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EDUCATIONAL NEUROTECHNOLOGY IN ATTENTION TO THE SPECIFIC NEEDS OF HIGHER BASIC GENERAL EDUCATION STUDENTS

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Abstract
The 21st century is It has been characterized by paying special attention to the studies of the brain, becoming known as the age of knowledge, the world is changing and with it the way of learning, each time new indications are discovered of how the human being learns, the Technologies of Information and Communication have given way to a range of innovative tools that collaborate in the educational process, gamification as an educational strategy has opened the doors for educational agents to improve their teaching practice, taking into account different learning styles and different Specific Needs of students, however, it has been observed that teachers do not know enough about common concepts or educational neurotechnology and its benefits in education, therefore, this work arises whose purpose is to analyze the contribution of neurotechnology as a contribution to the specific needs of students, for this, methods such as analysis-synthesis, inductive-deductive, in addition to a survey of a population of 50 teachers and an interview with an expert, the data obtained allowed us to conclude that neurotechnology positively affects the improvement of the Specific Needs of students, since through the use of ICT is given the correct neural interpretation, understanding how students learn.

Introduction

Research on the functioning of the brain has gained strength in the 21st century, scientists try to understand how this organ has a great influence on the development of people in different areas of life and in the development of different processes that human beings develop in their daily lives. Among the most relevant research on the brain is the one carried out in 2013 by the European Union, this research was called "Human Brain Project".

With the research, impressive results were obtained, it was possible to show that the brain grew by 3.9% each year, in addition, it was possible to appreciate the communication between the brain and electronic devices. These studies had therapeutic purposes, as they were used to treat illnesses such as Parkinson's, deafness, blindness, and other diseases. This gave new hope to people who saw the possibility of improving their lives thanks to technology and the study of the brain (Roberts, 2019). Another study carried out in the same year in the United States, called Brain Research through Innovative Neurotechnologies ”(NIH The BRAIN Initiative), allowed to revolutionize the understanding that people had about the human brain, with this project it was also sought that Neurotechnology will lead to cognitive augmentation, giving way to the development of innovative treatments for certain neuronal ailments in the population (National Institute of Health (NIH) of the United States, 2019).

The era in which the brain is given prominence and its functioning has begun and is far from over, as large investigations are still being developed that try, using different methods, to explain how the brain works. Thus, in China the Chinese Institute for Brain Research was created in 2016, which was inaugurated in 2018, its objective is to study the brain and brain-like intelligence technologies, it is hoped that results can be obtained with this. relevant information that provides the necessary information to deal with the problems that certain individuals who have neuronal affectations may present and that hinder the normal development of the activities they practice in daily life.

The turn of the century has brought with it the transformation of educational processes, emerging new approaches that have as their axis the use of technology in relation to processing and the brain. Here a new science of learning is born, which uses knowledge about the functioning of the brain and the methodology used when using technology in schools, in its basic form, this science explains how and what students learn, giving way to that the needs they may have to work on it are evidenced and turn them into strengths that allow them to acquire new knowledge (Pradas, 2017).

According to Pradas (2016), the knowledge of the brain at the time of putting into practice the use of technology in the school environment, facilitates the teacher's task of helping his students in the learning process. Neurotechnology becomes an ally to support the learning difficulties that students frequently present in classrooms, the application of technology based on the knowledge of how the brain learns provides efficient and effective support for the development of skills and abilities that reinforce learning and enable students to cope with these difficulties. In short, educational neutotechnology helps the student to build their own learning strategies, relying on new approaches that facilitate the resolution of the difficulties that they may go through when learning, this new science allows the teacher to know the functioning of the brain of their children. students and thus is able to select the appropriate technological resources to work on those shortcomings that affect the normal development of the teaching-learning process in the classroom (Meza & Moya, 2020).

Even though neurotechnology is a new science that is seeking its place in the field of education, there is little knowledge about it and about the benefits that its use provides for the attention of the specific learning needs that some students experience in the stages of their school life. Ecuador is one of the backward countries in educational technology, this, like other countries, is not well positioned, not only in equipment but in digital skills both in classrooms and at home (Palacios, Loor, Macías, & Ortega, 2020). Many of the teachers in the educational system have not been trained in the new avant-garde technologies and if to this is added the lack of knowledge about how the brain learns the contradiction of not knowing how to contribute to the attention of specific needs is generated. of students in classrooms.

Starting from the little consensus that exists about educational neurotechnology, this research arises, which is relevant because it will allow teachers to know about this new discipline and how to use it for the benefit of their teaching practice, this research will be carried out to encourage students teachers to be trained in the knowledge of new approaches and paradigms that will help them to know how their students learn and to choose the most efficient and effective technological resources for the resolution of learning difficulties in the classroom.

This research has an innovative and original character, since many of the aspects that are shown, the contribution of neurotechnology has not been considered as a contribution to the specific needs of students of Higher Basic Education, from this research the teachers will find a new way to carry out the teaching-learning process, providing an education that is comprehensive according to the needs of the students of this century. A study on educational neurotechnology and attention to specific needs was approached, starting from the hypothesis that educational neurotechnology contributes in a positive way in the attention to the specific needs of students, making use of analysis-synthesis methods, inductive-deductive, survey and interview; that will allow a better interpretation of the research literature, in addition; Techniques such as the survey guide and the interview guide will be used, allowing the collection of relevant data to support this work.

In order to contribute to the improvement of teaching practice through the use of new paradigms and educational approaches, this research will be developed whose purpose is to analyze the contribution of neurotechnology as a contribution to the specific needs of students, it will also pretend; Identify the advantages and disadvantages of the use of ICT in the functioning of the brain and determine the basic concepts of educational neurotechnology in the specific needs in the teaching-learning processes.

Materials and Methods

This research work is based on a literature review based on analysis-synthesis methods that leads to the extraction of new and clear information to understand the problem and seek possible solutions to them, the inductive method will also be used. deductive to explore, describe and analyze the data and be able to reach conclusions from the study carried out. From the use of these methods it is also intended to carry out an analysis of the different theories that are found, in addition, the survey and interview will be used; The same that will be applied through a survey guide prepared under the likert scale, and applied by WhatsApp, previously prepared in a Google form, and the interview guide technique will be applied through a conversation through the platform Zoom, to apply the survey and interview, short, clear and simple questions will be developed that allow obtaining specific and relevant data to give a solid argument to the investigation. The population and sample will be made up of -50 teachers to whom the survey guide was applied and 1 DECE staff to whom the interview guide was applied (Hernández, Fernández, & Baptista, 2010).

Analysis and discussion of results

Bases of educational neurotechnology Educational

neurotechnology is a new discipline that is beginning to be used in the educational field, trying to understand how the brain learns and therefore seeks to make clear how students acquire new knowledge with the help of the Information and Communication Technologies (ICT). This discipline tries to explain the use of technology in the educational field, the incorporation of technology in the learning process must respond to the improvement of its quality (Muñoz, 2019). Being educational neurotechnology a discipline that is beginning to be applied in the school environment, and that some may not know it, it is necessary to present the bases from which this new way of teaching was born. Educational neurotechnology comes from the cohesion of neuropsychology and technology, putting each of these branches at the service of the other to understand how learning processes occur using technological tools. On the other hand, it is also important to clarify concepts such as neuroscience, neuroeducation, neurodidactics and neurolearning, which undoubtedly, with their multiple evolutionary studies have contributed to the generation of educational neurotechnology and that it is introduced in the school field seeking the correct neural development and detecting in time the possible shortcomings that limit students in the process of acquiring their skills, abilities, and knowledge. To make a comparison in the characteristics of the concepts, figure 1 is presented.

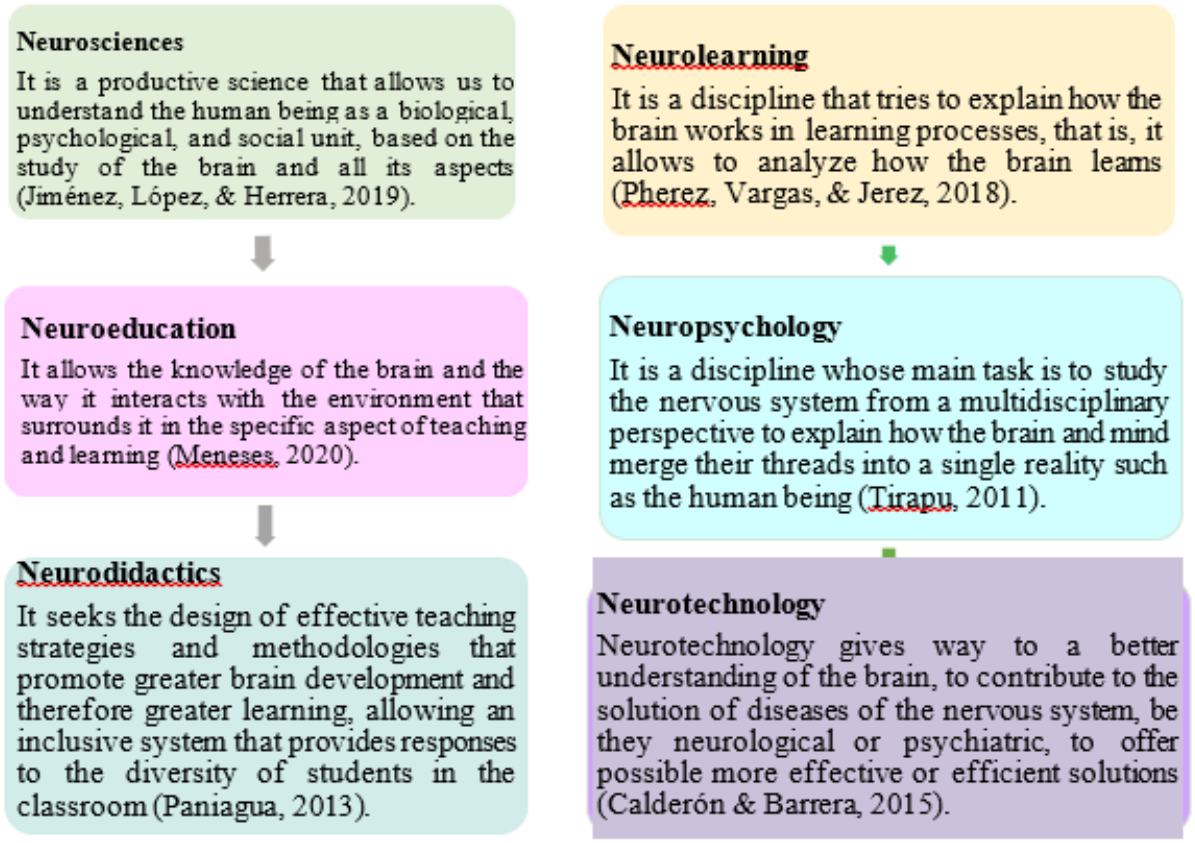

Figure 1. Differences between concepts in neurosciences

Source: Own elaboration based on research.

According to what can be seen in Figure 1, neuro sciences have taken a boom in recent times, all are based on the study of the brain, how this organ works and all aspects related to it, how it develops with learning, In such a way that possible problems that affect the normal maturity of individuals can be detected in time, in this way the best strategies can be sought to help control these inconveniences and provide a better quality of life for human beings.

Gamification as an educational strategy

Gamification refers to the incorporation of game elements in different contexts, including teaching and learning, several studies have reported that the application of this active methodology in education has improved the participation and interaction of students in the traditional classroom and online learning (Revelo, Collazos, & Jimenez, 2018). For the introduction of gamification in education, it has made it possible to improve learning experiences in students of different educational levels, promoting the motivation of students, increasing their commitment to their training process. In this way, the usual forms of teaching are changed, and an innovative education is committed that awakens in students a taste for learning (Deterding, Dixon, Khaled, &Nacke, 2011).

Gamifying means using the psychology of the game in other fields creating a fun experience; it is a kind of learning. In the professional educational field, it is used to absorb knowledge, improve skills, which makes it easier to internalize knowledge through the playful model, which also makes learning more interesting; strengthens resilience and creates a positive experience for individuals. It helps to encourage individual and group improvement. Its main

objective is to reward and motivate users so that in this way they can continue playing and reaching goals while learning (Iquise& Rivera, 2020).

Gamification allows the use of various tools in the classroom and with these, teachers have several options to choose from to develop their teaching practice, motivating students to improve their skills and abilities using technological applications. Figure 2 presents some tools that can encourage learning in students and that can be used by teachers to innovate their teaching, making education an exciting, eye-catching, and innovative experience.

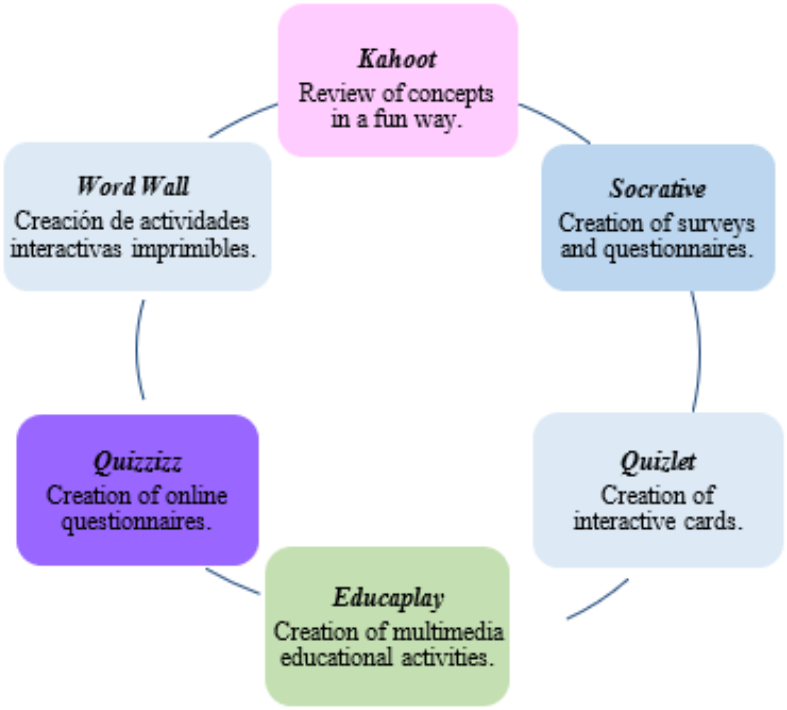

Figure 2. Gamification tools in the classroom

Source**:** Own elaboration based on research.

Making an analysis of figure 2 it can be mentioned that there are countless digital applications that can be used in the classroom to implement gamification in the educational system, which can be used by teachers to improve the teaching process- learning: **kahoot**, is a game-based response system that allows you to create questionnaires in a fun way and can be used to evaluate (Martínez, 2017). In the same line of applications, there is the tool**socrative**, which allows students to be evaluated in a fun way, by preparing multiple-choice questionnaires, short answers, and true and false questions (Bello & Merino, 2017).

Quizzlet, is another effective tool to streamline the learning process, this digital application allows you to create activities and review cards for students (Gutiérrez, 2019). In the same way **Educaplay**, is an App that motivates students to learn, this tool allows you to design a set of online educational activities such as crosswords, word searches, memory cards, among others (Pérez, 2014). **Quizizz**, meanwhile; allows you to evaluate students while having fun, in this application you can create questionnaires from scratch or using existing templates (Román, 2021). Another application that involves gamification is Wordwall, whose objective is to allow users to create educational activities in a simple and attractive way, these activities can be interactive or printable, in this tool you can create game activities to teach as well as letters to the Random, smash moles, random wheels, open the box, flip tiles, among others (idDOCENTE, 2021).

Specific needs in students

In figure 3 it is observed that the Specific Needs of Educational Support are divided into subgroups, thus are the Special Educational Needs, which are alterations in the intellectual or physical capacity of people or can also be individuals with serious behavior, behavior and attention disorders, many of these people study in regular education schools, allowing them to share great experiences with their peers, learning together and developing skills from the mutual support that they can provide. However, some teachers do not know how to deal with these needs that arise in the classroom, so it is important to prepare to learn multiple strategies that can be applied and that allow people with disabilities to live a full life within a comprehensive and inclusive educational system.

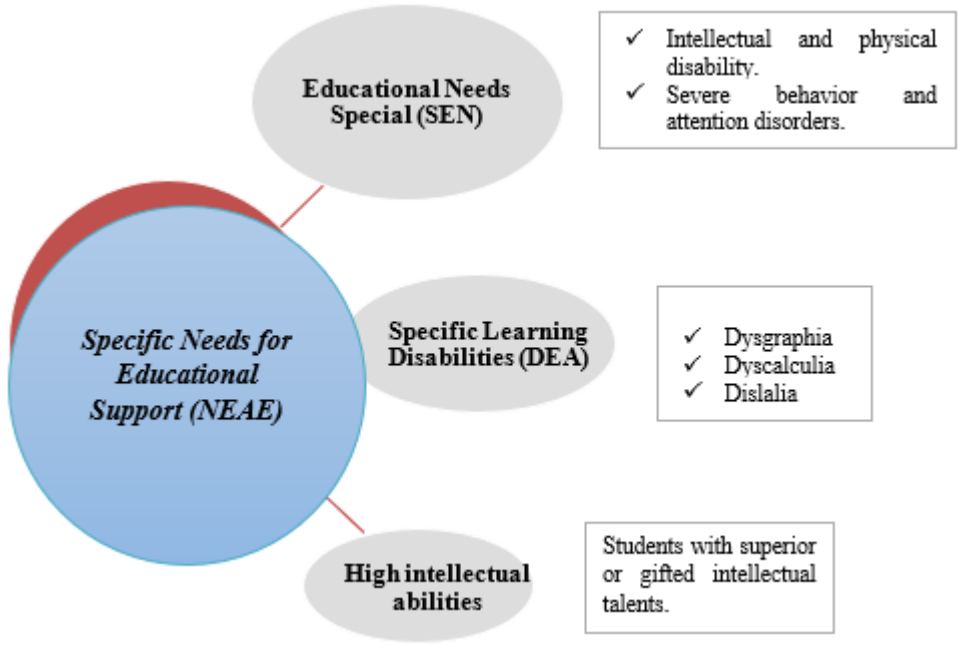

Figure 3. Specific needs for educational support and special educational needs

Source**:** Own elaboration based on research

Other Educational Needs are those that belong to the field of learning and that on many occasions are the culprits that students do not develop their skills and skills appropriately, having difficulties in their learning development, it is necessary for them to know the strategies that can be applied to deal with each of these contradictions that can limit the acquisition of new knowledge and the development of new skills in students. High intellectual abilities are also a Specific Need that can occur in students within the educational system, they must have the necessary tools to deal with these cases, helping these people to take advantage of their talents but always within the framework of inclusion, help, love and respect (Couñago, 2020).

In Ecuador, it has always been ensured to provide inclusive education, therefore, equal opportunities at the educational level is a challenge that has been worked on for some time, but it is a difficult goal to achieve. To achieve this, it is necessary to make changes that allow education to meet the needs of each student. Environments have to change so that people with Educational Needs who require educational attention are included, offering them conditions for their full development. Educational inclusion promotes seeing each person as a different and unique being, valuing differences and giving importance to the needs of each student.

Each child has characteristics, interests, abilities and needs that are their own; If the right to education means anything, educational systems must be designed, and programs developed to consider the full range of these different characteristics and needs (UNESCO, 1994).

Learning styles

A style is the way that each person uses their own strategies to acquire new knowledge, the way in which they use their tools to generate learning. Learning styles have become important elements to promote quality teaching, since knowing the pre-dominance of the learning styles that students have, allows the appropriate teaching methodologies to be adopted to the characteristics of each student and thus contribute to raising their level of educational performance (Gutiérrez, 2018). Next, in figure 4, one of the classifications of learning styles is presented, the Honey and Mumford model was taken.

Figure 4 shows one of the many classifications of existing learning styles, although it is true, they all converge in the fact that no one learns the same way, since each human being acquires new knowledge in a different way and develops their skills and abilities. skills depending on multiple factors that each human being can experience throughout his life. Referring to the classification according to Honey & Mumford (1986), there are four types of learning, active learning, possessed by those people who are open-minded, who think that everything must be tried, are creative, innovative, and eager to learn and solve problems. On the other hand, those who learn in a reflective way are those people who are proving, good observers, are prepared, patient, and detailed. Those who have theoretical learning, are logical people, seek rationality and objectivity, fleeing from the subjective and the ambiguous. Those who have a pragmatic learning, as the same word indicates, are practical, they learn from new ideas and take the opportunity to experience them, they like to act quickly and with confidence, they are determined people when solving a problem.

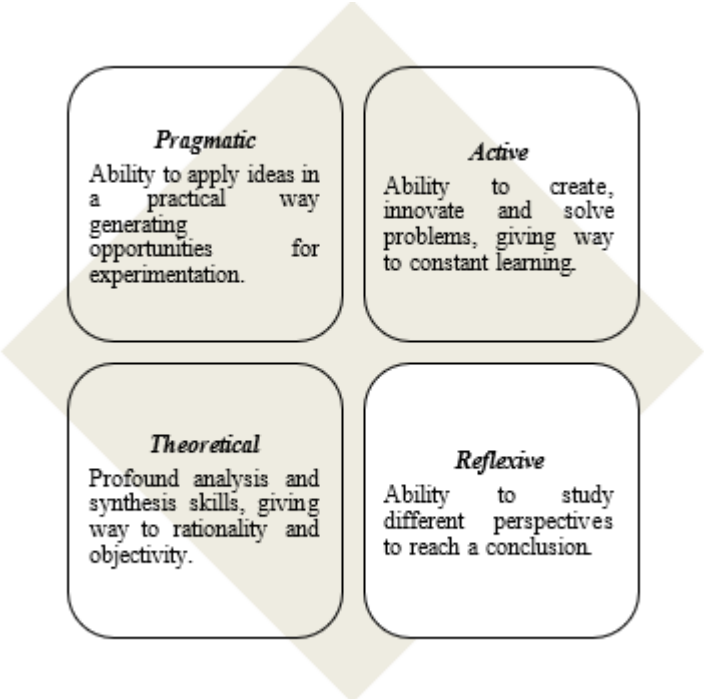

Figure 4. Honey and Mumford learning styles

Source: Own elaboration based on research.

Once the research literature on the topics that support this work has been analyzed, the results obtained by surveying some teachers and by interviewing an expert on the subject are

presented, figure 5 shows the importance of knowing the brain to understand the evolution and development of students with Specific Needs who require educational attention.

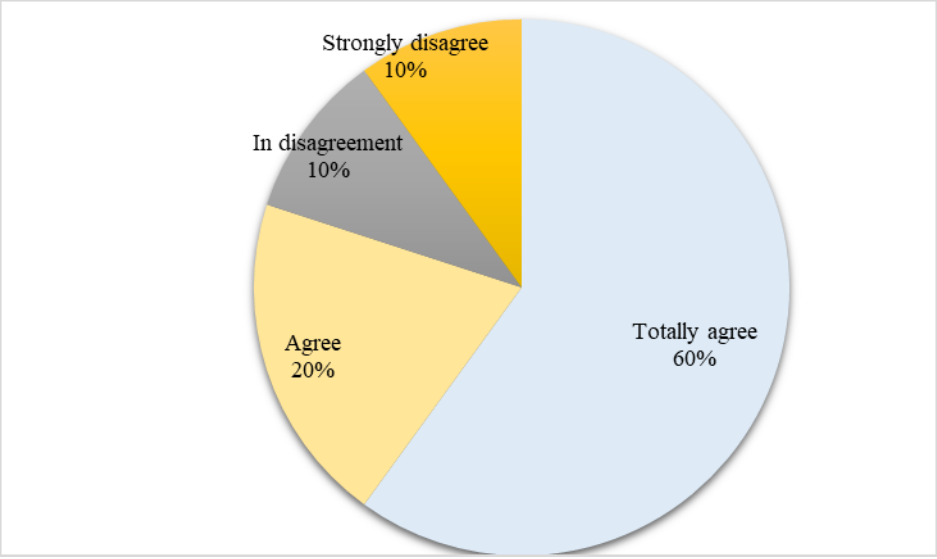

Figure 5. Importance of brain function for understanding Specific Needs

Source: Survey applied to teachers

According to the data obtained, 60% fully agreed that it is essential to know how the brain works in order to apply the necessary strategies to help students with Specific Needs, and 20% agreed, this in order to accompany and guide them in their learning, as is also stated by Palomar (2017), when it assumes that teachers should know about the operation of the brain, so that they are able to attract the attention of different students, offer effective feedback that generates a deeper understanding and create an enriching learning environment that addresses the social and emotional needs of students, at the same time as their brain it develops.

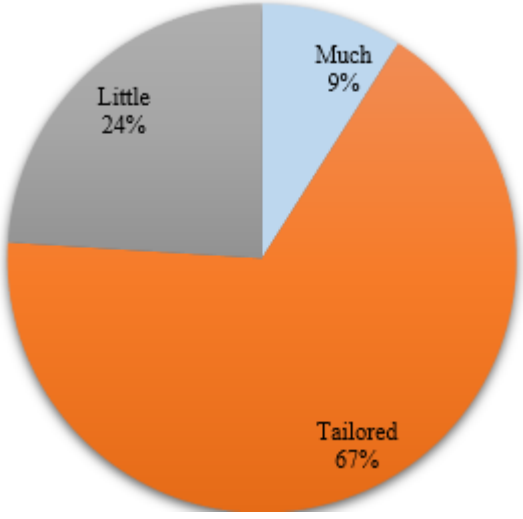

Figure 6. Knowledge that teachers have about neurotechnology

Source: Survey applied to teachers

Based on what has been studied, it is necessary for teachers to know how students think and how they act in order to understand them and adjust teaching to their needs, without However, this research showed that 67% of those surveyed know half about neurotechnology and its

benefits in the field of education and 24% do not know anything. This shows that neurotechnology is not being used to a great extent by teachers to support their teaching practice and improve student learning, since they do not know the positive aspects that applying this science can bring to the benefit of education. In this sense, Salazar (2005) agrees that the study of the brain can provide teachers with the conceptual tools that support the decisions that guide methodological actions in the pedagogical environment.

According to what is observed in figure 7, 66% of the respondents fully agree that neurotechnology provides strategies that help students with Specific Needs to improve their learning development and 34% agreed. This is related to what Reyes (2016) mentions, an educator who has knowledge about the brain, who knows its peculiarities and knows how to relate that knowledge to the use of New Information and Communication Technologies, will be able to understand how being Human development and how learning influences this process, before this we will always try to improve the methodologies used in the educational system, improving teaching practice and student performance.

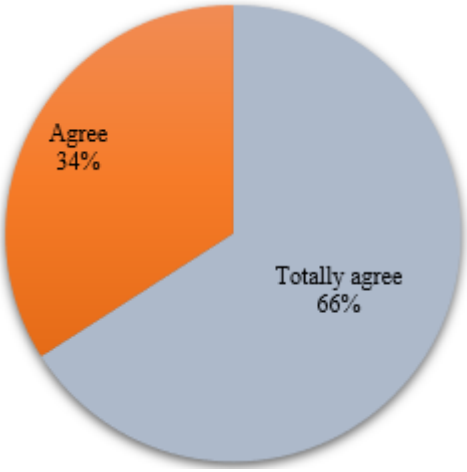

Figure 7. Neurotechnology improves the Specific Needs of students

Source:Survey applied to teachers

Given the analysis, it is essential that teachers train on these new concepts that appear with new studies, because learning evolves, students increasingly need new methodologies, approaches and teaching strategies that awaken them the Attention and motivation, leaving behind the monotonous ways of learning, now the student is the center of learning and therefore requires that innovative methods be manufactured that allow them to learn based on their educational, emotional, personal and social needs.

Figure 8 shows the importance of ICT tools in the classroom to contribute to brain plasticity, generating better learning in students with Specific Needs, in reference to this, 64% of respondents indicated that they fully agree on the benefits of this connection to work in the classroom, since ICTs contribute to improving brain functioning and 36 agreed, this is corroborated with what Barba, Jiménez, Humanante, Silva, & Ortega (2019) indicate With the use of ICT in the classroom, favorable emotional states are created for modifying the number of synapses and brain connections from neuron to neuron, increasing flexibility, brain plasticity and adaptability to the environment in students.

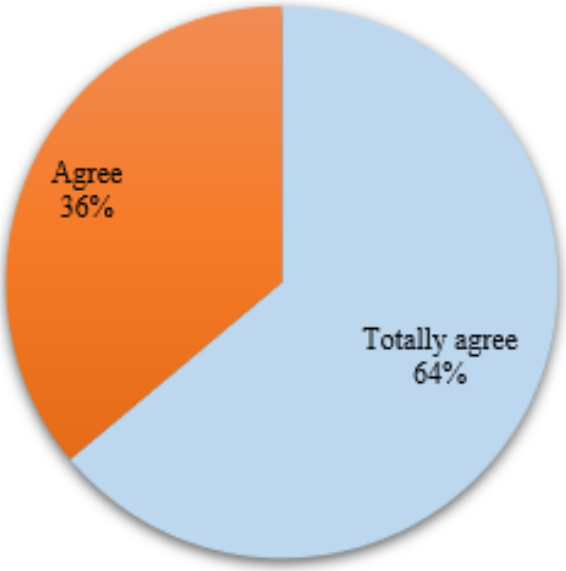

Figure 8. Technological tools contribute to brain plasticity

Source:Survey applied to teachers

As could be seen in the presentation of the results of the survey, those who participated in the study despite not knowing much about neurotechnology are aware that it is important to understand and guide students with attention to specific needs, this is verified with the explanation provided by an expert on the subject to whom an interview was applied, as a psychologist from an educational institution, when asking this psychologist about whether the connection between the Neuropsychology and the application of ICT to treat the Specific Needs in students, she responded very confidently that in her extensive work career she has always seen it necessary for all educational personnel to be trained and trained in new innovative strategies that allow them to guide these students and recognized that the study of brain function is necessary for teachers to understand their students and if to this is added the wide range of learning opportunities offered by ICT, we have the perfect duo that will transform teaching practice by ensuring the full development of the abilities and skills of all students in the classroom. classroom, attending to the different learning rhythms and styles in which students learn and taking their needs into account to be able to satisfy them in an efficient and effective way, allowing their integral development.

Conclusions

Neurotechnology has a positive impact on the treatment of the Specific Needs of students, because using ICT in the classroom the correct interpretation of neural processing is given, understanding how each student learns.

It is necessary for teachers to know the functioning of the brain of their students because this will allow them to understand that everyone does not learn in the same way or at the same pace, that each one has their own needs when learning, in this way they can adopt new one's strategies that allow them to improve their teaching practice.

Teachers do not have enough knowledge about neurotechnology to allow them to apply it and obtain the benefits of it in the educational process, this may contribute to having a limited bag of strategies that they can use to guide the learning of students with attention to Specific needs.

ICTs develop neural plasticity allowing students to learn in a more fun, innovative, interactive, and attractive way, developing their skills and competences in a pleasant environment, far from traditional teaching.

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