**[Inspiring Teachers](http://inspiringteachers.blogspot.com/)**

A blog of teaching tips, ideas, and strategies shared by veteran teacher and author, Emma McDonald.

**Thursday, January 14, 2010**

**More Bang for Your Buck: Movement and Learning**

When shopping you probably look for the best possible deal getting the most you can for every dollar you spend. Learning should be like that too. For every moment we spend on a topic, concept, or skill we want our students to get as much knowledge out of it as possible. More importantly we want them to retain that information and be able to recall it and use it in the future. For some teachers this means cramming as many facts and figures into each child's head as possible in a forty-five or fifty minute class period. Lecture and skill-and-drill rule the day. However, current brain research tells us that our students are less likely to remember these facts and figures through lecture and skill-and-drill exercises. The Learning Pyramid, developed by the National Training Laboratories, shows that over time students only retain 5% of what they've learned through lecture. This is followed closely by 10% of an audio-visual presentation, 20% of what they read and 30% of a demonstration. These are all passive learning strategies.

What current brain research tells us is that students need to be active to get their brains working and growing. Scientists have discovered that our brains continue to grow even past childhood. For every new stimulation, situation, and challenge we face, brand new neurons grow. The more we use those new neurons, the more they flourish and expand to create synapses with other neurons. For the longest time scientists believed that this new growth only happened in the cortex, the thinking part of our brain, and that only new mental stimulation would increase that growth. However, scientists like Peter Strick, a professor of Neurobiology and Psychiatry at the University of Pittsburg, have traced pathways from the cerebellum to parts of the brain that are involved with memory, attention, language, emotion, and decision making. Whoa, what does that mean exactly? Well, the cerebellum has been thought to only deal with physical movement and not much else. The cortex, on the other hand, has been labeled as the thinking brain because it houses memory, language, attention, decision making, and other mental skills. What Dr. Strick discovered was a series of connections (neural pathways) between the "movement" brain and the "thinking" brain. What can you conclude from that bit of knowledge?

Interestingly enough, the cerebellum is only one tenth of the overall brain in size and yet it contains over half of all the brain's neurons and more than 40 million nerve fibers. That sounds to me like a lot of activity happening in the movement part of our brain. Additionally, the vestibular nuclei (has connections to the brainstem) within the cerebellum is an information-gathering and feedback source for movement. The cerebellum takes these movement messages and combines them with visual and auditory messages before sending the whole package to the cortex (the thinking brain). When movement and thinking are both in play, these "packages" of messages are then relayed back and forth between the cerebellum and cortex. Movement stimulates growth in both the moving brain and in the thinking brain. These links show us that movement is an important part of learning.

Not only does movement increase academic performance, but it also factors into long-term memory. The more multi-sensory interactions, the more synapses are created. Watching a video of how to make adobe bricks only engages the eyes and the ears through audio and visual inputs. However, getting students outside mixing sand, dirt, straw, and other materials by hand to make adobe bricks themselves offers a multitude of sensory inputs through the feel, smell (and for those more adventurous souls – taste) as well as a lively discussion with others about the process. Emotions are also brought into the process through the enjoyment of the activity and the interactions with friends. When we understand how memory is housed in our brain, we have a greater insight into why these interactions with our environment are so important for learning.

"Memory is not an entity, planted in one spot – but planted throughout the brain, an interplay of sensory perception and emotion." Susan Jones, author of Grow a Brain, tells us that memory is separated and stored in segments. One memory is a composite of the different senses as interpreted by the brain. For example, the memory of a slice of pizza is a composite of the smell of the cheese, the spicy taste of the pepperoni, the tangy taste of the sauce, the flat texture of the bottom crust, the crunchy texture of the side crust, the angle the pizza is cut, the pure enjoyment of eating it, and more. This one memory is taken apart into pieces, stored, and then reassembled when recalled. When one segment is recalled, brain is able to retrieve the entire memory or even a series of different memories. Therefore, the more parts of the brain that are involved – sights, sounds, feelings, textures – the easier it is for the brain to retrieve the memory. Think about the last time a particular smell brought forward a specific memory or even a general feeling of well-being, anger, or fear. (As a side note - our emotions are also a very important part of memory and learning, but I'll hit that subject in another blog.) When we help students make multi-sensory connections through movement and activity, we are helping them to plant long-term memories.

You might be thinking, *those touchy-feeling activities may be well and good for elementary students, but my secondary students have major tests to pass!* You're right. Your students do have tests to pass. And just think how much easier it would be for them to think of a single activity and be able to retrieve all the stored data connected to that activity through direct instruction and class discussion. This is made even easier when the activity was enjoyable, bringing positive emotions into the memory retrieval. Even pantomiming an activity with their hands (such as building bricks) can then help retrieve both the memory of the activity and the data (or learning) connected to it. To top it all off, physical movement releases acetylcholine, a brain-chemical involved in communication between neurons. According to Susan Jones this brain-chemical "aids in the planning and retrieval of long-term memory." As she says, "Movement helps cement memory!"

**Resources:**

"Movement and Learning: The cerebellar connection and the link between physical education and learning." <http://www.bctnz.co.nz/resources/dore_learning.pdf>

"Grow a Brain!" by Susan Jones. [http://www.**susan**j**jones**.com/movement.pdf](http://www.susanjjones.com/movement.pdf)

The Learning Pyramid. <http://com546.files.wordpress.com/2009/02/learning-pyramid.gif>

I also highly recommend reading "Have You Heard of Brain Gym?" by Cecilia K. Freeman, M.Ed. <http://www.specialchild.com/archives/ia-052.html>

While her article focuses on the use of Brain Gym with special needs children, I found many ways to use these exercises for myself to increase focus, organization, and communication. I can see the benefits of learning small exercises that can be done in the classroom to help when students seem unable to focus or need a bit of physical stimulation to "wake-up" the brain.

Posted by [Emma S. McDonald, M.Ed](http://www.blogger.com/profile/00163279437134152646) at [10:18 AM](http://inspiringteachers.blogspot.com/2010/01/more-bang-for-your-buck-movement-and.html) [http://img1.blogblog.com/img/icon18_email.gif](http://www.blogger.com/email-post.g?blogID=4162714508795282979&postID=7363771997631751958)[http://img2.blogblog.com/img/icon18_edit_allbkg.gif](http://www.blogger.com/post-edit.g?blogID=4162714508795282979&postID=7363771997631751958&from=pencil)