

NEUROSCIENCE AND EDUCATION: THE ROLE OF EMOTIONS IN THE ACCEPTANCE OF A SCIENTIFIC MODEL

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Resumen

The interest in understanding the functioning of the brain and the mind had, in recent decades, a vertiginous growth, transforming Neurosciences into a fundamental area for understanding the relations of the human beings with the natural and social world. Currently, modern Neuroscience provides a new understanding of different cognitive processes and reveals the neural properties, which give support to language, to arithmetic understanding, to the realization of calculations etc. Non-invasive methods like Functional Magnetic Resonance Imaging and Electroencephalography have come to be used to scan the brain, changing old conceptions of various cognitive functions, and capable of bringing, in the future, significant results for Education. The objective of this work is to bring to the attention of researchers in Education the new paths opened up by research in Neuroscience. This work will present a pilot study of a research on the role of emotion in learning and construction of scientific knowledge. This research will be guided by work derived from Cognitive Psychology and the data will be collected and analysed by means of the technological and theoretical structures derived from Neurosciences.

Neuroscience and Education: For decades, studies in Education have sought to understand and elucidate the complex and intricate processes of teaching-learning. In parallel, the processes of acquisition of knowledge have fascinated researchers in different fields of understanding, such as philosophers, psychologists, and doctors. The interest in understanding the functioning of the brain and the mind had, in recent decades, a vertiginous growth, transforming Neurosciences into a fundamental area for understanding the relations of the human beings with the natural and social world [1, 2]. Currently, modern Neuroscience provides a new understanding of different cognitive processes and reveals the neural

properties, which give support to language, to arithmetic understanding, to the realization of calculations etc. Non-invasive methods like Functional Magnetic Resonance Imaging (fMRI) and Electroencephalography (EEG) have come to be used to explore and scan the brain, changing old conceptions of various cognitive functions, and capable of bringing, in the future, significant results for Education. [3, 4]

Objectives: The principal objective of this work is to bring to the attention of researchers in Education the new paths opened up by research in Neuroscience. The intention is to present the possibility of integration of the two areas with the aim of increasing the knowledge of cognitive processes involved in various educational problems. This work will present a pilot study of a research on the role of emotion in learning and construction of scientific knowledge. This research will be guided by work derived from Cognitive Psychology and the data will be collected and analysed by means of the technological and theoretical structures derived from Neurosciences. As the pilot study will be conducted in this semester, our data will be presented only in the Conference.

Emotion and Education: The picture which is created of Science makes it appear as the most rational of human constructions, without any vestige of emotion. While its products are built up using logical components, analyses and experiments, the task of constructing Science involves a series of emotional aspects, given that these guide the conceptions of scientists. Moreover, in recent decades, various philosophers of science have devoted their attention to revealing the error of supposing that the construction of Science derives only from a rational basis of thinking, taking into consideration only those rational criteria. In the light of this, one may pose a question: given that it is not possible to exclude emotional aspects from the construction of the edifice of Science, conceiving it as composed only of rational elements, may one visualize the teaching of Science divorced from those aspects? That is, what may be the influence of emotions in the processes of construction, assimilation and maintenance of scientific knowledge in the school? In the field of Science Education, various researches, in particular in the context of conceptual change, indicate that, in scholastic context, is necessary to consider emotional aspects that seems influence significantly in the intellectual activities of the students, in particular, in learning

Hypotheses: Therefore, they are related to an investigation of the role emotion in adhering to, or rejecting, a scientific model (representation). In particular, the thesis is that a judgement on the validity of a representation of the world derives from more than the criteria based on logical rationality. From that thesis one may derive two testable hypotheses. When one is called on to evaluate the quality of explanations of physical situations, then: Hypothesis 1. Individuals with a formal education in Physics will have a greater activation in the brain areas related to emotion when they are presented with correct scientific representations compared with the activation in those same brain areas with representations based on intuitive/spontaneous conceptions. Hypothesis 2. Individuals without a solid scientific formation when exposed to spontaneous models will have an activation increased when compared to the activation in those same brain areas when presented with scientific representations. In that case one hopes to show that even after having been presented with scientific models, the emotional bond with their spontaneous conceptions makes it difficult to grasp the scientific models.

Design and procedure: For that, it was elaborated an experimental design which allows the collection of data from the use of fMRI. Those data will then be combined with data collected by traditional methods of research in Cognitive Psychology, such as interviews and questionnaires, with the aim of looking for correlations. The experiment will consist in to show, for two distinct subject groups, one with scientific formation and the other without this kind of formation, a series of videos that reproduce traditional cognitive conflict situations, knew in the Science Education literacy. Thus, inside the fMR, the subjects will be presented the videos and will be chose, for each situation, which is correct. Thus it will be possible to investigate the pattern of neuronal activation of areas linked to emotion in each situation. We will deal with the relationship between reason and emotion using, mainly the work of Antonio Damasio [5]. With a robust

theoretical framework, this author proposes concepts and hypotheses, testable by the technology used in Neurosciences, to deepen the understanding of cognitive processes and its relations with emotion, mainly related to neuronal correlates behind decision-making.

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