect and collaboration of all students.

In our view, education will only become inclusive when children with disabilities are conceived as active social subjects within the classroom, so that they can participate in pedagogical dynamics and activities on an equal footing with their peers. Hence the importance of the object mediating learning.

It is important to highlight the urgent need to invest in continuing education for education professionals, especially to deconstruct myths and prejudices about the (in)capacities of people with disabilities. "Good intentions" on the part of teachers are not enough; continuing education is urgent.

There are still doubts about the future of the academic life of the observed students and their understanding of the content presented. However, if situations of exclusion and prejudice against students with disabilities that harm their experiences at school still persist, it is urgent to correct the course of inclusive education.

References

AQUINO, Pabline; TOASSA, Gisele. Notes on Vygotsky's pedology: some important concepts in its historical context. *Obutchénie. Journal of Didactics and Pedagogical Psychology*, [S. l.], v. 3, n. 2, p. 1–19, 2019.

BRAZIL. Law No. 13,146 of July 6, 2015. Brazilian Law for the Inclusion of Persons with Disabilities. Brasília: Edições Câmara, 2015.

BRAZIL. Ministry of Education. National Common Curricular Base. Brasília: MEC, 2018.

DAINEZ, Débora. Development and disability from a historical-cultural perspective: contributions to special and inclusive education. Journal of Psychology, [SL], v. 26, n. 2, p. 1, Dec. 22, 2017. University of Chile. DOI: https://doi.org/10.5354/0719-0581.2017.47948.

DAINEZ, Débora; SMOLKA, Ana Luiza. The social function of school under discussion, from the perspective of inclusive education. Education and Research, [SL], v. 45, p. 1-18, 2019. FapUNIFESP (SciELO). DOI: https://doi.org/10.1590/s1678-4634201945187853.

EMBIRUÇU, Emília; MONTEIRO, Carlos; SILVA, Talita; REIS, Alberto; VALENTI, Vitor; OLIVEIRA, Adriana; ABREU, Luiz. Paralisia cerebral. In: MONTEIRO, Carlos Bandeira; ABREU, Luiz; VALENTI, Vitor (orgs.). *Cerebral palsy: theory and practice.* São Paulo: Plêiade, 2015. p. 31- 56.

FIGUEIRÊDO, Alessandra. The use(s) of the concept(s) of stigma in the field of public health. *Saúde em Redes*, v.7, n.1, p.87-97, 2021. DOI: https://doi.org/10.18310/2446-4813.2021v7n1p87-97.

GLAT; Rosana; BLANCO, Leila. Special education in the context of inclusive education. In: GLAT, Rosana. (org.). *Inclusive education: culture and school routine.* Rio de Janeiro: 7Letras, 2007, p. 15-35.

GOFFMAN, Erving. *Stigma: Notes on the Manipulation of Spoiled Identity*. Rio de Janeiro: Zahar, 1982.

KASSAR, Maria Cristina. Special education from the perspective of inclusive education: challenges of implementing a national policy. *Educar em Revista*, Curitiba, Brazil, n. 41, 2011, p. 61- 79. DOI: https://doi.org/10.1590/S0104-40602011000300005.

FARIA FILHO, Luciano; VIDAL, Diana. School times and spaces in the process of institutionalization of primary school in Brazil. *Brazilian Journal of Education*, n. 14, 2000, p. 19-34. DOI: https://doi.org/10.1590/S1413-24782000000200003.

LINHARES, Renata; FACCI, Marilda. The development of higher psychological functions: breaking with the dichotomy between the natural and the historical-cultural. In: FRIBIDA, Fabiola; FACCI, Marilda; BARROCO, Sônia. *The development of higher psychological functions: breaking with the dichotomy between the natural and the historical-cultural: contributions of psychology to education.* Uberlândia: Navegando Publicações, 2021, p. 29-46.

MANZINI, Eduardo; SANTOS, Maria Carmem. *Portal of technical aids for education: special teaching equipment and material for education, training and recreation of people with physical disabilities.* Brasília: MEC/SEESP, 2002. 54 p.

MONTEIRO, Darlisângela; GHEDIN, Evandro; KRUGER, Marcos. Leontiev's epistemology, the relationship between the development of the human psyche, culture and its implications for science teaching. In: GHEDIN, Evandro (org.). *Psychopedagogical theories of teaching and learning*. Boa Vista: UERR Editora, 2012. p. 154-171.

SASAKI, Aline; SFORNI, Marta. Development of thought in education. In: FRIBIDA, Fabiola; FACCI, Marilda; BARROCO, Sônia. *The development of higher psychological functions in historical-cultural psychology: contributions of psychology to education.* Uberlândia: Navegando Publicações, 2021, p. 128-138.

SILVA, Anair; OLIVEIRA, Guilherme; ATAÍDES, Fernanda. Action research: principles and foundations. *Prisma*, Rio de Janeiro, v. 2, n. 1, p. 2-15, 2021.

SILVA, Grazielle; MACÊDO, Kátia; REBOUÇAS, Cristiana Brasil; SOUZA, Ângela Maria. Interview as a qualitative research technique. *Objn*, [s. l], p. 2046-257, Jan. 2006.

SILVA, Renan; CARMELLO NETO, Artur; MUZZETI, Luci. Inclusion in Brazil: intellectual disability and Vygotsky's contributions. *Scientific Interfaces - Education*, v.9, n. 1, p. 93-106, 2020. DOI: https://doi.org/10.17564/2316-3828.2020v9n1p93-106.

SOUZA, Vera; ANDRADA, Paula. Vygotsky's contributions to the understanding of the psyche. *Studies in Psychology*. Campinas, v.30, n.3, 2013, p.355-365. DOI: https://doi.org/10.1590/S0103-166X2013000300005.

STREDA, Carina; VASQUES, Carla. Down Syndrome and Intellectual Disability: History and Logic of an Association. *Brazilian Journal of Special Education*, Corumbá, v. 28, p. 417- 432, 2022. DOI: https://doi.org/10.1590/1980-54702022v28e0085.

VYGOTSKY, Lev. The method of investigation. In: VYGOTSKY, Lev. *Selected Works*. Volume III, Madrid: Visor Distribuciones, 1931/2013, p. 47-96.

VYGOTSKY, Lev. The instrumental method in psychology. In: VYGOTSKY, Lev. *Selected Works*. Volume I, Madrid: Visor Distribuciones, 1930/2013, p. 65-70.

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