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# Neuroscience Role in Education

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**Abstract**---Education is the path that facilitates the acquisition of knowledge, skills, and abilities, the research aimed to study the brain and learning a fundamental role in education, it addresses motivation, memory, and intelligence for learning classroom. The work offers a conceptual analysis of the brain, considered as the machine for capturing the individual and learning as a process that is acquired during life. The methodology applied in this study was based on the fieldwork carried out in an educational unit, of the city of Manta. In the 2019-2020 school period, where the qualities of the students and teachers were observed, as subjects and primary objects for the study index. The methods applied were qualitative, by the detailed description of the phenomenon of study on behavior, thinking and attitudes; in addition, the inductive-deductive methods have applied, by the study of the general to the particular and particular to the general. Finally, the conclusions have presented on the basis that, neurosciences cover an attractive field that allows knowing the human being internally and externally, how to motivate the individual to achieve success. In the educational field, it was possible to know appropriate strategies and techniques for learning in the classroom, it is necessary that human beings take care of the brain, nourishing it with food energy and knowledge through reading and research.

**Keywords**---intelligence, learning, memory, motivation, neuroscience.

## 1 Introduction

The extraordinary thing about life is the human being, by the way of thinking, creating, feeling, expressing emotions, making decisions and unfolding in the surrounding environment. In research, the brain and learning were studied as a fundamental role in education; the brain is the relevant organ of man, learning is the knowledge that is acquired spontaneously, by survival or formal, developing skills and abilities (Malaiya *et al.*, 2017).

Learning then, is the essence that allows us to survive and cultivate new knowledge, but where does the initiative to learn come from? This was a starting point for knowing the neuroscience that the study of the brain addresses; the nervous system that relates understanding, behavior, cognitive processes linked to brain development and transformation (Jain, 2017).

With neuroscience, it has been possible to emphasize how the teacher can relate learning with the so-called executive director of the brain, the frontal lobe, which is responsible for planning, coordinating, directing and making decisions, which involves memory, language, movements and the decisive role for knowledge actions.

This research motivated the study of the brain and learning as a fundamental axis in education and especially in the autonomous preparation of the teacher, which must be significant to know the multiple intelligences and learning styles of students because educating is the promoting essence of Knowing and learning involves investigating how the brain works.

## 2 Materials and Methods

The study of the brain and learning had as a basic modality of the investigation the fieldwork by means of the observation of the object and bibliographic, by the references of authors in articles and other electronic sources. The study is of qualitative type of the natural behavior of the brain, which gives an open response to the study of learning; the inductive method that starts from the particular to the general was used, in this case the human brain. The tool used for the graphic organizer was MindMaster, which allowed to create a novel and significant figure in the subject studied.

## 3 Results and Discussions

### *Neuroscience*

Nowadays, neuroscience is a necessary discipline for the study of the nervous system and everything related to human, social and exact sciences, opens the door to the contribution of human well-being, allows us to improve the quality of life, during the process of the development of the individual in learning.

The field of neuroscience transforms man to acquire through learning; in the process where individuals gain knowledge, skills, and abilities. You can only learn what you love, and this can be discovered in cognitive neuroscience, by studying the brain and functions; also with an incisive character that learning is a process that is already programmed in the brain (Villalobos, 2016).

Within this framework of neuroscience study bases the importance of the brain in learning, taking into account, that emotion should be aroused in the student, so that he achieves greater attention and facilitates knowledge, that is, it is necessary to arouse curiosity about research to reach the motivation and survival of the individual (Rosado *et al.*, 2018).

### *Motivation and the brain*

Goals and success come from the brain, a significant organ of every human being; The prefrontal cortex (CPF), is responsible for the executive functions of the body, is also known as the prefrontal cortex, which is located in the anterior part of the frontal lobe, specifically it is an area that is located in front of the motor and premotor area of the frontal cortex, therefore, cognitive behavior planning is established in this region.

Attention is considered to be a mechanism that acts in a coordinated manner and is linked by motivation, which is the impulse to act involving the perception of competence to improve and consolidate skills under the novel and significant satisfaction itself (Navarro, 2015).

In fact, motivation leads to creating positive thinking, at the educational level, for example, the teacher must apply creative learning strategies, ensuring enjoyment through research and reading, activating the student's curiosity naturally and spontaneously, giving I turn to intrinsic motivation by them as students and extrinsic motivation by the teacher.

Intrinsic motivation is those that are based on the individual's internal factors, as well as self-determination, curiosity, challenges and efforts, which spontaneously emerge their own feelings, development that significantly influences (Dominguez & Pino, 2014).

It is essential to indicate that intrinsic motivation is based on one's own will, inspiration and desire, these three dimensions refer to self-determination, that is, internal motivation is considered as the need to feel competent, to relate and to have autonomy to reach goals and feel fulfilled.

While extrinsic motivation is that external motivation, in a psychological way where positive praise is expressed towards the person; in comparison it can be stated that intrinsic motivation arises from the individual's own task, while the extrinsic one is that which starts from outside the person, all these actions are sequenced by the brain, which is divided into two hemispheres, being in charge of controlling and executing different functions.

### *The hemispheres of the brain*

The brain is an organ, which consists of two halves, this means the right half called the right hemisphere and the left half called the left hemisphere; both are connected to each other by a structure called the corpus callosum, formed by millions of nerve fibers that run throughout the brain (Mendieta, 2013).

The right hemisphere is in charge of coordinating the movement of the left part, while the left one coordinates the right part of the body, each hemisphere is characterized according to the following functions: the left hemisphere is logical, rational, objective, analytical and centered in the details; As for the right hemisphere, it is characterized by being intuitive, holistic, subjective, focused on a whole, both are important, and it is also necessary to highlight the function of memory.

Memory fulfills a significant function in the human being, since it allows to acquire, store, encode and retrieve information (Lavilla, 2011), assumes that memory is the faculty of the mind, that they retain, evoke and recognize the consciousness of the past, preserving conscious processes through representations based on experience.

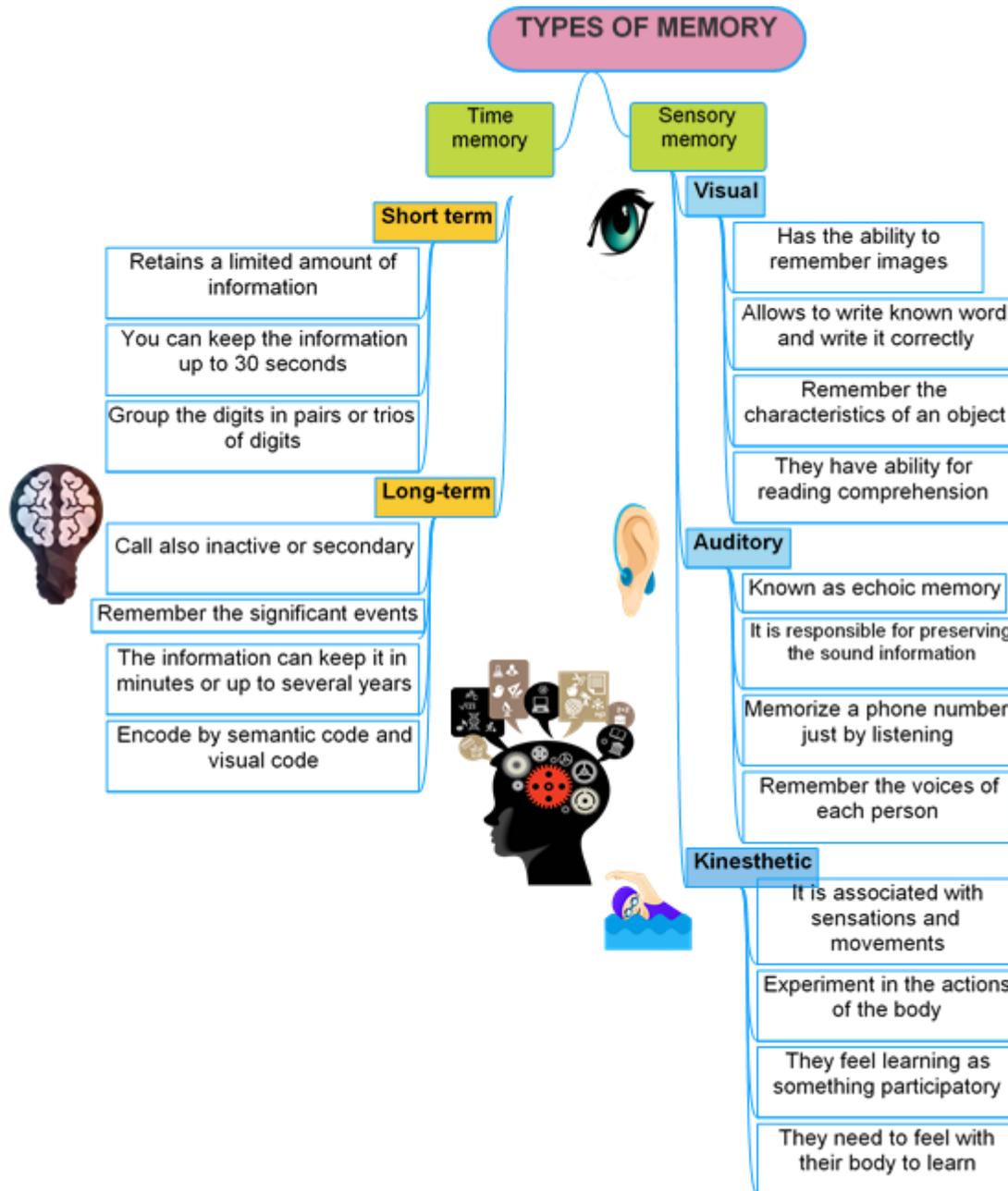
Teachers should familiarize themselves with knowing the multiple intelligences of students, constantly evaluating themselves to identify which hemisphere predominates on a personal level; The brain and learning in the educational field must be studied carefully, to know how to act in the classroom, for example, the left hemisphere allows the teacher to relate the class using talks and debates, in a quiet, clean and orderly environment, On the other hand, teachers with a predominant right hemisphere will use practical activities, visual aids, virtual projects, here there is a noisier and more active classroom environment. Both hemispheres are important and the human being can have a balance in the two hemispheres attracting the attention and motivation of the student.

### *Memory*

Memory is a construct of the theory that is related to cognitive psychology and that plays an important role in the child, also states that after seven years the working memory resembles that of adults in the organization and the strategies they use in the daily newspaper (Barriga, 2015).

There are two types of memory, sensory and time memory; the sensory is subdivided into visual, auditory and kinesthetic; while that of time is subdivided into the short and long term. Visual memory is related to photography or iconic, that is, it allows you to remember what you see through images; auditory memory is what allows one to remember what is heard, while kinesthetic memory is when it relates to the sensations and movements of the body.

In figure 1, it shows the types of memory of the human being, where the emphasis is given to sensitive memory and time memory. The sensitive one usually takes into account the visual, auditory and kinesthetic memory, while the time memory gives a brief analysis of the short and long term memory.



**Figure 1.** Types of memory

Memory and intelligence are part of the brain, memory has the ability to store information and remember them, while intelligence is integrated by cognitive processes that relate to knowledge through perception, memory, attention, reasoning and motivation.

Classroom learning is essential for the teacher to know the students, this allows for better teaching and learning, it is remarkable to know the multiple intelligence that differentiates the human being, the same that can be applied creative and innovative strategies.

### *The types of intelligence*

Intelligence plays a fundamental role in the development of knowledge (Regader, 2018), states that human life requires the development of various types of intelligence, there are cases of developed cognitive skills and few others

developed, but both have the ability to reason and be able to memorize; Identify eight types of intelligence that allows the individual to learn uniquely.

Among the main multiple intelligences is:

- a) Linguistic intelligence, has mastery in language, in communication, referring to oral communication, as well as writing and the gestural part, use the left and right hemisphere. Among the capacities that involve it are the understanding of the order and meaning of words, these are at the time of reading, writing, speaking and listening, they also have the ability to make a formal speech.
- b) Logical intelligence - mathematics, links to logical reasoning and the resolution of mathematical problems, are extraordinarily fast for numerical problems, the capacity that implies it, is in the calculation, formulas with inductive and deductive reasoning, as a professional profile are related careers Economy, engineering
- c) Spatial intelligence has the capacity for visual ideas, create mental images, draw and understand by developing skills that include visual discrimination, recognition, projection, mental image, spatial reasoning, management and reproduction of internal and external images (UPAEP, 2017), learn through sight and observation, easily recognizing faces, colors and details.
- d) Musical intelligence has the ability to create sounds, melodies or rhythms, they also have the ability to perceive emotions in other people. As a professional profile are musicians, composers, music critics, are able to create or compose music.
- e) Kinetic body intelligence, have the body and motor skills, drive, have specialized body movements, express feelings through the body, have strength, speed, flexibility, and coordination in balancing actions, this intelligence is related to people who learn physical skills.
- f) Interpersonal intelligence, allows you to work and understand others, likes to work with people in order to identify and overcome problems, recognize and respond to feelings, empathize with other people around you, like to talk and learn in groups or in pairs.
- g) Intrapersonal intelligence defines the ability to know oneself, stand out for emotions and reflection, work independently. This intelligence is based on the knowledge and internal aspects of a person, that is, access to their own emotional life, with emphasis on feeling, their abilities involved are the control of their own thinking, goals are set, they have rich and deep self-knowledge (Rumazo, 2013).
- h) Naturalist intelligence is related to nature, allows us to detect, differentiate and categorize people, animals, plants and any object that is in the environment, is one of the intelligence considered as part of human survival.

According to the analysis of multiple intelligences, it is necessary to know the type of learning that students can obtain in the classroom. In Table 1, it shows the type of learning according to multiple intelligences, data necessary for the learning process teaching in education.

**Table 1**  
Learning according to intelligence types

Multiple intelligence	Types of learning type
<p><b>LANGUAGE INTELLIGENCE</b></p> 	Uses materials such as books, tape recorders, to carry out activities such as conferences, dialogue, word games, storytelling, and reading.
<p><b>MATHEMATICAL LOGIC</b></p> 	Develops activities such as riddles, scientific experiences, number games, critical thinking, idea schemes with the use of materials such as calculators, scientific equipment, math games through software.
<p><b>SPACE INTELLIGENCE</b></p>	Perform activities such as visual presentations, artistic

	<p>activities, and imagination games, concept maps, through materials such as videos, graphic organizers, optical illusions, and cameras.</p>
<p><b>BODY OR KINETIC INTELLIGENCE</b></p> 	<p>Learn through drama, dance, sports, manual skills, exercises. Through the manipulation of objects or sports techniques.</p>
<p><b>MUSICAL INTELLIGENCE</b></p> 	<p>They acquire knowledge through songs or composition; they can represent it through techniques such as a recorder or musical instruments.</p>
<p><b>INTERPERSONAL INTELLIGENCE</b></p> 	<p>They work in the classroom in pairs, through social activities through changing rooms, games, this will allow you to interact.</p>
<p><b>INTRAPERSONAL INTELLIGENCE</b></p> 	<p>Allows you to perform individual instruction, independent study through research, essays, and projects, this will help you interact with life and make sound decisions</p>
<p><b>NATURALIST INTELLIGENCE</b></p> 	<p>Work through laboratories, field tools, audios, videos.</p>

Learning styles predominate in the development of knowledge in the classroom, since they are cognitive traits that involve the interaction of how a student can learn, as already mentioned, learning has to do with memory, thinking, and motivation. aspects that involve the human brain.

Learning styles are cognitive, affective and physiological traits, which serve as relatively stable indicators of how learners perceive, interact and respond to a learning environment ([Gutarra, 2015](#)).

## The Brain and physical activity

The human body needs physical activity to activate vascular brain health and the production of BDNF or brain-derived neurotrophic factor, which is a protein that stimulates the creation of new neurons. Some of the exercises benefit my brain and heart is an aerobic activity, in addition to running, cycling improves brain activity, allows the body to release hormones for growth and repair of neurons, as well as stimulation in growth of the cerebral blood vessels.

Figure 2 summarizes the benefits of physical activity in sport

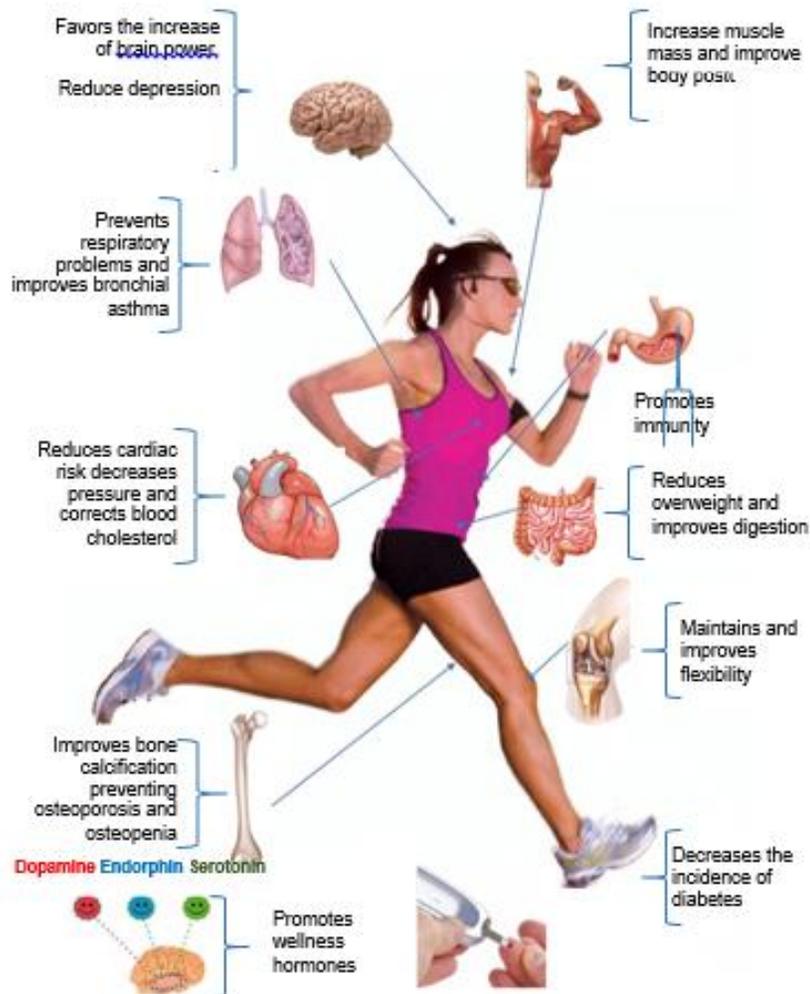


Figure 2. Benefits of physical activity  
Source: (Cárdenas, 2019)

## 4 Conclusion

The study of the brain and learning offers an enriching knowledge in the teaching and learning process, evidencing intrinsic and extrinsic motivation, memory types, left hemispheres and right, the multiple intelligences, which are part of the neurosciences.

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