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Research Article

NEUROEDUCATION AND NEURODIDACTICS IN THE ROLE OF THE UNIVERSITY PROFESSOR IN SPAIN

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A R T I C L E I N F O

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A B S T R A C T

Neuroscience studies the behavior of the brain and is applied to the educational field trying to optimize teaching-learning. In this process, the role of the university professor is linked to his performance inside and outside the classroom (empowerment, teaching collaboration, working conditions and evaluation), with the alternation of methodologies being the most optimal to attend to the diversity of the student body in the achievement of a real and effective inclusion, neuroscience being able to be a great ally in the treatment of learning. Neurolearning can be key in the development of talent, making it possible to glimpse the most appropriate measures in the face of the diversity of the student body and the guidelines to follow in said development. Actions aimed at enhancing performance, the personal satisfaction of students, more significant learning, a more efficient emotional and social environment, pedagogical strategies or offering a diversity of resources.

INTRODUCTION

Neuroscience and neurodidactics are valuable to know at the brain level how students learn and what learning is the most effective. Concepts that can be taken into account in the methodological design to be used in the classroom.

From another perspective, in the field of education, there is a boom in knowledge about the brain and its contribution to the field of learning. Neuroscience relates this knowledge and teachers. The goal is a better understanding of the brain and the development of tools that help teachers to detect problems and find ways to help on the path of teaching-learning. In order to find these ways, it is necessary to make decisions so that, meeting the social and personal needs of the students, learning routes are traced through collaborative work in which the choice of methodology, the choice of teaching materials, among other factors, become relevant, ultimately seeking to serve all students.

Analysis of Concepts of Interest

Among the historical contributions provided by different authors, we find in the prologue of Miguel and Blanco (2019), the neurobiologist Alonso who considers that neuroscience is the multidimensional analysis of the nervous system that encompasses its structure, its function and the processes of neuronal activity. Miguel and Blanco (2019) consider that neuroscience constitutes a scientific and didactic source, and that it provides intervention programs in practice and improves aspects of curricular development in students (language, reading, language learning, auditory development, multiple intelligences)., and so on). Another fact to consider is the plasticity of the brain, which is capable of changing its structure throughout life, since learning experiences are linked to the strengthening of the synapses that occur with neurons. As it is collected in Aula Planeta (2018), the learning of each individual is conceived differently based on the plasticity of their brain, according to which educational neuroscience arises. Domínguez (2019) emphasizes the need for knowledge of the functions of the brain, as well as its structure and behavior for the sake of improving educational systems and teaching practices. The neuroscientific keys can help new educational practices, thus giving rise to the concepts of educational neuroscience or neuroeducation. However, there is a semantic difference between both terms if we look at their intrinsic definitions: in the first concept, the emphasis is on neuroscience, while in the second on education. Therefore, it seems more accurate to speak of educational neuroscience, since the objective is to put neuroscientific studies at the service of education. Following this line, Moral (2017) defines educational neuroscience as the conjugation between the knowledge of the brain and the interaction of the individual with his teaching and learning. Carballo and Portero (2018) explain that educational neuroscience is a discipline that tries to include neuroscientific knowledge in relation to the functioning and learning of the brain in the educational field. Gago and Elgier (2018) call educational neuroscience an expanding discipline that tries to study the effectiveness of the teaching and learning process based on neurobiological principles and the functioning of the brain.

Similarly, in the article by Bosada (2021), Dr. Forés defines educational neuroscience as a doctrine that favors the

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understanding of the brain and neurobiological processes in learning in order to contribute to its effectiveness in a didactic way in the classroom. This same author highlights the importance of this discipline because it interconnects with thoughts through the neural bases for the strengthening of memory, learning and emotions. Jara, Macías and Pesantez (2021) mention that educational neuroscience is a discipline that helps discover the nervous system and its functions, in such a way that it offers the teacher help in understanding the brain. Trying to string together the different definitions, educational neuroscience can be considered as a discipline that tries to study teaching and learning based on the knowledge and functioning of the brain. This is where neuroscience and learning converge, in the words of Fortunato and Salva (2021), neurolearning (linked to creative development and as an effective tool as a didactic strategy). In this sense, Palacio (2017) defines the provision of information on the learning difficulties of students with special needs based on scientific contributions on the brain in schools as neurodidactics. Molina, Parra and Casanova (2017) cover neurodidactics as an interdisciplinary research framework in which they connect aspects of neuroscience with other disciplines such as didactics or educational theories. These last authors affirm that the purpose of neurodidactics is to provide new proposals and principles to provide new information about teaching and learning according to the behavior of the brain. Cedeño and Álvaro (2019) neurodidactics is a tool that emphasizes knowledge of the brain to use techniques, in a way that allows building new learning and improving its quality.Other authors such as Tapia, Anchatuña, Cueva, Poma, Jiménez and Corrales (2017) also define this concept as a tool that uses knowledge of the brain and neuroscience techniques to enhance teaching processes. Thus, Rosell, Juppet, Ramos, Ramírez and Barrientos (2020) conclude that neuroeducation is a tool that gives importance to the behavior of the brain and offers a new perspective in the educational context. These authors also support that the didactic action must be aimed at understanding how the brain works in order to favor strategies in class and the pedagogical practices of teachers. From the above definitions, the conception of neurodidactics can be inferred as a tool that aims to enhance the teaching and learning processes in the educational context based on the functioning of the brain and the use of neuroscientific techniques.

Based on the foregoing, we can appreciate that each and every one of the above terms are interrelated, since the study of the functioning of the brain and the multidimensional analysis of the nervous system (neuroscience), is particularized to the educational field trying to study the teaching and learning (educational neuroscience) and seeking to maximize the processes involved in a particular way (neurodidactics). It is in this last field where neurolearning constitutes a key strategy for the development of each and every one of the students' talents, trying to attend to diversity by adopting the appropriate measures to skillfully eliminate or circumvent an obstacle (inclusion). and the establishment of guidelines so that the conditions of each and every one of the students are as close as possible at the social level (principle of normalization). Thus, taking into consideration the needs of each and every one of the students, various activities and resources must be offered to transmit knowledge.

The Scope of Educational Neuroscience and Neurodidactics In Student Learning

What can educational neuroscience and neurodidactics contribute to the practice of teaching-learning? Educational neuroscience provides evidence that allows empirical evidence from the field of research to be applied to the classroom. Through these neuroscientific contributions, neurodevelopment is promoted in the educational context, since they consolidate knowledge that has an impact on curricular aspects such as methodology. Bisquerra (2019) alleges that neuroscience investigates the nervous system in each of its components: functioning, design, development, among others, as well as the effects it produces on behavior, emotions, and thought. In this way, the concept of neuroplasticity arises, where various structures of the brain change incessantly and various actions, feelings and thoughts proceed. This same author also mentions that in certain parts of the brain some neurons are replaced by new ones, included in the concept of neurogenesis. In the dialogue between neuroscience and education, Fuster (2015) mentions seven relevant points: the biological and cultural evolution of the human brain; the executive functions of the brain; the duality of perception and cerebral action; impulse inhibition; tree model of cognito (neural networks); overlapping of cognitive networks that are mutually connected by associating attributes of knowledge and/or memory; the duality of perception-action and neural networks in education. In this way, Marina (2015) concludes that education is understood through the neural perspective. Educational neuroscience is applied to any study for the understanding of new knowledge. Neuroscientific studies are linked to the pedagogical practice of the teacher for the knowledge of the global structure of the brain, the hemispheres, the lobes, the angular gyrus, the cerebral cortex, among other areas. Pardos and González (2018) state that neurodidactics applied to the classroom has various neuropsychological factors that have repercussions both at a social level and in student performance. Román (2019) states that social cognition adapts our behavior towards others in interaction situations, because as human beings we have social skills. Guillén (2019) exposes the importance and influence of executive functions on a student, which with practice can improve. Concentration (to store and organize certain information), reflection (to analyze, contrast and assess specific information) and impulse self-control (which affects decision-making), for example, are necessary for the student. They are determining factors in both performance and personal satisfaction. Trinidad, Hernández and Forés (2019) collect in their chapter that neuroeducation offers information to scientifically verify and improve the various functions of education. In education, making decisions is an act that is always present: by the teacher, by the students, the delegation of decisions at the time teaching material is used with a traced itinerary and therefore with a "judgment" or marked path, in the use of a certain methodology, etc. In this line, cooperative work is essential to share experiences between teachers and progress during learning, adapting it to new social and personal needs.

The Ministry of Education and Vocational Training of Spain (2021), shows a "National Neuroscience Plan applied to Education" pursuing a methodological change and improving the quality of education based on: scientific advances applied to education, improvement in learning processes in students

with disorders or prone to school failure and, according to the studies carried out, the centers that apply neuropsychology obtain better results. Some of the general objectives are: Improve academic performance, learn about and provide neuropsychological resources, neurotechnology for research, recognize teaching work and exchange good practices, among others. Some lines of research are: "talent and high abilities", "neurodevelopmental disorders", "neurotechnology", "executive functions and attentional processes", "emotional intelligence and creativity" and "neuromotricity and learning". Among the conclusions of Pherez, Vargas and Jerez (2016), the following can be highlighted: eradication of conventional teaching with decontextualized knowledge without application to practice; consideration of pedagogical practices taking into account the context and daily work in class; adaptation of teaching taking into account the functioning of the brain in order to improve results; proposal of optimal feedback to produce deeper learning; creating a satisfactory climate for the emotional and social needs of students; application of methodological strategies for people with learning difficulties; promotion of motivation by improving the ability to learn and self-control; teamwork to solve problems; training from ethics and work skills.

CONCLUSION

A way to help the teacher opens with educational neuroscience and neurodidactics, which, based on the behavior of the brain and the nervous system applied to the educational field, try to study and help the teaching-learning process. And this is where the role played by the university teacher in serving students becomes crucial, given that having fewer regulatory tools, they have to choose, in the exercise of their right to academic freedom, the ideal ones, from their perspective, to the achievement of an efficient and quality education.

Research in neuroscience and neurodidactics influences this direction, since from the behavior of the brain you provide aspects and/or considerations to take into account in the effective design of said route; taking into account at all times the different capacities of students to offer diversity of resources so that education serves as a boost to students in their immersion in society and making its progress possible. Therefore, a line of research and study is opened on the most efficient tools of the university teacher to attend to the diversity of abilities of the student body, taking into account neuroscience and neurodidactics.In the words of Leslie Hart (2018): "Teaching without knowing how the brain works is like trying to design a glove without ever having seen a hand."

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