

Teaching the Teen Brain  
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Describe Teen Behavior

- Hormonal
- Risk takers
- Poor decision makers
- Sleep late
- Peer pressure
- Technological genius

What does the research tell us?

Can you change a BRAIN?

- Neural Plasticity
- The ability of the brain to change
- Exercise creates the optimal environment for the brain to create new brain cells and protect and build the existing ones.  
(Ratey)

Characteristics of the TEEN Brain

- Puberty: Biological warfare
- Neural Pruning
- Emotional (Amygdala) Stress
- Pre Frontal Cortex
- Interpretation of facial expression
- Sleep patterns
- Nutrition
- Gender differences

Puberty

- Why and when
- Early onset
  
- Girls: 11yrs 2 mo
- Boys: 12-13 yrs

- Obesity
- New study on teen girls
- Physical changes
- Changes happening quickly
- Awkward coordination
- Spatial awareness
- Directionality
- Attention

#### Application

- Individual
- Partner
- Small group
- More activity during the day

#### Brain Anatomy 101

- Neurons
- NEURONS
- Neuron
- Axon
- Myelination
- Synapse
- Dendrite
- Secondary dendritic branching

#### Neural Pruning

#### Neurogenesis

- One trillion to 100 billion
- Use it or Lose it
- Move it or Lose it
- Pruning during sleep

#### Exercise grows Brain Cells

#### EXERCISE!

- Changes the brain at a molecular level
- Balances brain chemicals
- Improves mood and behavior
- BDNF: The brain's Miracle Gro

The CHAIR is the least effective environment for LEARNING!

—Application for Teen Brain

—Create healthy neurons

### **N.E.W.S.**

—Repeat to remember

—Remember to repeat

—Stir up BDNF

—Teen Brain on Exercise

Learning Readiness PE

Naperville Central High School

Texas Youth Fitness Study

Cooper Institute

March 9, 2009

***“Significant associations were consistently found between physical fitness and various indicators of academic achievement, specifically: Academic Performance (TAKS) – higher levels of fitness are associated with better academic performance.”***

### **Texas Youth Fitness Study**

**“School Incidents – Higher levels of fitness are associated with fewer negative school incidents.”**

**“School Attendance – Higher levels of fitness are associated with better school attendance.”**

**“According to the Texas Education Agency, reducing absenteeism by 10 percent would earn public schools approximately \$237 million in state funding.”**

Stall High School

—Charleston, SC

—87% improved attendance

—63% improved office referrals

—Improved academic performance

—Characteristics of the TEEN Brain

—Puberty: Biological warfare

—Neural Pruning

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## Brain Anatomy 202

- This is your BRAIN...
- Your brain is about the size of 2 fists put together
- Information flows back and forth, side to side and up and down
- Corpus Callosum
- Motor Cortex
- Three basic motor movements
  - Walking/Crawling
  - Jumping
  - Rolling
- Cerebellular Training

The cerebellum and the Pre frontal Cortex are connected. The PFC controls memory, language, emotions, social skills, and attention. If the cerebellum is off, then cognitive function suffers. Physical patterns and skills challenge the cerebellum and it grows quicker. Cerebellular exercises that cross the midline enlist more parts of the brain for well developed attention systems.

## Application

- Cross curricular challenges
- Skipping is an indicator of Reading Readiness

How does the brain work?

Brain Anatomy

REGIONS of the BRAIN

- The LIMBIC System
- Amygdala

- Basal Ganglia
- Hippocampus
- Thalamus
- Amygdala
- Thalamus
- Amygdala
- Emotions drive attention which drives learning
- Emotional filter
- Teen amygdala
- Matures about age 25
- Basal Ganglia
- Motor Planner
- Connected to amygdala
- Motion and Emotion are connected
- Balance mood and behavior
- Stress

## Neurotransmitters

### Brain Chemicals

- Endorphins
- Serotonin
- Cortisol
- Dopamine
- Homeostasis to Allostasis

## Brain Imaging Technology

- The effects of drugs on the teen brain

## Facial Expression Application

- Characteristics of the TEEN Brain
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- PFC
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- Sleep patterns
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—Gender differences

- Teens need 9+ hours of sleep
- Characteristics of the TEEN Brain
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- PFC
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Be a label reader!

- 10+ ingredients
  - Chemical compounds added
  - Sugar content
  - Nutrients
  - A High Fat High Sugar diet impedes the ability of the brain to uptake its glucose
  - High Fructose Corn Syrup
  - Not recognized as a nutrient
  - Blood sugar rises
  - Turns on trigger for food intake
  - Highly addictive
  - Very common inexpensive sweetener
  - Seems to affect memory loss
  - Banned in other countries
  - Caffeine is an addictive drug!
- Potent stimulate

Why Water?

- Water is the natural conductor of electricity in our body
- We have enough electricity in our body to light a 20 watt light bulb

- Dehydration affects learning
- Are you hungry or are you thirsty?

### Gender Differences

- Male
- Hunter
- Convergent thinking
- Focused efficient
- Spatial/Temporal
- 4000+ words
- Alpha male

### Female

- Gatherer
- Divergent thinker
- Multi tasking
- Language/emotion
- 10000+ words
- Alpha female

### Now What?

- Individual, then partner, then small group
- Mixed grouping, same gender grouping
- Content application to life
- Novel interesting challenging content
- Embrace emotions
- Use of music as classroom manager
- Self Management

**Jean Blaydes Madigan**

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