Neuroscience Advances in Learning
"From Brain Scan to Lesson Plan"

- The brain is the only organ in the human system that learns.
- The brain has had hundreds of millions of years to form into what it is today.
- Can see the brain develop in embryo at three weeks after conception when embryo is only approximately 3 mm long.
- At two months, the fetal head is approximately half of its body size.
- The newborn's brain is approximately one-quarter of its adult weight.
- The average brain weighs approximately three pounds
- The brain consists of billions of cells, each connecting with tens of thousands of others through electrical-chemical impulses, resulting in trillions of connections.
- These connections allow us to learn and control the workings of our bodies.
- There is rapid synaptogenesis (cell connections) in the human brain during the first few years of life.
- Degeneration of synapses occurs after the first few years of life, although the brain continues to respond to experience and develops connections throughout life.
- Connections become specialized and differentiated among us, depending upon how we experience/use our brains.
- Human development is the interplay between nature and nurture.
- Early care and nurturing and how we exercise our brains throughout life has a tremendous impact upon how we learn.
- Nature has a schedule and optimal times for learning, especially during the early years of life. Yet, opportunity for development and learning exists throughout the life span.
- Negative experiences affect brain connections throughout life, although early age deprivation is more likely to have profound effects.
- Acquired illness, trauma, neglect, substance abuse, environmental toxins, institutionalization, poverty ... can all impede brain development and learning.

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- We can use our knowledge of brain development to affect public policy, especially in the realm of education and monies funded to educational programs.
- The major functions of learning include attention, perception, speech/ language, memory, motor and mood functions.
- These functions require the working relationship and cerebral organization of multiple brain zones and are dependent upon biophysiology, multigenerational transmission and external/environmental cues.
- As children, we learn mostly by repetition and recollection. As we grow, we learn more by reflection-active thinking.
- Learning which embraces reflection-active thinking strengthens neuronal connections. It promotes external speech to become internal speech, which guides our behaviors and learning.
- Optimal learning requires ''relaxed alertness'' - low threat and high challenge.
- Continued education can produce healthier people and slow cognitive decline.
- Continued education is an attractive wellness option.
- At all ages, respect and take into account multiple intelligences and different styles of learning and be flexible.
- There are all kinds of minds and multiple learning styles. Adult learners bring to the classroom years of experience and information. Focus on the strengths of adult learners.
- Adult learners are goal-oriented and you already have their attention. Discuss how your class will aid in meeting their goals.
- All of us possess multiple intelligences. Education which respects and embraces multiple learning styles enhances motivation.
- Neuroscientists try to understand how humans learn. Educators develop learning.

The meeting of minds of these disciplines can surely bring a student into the depths of one's own mind and aid in developing one's quality of life.