



Character Under the Hood: Understanding the Teen Brain

Implications for Middle School Classrooms

Dr. Elizabeth B. Day
Santa Clara University



Reflection...

Turn to a neighbor and describe an experience you had as a teenager where you did not make the most responsible decision or choice.



The good news is...

- It wasn't entirely your fault!!
- Agenda today is to learn more about the teen brain and how we can apply this information to our teaching.

Concrete to abstract thought



- By the end of 6th grade about 50% of students move from concrete to abstract, symbolic thought
- *“I’ll make one kid pretend he’s x and another kid will be y and I put them in the front of the room and make them act out an equation. They need to see it.”*

Honoring who they are...



- Distinction between early adolescents and older ones
 - *“It’s like you have high track hurdles for high school but you would not use them for middle school.”*
 - *They have their own hurdles but they are smaller. The hurdles have to be appropriate.”*
Ken Mitchell- NYC teacher
- Middle school kids are not high school or elementary students--they are unique...and at times, hard to understand.

School shootings

“To understand what goes wrong in teenagers who fire guns, you have to understand something about the biology of the human brain...

The 15 year-old brain *does not have the biological machinery to inhibit impulses* in the service of long-range planning...



School shootings

This is not meant to absolve criminal behavior...but the shooter at Santana High needed ***people and institutions to prevent him*** from being in a potentially deadly situation where his immature brain was left to its own devices.”

Daniel Weinberger
Director Clinical Brain Disorders
Lab at NIH



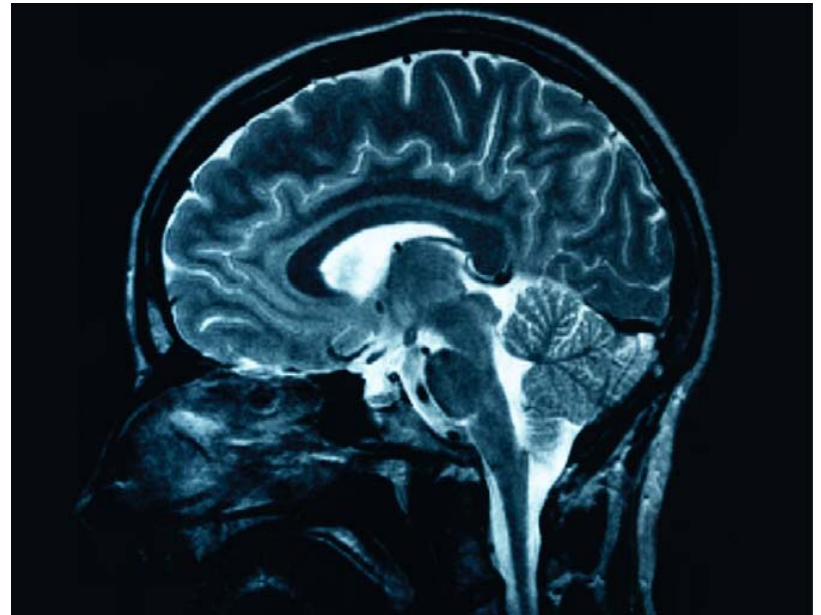
School shootings

- Linking brain research to complex behavior is tricky:
 - culture
 - circumstances
 - violent entertainment
 - lack of accountability for deviant behavior
 - unstable home life all play a role



Peering into the Living Brain...

- **Who?** Dr. Jay Giedd
 - Neuroscientist from National Institute of Health (NIH)
- **What?** Scanned MRI images of teenage brains over past 10 years
- **Why?** To study long-term brain development
- **Teen incentive?** \$60 a visit!



Surprising discovery

- Brain not finished developing by adolescence
- Teens are ‘crazy by design’
 - It’s not “just hormones”
- Their behavior in some ways *does* make sense.
- Compassion not judgment





What's happening?

- Researchers found ongoing growth:
 - Cerebral cortex
 - logic and spatial reasoning
 - Temporal areas
 - language
 - Prefrontal cortex
 - the brain's 'policeman' or CEO

Prefrontal cortex controls inhibition, impulse control and working memory

- Brain works constantly
- It is learning how to *inhibit itself from inappropriate actions*
- Passion and strength but no 'brakes' until 25 years old



Prefrontal cortex controls inhibition, impulse control and working memory

- Creates conflict in teenagers as they enter an increasingly complex world.
- They don't have the maturity in their frontal lobes to regulate many adult situations.
- Drawn to risk-related activities without judgment





Reflection...

Turn to a neighbor and describe a student in your class that is lacking ‘prefrontal cortex’ maturity.

- *How is this lack of development (previously viewed as total immaturity!) manifesting itself in your classroom?*
- *How have you tried to cope?*

Prefrontal cortex process: growth and then pruning...

So...what's
going on?
Lobes peak at
puberty and then
undergo severe
pruning





What impacts what teen brains decide to keep and ditch?

- Survival!
 - If it helps you stay alive, keep it!
- Zone of proximal development
 - Do I have a history with it?
- Set the purpose
 - Do I have a reason for knowing this that matters to me?
- Intensity
 - Accessing emotions improves motivation and retention.
- Movement
- Novelty

What happens after the pruning? Moral development continues...

- Post-pruning frontal lobes integrate:
 - social
 - emotional
 - intellectual aspects
- Teens begin to step outside themselves
 - understand others' feelings
 - their own experience
 - meta-cognition deepens





Moral development continues...

- What the brain is exposed to impacts moral development:
 - external experiences
 - school
 - culture
 - peers
 - role models
 - media



What is our role during this time?

- Teachers need to act like surrogate frontal lobes
- Step-in
- Offer a road map
- Problem solve aloud
- Model critical thinking



Nicotine and the brain...

- Teens who are heavy smokers
 - Rate of panic attacks 15 times higher than non-smoking teens
- Prone to depression and infections
- Girls get hooked more easily
- Consequences don't apply to me
 - Critically think through issue with them
 - Different from offering 'advice'



Drinking and the suicide gene

- When kids are heavy drinkers the brain reacts when they temporarily stop drinking
 - Brain becomes alcohol-soaked and an abundance of glutamate receptors are created
 - Leads to too much calcium in the brain
- Overload of calcium turns on the “suicide” genes in a cell
 - Causes anxiety, depression and small seizures
- Share facts and ‘think aloud’



Further awareness and compassion

- Keep in mind:
 - Average teen gains 50 lbs. in 4 years
 - Don't let size fool you- kids aren't as mature as they look
 - Many teen behaviors are derived from the evolutionary drive to mate



Building on middle school aptitudes

- Make content relevant
- Teach experientially
- Introduce “whole” concept
 - Provide curriculum road map.
 - Where are we going?



Building on middle school aptitudes

- Provide pro-social and structured times for peers to talk
- Joy enhances learning
- Multiple intelligences
 - Art, music and movement
- Interdisciplinary units connections
 - Teens are trying to make sense of the world



Building on middle school aptitudes

- Provide opportunities for students to summarize or reflect on material
- Increase wait times
- Increase complexity, not difficulty
- Frequent feedback
- Teach not only content, but *how to study it*



Inform your students: They are smart! IQ is not set at birth!

- Encourage
 - discussion groups
 - apply material
 - students teach others
 - metaphors and analogies
- Integrate instruction around themes
- Practice is vital. Revisit previous learning.
 - Correct misconceptions at each stage



Direct implications to our teaching: Teens need choices

- Offer a *wider definition of success*:
 - Choices: imovie, skit, mobile, diorama, game, simulation, song, essay, or interview to demonstrate knowledge
- Lead them in taking *positive risks*:
 - a project outside their comfort zone, mentoring/reading buddies with younger kids, a service project, public speaking
- Structure activities that provide *time and space to roam* intellectually, physically and emotionally
 - exploratory classes or projects for instance (digital photography, clay, art, music)



Middle school kids benefit from...

- Water
 - hydrates the brain and increases thinking
- Fresh foods
 - Nuts, sandwiches, fruit, bagels, beef jerky, trail mix, raw veggies
- Movement

What are we striving to create for our students?

- Positive social interaction with adults and peers
- Structure and clear limits
- Creative expression
- Competence and achievement
- Meaningful participation in families, school, and communities
- Opportunities for self-definition





Reflection...

Turn to a neighbor and describe one thing you can do differently this spring in your classroom as a result of learning more about brain based research and teaching.



For more information...

- Contact: Dr. Elizabeth Day
 - ebday@scu.edu
 - Santa Clara University
 - School of Education, Counseling Psychology and Pastoral Ministries
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