

*“If We Understand the Brain,
We can influence it”*

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Goals for Brain Based Teaching

To better understand how the brain/mind works and to explore the implications of the research for:

- You personally - your own learning*
- Your students – how they learn and what you can do to increase their understanding and ability to use information.*
- Your teaching – how you structure your classroom and instructional activities.*

Brain Quiz

1. T F *We use only 10% of our brain.*
2. T F *For a higher level cognitive activity one uses many areas of the brain.*
3. T F *Complex music produces complex brain activity.*
4. T F *There is one specific area for arithmetic and other content areas.*
5. T F *Development of knowledge occurs in a ladder-like fashion.*
6. T F *We can grow new brain cells.*
7. T F *Teens' brains are like a toddler's brain.*
8. T F *Food influences our brains.*
9. T F *Learning through repetition produces a permanent neurophysiological change in our brains.*
10. T F *Gifted teens have more developed brain maturation in the frontal lobes.*

Myths....

of how the student brain learns

It is good to surprise students with novel content and new information.

Learning is influenced very little by how the student feels (their brain's chemistry).

Reduce the non-learning, 'off-task' time and keep students active and busy.

Students will get it right the first time if they are paying proper attention.

If students write it down or read it, they should be able to remember it later.

Because of time constraints, teachers should move on to new topics quickly.

Physical Structure of the Brain

- Cerebrum (Latin for brain) Cortex (Latin for bark)
- Mid Brain – the CEO of the nervous system (Includes thalamus, hypothalamus, amygdala, and hippocampus) – responsible for emotional functions, memory, social bonding, intuition, immunity, and healing. Sensory information passes through the thalamus before entering the cerebral cortex.



Physical Structure of the Brain

- Frontal Lobes – (last to mature, develop fully) controls consciousness, critical thinking, the ability to problem solve, plan for the future, and expressive speech.
- Parietal Lobes – (interprets where pain is coming from) receives and processes data from the senses, responsible for touch, pain, temperature, calculating, and writing.
- Occipital Lobes – (vision center) controls processing of visual images, hearing, and language
- Temporal Lobes – (memory & who we are as an individual) interprets music and language, stores information

Three Parts to our Brain:

- ④ *Genetic wiring* – *highly inheritable*
- ④ *Environment* – *in our surroundings with no conscious reactions : nutrition, drugs, toxins, temperature*
- ④ *Experience* – *in our surroundings with conscious reactions: people, tv, computers, books, museums, etc.*

Inside the Teenage Brain

- ~ Around puberty, the brain blossoms with new brain cells*
- ~ Frontal lobes undergo wholesale renovation; extraneous neuronal branching gets 'pruned' back; also occurs in infancy to create a more efficient, consolidate circuitry*
- ~ Teens' rational, thoughtful frontal lobes "light up" less, their amygdala lights up more!!*
- ~ Teens process information differently than adults; very emotional*
- ~ Mid Brain processing daily info and interactions*

The Gifted Brain

- *The brain expansion during childhood – cortex and axon branching & myelination in frontal lobes – relatively earlier with gifted children*
- *Gifted brain exhibit superior neurophysiology in frontal areas – greater density of localization of neurons & thickness of cortical layers in frontal areas*
- *Some studies show gifted brains have double the number of gliocytes than the normal brain*
- *Gifted males' brains shut down verbal to do spatial task*
- *Connectivity must be robust to do difficult cognitive activities*

Next decade: Functional Connectivity



*As educators, we are responsible for helping students
'guide out' from themselves
the beliefs and behaviors that promote optimal living.*

*When we teach our students how to learn, we are also
teaching them how to be happy.*