

The Brain and Learning: Boosting Brain Power for Success

Conferences on Learning & the Brain held in Cambridge, Mass., the last few years have brought dramatic new information from brain imaging techniques. Researchers now study the working of the human brain in living subjects. Functional MRI technology includes pictures of the brain structure and function. A subject performs a task during the study, the brain is activated, and the technician and scientist can follow the neural activity, blood flow, oxygenation and bold contrast to the analysis and interpretation. They are literally “watching the brain at work.” One of the upcoming meetings will even give attendees a chance to have an actual brain scan tour at the Massachusetts Institute of Technology. Neuroscientists are learning valuable information about how genes and the environment react to affect the brain and learning. The core content of these conferences then concentrates on the brain, memory and attention, and concludes with best research-based strategies for optimal learning.

The conferences now create an interdisciplinary forum where researchers, doctors, clinicians and educators share new findings with respect to applications in clinical work and in the classroom. Co-sponsors and presenters include faculty from distinguished institutions and authors partnering to unravel the mysteries of learning and memory to enhance the uniqueness of every learner.

The term “brain-based learning” has received much attention in recent years with some skeptical reactions. Isn’t it understood that all learning involves the brain? The renewed interest is because neuroscience and children are now connecting in ways that inform us how children are best able to learn based on new research and applied to best practices in the classroom. The biannual meetings highlight the brain abilities for everything from early learning to adult learning and new partnerships of scientists, policy makers, parents and educators. The next conference will be Nov. 21 and will have opening keynotes on motivation, mindsets and metacognition. Following that, a conference held in San Francisco in February will focus on social and emotional brain research and behavior.

One of the future conference speakers will be John Medina, who wrote *Brain Rules*, one of our faculty summer reading books. One of the most outstanding findings in recent years is the fact that the brain is not hard-wired as was previously thought; brain behavior is not based on static genetics but is ready and suited for development through education. Neuroscientists use the term “plasticity” to refer to changes in the rapid firing of synapses, the brain behavior most well-studied and essential for long-term memory. Learning and studying bring development, growth and changes in the brain function and organization. For educators, and especially our students, this information can bring great relief and hope. The students can realize that they are not “stuck” in time and that, by practicing new strategies, their brains will in fact re-wire, throw away old neurons and grow new pathways for learning. Medina also reminds us that “some parts of our adult brains stay as malleable as a baby’s, so we can create neurons and learn new things throughout our lives.”

Students are usually very interested in learning about the brain and how it works, particularly, their brain. Some of the basic principles students need to learn and discuss are listed here:

- Each brain is unique
- Learning engages the entire physiology
- Search for meaning is innate
- Remembering comes through patterning, practicing and exercising
- Emotions are critical
- The brain needs focused attention and rest (sleep)

- Questioning is important for “active processing”
- Learning is enhanced by challenge; inhibited by stress

First, in practice, students need to know that the three main skills for enhancing memory are to encode properly, process effectively and obtain the desired output. The first and most important area is the executive functioning (EF) arena, including explicit instruction for students in planning, organizing, initiating, inhibiting distractions, shifting and acquiring skills of working memory and monitoring. These are important abilities to assist them in goal-directed, problem-solving actions for success.

At the annual conference of the International Dyslexia Association in Philadelphia last year, Peter Wiley, a psychologist at Children’s Hospital, remarked that executive functions, or “getting your act together,” have become more important and challenging in schools for many reasons. Students today have more homework, more long-term projects to manage, more scheduled activities and more competing temptations and distractions, especially with video games and social networking on the internet. Wiley believes that parents and teachers must accept that they have to function as the child’s frontal lobe (organizer) much longer than they may wish; they can withdraw their support as the student learns to manage, usually much later than we think.

While there have been many studies investigating the development of EF skills in early and late childhood, only a handful of studies have reported the changes in EF in adolescents, until recently. Is there a plateau of functioning during the years between ages 10 to 14? To better understand teen brain development, we can look forward to Robert Sylwester’s new book on *The Adolescent Brain: Reaching for Autonomy* and Fay Brown from the Yale Child Study Center and her book *How the Teen Brain Matures*, linking social development and academic achievement.

Learning consultant Terry Matlin encourages slowing down the brain to accomplish tasks, admittedly a difficult skill to practice. Students should begin studying as early in the day as possible, creating a doable check list with small breaks, focusing on what is most important and trying to wind down before bed with quiet reading, etc. The more routines a student can build into habits, the more automatic the tasks will be.

The saying “everything bears repeating” is a mantra to use to increase memory for all of us. The studies confirm that we need to continue to use engaging methods to grab attention, especially when requiring students to absorb dense information at a high rate of speed. To ensure transferring working memory into short-term memory and comprehension, students need time to question, and paraphrase at the moment they are initially taking in new information; then, to continue to practice “spaced rehearsal.”

Learning about the brain and how it works equips students with an understanding of their own unique learning abilities. Through our combined efforts, we can be assured that our students have the tools to boost their brain power.

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