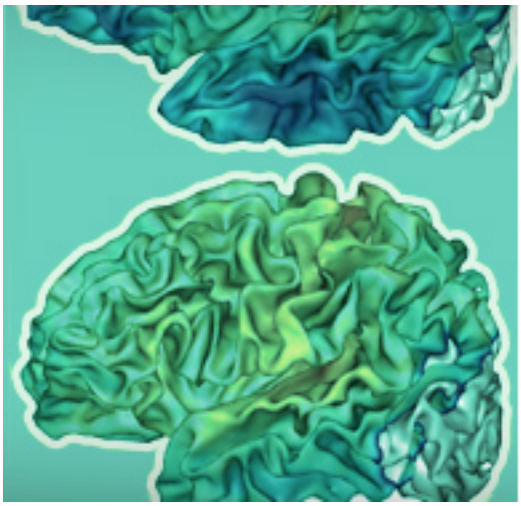
Human Neuroplasticity and Education

Working Group



This meeting can be considered as the continuation of the workshop on *Mind, Brain and Education* held at the Pontifical Academy of Sciences in november 2003 (Battro, A.M., Fischer, K.W & Léna, P. Editors. The educated brain: Essays in neuroeducation. Cambridge University Press & Pontifical Academy of Sciences, 2008). Since then the theory and practice of neuroeducation have shown a significant progress. Several advanced research institutions in America, Asia and Europe are now involved in the transdisciplinary study of the neurocognitive foundations of learning and teaching, and the topic of neuroplasticity appears as the perfect link to address some fundamental questions coming from different fields. The human species has developed an educational system to create and transmit knowledge and values from one generation to the next. With the help of education humans have expanded their cognitive potential by many orders of magnitude, well beyond the limits imposed by biological evolution. In particular the human cerebral cortex has revealed impressive capabilities to change its functionality and even its architecture during the process of education. Several mechanisms of neuroplasticity have been detected in the laboratory, the clinic and the school, that could sustain different learning styles.
Our workshop will discuss several topics at the cutting edge of the mind, brain and education sciences. For example the theory of a neuronal recycling process provides a new framework to understand, and to improve, the way young children learn to read and calculate. A wealth of experimental results illustrates the different neurocognitive pathways in the acquisition of first and second languages and the unfolding of basic arithmetical and geometric operations. Also the development of the social aspects of cognition, essential to educational practice, is now studied with new and powerful technologies and new theoretical models. The gap between genomics and

education has shown in recent years a significant reduction. Neurocognitive models of developmental dyslexia and genotype-phenotype research studies in mental retardation and learning disabilities may show that heredity is not destiny. Some unexpected outcomes for treatment of those mental handicaps will be addressed.

Perhaps one of the most relevant tendencies in the mind, brain and education sciences of today is the expansion of the neurocognitive studies beyond the laboratory into the school and the community. The possibility to monitor online many aspects of the learning and teaching activities using the powerful tools provided by digital networks and wi-fi technology opens a new horizon of research and practice. In particular we experience the formidable impact of computer and communication devices in the new ways children learn, and even teach, in a digital environment. Brain activities can be recorded nowadays in many ways in natural conditions with portable and wearable equipments. But the great novelty is the change of scale in education that the new digital technology triggers. Millions of children around the world can now be educated in a global cognitive environment.

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