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The Mind in the Technological Environment: An Epigenetic Approach

Abstract

Purpose. This study examines how digital technologies and social media reshape the developmental pathways of culturally acquired competencies in children.

Research problem. The presentation outlines a research framework for analysing children's engagement with digital technologies, including artificial intelligence (AI). The central question concerns the extent to which these technologies modify learning environments and influence the development of cultural competencies such as social communication, emotional regulation, and problem-solving. Clarifying these mechanisms is essential for designing evidence-based educational strategies. The project adopts an epigenetic perspective, conceptualizing digital technologies as environmental factors capable of modulating neurocognitive development.

Approach. Drawing on neurobiological evidence, the study investigates how sustained exposure to digital environments may alter typical neurodevelopmental trajectories, particularly through changes in attentional control, executive functioning, memory consolidation, and socio-emotional processing. I will critically examine the use of visual stimuli (screens), which can induce measurable and, in some cases, lasting modifications in neural structure and functional organization. Current evidence indicates that the prefrontal cortex is particularly sensitive to prolonged and excessive overstimulation, with reduced maturation in this region associated with impairments in attentional control, action planning, and the evaluation of behavioural consequences. The hippocampal system shows susceptibility to structural changes that affect memory formation and spatial reasoning. Altered patterns of interhemispheric connectivity, mediated by the corpus callosum, may influence the integration of information across hemispheres. Temporal-lobe regions, including Wernicke's area, are implicated in higher-order language processing, while the amygdala is involved in modulated shifts in emotional reactivity and socio-emotional sensitivity.

Methodology & Methods. The study is based on a systematic, literature-driven review of empirical findings (meta-analysis), integrating research from developmental neuroscience, cognitive science, and cultural learning theory.

Keywords: digital technology, brain plasticity, learning, abilities, cultural competencies, epigenetics.