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Open and Distance Learning (ODE) in the early years of elementary school in the face of pedagogical practices with an emphasis on neuroscience

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ABSTRACT
The introduction of neuroscience needs to be considered in all teaching modalities. Among these is distance education in the early years of elementary school, which was the focus of this study. Neuroscience contributes to distance education because current knowledge about neurodevelopment and the functioning of the brain-mind complex helps us understand how people learn. Acquiring knowledge of neuroscience enables teachers to motivate, teach and assess their students in a way that is compatible with brain function. The aim is to investigate teaching practices in the early years of elementary school in the face of the information society, for autonomous and meaningful learning; through a case study. It also aims to highlight the importance of neuroscience in the distance education system in the early years of elementary school. This study opted for bibliographical scientific research, as it used theoretical sources; qualitative research, as it appropriated the subjectivities of the authors used; and exploratory research, as it investigated the phenomenon of "Distance Education (DE) in the early years of elementary school in relation to pedagogical practices", bringing it closer to the scientific community, aimed at a teacher of the early years of elementary school in the private school network in Campos dos Goytacazes/RJ. From this study, it can be concluded that: learning is the result of neuroplasticity; the human brain does not end its development, but is constantly restructured and reorganized; new ideas about cognition and development can give new directions to education; neuroeducation is a proposal that is growing and becoming a field and intersection between education and neuroscience.

Keywords: ODE, Neuroscience, Teaching practices.

INTRODUCTION

The purpose of this article is to reflect on the importance of distance education in the early years of elementary school and the relevance of neuroscience studies to education. It is based on the following theme: "Distance Education (DE) in the early years of elementary school in the face of pedagogical practices" and arose from the question as to why teachers in the early years of elementary school do not use knowledge of neuroscience to teach in a meaningful way in Distance Education (DE).

Brazilian society has been undergoing abrupt changes as a result of the technological revolution, which has challenged people to live connected lives, also influencing the educational system and teaching practices.

According to Demo (2000), technology is a reality in schools where marginalized populations can have access to it and the future of education is tele-education, in which a large part of classes will be

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virtual. Although the teacher's presence is irreplaceable in some moments that require face-to-face exchanges and in the political reconstructive process, he or she must become familiar with the technology in order to know how to use it properly, eschewing traditional, expository lessons in a reproductive manner, since the internet provides access to a lot of information. Therefore, the new technologies are not a threat to the teaching profession; on the contrary, they enhance the teacher (DEMO, 2000).

According to Demo (2000), technology can be a great ally in the political reconstructive process, motivating students in order to promote formative processes in a fun way. It is therefore necessary to study this topic.

OBJECTIVE

The study aims to investigate teaching practices in the early years of elementary school in the face of the information society, for autonomous and meaningful learning, through a case study; to present the advantages and disadvantages of distance education (DE) in the contemporary educational system; to relate the advantages of neuroscience in the development of distance education (DE); to highlight the importance of neuroscience in the distance education (DE) system in the early years of elementary school.

METHODOLOGY

The methodology of this work is characterized as bibliographical, for using theoretical sources; qualitative for appropriating the subjectivities of the authors used and exploratory, for investigating the phenomenon "Distance Education (DE) in the initial years of Elementary School in relation to pedagogical practices" approaching the scientific community, aimed at a teacher of the initial years of Elementary School in the private network in Campos dos Goytacazes / RJ. "The interview, which aims to obtain valid answers and pertinent information, is a true art, which improves with time, training and experience" (LAKATOS; MARCONI, 2003, p. 198).

DEVELOPMENT

DISTANCE EDUCATION (EAD) IN THE EARLY YEARS OF PRIMARY EDUCATION

According to Assumpção (2012), children born into the digital age are subjected to stimuli that affect the way they learn and nurture expectations in relation to the education they want, so distance education (DE) for this audience must meet the basic differences of this age group, i.e. adapt to their specific needs. Pedagogical strategies must therefore be adapted to the profile of this generation, known as

digital natives[3] , who are familiar with digital technology and the internet, and schools must adopt distance education (DE) strategies to extend their role beyond the school walls and meet students' expectations.

The world has undergone changes in various sectors of society and education is no different. Education is also undergoing changes, as exemplified by distance learning, which expands and democratizes access to education, provides interaction, among other things.

> As an educational modality, distance learning is considered an alternative and complementary form of training for Brazilian citizens to face-to-face education and has proven to be exceptional for the democratization of knowledge and also very rich in terms of pedagogical potential (MILL, 2012, p.280).

Contrary to what many people think, distance education (DE) did not emerge recently. It had its first experiences with correspondence studies, enabling people to study at home or even at work during their free time.

According to Alves (2011) distance education emerged in the eighteenth century in the United States in a non-institutionalized way, and in the nineteenth century in an institutionalized way, in Sweden, the United States and England (ALVES, 2011).

According to Moore and Kearsley (2007), distance education has evolved over five generations using the main communication technologies of each era. The first generation is characterized by correspondence study, enabling individualized study. The second generation is characterized by radio and television transmission (with added oral and visual aspects), with almost no interaction between student and teacher. The third generation of North American open universities combined audio/video and correspondence with face-to-face guidance, using practical methods to disseminate instruction. The fourth generation is characterized by audio, video and computer teleconferencing, enabling real-time interaction between students and instructors. The fifth generation is characterized by online virtual classes based on the Internet, arousing great interest, collaborative learning and the combination of text, audio and video on a single communication platform (MOORE; KEARSLEY, 2007).

The term distance education (DE) as it is used today emerged in Germany at the University of Tubingen, when researchers began to refer to correspondence study with the terms Fernstudium, or distance education, and Fernunterricht, or distance learning (MOORE; KEARSLEY, 2007).

In Brazil, the first records of distance education date back to around 1904 with private correspondence courses in typing. Art. 80 of Law 9394 of 1996 is a milestone in the regulation of distance education (ODL) in Brazil and establishes that the government should encourage the development and

[3] In the case of Brazil, these are people who were born after 1988 and grew up in a context where digital technologies have become part of everyday life, changing the way they think, interact and learn (ASSUMPÇÂO, 2012, p. 128).

dissemination of distance learning programs at all levels and modalities of education, and continuing education (BRASIL, 1996).

In contemporary times, distance education (DE) has been gaining more and more ground, mainly due to the intermediation of Information and Communication Technology (ICT), which is widely used in distance education (DE) and for this to happen, more elaborate and self-explanatory materials are needed.

According to Veloso (2020), the society we live in is influenced by technology, and it is important for teachers to reflect on virtual spaces as training environments, i.e. teachers cannot ignore the technological world that is part of the process of building and training subjects.

Therefore, we cannot ignore the fact that Information and Communication Technologies (ICTs), which are widely used in distance learning, have benefited it. As a result, the relationship between students and teachers has changed, as they are not present in the same space and time, i.e. there is no rigidity regarding the physical presence of people in the same space and time.

> Art. 1 For the purposes of this Decree, distance education is considered to be the educational modality in which the didactic-pedagogical mediation in the teaching and learning processes occurs with the use of information and communication means and technologies, with qualified personnel, with access policies, with compatible monitoring and evaluation, among others, and develops educational activities by students and education professionals who are in different places and times (BRASIL, 2017, p. 01).

Therefore, distance education (DE) is an educational modality characterized by flexibility and asynchrony, i.e. in which teaching and learning between students-students and students-teachers do not take place in the same space and time.

Distance education (DE) is not just a privilege for higher education and open courses, but for all levels of education, including basic education.

Article 2 of Decree No. 9,057 of May 2017 states that basic education and higher education may be offered in the distance modality under its terms, observing the accessibility conditions that must be ensured in the spaces and means used (BRASIL, 2017).

Furthermore, distance education (DE) has an audience with very heterogeneous characteristics, unlike face-to-face education. Thus, distance education (DE) has come to provide access to knowledge for those who for some specific reason would not be able to attend traditional face-to-face classes.

Paragraph 4 of Article 32 of Law No. 9,394 of 1996 stipulates that the provision of primary education in distance learning mode must occur as a complement to learning or in emergency situations. These emergency situations are established by Art. 9 of Decree No. 9,057 of 2017, referring to situations such as: people who are prevented, for health reasons, from attending in-person education; who are outside Brazil for some reason; who live in locations where there is no regular in-person school service network; people who are compulsorily transferred to regions that are difficult to access; who are in a

situation of deprivation of liberty or are enrolled in the final years of regular primary education and are deprived of the provision of compulsory subjects in the school curriculum (BRASIL, 2017).

Furthermore, while in Brazil the law still does not allow the offer of totally distance learning courses in primary education, with a few exceptions, in other countries this is already a reality, and the semi-presential or complementary model is already widely adopted in many schools (ASSUMPÇÂO, 2012).

Therefore, it can be seen that the way teaching is done is changing, even though in Brazil distance education (ODL) in the early years of elementary school still only occurs with a few exceptions.

In addition, it is important to note that education as a right for all, aimed at full development and the exercise of citizenship, was guaranteed in Article 205 of the 1988 Federal Constitution. Item I of Article 206 of the 1988 Federal Constitution provides for equal conditions for access to and attendance at school (BRASIL, 1988). It is known that the reality of Brazilian society is unequal and divergent, and distance education (DE) is fundamental for the population to be able to access education and continue studying, as many are unable to attend or remain in regular face-to-face schools for various reasons, including time, distance and illness.

Education is teaching how to think. Distance education encourages the student to be a researcher, in other words, to seek answers to their questions and encourages interaction through discussion of the answers. Through interaction there is an improvement in the quality of distance education (DE) and for there to be meaningful learning there needs to be interaction and reconstruction of knowledge.

In addition, distance education (DE) enables social transformation, inclusion and democratization of access to quality education, so distance education (DE) meets a demand from society itself to democratize access to education. Distance education is therefore inclusive, as it enables access to knowledge and quality formal education.

Article 32 of Law No. 9.394/96 regulates compulsory primary education, as well as the learning (social, cultural and content) of the student and the teaching of their rights as provided for in the Statute of the Child and Adolescent, in other words, the formation of a citizen for life (BRASIL, 1996).

Therefore, as the Freirean proposal states, education must be liberating, i.e. the student will build their worldview through quality education, acting in society according to the way they understand and see the world, and not in the traditional banking way, which imposes a way of reading the world on the student. Therefore, distance education (DE) is an ally and should not be seen as an opposition to face-to-face education, as it makes it possible to democratize access to education, as well as making the student question and be an active participant in their educational process, which not only involves teaching the content, but the formation of a citizen who is active in society.

> ODL itself is a broad and generic term. Certainly, there are various ways of carrying out distance education, but many institutions still seem to see distance education as a mere opposition to face-to-face education. We need to understand that this is a time of transition towards a more flexible education. Public policies need to meet the demands of society and educational legislation needs to anticipate the changes (NETO, 2012, p.9).

It can be concluded that distance education (DE) is not a recent form of teaching, but one that has come to meet a demand from society that was unable to attend rigid traditional face-to-face teaching and that over the years it has gone through various phases, adapting and using the technologies available at the time to its advantage. In addition, there has been a need to create laws and decrees that deal with specific teaching and learning issues for distance education, since it has spread and is increasingly present in society, meeting the demands not only of higher education, but also of the initial years of primary education, which is part of basic education as a way of democratizing access to quality education aimed at full development and social transformation.

Neuroscience revolutionizing teacher training in Distance Education (DE)

Neuroscience is a branch of research that seeks information about the nervous system. It aims to shed light on the mysteries of brain processes, the actions of the external and internal environment that can compromise the full functioning of these structures.

According to Relvas (2012, p. 34) she defines neuroscience as "a field of study in Anatomy, Biology, Pharmacology, Genetics, Pathology, Neurology, Psychology, Psychiatry, Chemistry, Radiology and the glimpsed studies inherent to human education in teaching and learning".

According to Relvas,

> Is there a bridge between understandings of science and education? Efforts are needed to understand how people learn, with the main process being the interrelationship between the nervous system, mental brain functions and the environment. Therefore, the question is to provoke in the educational sciences the possibility that learning and behavior begin in the brain and are mediated by neurochemical processes. This way is found in this dialogue, for a more neuroscientific Pedagogy, understanding that human brains are different through their processing and procedures, and that Neuroscience is thus a set of disciplines that study, by the most varied methods, the nervous system and the relationship between brain and mental functions (RELVAS, 2012, p. 35).

As the author emphasized, it is necessary to understand how the brain works in order to understand how the teaching-learning process takes place. Taking into account the different human brains, due to their processing and procedures throughout their lives.

Neuroscience, in the educational sphere, is yet another tool for teachers in their daily activities, helping to resolve issues that were previously obscure or even unjustified.

> From an educational point of view, understanding the learning process has become a new challenge for teachers, and the environment for this is the classroom. This place needs to be configured in such a way as to promote greater convergence between science, learning, teaching and education (RELVAS, 2012, p. 54).

In this way, it is of the utmost importance to know how the process that leads to learning takes place, because the classroom is the environment where it is possible to encompass science and education so that teaching favors quality learning. This makes it a challenge for education professionals to understand how the learning process works according to the contributions of neuroscience.

According to Bartoszeck (2007), his research at the Neuroscience and Education Laboratory of the Physiology Department at the Federal University of Paraná highlights the relevance of neuroscience to education and the implications of brain research for teaching and learning. The author concludes that neuroscience has much to add for the benefit of education.

Successful learning also has to do with the teacher's curriculum and the context in which the classroom and the community as a whole are inserted. It is these requirements that will interact with the specialties of each brain in its uniqueness (GOSWAMI, 2004).

The constructivist educational environment allows for multi- and interdisciplinary intervention in the formation of knowledge and dialogues with the professionals interested in it. Neuroscience is essential knowledge for teacher training, contributing to an understanding of how the brain-mind complex works.

> Because we understand the importance of the brain in the learning process, here we consider the contributions of Neuroscience to teacher training, with the aim of offering educators an in-depth study in this regard, so that better results can be obtained in the teaching-learning process, especially in basic education (NORANHA, 2008, p.1).

Neuroscience has made several contributions to teacher training, facilitating teachers' understanding of each student. In basic education in the distance learning modality, it is necessary to take a closer look at cognitive issues, bringing understanding to the functioning of each person's brain, in order to bring methodologies that add to teaching and learning in an effective way.

When Neuroscience is related to Education, it generates resources for the educator to become a bridge on how to teach with quality through pedagogical resources. Thus, the educator can sharpen the student's thinking about thinking (RELVAS, 2012).

Educators need to understand this complexity that is the link between cognition, memory, intelligence, skills, learning, behavior and new technologies, and, as an observer and identifier of learning difficulties, see them not as failures, but as a possibility of reorganizing this thinking being, who feels and lives this social and cultural integrity. The classroom needs to be reframed to become a place that offers the possibility of generating interaction with learning through new technologies (RELVAS, 2012).

These new technologies that are used in distance learning have been of great importance in the lives of many students, as they have contributed significantly to the learning of students who, due to their particularities, have found this modality to be an effective way of building their knowledge. However, many educators have faced some difficulties in reconciling this modality due to cerebral behavior. Being the mediator between the connection of these brain processes has brought some impossibilities due to the complexity of making all the brain processes come together in favor of the cognitive development of the students.

It is possible to see that learning happens in different ways and at different speeds for each human being. In addition, Leite (2011) highlights the importance of professionals involved in education understanding that the behavioral action of their students is the result of dynamic brain activity. In this respect, the author recommends that:

> The brain is unique and there is no other like it. Each individual has their own brain in a different way, resulting in a dynamic interaction between nature and the environment, genetics and stimulation respectively, where everything the subject does is based on communication between neurons. People learn in different ways where a single method is not ideal for all students, it is necessary to have several different teaching strategies, so allowing the student to choose whenever possible is not a revolutionary proposal, it requires teachers who are prepared, attuned and committed to education and the method to be applied when developing a diversified and differentiated teaching, capable of identifying, respecting and taking advantage of the learning style that is preferably most suitable for their students (LEITE, 2011, n.p).

Each brain functions according to the particularities of each human being, because the communication between neurons causes neurotransmitters to act in such a way that the interaction between the environment and genetics influences the stimulation of cognition. This is why each individual develops at different times and in different ways. It is therefore necessary for educators to look for a variety of ways to make a significant contribution to teaching and learning, so that each student can develop as a whole.

In view of this, it is worth highlighting the importance of distance education in this teaching and learning process. The clearest definition of distance education was given by Moran (2002), who defines it as the teaching and learning process, mediated by technologies, where educators and students are separated spatially and/or temporally. In addition, Moore and Kearsley (2007) complement this by stating that as students and teachers are in different locations, they need some kind of technology to transmit information and provide them with a means of interaction.

In this way, the teacher and tutor become mediators in the teaching and learning process, and the student will not be considered a simple reservoir of content, but can be the agent that builds their knowledge in a cooperative and interactive way. Belloni (2009, p. 81) reinforces this idea by stating that the teacher in distance education "should become the students' partner in the process of building

knowledge, i.e. in research activities and in the search for pedagogical innovation". The author stresses the importance of the teaching materials that are posted on VLEs, according to her: "The production of a course and its materials requires a long process of preparation, planning, realization and distribution which can negatively affect the conditions of study and student motivation" (BELLONI, 2009, p. 55).

In view of this, it is important to emphasize that it is necessary for distance learning to have adequate materials for the construction of learning, since a lack of planning can have certain implications for the construction of knowledge. This material must be synchronized with neuroscience so that it is developed in a way that is meaningful and stimulating for learners.

Kenski (2005) is also concerned about choosing the type of media used to conduct classes in the distance learning mode:

> Developing distance education projects with technical and pedagogical quality requires care in many ways. The management of media for use in education is one of the first steps towards its realization. It involves not only the analysis of investment and the acquisition of equipment, but also the treatment of content that will be conveyed and the training of the team of professionals for its best use by the educational area as a whole and in each teaching project in particular (KENSKI, 2005, p.3).

As the author pointed out, the quality of the teaching material has a strong influence on the consolidation of constructive learning by the students. The choice of these materials must be focused on full cognitive development, as the content it contains will broaden or narrow learning horizons.

According to Oliveira (2014, p.18) it is important to understand that "learning is not about absorbing content and requires a complex network of neurophysiological and neuropsychological operations". For this reason, the great relevance of neuroscience in learning is emphasized, regardless of the teaching modality, face-to-face or distance learning. The learner is a unique being with different needs, skills, abilities and motivations, which is why the school environment, whether face-to-face or virtual, is not seen in the same way by everyone who lives there. And in order to reach all students, it is necessary to have a dialog between pedagogy and neuroscience in all its dimensions and possibilities of application in the classroom context. Chedid (2007) rectifies this idea by stating that:

> The influence of neuroscience on our educational practice will strengthen strategies already used in the classroom, as well as suggesting new ways of teaching. Knowledge about neurodevelopment and executive functions can provide us with practical and theoretical support not only for the inclusions present in schools, but also in the teaching and learning of all students (CHEDID, 2007, p.300).

Neuroscience has had a major positive influence on teacher training, especially in distance learning. Through neuroscience, teachers in this modality are able to understand the importance of the brain for the full cognitive development that happens to each student in a different way.

The psychologist Vygotisky contributed his theory to understanding the interaction processes of human activity, higher mental functions, symbolic mediation and conceptual elaboration. According to Joenk (2002), the socio-interactionist approach is important for understanding the contribution of current neuroscience to education. Neuroscience in the educational sphere is bringing transformations in relation to understanding how teaching and learning takes place. Understanding that each student has his or her own particularities makes all the difference in the formation of this citizen.

However,

> In distance learning there is no specific concept of education, so it is necessary to investigate what would be most suitable in terms of learning orientation for adult students, which is the greatest demand for distance learning and the formation of the individual as a whole, for the present day (GOMES, et al, 2002, p. 2).

In view of this, we can see the need for Neuroscience in the training of teachers so that teaching in the distance learning modality is integral and active. Where the construction of knowledge is the main objective of this model of education. Understanding the specificities of each human being contributes to cognitive development.

According to Perry (2006 p. 8) "it is necessary to create an environment that favors meaningful learning for the student". From a social point of view, distance learning, when using virtual environments, forms a network with interpersonal relationships, with practices and habits specific to each culture. There is a relationship between the technological resources used and the activities proposed, with necessary adjustments and adaptations between them. The technologies must be characterized by their diversity, continuous updating, respect for socio-cultural, psycho-affective and cognitive aspects, with the vision that they are a system, a network.

> Education needs to be modernized to keep up with the enormous transformations in neurology, cognition and information technology that have taken place around the world. A great advantage of this modality is the integration of the various media into a single medium or communication vehicle: the Internet (HAGUENAUER, 2005, p.2).

Therefore, distance education is the reality of the world today, and it relies on the partnership of neuroscience for the all-round development of each student. This modality brings great advantages to teaching and learning, especially with the positive influence of neuroscience in understanding the cognitive development of each student.

Case study

The statements below were collected from one teacher. In order to protect the identity of the professional interviewed and ensure her anonymity, we have chosen to refer to her as Teacher X.

1 - What active methodologies do you use in distance learning in the early years of elementary school?

"Challenges sent via whatsapp, with students sending photos of suggested experiments, videos of students reading part of textbooks, talent shows (encouraging students to record with a family member), games, among others."

Active learning methodologies favor student protagonism, i.e. students participate actively and not passively, thus encouraging their autonomy, as well as interaction and quality learning in which knowledge is constructed and not transmitted, thus escaping traditional education. In active learning methodologies, the presence and use of Information and Communication Technologies (ICTs) are striking and fundamental, since the world has been undergoing transformations and students need a pedagogy and didactics that attracts them and arouses their interest in learning.

According to Morán (2015, p. 17) "the best way to learn is by combining activities, challenges and contextualized information in a balanced way." According to the author, teachers need to adopt methodologies that involve students, in which they have to make decisions and evaluate the results with the teacher's mediation, with the support of relevant materials, so that they are creative, take initiative and reflect, as well as challenges and activities that use technologies (MORÁN, 2015).

It can be concluded that teacher X used active learning methodologies, as she stimulated her students through challenges via WhatsApp, games and the use of technology to fulfill the proposed activities. In this way, teacher X escapes from traditional classes, with her students being the protagonists of their learning, while at the same time engaging them through the use of technology, challenges and games.

2- Did you study neuroscience during your academic training?

"Unfortunately, when I finished my degree in Literature (P/I) there was no talk of neuroscience, nor was there when I finished my Pedagogy degree. In my postgraduate course in Neuropsychopedagogy, I heard very little about neuroscience. But I have been following some lessons with Dr. Rosana Alves and Thais on the subject. As well as Dr. Renata Jardini's course on little mouths. As a literacy teacher, I'm very interested in understanding how the learning process takes place."

For Moraes and Torre (2004), neuroscience provides knowledge that educators should take advantage of. These authors point out that learning is provided by the plasticity of the brain and is influenced by the environment. In this way, educators, through their professional actions, provide stimuli

that can promote the secretion of hormones that provoke enthusiasm and the desire to learn, or the opposite extreme, disinterest.

> After more than a decade of rapidly growing discussion about the social impact of neuroscience, terms like "cerebrality" and "cerebral subject" can help connect social processes, cultural representations, scientific developments, and developments in medicine, philosophy, education, the media and other fields, which historians, philosophers, anthropologists and sociologists have studied from their own perspectives (ORTEGA, 2007, p.2).

Neuroscience has gradually gained a foothold in the educational field. Many trained professionals had not studied this subject in their training. Professionals who sought more knowledge about cognitive development found in Neuroscience the answer to the specificities of each brain. And with the importance of this area for understanding cognitive development, it began to grow more and more in the educational sphere, thus generating a positive social impact for the full development of students.

3- How important do you think neurosciences are in meeting the needs of each student?

"Understanding how the brain learns and defining the right stimulus for each stage is fundamental to teaching and learning. It also enables real inclusive actions."

> By knowing how the nervous system works, educators can better develop their work and support their daily practice, with repercussions on the performance and development of their students. They can intervene more effectively in teaching and learning processes, knowing that this knowledge needs to be critically evaluated before it can be applied efficiently in everyday school life. The knowledge added by Neuropsychology can contribute to an advance in education in search of better quality and efficient results in the life of the individual and in society (SOUSA, ALVES, 2017, n.p).

Human learning is not the result of simply storing data, but of processing and elaborating information native to perceptions in the brain. In order to understand how the brain learns, we need to know how learning works. Teacher X is therefore correct in saying that neuroscience is important for knowing how the brain learns, and then defining the right stimulus for each stage of teaching and learning to enable real inclusive actions.

> The use of computers from an early age is shaping a new type of student, with cognitive processes stimulated in a different way to the current generation of teachers. We need to know how our students think and learn in order to help overcome these deficiencies and channel their use of technology towards educational purposes where truly meaningful learning takes place. [...] And this doesn't just mean spending time preparing pedagogical activities that deal with these aspects, but also having a lot of creativity and experimentation to find the most effective strategy (ASSUMPÇÂO, 2012, p. 158).

In this way, learning is constructed through the experiences of human beings, and the learning process is essential for cognitive development. The environment in which citizens live has a major influence on the construction of their knowledge. That's why it's important for teachers to study more about the brain and understand that it works differently in each person, because the knowledge acquired will change the individual's behavior.

> This teaching task involves a willingness to understand students in their individual and situational particularities, following their evolution in the classroom context. (...) the teacher's willingness to get to know their students as individuals must be imbued with sensitivity and discernment in order to avoid excessive generalizations and drowning their perception of individuals in an indistinct aggregate that is not very fertile for adapting their actions. This predisposition to get to know students as individuals seems to be underdeveloped in student-teachers (...). Acquiring sensitivity to the differences between pupils is one of the main characteristics of teaching. This sensitivity requires a continuous and very long-term investment on the part of the teacher, as well as the willingness to constantly revise the repertoire of knowledge acquired through experience (Tardif, 2003, p. 267).

Understanding how the brain learns is essential for teaching and learning, which is why teachers need to become more familiar with neuroscience and use it to make a positive contribution to each student's cognitive development. Taking into account their individualities and specific needs. Always being willing to develop work that is in line with the needs of each student.

4- What electronic devices do you use in your distance learning classes?
"Notebook, computer, cell phone and television."

Digital technologies have become an essential resource in the construction of teaching and learning, as they broaden horizons in the educational sphere.

> (...) computerized media are like environments in which the human mind finds space to dialogue with itself, as well as to facilitate the organization and systematization of the process of constructing knowledge. Computers are therefore means in which critical and reflective thinking is developed, in the way conceived by Vygotsky. It is therefore possible to consider the concepts of learning mediation and the proximal zone in these environments (MATTA, 2002, p.8).

Furthermore, these technologies, such as the computer, contribute positively to the cognitive development of students, thus encouraging critical and reflective thinking through research, which makes it possible to expand knowledge.

> Digital mediation reshapes certain fundamental cognitive activities involving language, sensitivity, knowledge and inventive imagination. Writing, reading, listening, playing and composing music, seeing and making images, conception, expertise, teaching and learning, restructured by unprecedented technical devices, are entering new social configurations (LÉVY, 1998, p.17).

As well as providing comprehensive knowledge, digital technologies help improve writing, interpretation and orality. It also aids creativity through the range of quality content it makes available.

5- How do you include and integrate distance learning in the early years of elementary school?

"Diversifying the activities, using a lot of music videos, animated videos and concrete materials that were requested from the family at the beginning of each week along with the weekly class schedule."

According to Chtena (2016), classrooms today are very diverse in terms of students' characteristics, personality, cognitive style, ability and interest. Some have disabilities, often hidden, that affect their ability to see, hear, pay attention or participate in activities in the same way as their peers. According to the aforementioned author, some learn visually, others learn aurally and some learn by practicing. And each student has their own preferences and ways of expressing their knowledge, some, for example, express themselves better through writing, others through speaking and others through visual means.

For Orsati (2013), "planning teaching for diversity implies, firstly, accepting the different abilities, learning styles, capacities and interests that exist within the classroom. Secondly, when this diverse group does not fit into your original plan". In this way, the planning of distance learning classes must be based on an understanding of the different ways of learning, because learning varies from brain to brain.

According to Nelson (2013), "the principle of Action and Expression encourages teachers to include physical interactions, using both high-tech and non-tech tools and structures that guide the student towards self-assessment." Therefore, diversifying strategies can help students to demonstrate the knowledge they have learned. It's about providing students with opportunities to demonstrate what they know through differentiated activities or creations, which can include physical actions, means of communication, object construction, written production, among others.

6- In your opinion, what are the benefits and harms of technology?

"Technology expands the possibilities of access to diversified content (I did it with the class, virtual visits to museums, zoos...), it makes the class more dynamic, but it becomes tiring as it limits interaction and experimentation with face-to-face contact."

Technologies make it possible to disseminate information simultaneously to a large number of geographically dispersed points, eliminate distance, enable learning interaction between learners, teachers and content, reach people living in remote locations, socio-economically heterogeneous audiences, as well as making it possible to get in touch with different cultures and experiences (ASSIS, 2012; MAIA, 2012; MARTINS, PIMENTEL, 2012).

As we can see, the teacher's use of technology has made it possible to access culture through visits to museums and new experiences such as a virtual visit to the zoo, as well as making it possible to access content and overcome distance barriers. We can therefore see the technological benefits used by teacher X in her lessons, making them more interesting for the students.

Some authors such as Jane Healy "warn of the dangers of indiscriminate use of technology in education, as well as the danger of using certain technologies too early, when cognitive development processes are still taking place" (ASSUMPÇÂO, 2012, p. 157).

In addition, Healy is concerned about how technology is impacting learning on a social, emotional and cognitive level and draws attention to some worrying aspects in primary education, such as: the replacement of human help by the computer; children believing more in the computer's ability than in their own abilities; problems with selective attention, i.e. the ability to direct attention and focus on what should be learned despite the distractions that surround us is being negatively affected; children who use the computer a lot become deficient in memorizing; the restriction of sensory experiences of all the senses; the impairment of logical/causal reasoning when the computer is misused, because children learn to think about abstract relationships from physical experiences of sequences of actions that they themselves can control, as well as the ability to deduce how the other is feeling, i.e. sociocausal reasoning needs real physical and social experiences with other human beings; computers and educational software sometimes don't concern themselves with the formal symbolic representations (letters and numbers) that children between the ages of four and seven should begin to master; lastly, teachers need to be wary of educational software that offers "rewards" for any activity, as children can be motivated only by the rewards and not by the pleasure of the effort as a reward in itself or of overcoming a challenge (ASSUMPÇÂO, 2012).

Some of the harms cited by teacher X was the fact that technology makes it impossible to interact and experiment through physical contact, which, as previously mentioned, is detrimental to children, as it harms sensory experiences and logical/causal reasoning, which children need real contact to develop.

Therefore, it can be concluded that technology has many benefits, which were used by teacher X during her lessons, as well as identifying some of its drawbacks, such as the lack of real contact, which is detrimental to children's development.

FINAL CONSIDERATIONS

Therefore, at the end of this analysis, the subject is not exhausted here. Theoretical references were sought to help with the analysis. Therefore, the theory used was of paramount importance in order not to make hasty judgments.

Throughout this work, we have seen that distance learning is a type of teaching that contributes to the democratization of access to education and uses technology to its advantage, especially virtual digital technologies, which have favoured its expansion. Thus, there was a need to create laws and decrees to regulate it, because the way we teach is changing and schools need to keep up with these changes in society. Although compared to other countries in terms of distance learning in the early years of primary education, Brazil is still lagging behind.

Given that in Brazil, distance learning in the early years of elementary school is only used to supplement learning and in emergency cases, there is a need for pedagogical strategies that incorporate technologies into teaching, so that face-to-face classes are available for discussion and activities, in which the student has the opportunity to actively participate in their learning, because although technology allows content and interaction to be made available, even at this stage of life, real interaction with the mediation of the teacher is necessary.

Neuroscience is an ally in education so that teachers can understand how the brain works and how children think and learn, requiring educators to prepare, train and undergo ongoing training, as digital natives show changes in their brains, requiring teachers to be trained to teach according to the learning needs of these students who are familiar with technology, but they need the teacher to mediate, teaching them how to deal with the virtual environment ethically and how to use the internet properly so that they are not passive, i.e. just watching the screen, but individuals who know how to reflect critically so that effective and meaningful learning can take place.

The initial hypotheses were a lack of continuing education, a lack of professional training courses and an inadequate ICT curriculum. After the case study, it can be concluded that even though the teacher had a degree and a post-graduate course in Neuropsychopedagogy, she did not have an in-depth study that would enable her to learn more about the subject, seeking other means to understand more about neuroscience, given that during her undergraduate and even post-graduate studies in Neuropsychopedagogy, it was not discussed or was discussed in a superficial way that does not provide a basis for the professional to work, so she had to look for other ways to train herself. In addition to the lack of professional training courses, it can be concluded that the curriculum is also not adapted to ICTs, because although they are part of social reality, the curricula still do not include them as they should.

Thus, this study found that neuroscience contributes to Distance Education (DE) in the early years of elementary school, as it helps teachers understand neurodevelopment, although the study of

neuroscience is not yet part of the reality of higher education institutions of pedagogy and even postgraduate courses that should include it. Neuroscience has several advantages for Distance Education (DE), because by understanding how people learn, it is possible to design meaningful lessons according to the students' learning needs, which also makes it possible to understand the disadvantage of the lack of real physical contact, which is fundamental for children in this age group.

Therefore, it can be concluded that although there has been progress in Distance Education (DE) in Brazil in the early years of elementary school, there is still a long way to go for it to become a reality in Brazilian education, which does not use all the contributions that neuroscience provides to teaching practices for autonomous and meaningful learning.

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