# Neuroeducation: Reinventing the Classroom with the Brain in 'Mind'

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## Abstract

Little of 150 years of research in Cognitive Neurosciences and Human Factors, have found their way into educational policy and certainly not into the classroom or in the production of educational materials. Whilst more mundane concepts of timing, sequencing, spatial organization, and gestalt principles are well known and applied, the maintenance of simplistic notions of developmental brain organization and hemisphericity, rather than applications of our understanding of the human connectome, still inform pre-K-12 curriculum as well as adult learning.

The current dominant types of education, even those professing constructivist instruction, impose structure of largely didactic instruction, right-wrong criteria, and dominance of the logical-objective approaches over the intuitive-subjective approaches on the learner. Early in the course of emergent awareness of a learner's world (s)he often finds creativity inhibited, or diminished. This leads to the underdevelopment of the brain's right hemisphere. As a result of the emphasis on intellectualizing, verbalizing, analyzing, and conceptualizing, learning has become equated more with 'understanding' rather than learning. This binds mental processes so tightly that novel learning is impeded, or diminished. In the words of Gazzaniga, curriculum is "inordinately skewed to reward only one part of the human brain leaving half an individual's potential unschooled."

The central five areas to be presented in are: (A) examination and study of regional cerebral differences in brain function to explain and evaluate the learning process within the educational system is not as relevant as previously thought; (B) evaluation of students by standardized aptitude and achievement tests is not sufficient; (C) educational systems would do better to examine student outcomes and teach towards "cognitive efficiency" with methods that employ both psychophysics examining person-environment interaction and with mathematical means of examining optimization looking at how far or close a learner is functioning from a mathematically-derived optimization regression line; (D) movement is necessary to effect cognitive efficiency and that movement must be incorporated into new learning environments; and (E) in both on-ground and online learning environments the developments in Human Factors can positively affect learning efficiencies

The presentation intends to overview the science of human physiologic efficiencies in an attempt to develop novel approaches and thinking about classroom-based practice based on current neuroscientific realities that could then inform curriculum and materials development, evaluation methods, and ultimately educational policy.