**Brain Function** Dr. David Sousa August 2012

The brain, weighing 3 lbs., is constantly changing. With every new experience, it is no longer the same brain. “Teaching is changing the brain every single day!”

-The worst time to learn is after lunch. Only some of this is because the blood is being used for digestion. Studies with those who had NOT eaten lunch also showed decreased learning ability. It is when our dopamine levels are lower naturally. Many countries have a siesta during this time because the tryptophan makes us sleepy (also found in whole milk and turkey). We need the dopamine to talk our brain through the connections! It is what helps us to focus.

-Dopamine is pleasurable so reward systems are based on it. That is why we repeat behaviors that raise the dopamine level.

Brain Sides

Left: analytical, logical. Math and Language.

Right: Visual, color.

-Hormones affect brain functioning. Cortisol is a stress hormone that builds up in the frontal lobe. When we choose to take a “mental health day”, it is our way of get the cortisol back to a normal level.

-Education used to be just based on stimulus and response. Studies are showing that memory systems also rely on emotions and attention to learn. You need all of this during language acquisition, learning to read and learning Math.

Attention

-3 systems of the brain are needed to get your attention:

1. Alerting…suppresses the irrelevant. (You hear a bus approaching and ignore all else.)

2. Orienting…prepares you for the expected stimulus. (You turn toward the sound.)

3. Decision…links both sides of your brain. (Should I run or should stop?)

How to get a student’s attention

1. Novelty: the unexpected. Use humor, not sarcasm. Laughter and music bond all children from around the world.
2. Movement: improves memory storage and access to the brain. BDNF …brain derived neurotropic factor.
3. Quiz games: students learn while writing questions and answers. They are performing visual and auditory learning.
4. Background music: make the beat appropriate to what mood you need. *Perk up = 80 beats/min. Think=60 beats/min. Relax=40 beats/min.*

* Technology is not affecting our attention yet (it may in the future). Right nowit is the DEMANDS on the students’ attention that is increasing.

Memory Systems

* Working memory, temporary: short term, immediate memory. Working memory used to hold 5 – 7 chunks of memory. In 2000 they retested this after the advent of technology and they found it is now 3 – 4 chunks of memory. Therefore, when teaching, keep in mind that less is more!

Teaching

* Practice does NOT make perfect unless you are repeatedly doing it correctly. A more accurate phrase is that practice makes permanent….right or wrong! Don’t let students practice an activity unless you know they are doing it correctly.
* Repeat important things throughout the curriculum.
* Teach new information first. Shorter is better. Go over the new information at the end as well.
* Sitting more than 30 min. causes the bold to pool in your seat and in your feet. Blood there is NOT helping your brain. Move around.

The frontal lobe cannot multi-task. For example: The cerebellum (in the back of the brain) is what drives the car and it is the frontal lobe (front) that is thinking of the lesson plans you should be working on. This is why shifting from one cognitive task to another makes you lose cognition. Don’t drive and talk on the phone at the same time. This is the equivalent to having 4 alcoholic drinks. Therefore, do not give students several cognitive tasks to do at once.

In the brain, the frontal lobe is far apart from the other parts of the brain that are important in memory. The hippocampus (memory), the amygdala (emotional memory) and the limbic area (emotions) are all close together.

The things we remember forever are located in the emotional part of the brain! Therefore, we must introduce emotion into everything we teach!

During sleep is when short term memory moves into long term memory. Sleep is IMPORTANT. Less, sleep, we don’t remember what we have learned.

Gender Differences for survival

Boys (3 – 10 years) Hunters…quiet and focused. Skills are visual, spatial, temporal (time) and faster.

Girls (3 – 10 years) Transfer language skills... chatty and social. They excel at spoken language skills; these come faster and easier to females.

Males are contextual…simple and direct.

Females are elaborative.

-The brain handles intelligence and creativity separately.

- They are finding that creativity can actually be taught.

Neurogenesis: They have discovered that brain cells actually do regenerate! This is affected by diet. If you restrict calories and fat, increase your exercise and sleep you brain cells WILL regenerate. That is why technology is bad in the bedroom.

What is the best way to learn?

* Studies have shown that if you are *reading*, there is low frontal lobe activity.
* If you are *being taught by a teacher and listening*, there is slightly more activity.
* If you are *recalling old rote material,* there is a little more activity.
* If you are trying to *teach the new material you have just learned to another person*, the frontal lobe activity lights up!