FROM THE GROWING KIDS' PARENTING RESOURCE LIBRARY

Early Brain Development Research Review and Update

PAM SCHILLER

Thanks to imaging technology used in neurobiology, we have access to useful and critical information regarding the development of the human brain. This information allows us to become much more effective in helping children in their early development. In fact, when we base our practices on the findings from medical science research, we optimize learning for all children. This article will review five research findings and new areas under investigation.

The first findings from the advancement of technology in the neuroscience field made their way into the early childhood profession in Rethinking the Brain: New Insights into Early Development published by the Families and Work Institute (1996). This publication examined five major findings and their relevance to the development of young children and to those who work with young children.

Finding 1: The brain of a three year old is two-and-a-half times more active than an adult's.

Infants are born with a limited amount of neurological wiring. Their vision is rudimentarily wired, as are their hearing and other senses. Nothing is wired in the higher region of the brain, known as the cerebellum. The hardware is in place and ready to wire but requires 'earthly' experiences and human interactions for the cells to forge the neurological networks that will become the foundation for thinking and reasoning, language, physical movement, and social and emotional behaviors. During the first three years of life, a child builds an estimated 1,000 trillion synapses through the experiences she encounters.

Finding 2: Brain development is contingent on a complex interplay between genes and the environment.

One of the most dramatic findings from medical research was the significant role the environment plays in the structure and capacity of the brain. Daniel Goleman (2006) says, "Seventy percent of what is given to us genetically is brought to fruition by our environmental experiences." The richer the environment and the more intentional and purposeful the interactions and experiences, the greater the number of neurological connections children are able to forge.

Finding 3: Experience wires the brain. Repetition strengthens the wiring.

The primary task of the brain during early childhood is to connect brain cells (neurons). Every neuron has an axon, which sends information out to other neurons, and several dendrites, which

receive information from the other cells. As axons hook up with dendrites, trillions of connections, called synapses, are formed. Everything we learn is stored in communities of neurons. Experience forges the connections and repetition strengthens them.

Finding 4: Brain development is non-linear (Families and Work Institute, 1996).

There are fertile times when the brain is able to wire specific skills at an optimum level. These fertile times are called 'windows of opportunity.' The windows are scientific; they are open from birth to puberty. The open windows of opportunity are the same for all children, no matter where on the planet they are born, and no matter the conditions under which they are born — premature, developmentally-delayed, or typically-developing. Positive experiences during open (fertile) windows result in positive outcomes. Negative experiences during open windows result in a negative outcome.

Finding 5: Early relationships affect 'wiring.'

Young children depend on adults — parents, teachers, and caregivers. They are biologically wired to speak, think, feel, interact, and to be mobile. However, they depend on human interaction to learn these skills. As early as four months of age, the cells that will wire for social inter-action and empathy (spindle cells and mirror neurons) are already positioning and preparing for their role in the child's social and emotional intelligence. According to Daniel Goleman (2006), how prolific they are depends on various factors, such as a loving atmosphere (for the better) and stress (for worse).