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The participation of students with disabilities in science fairs: the relation between playfulness and learning

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RESUMO

Science Fairs have the potential to provide the inclusion of students with disabilities. Thus, the aim of this work is to present reports and reflections on the participation of students with disabilities in Science Fairs. The playful character present in this event and the development of students with disabilities were evaluated. The data construction instruments were: participant observation and semi-structured interview with two students with disabilities who participated in a Science Fair at the school and in the Science Fair of the Federal University of Catalão, a regional event held annually. The influence of the environment and social relationships through the student's experiences in activities determine their development. The results showed the success of the experience, as evidenced by the narratives of the participants, who expressed motivation, interest, and pleasure in participating in the Science Fairs, allowing them to be autonomous, to appropriate knowledge in a critical, pleasurable way, learning to communicate, and, mainly, improving their self-esteem. Thus, it is concluded that Science Fairs are playful activities capable of providing the appropriation of knowledge in an autonomous and pleasant way to students with disabilities.

KEYWORDS: Special education. Science Fairs. Playfulness.

INTRODUCTION

Concerns about the development of students with disabilities became an important issue after the guarantee in law of the inclusion of these students in regular education. According to the Law of Directives and Bases of National Education (LDBEN) (BRASIL, 2019), the Declaration of Salamanca (UN, 1994) and the World Declaration on Education for All (UN, 1990), this is a modality of Basic Education offered, preferably, in the regular education network. In other words, the legislation ensures the access and permanence of the disabled student in all levels of education.

When working with students with disabilities, it is necessary to realize their potentialities in order to ensure their full development, as well as to conceive them as an active subject that is constituted by means of the relationship with the other and with reality (ADAMS, 2020). The author makes this statement based on Vygotsky's words:

> (...) the new point of view prescribes to consider not only the child's negative characteristics, not only his faults, but also a positive portrait of his personality, which presents, first of all, a picture of the complex indirect paths of development. The development of higher psychic functions is possible only through the paths of cultural development (...) (VIGOTSKI, 2011, p. 869).

Motivation is one of the main factors not only for the success of learning, but also for the acquisition of new skills (VIGOTSKI, 1994).Therefore, Adams (2020, p. 4) discusses that both the school and the teacher must be attentive and make available different types of resources and methodologies so that students with disabilities may develop themselves, besides having access to scientific knowledge that is provided to all, "allowing them, with this, to develop a way of thinking, memorizing, abstracting in a more complex way, preparing them for life.

For the development of the student with disabilities, Vygotsky (2011) discusses very clearly about the importance of alternative paths, which are the resources and methodologies to be developed by teachers. The author describes that it is through them that the child's development happens, since they are always used when the direct path does not provide the answer, when it is offside, that is, when the first answer becomes unsatisfactory (VYGOTSKY, 2011).

As a possibility of alternative methodology to promote the development of students with disabilities, we present the Science Fairs, which can provide students with a rich environment in which they can interact, communicate, create and learn from their potential. In an activity such as Science Fairs, students are responsible for communicating projects planned and executed by themselves (ADAMS et al., 2020).

Nunes et al (2016), still classify the Fairs as playful activities, considering that they are free and voluntary, in addition to having rules, time and space limitation, as well as problems and challenges to be solved by students, which can stimulate student protagonism, which are characteristics of playfulness. Corroborating, Adams et al (2020, p. 86) state that:

> Science Fairs have increasingly gained space in the teaching and learning process because they are considered teaching methodologies that bring a range of possibilities for a citizen education, allowing the socialization of knowledge in a playful and enjoyable way and overcoming traditional teaching.

Castro and Bernardes (2016), in addition to stating that Science Fairs are playful, discuss that these are also inclusive, because they allow students with disabilities to have contact with scientific knowledge through a differentiated and enjoyable activity. Taha, Franco and Silva (2017) complement this by stating that activities such as Science Fairs strengthen the inclusion of students with disabilities, since they strengthen and expand the possibilities they propose: involving students so that the activity adapts to their needs.

During the participation in a Science Fair, the student has the opportunity to present a project for which he dedicated several hours of study and research, searched, gathered and interpreted information in order to expose them to the public (NUNES et al., 2016). Such actions allow students to develop scientific learning in an effective and active way, still relating this knowledge to their daily lives. And all this in a playful and enjoyable way. Another characteristic that leads to consider Science Fairs as playful activities is the fact that these are configured as an activity that can involve fun and pleasure during its process.

It is a type of activity that has no mandatory participation, it is spontaneous (NUNES et al., 2016), another characteristic that allows us to state that Science Fairs are playful activities, and that enable the inclusion of students with disabilities. As this activity will allow them to be part of a group, based on their interests and affinities (CASTRO; BERNARDES, 2016) so that this spontaneous action will become a pleasurable activity for the student with disabilities, who will no longer be seen by teachers and other classmates as a subject with difficulties to be seen as part of a group, a subject with potential. In this sense, Adams (2018; 2020) states that in the teaching and learning process of students with disabilities, they need to be seen as subjects capable of developing themselves.

As an example, we cite the work of Capalossi, Gama and Barroso (2017), who report the participation of visually impaired students in a Science Fair. The authors mention that the group activities were of great importance for their development, so that they held meetings to discuss the projects to be presented. The discussions were carried out in alternative ways of understanding, as the study material was read out loud by someone in the group, and, after the reading, the material was transcribed to Braille, so that the visually impaired students could read more deeply. Then the phenomena were presented during the preparation meetings, in order to provide information not only to the visually impaired students, but also to the sighted students who would participate in the presentations. This whole process allowed the students to be motivated to participate in the Science Fair, to have fun in the process and to appropriate scientific knowledge, besides overcoming their difficulties and expressing their potentialities.

Therefore, Science Fairs are teaching methodologies that can and must be used in the development of students with disabilities, as this activity awakens their potentialities. Vygotsky (1997), in his studies on defectology, discusses the need for the compensation of disability; thus, this capacity is observed in the

development of playful activities. In this context, an event such as the Science Fairs, which present a ludic nature, could provide to all students an important role in their educational and social development.

Mezzari, Frota and Martins (2011) state that in addition to the Science Fairs promote meaningful learning, the students' participation provides their contact with the community and with several areas of knowledge, and they not only appropriate scientific knowledge, but also form themselves socially and culturally. Another important characteristic for the development process of students with disabilities is the socialization linked to the appropriation of scientific knowledge, which is enhanced with the Science Fairs, since when participating in this type of activity they are stimulated to socialize; initially with the group of students and, in the culmination, with the general public of the event.

Vygotsky (2010), states that development is related to the environment and what determines this influence are the experiences, not only experience or live a situation, but experience in the sense of acquiring knowledge, having a mediating role in the relationship between child and culture. The environment determines the development and this is modified through education, which is fundamental in the child's development process:

> (...) the elements that exist to determine the influence of the environment on the psychological development, on the development of his conscious personality, is the experience. The experience of any situation, the experience of any component of the environment determines what influence this situation or environment will exert on the child. Thus, it is not this or that element taken independently of the child, but rather the element interpreted by the child's experience that can determine its influence in the course of his future development (VIGOTSKI, 2010, p. 684).

It is known that learning is not development, but if properly structured, it leads to development, since the learning process occurs more slowly and relies on processes that are still immature but are in the process of development, that is, learning is a source of development.

Thus, with the objective of propitiating learning and promoting other knowledge and developments, such as public speaking, working in teams, researching and interpreting information, accepting ideas, expressing opinions, building values, among others, it was proposed to students with disabilities their participation in two Science Fairs, one inside the school and another at a regional level. The proposal was for the students to build knowledge, but in a more relaxed, fun and effective way.

Given this, the question was raised: what are the contributions of a playful activity, such as a Science Fair, in promoting the inclusion of students with disabilities? Thus, this paper aims to evaluate the results achieved after this participation and analyze the role of Science Fairs as a playful activity capable of ensuring the learning of students with disabilities. This is organized in methodology, section in which the methodological procedure of construction and data analysis are described; then, the results and discussions, in which reflections facing the Science Fair as a playful and inclusive activity are presented from the speeches of two students with disabilities and, finally, the final considerations are materialized.

METHODOLOGY

It is emphasized that choosing a method and the instruments of data construction in a research in the field of education is not an easy task. The method must be related to the objectives and to the character of the investigation. Thus, the present research is based on the cultural-historical approach, whose main theorist is Vygotsky (2007, p. 69), who sought in Marxism the method to build his theory and states:

> The search for a method becomes one of the most important problems of every enterprise to the understanding of the characteristically human forms of psychological activity. In this case, the method is both prerequisite and product, the instrument and result of the study.

For Martins (2002), Marxism defends a method that contains the possibility of learning social life as a reality that is continuously being transformed, even by people's involuntary participation. According to the aforementioned author, for Marx, men make their own history, but they do not make it as they wish, nor under circumstances of their own choosing, but under those they are faced with directly linked to passing on the past.

Based on the observation of the participation of students with disabilities in two Science Fairs, one within the school and another at a regional level, and on a semi-structured interview conducted with them, we aimed to evaluate the results achieved by the students in special public education from this experience, trying to show the playful nature of learning in the development of students, considering their participation in the activities.

Thus, this analysis was developed through a qualitative research; according to Bogdan and Biklein (1994), the qualitative approach aims to capture the perspective of the research participants, which was done through interviews and observations made by the researchers.

According to Gil (2008), an interview can be defined as a technique in which the researcher presents himself in front of the investigated and asks questions with the aim of obtaining data that are of interest to the investigation. The interview is, therefore, a form of social interaction. More specifically, it is a mode of dialogue in which one of the parties seeks to collect data and the other presents itself as a source of information.

The interview was chosen, in this case, for allowing ample participation of the students, who would thus have greater freedom in a "conversation" than in a questionnaire. According to Adams (2018), the interview is an instrument that enriches data construction, because it allows answering the research problem from the analysis of the participants' speech/opinion/experience on the studied theme, since it is a dialogue with pre-established objectives.

Before the interview, the students were informed about who was responsible for the research, the Informed Consent Form was presented, and the consent of those responsible for the students was obtained, since they were minors. The interviews were audio recorded, with the help of the Moto X Play video/audio cell phone application, totaling one (1) hour of recording. For the transcription of the two interviews, we observed the rules developed by

Marcuschi (1986), who compiled fourteen (14) signs he considered more frequent and useful for the transcriptions.

The author also describes some tips for transcription: 1) avoid capital letters at the beginning of a turn; 2) use a sequencing with not too long lines to improve the visualization of the whole; 3) indicate the speakers with acronyms or letters of the name or alphabet; 4) do not cut words in the passage from one line to another. For the same author, words pronounced differently from the standard would have some consensual spellings, such as: *né, pra, prum, comé, tava*, or truncations, such as: *compr* (bought), *vam di* (let's say), among others (MARCUSCHI, 1986).

The participants in this research were two students with disabilities, a 15-year-old boy in the second year of high school, and a 16-year-old girl in the third year of high school. In order to guarantee the participants' anonymity, we chose to use fictitious names: Renato and Marcela.

The first Science Fair in which the students participated took place at their own school, where they presented their project to their classmates, school teachers, university professors who were invited to evaluate the project presented, school managers, and the community in general, which was also invited to attend the event, which had free entrance.

All students from the three years of high school participated in this event, totaling 32 projects that covered the area of Natural Sciences (Biological Sciences, Chemistry and Physics). The projects were presented during the whole afternoon, being evaluated by teachers from the school and teachers from the Federal University of Catalão - UFCAT. It is noteworthy that before the Fair the students had the support of teachers of the area of Natural Sciences to answer questions about the project developed. The best projects were awarded prizes by the school and invited to participate in the Regional Fair.

The second Science Fair in which they participated, at a regional level, was the IV Science Fair of the Federal University of Catalão, an event that was also free and open to the community in general, which showed up in large numbers to attend. There, the students presented their project together with students from the entire city and region. There were 99 projects (Kindergarten: one project; Elementary 1: 11 projects; Elementary 2: 41 projects; High School: 43 projects; Technological Education: 3 projects), involving 252 students and 42 teachers. Twenty (20) schools participated in the event, and the academic community and the region were also visited during the project exhibition. It can be seen, therefore, that the students with disabilities were part of a large event, both in number of projects and in public.

For the treatment of data collected through the interviews, we used the Textual Discourse Analysis (TDA) (MORAES, GALIAZZI, 2016), in which the students' answers were grouped into units of meaning. This type of approach corresponds to a qualitative data analysis that begins with the so-called unitarization of the texts, which fragments them into units of meaning. After unitarization, the categorization process is performed, which consists in grouping the similar units of meaning into categories. And, finally, in the communication stage, metatexts are elaborated, explaining the conceptions that emerged from the information in combination with the theoretical references, when three (3)

categories were created: 1) "Science Fairs, a voluntary, free and fun activity"; 2) "Science Fairs: a fun way to develop learning"; and 3) "Science Fairs, a playful activity that guarantees learning with pleasure". In the next topic, the discussions referring to these categories follow.

RESULTS AND DISCUSSION

A Science Fair was developed in a public school in the city of Catalão/Goiás with the aim of bringing together and promoting the appropriation of knowledge by students autonomously, meaningfully and with pleasure (playfully). In this activity two groups participated which had members who were students with disabilities. One of the students had a mild intellectual disability report, and the other had a learning disability.

Intellectual disability is classified as a set of problems that affect an individual's intellect, however, it does not alter the other functions of the brain as many believe (FIGUEREDO; GOMES, 2003, CAMPOS, 2018). It can also be characterized by any functional limitation lower than the normal standards of functioning of the human organism. According to Ciasca (1990), learning disability is understood as a peculiar and complex form of behaviors that are not necessarily due to organic factors and are therefore more easily removable. It is fundamentally characterized by the presence of difficulties in learning greater than those naturally expected for most children, generating insufficient educational achievement and negative self-esteem (FIGUEREDO; GOMES, 2003, CAMPOS, 2018). It is noteworthy that neither of the two students had a support teacher in the classroom.

One of the groups presented the project entitled "Mini air conditioner", which sought to demonstrate a homemade way, using recycled materials, to cool down from the heat. This group included the student Renato, who has a mild intellectual disability. The other group, in which Marcela, a student with learning disability, participated, presented the work "Faraday's cage", which aimed to show the electrostatic shielding.

Renato was shy during the classes, he did not talk much, but he would ask his questions about the contents and expressed himself relatively well; he had a different development process from the other students and, in the subjects that dealt with calculus, such as chemistry, physics, and math, he needed individualized attention. Renato had a good social relationship and participated actively in all the activities developed at school.

Marcela was a very participative student in class and dedicated to her studies in order to overcome her difficulties, but she did not have a good relationship with most of the students in her class. She also presented greater difficulty in subjects that involved calculus, such as physics, chemistry and mathematics, thus requiring individualized attention.

Participation in Science Fairs allowed Renato and Marcela greater proximity to the contents of the subjects they had difficulty with. According to Adams (2018, p. 37):

> When the student begins to master knowledge of mathematics, physics, chemistry, mother tongue, etc., he is transformed not only by the content of the disciplines that offer another explanatory basis for events and facts, but he is also provoked to have a more complex way of thinking, to voluntarily direct his attention, to remember things in a mediated way. In this sense, schooling provokes true revolutions in students. We believe that teachers, together with other school professionals, must establish work plans for students with disabilities that result in learning.

It was also observed that Renato and Marcela had low self-esteem, especially regarding their difficulties in developing classroom activities. Self-esteem is built along the learning history of each person. It is related to lived experiences, to the description that others make of you. It is noticeable when a person talks about his/her identity, describes his/her personal characteristics, not only physically, but mainly emotionally. It is also related to the degree of appreciation that experiences both of their achievements and in the relationships they establish (BALBINO, 2013).

These students, due to their difficulties, may have been underestimated throughout their educational path, both by teachers and by their peers, due to the culturally constructed view that students with disabilities are not capable of learning. This view must be overcome, since they do have potentialities and these must be taken into consideration in the teaching and learning process (ADAMS, 2020). It is noteworthy that Renato and Marcela, when participating in the Science Fair, had their potentials, such as creativity and communication, considered by their group colleagues and teachers, an aspect that authors such as Taha, Franco and Silva (2017) consider important in the participation of students with disabilities in this type of activity.

Adams (2018; 2020), discusses that learning occurs through the insertion of the individual in a cultural group, which will facilitate the development of subjects. According to the author, what is presented is a weakened inclusion proposal composed of shortcomings in the very concept of man and education, which continues to see the disabled man by his condition of disability instead of seeing him for his human potentiality, which can be broken by the activity of the Science Fair. The author also believes that, it is up to the school and the teacher to promote alternative ways for the student to learn (ADAMS, 2018).

Renato and Marcela presented their project to classmates, teachers, community, and evaluators. The latter release grades to the projects and the groups participating in the Science Fair were classified based on this grade, and the best classified projects would represent the school in the Regional Science Fair, which took place later at the Federal University of Catalão (UFCAT). Thus, Renato and Marcela's groups were classified. It is worth noting that the evaluations were carried out without taking into account or highlighting the inclusion of the groups, and were, therefore, an impartial process. According to the evaluators' reports, they did not perceive in Renato and Marcela any difficulties in presenting their projects, and they excelled in their presentations.

After their participation in the two Science Fairs, the students were interviewed in order to investigate how were their experiences in the activities and if they built knowledge during the experiences.

It was also sought to evaluate whether the activities had a playful character; for this, we sought to analyze whether they presented the following characteristics related to playfulness (SOARES, 2008; 2013): - It must present a non-serious character, that is, the activity should not be imposed, it should be a voluntary and free proposal; - The proposed activity has to be fun (degree of student involvement and how much they actually have fun); - It is necessary not only that the activity be fun, but the presence of rules, explicit or not, so that contact with the playful activity can be initiated and, as a consequence, the appearance of the expected criteria; It must provide interaction between all those involved in the process;- It should favor learning through error; - It should stimulate exploration and problem solving, since it is free from pressure and evaluation, it creates a suitable climate for investigation and the search for solutions.

In the following items, we describe the categories elaborated from the speeches of the participants in order to discuss the playful character in the appropriation of knowledge by students with disabilities.

SCIENCE FAIRS, A VOLUNTARY, FREE AND FUN ACTIVITY

In the first moment, the school students were divided into groups of two or three members (the students themselves chose their groups), and were then encouraged to freely and voluntarily choose the projects to be presented at the school's Science Fair. It should be noted that this was an extra activity, the students would participate only if they were interested. They were encouraged to develop projects that took into account their concerns and curiosities, so that they felt stimulated to search for knowledge in an autonomous, active and pleasurable way.

The same process occurred with Renato who organized himself in a duo and Marcela who organized herself in a trio. They were asked about what led them to participate in the Science Fairs; both interviewees stated that their intention was to demonstrate their idea/experience to other people:

> Excerpt 1 - With my project I want to solve the heat problem we are facing in a simple and cheap way [...] Renato.

Through Renato's speech, we can see his interest in solving a social problem, heat, in a way that everyone could have access to, because he believed he had proposed a simple and cheap solution to the problem faced by the local society. Currently, the social emphasis has had a strong appeal in the projects presented at Science Fairs, showing a relationship of knowledge with the social context and thus configuring a more critical and citizen education. Many investigations have presented an interdisciplinary character and, most of the times, they are motivated by problems and directed to solutions existing in the community itself, revealing a contextualization of knowledge (MANCUSO; FILHO, 2006; ADAMS et al., 2020).

Both the projects presented by Renato and Marcela were an appropriation based on their interests/curiosities. Thus, it is clear that the Science Fair met one of the requirements of playfulness, being free and voluntary, because the

students participated voluntarily and developed projects based on their interests, concerns and curiosities. Moreover, it is clear that the activity valued the interests and potentialities of students with disabilities, allowing them to develop autonomy in their teaching and learning process.

Caillois (2001), Huizinga (2007), and Soares (2017) point out freedom as a characteristic of playfulness. This is present in Science Fairs, because students are free to choose to participate and to raise the topic that interests them most to carry out their research. In addition to learning to work as a team and to build knowledge in a collaborative way, which can be a source of stimulus and motivation for learning. Once again, the educational and inclusive potential of Science Fairs can be seen.

It is worth pointing out that Marcela was a student who presented some socialization problems, thus having to be stimulated to improve in the way she relates to her classmates, which was facilitated by the Science Fair:

> Excerpt 2 - It was nice, I exchanged ideas with my colleagues, they listened to me and we developed the project, it was fun to do the Fair with them [...]. Marcela.

It was observed, through Marcela's speech, that the theme of the project was chosen as a group and that she felt included, listened to, respected, because her opinion was considered when choosing the theme of the project and during its development, which, in fact, occurred as a team. Thus, teamwork can be highlighted, since students had to learn to accept the ideas of colleagues to reach a consensus on the subject to be researched, which is clear in Marcela's speech, when she said she was heard in her opinions and ideas. According to Adams et al. (2020) the participation of students in a Science Fair can cause the expansion of communicative capacity due to the exchange of ideas, cultural exchange and relationships with people, which can be seen in this experience. Marcela also highlights that she had fun doing the activities involved in the Science Fair project, which demonstrates, once again, its playful character.

It was observed during the presentation of the projects that Renato and Marcela took the lead in the exhibitions, interacting with the public and expressing their ideas. In other words, while participating in the Science Fair, the students were more relaxed and confident than in the classroom. During the interview, the students said that they were nervous at first, but as the presentation went on they loosened up and felt comfortable talking about their ideas to people. They felt recognized by those who visited their work:

> Excerpt 3 - [...] I was very nervous at first, but I loosened up by talking to people and also I knew all the knowledge that was involved in the project. And when I presented it I felt that my work was recognized by the people at the Fair. Renato

It is believed that these skills were developed from the free character of the Science Fairs, because the students were talking about something they owned, studied and researched. They felt more secure and prepared when presenting their work, considering that they were the ones who developed their projects, and this motivated them and also helped them build self-esteem. The activity

promoted the appreciation of their potential, which is fundamental for students with disabilities, who are considered incapable of learning. Therefore, Science Fairs are activities that allow the inclusion and the teaching and learning process of students with disabilities (TAHA; FRANCO; SILVA, 2017), besides allowing teachers to recognize several potentialities of Renato and Marcela to be incorporated into their daily classes.

SCIENCE FAIRS: A FUN WAY TO DEVELOP LEARNING

According to Pavão and Lima (2019), the realization of Science Fairs in a school brings benefits for students and teachers and positive changes in Science Teaching, such as greater involvement, interest and, consequently, motivation for the pursuit of learning. These characteristics are also present in lessons developed from the playfulness, because according to Messeder Neto (2016), the game is able to help the learner in the appropriation of scientific knowledge, since it will be contributing to the psychic development and demanding from the student more than he can at the moment, always advancing to the study activity, besides ensuring that the student becomes aware of what he is learning.

Pavão and Lima (2019) also ensure that the productions presented in Science Fairs are related to themes chosen by the students themselves, believing that this way there is a greater affective involvement with the study, research and presentation of the work. But, at the end of the development of the activity, it is necessary that the teacher gives meaning to the activity developed and to the knowledge appropriated by the students. This is also a common characteristic between Science Fairs and playfulness, which allows the inclusion of students with disabilities to occur, because it allows them to have access to scientific knowledge in a different way, which may not happen during a traditional class, in which they end up developing different activities from the other students in the class.

Messeder Neto (2016) states that the scientific content needs to occupy a central place in the action of playing, so that the student understands that fun is the way (not the end) to the development of learning. Promoting this awareness of that moment of fun has the purpose of ensuring the appropriation of scientific knowledge is not an easy task; therefore, it is necessary that the teacher revives, at all times, the purpose of that proposed activity. The author also mentions that the teacher needs, at the end of the game, to highlight what was important in the playful activity and what knowledge is possible to be extracted from it (MESSEDER NETO, 2012). Thus, the mediation of the educator in activities developed during participation in Science Fairs helps exactly in the effectiveness of learning with pleasure and fun, without taking into account the rules established in the process.

Motivation ensures that a student is able to take ownership of knowledge. In Special Education, motivation is even more essential for the development and learning of students; they must be encouraged to believe in their potential. To this end, they must experience participation in the various activities developed in the classroom and also at school:

> "In the classroom, the immediate effects of student motivation are that the student is actively involved in tasks pertinent to the learning process, which implies that he has chosen this course of action among others possible within his reach". (BZUNECK, 2001, p. 11).

Science Fairs can be considered a resource that ensures the motivation of students, because they stimulate exploration and problem solving in an autonomous and creative way. The Fairs are an interesting way to propose solutions to everyday problems, which occurred with the group that presented the work called "Mini air conditioner"; the students said they got the idea from the heat problem they were experiencing.

The resolution of problems provides the simulation of problem situations that require live and immediate solutions, which stimulates the planning of actions; allow the appropriation of a positive attitude towards the errors, since the situations follow quickly and can be corrected in a natural way, during the action, without leaving negative marks (BRASIL, 1999, p. 46). Thus, learning through error, one of the characteristics of play, is provided by the activities developed in Science Fairs.

This perspective of problem solving makes the Science Fairs a methodology that guarantees to the educational process the aspects that involve the exploration, the application and the explanation of the concept experienced. The elaboration of a project for a Science Fair demands the research of the theme to be worked on, of the material to be used and of the scientific concepts, that is, the student is impelled to be autonomous. Therefore, as the students work on their projects, they organize the information collected and the learning progresses is systematized through successes and mistakes in an attempt to solve the problem proposed by them. According to Kishimoto (2009), playful behavior provides opportunities to try behaviors that, in normal situations, would never be attempted for fear of error or punishment. The activities provided by Science Fairs allow the error in exploring ways to solve the problem, without the climate of punishment.

It is believed that this way the learning is promoted, especially with the students with disabilities, because the participation in the activities motivated Renato and Marcela to think, seek knowledge, interact, and dialogue with the group and the audience in order to seek a solution to a problem. The disability was compensated, mainly by the cultural development promoted by the proposed activity:

> "Cultural development is the main sphere in which it is possible to compensate the disability. Where no progress can be made in organic development, a boundless path opens up for cultural development" (VIGOTSKI, 2011, p. 869).

The activity also provided the development of other aspects with the students with disabilities, since they needed to master the content to explain their project. In this perspective, Messeder Neto (2016) believes that the more the student masters the scientific content, the more he develops his thinking, will be able to understand the importance of this content and will be able to concentrate in a voluntary way, i.e., he will discuss the content several times and thus appropriating it.

It is noteworthy that, in this process, the teacher was fundamental for the development of the students, because he closely followed the students development, allowing them to be autonomous. Through mediation, the teachers were clearing up doubts, raising questions, and presenting content syntheses throughout the construction process of the two projects. In effect, the teacher helped the students, especially those with disabilities, in the elaboration of critical thinking during the construction of the project to be presented at the Science Fair through questions and orientations related to the content. Therefore, the students did not develop by themselves, but through the help of the most experienced, the teacher.

In this sense, the mediating role of the teacher ensures the teaching and learning process of the student (FACCI, 2003). This concept has a strong relationship with the teaching and learning process "not as something that only occurs in the direct relationship between people. It can also occur [...] without the visible presence or immediate participation of the other" (PLETSCH; OLIVEIRA, 2013, p. 8). It is believed to be of fundamental importance the mediation in the teaching and learning process, especially for students with disabilities (ADAMS, 2020).

Vygotsky (1997) made a fundamental defense about the importance of understanding the student with disability as a social individual who, depending on the mediations received in his physical and social environment, may trigger compensatory mechanisms, which conflict with the external environment, to promote the maximization of his learning. The author recognizes the student with disability as capable of learning from the moment the teacher uses mediation to reach his potentialities, because mediation in the learning process is very important for the student with disability to leave the concrete immediate to form the categorical or conceptual thinking.

In this sense, one cannot lose sight of the identity of the student with and without disabilities who is in the process of learning. Therefore, depending on their access to culture, they will show a lack of intellectual abilities to establish, in a conscious way, the logical connections of phenomena among themselves.

SCIENCE FAIRS: A PLAYFUL ACTIVITY THAT GUARANTEES LEARNING WITH PLEASURE

Nunes et al (2016) present Science Fairs as a playful, pleasurable and welcoming activity, allowing students to learn and have fun at the same time. During the analysis of Renato and Marcela's interviews, it became evident that Science Fairs provided students with the desire to learn in a more enjoyable and fun way:

> Excerpt 4 - [...] "It was fun; I had help from my colleagues to assemble the project, which was nice, because I felt happy to see the project assembled. (...) Marcela.

> Excerpt 5 - [...] "It was fun to assemble the project and participate in the Fair. Renato.

It is believed that the students had fun, because they were motivated to seek and appropriate knowledge. We observed this motivation especially in the students with disabilities; they were included in the presentation and disclosed their work with all the other students without being stigmatized.

Indeed, Science Fairs are resources that promote learning with pleasure, since they overcome the traditional teaching model, based on the transmission/reception of content.

By participating in these activities, the student, whether disabled or not, gets totally involved (physically, emotionally, and intellectually) in the appropriation of the learning, becoming an important active subject of his development and learning. According to Pavão and Lima (2008), there is, on the part of exhibitors in a Science Fair, a commitment to the quality of what will be presented to the visiting public; for such, the authors state that efforts are made to understand, in depth, what they are presenting.

In addition to cognitive learning, the student who is inserted in a project and participates in a Science Fair has direct contact with people and develops personal skills such as learning to work in teams, to communicate and, mainly, to accept ideas and learn culture. The study conducted by Gentili (2005), showed that the student who is emotionally involved with the content learns more. It is believed that through the playful activities developed during the Science Fairs there was a greater involvement of students than in regular classes. It was also noticed that such practices are extremely enriching within schools; moreover, activities of this size involve all spheres of the institution, which can enjoy a day of entertainment and the appropriation of more significant knowledge.

During the interviews, the students expressed that they liked and found it fun to participate in the Science Fairs because they got out of the routine of normal classes and, similarly, they stated that they feel the need to have more differentiated classes:

> Excerpt 6 - [...] "It would be cooler to have differentiated classes, we would learn more". Marcela

> Excerpt 7 - [...] "We learn more building projects, I would like to have more classes to build projects". Renato

Thus, based on the interviewees' statements, it is observed that differentiated activities in which students are the active subjects, such as Science Fairs, facilitate learning, because they build knowledge in a pleasurable way, and also enable the inclusion of students with disabilities. Adams (2020) corroborates this idea by stating that the education of students with disabilities only exists if strategies and practices different from those traditionally practiced are introduced in classrooms, so that alternative paths are promoted, based on the students' potentialities.

CONCLUDING REMARKS

After the analysis of the interviews, it is possible to state that Science Fairs can be considered playful activities because they are pressure-free, voluntary,

pleasurable, have rules, allow the resolution of everyday problems, and stimulate the appropriation of knowledge from the mistake, without the pressure of punishment.

After the analysis, it was concluded that the participation in Science Fairs provided the acquisition of knowledge for students with disabilities, helping them to overcome different barriers and providing the development of creativity, autonomy and self-esteem. The students' participation was a free and voluntary activity that encouraged motivation and problem solving, allowed teamwork and the appropriation of knowledge through cooperation among students, and developed learning through error, but without embarrassing the learner. In this way, students had fun building and presenting their projects in Science Fairs and learned to communicate and, mainly, to accept ideas and moral values such as respect for diversity among people, for the social and for others.

Therefore, through the activities developed during the participation of students with disabilities in Science Fairs, the existence of the characteristics of playfulness in the methodology is proven, which are: 1) to be a free and voluntary activity that, despite having rules and times, is able to promote involvement, interest and motivation for learning; 2) being an activity that involves fun and pleasure, but at the same time promotes learning (promotion of learning with fun and pleasure); 3) Despite being configured as a fun activity, it presents rules that result in learning; and 4) the exploration of new ideas without the fear of error and punishment (the error as a tool for growth and learning).

Finally, it is believed that the insertion of Science Fairs in schools allows the inclusion of students with disabilities, as they provide conditions for students to overcome the existing diversities among them and the learning barriers, enhancing the capabilities that these students have to develop and learn.

A participação de alunos com deficiência em feiras de ciências: a relação entre ludicidade e aprendizagem

ABSTRACT

As Feiras de Ciências apresentam potencial de proporcionar a inclusão de alunos com deficiências. Assim, objetiva-se com este trabalho apresentar relatos e reflexões sobre a participação de alunos com deficiência em Feiras de Ciências. Avaliou-se o caráter lúdico presentes neste evento e o desenvolvimento dos educandos com deficiência. Os instrumentos de construção de dados foram: a observação participante e a entrevista semiestruturada com dois alunos com deficiência que participaram de uma Feira de Ciência na escola e na Feira de Ciências da Universidade Federal de Catalão, evento regional realizado anualmente. A influência do meio e das relações sociais por meio das vivências do educando nas atividades determinam o seu desenvolvimento. Os resultados evidenciaram o êxito da experiência, constatado a partir das narrativas dos participantes, que expressaram motivação, interesse e prazer em participar das Feiras de Ciências, permitindo que eles fossem autônomos, se apropriassem dos conhecimentos de forma crítica, prazerosa, aprendendo a se comunicar e, principalmente, melhorando sua autoestima. Assim, conclui-se que as Feiras de Ciências se constituem em atividades lúdicas capazes de proporcionar a apropriação de conhecimentos de forma autônoma e prazerosa aos alunos com deficiência.

PALAVRAS-CHAVE: Educação Especial. Feiras de Ciências. Ludicidade.

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