USE YOUR NOODLE

tips from neuroscience to sauce up your lessons

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Questions of Focus

✓ Why is understanding the adolescent brain important to the adolescent learner?

✓ Why is understanding the adolescent brain important to the middle school teacher?

✓ How can both populations use this information to their benefit?
NGSS and Common Core Math Connections

- **NGSS Science and Engineering Practices:**
  - SEP1: Asking Questions and Defining Problems
  - SEP2: Developing and Using Models
  - SEP4: Analyzing and Interpreting Data
  - SEP7: Engaging in Argument from Evidence
  - SEP8: Obtaining, Evaluating and Communicating Information

- **Crosscutting Concepts:**
  - CCC2: Cause and Effect: Mechanism and explanation
  - CCC5: Structure and Function

- **NGSS Performance Expectations:**
  - MS-LS1-2: Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function
  - MS-LS1-3: Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells
  - MS-LS1-5: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms
  - MS-LS1-8: Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate storage

- **Common Core Math Content:**
  - CCSS.MATH.CONTENT.7.RP.A.2.B: Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships
Crumbling the Cookies

- Place in pairs, or groups of 3-4

- **Materials:**
  - Cookie Map
  - Tweening Cards
  - Adulting Cards
  - Wax String
  - Scissors
  - Pencil
  - Directions
How did that Cookie Taste?

- What did you learn about the brain from the game you just played and the map you created?

- Was everyone’s map the same?

- Did your map change from youth to adulthood? Why or why not?
Online…

https://pregnantteens.files.wordpress.com/2011/03/limbic-system.jpg
Pruning; like a tree, not the fruit

Time-Lapse Brain

Gray matter wanes as the brain matures. Here 15 years of brain development are compressed into five images, showing a shift from red (least mature) to blue.

Age 5
Age 12
Age 20
Age 8
Age 16

Evidence for the Question: Why is understanding the adolescent brain important to the adolescent learner?

- Neuroplasticity – cell connections can be altered by repeated experience
- Brain seems more plastic in youth than in adulthood
- Underutilized connections are pruned away

Evidence for the Question: Why is understanding the adolescent brain important to the middle school teacher?

- Neuroplasticity – through repeated experiences, the lessons you teach can have a lasting impact on the structure and function of your students’ brains
- Middle School Students are emotional because the emotional regions of the brain are near maturation at this age
- Middle School Students have brains that are undergoing pruning – there’s a reason they forget
Exploring Myelin: A Hop, Skip and a Jump
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- **Two Groups:**
  - M (Myelinated Axon): 5-7 people
  - UM (Unmyelinated Axon): 10-15 people

- **Materials per group:**
  - String
  - Scissors
  - Foam Ball
Wrap up on Myelin

- Name one difference you noticed between the myelinated and unmyelinated axon in this model.

- How did this model help in the understanding of this concept?

- What are the limitations of the model?
Information of Focus

- **Evidence for the Question:** Why is understanding the adolescent brain important to the adolescent learner?
  - Neuroplasticity – more in youth
  - Less-used connections are pruned away

- **Evidence for the Question:** Why is understanding the adolescent brain important to the middle school teacher?
  - Neuroplasticity – *repeated experiences*, lasting impact
  - Limbic “emotion” regions online, prefrontal development
  - Pruning and increased white matter (loss, strengthening, and increased speed)

- **Evidence for the Question:** How can both populations use this information to their benefit?
Applying the Techniques

As you watch the video, think about:

- What you notice about her teaching techniques
- What points or concepts seem most important or memorable
Useful Resources

- **Videos:**
  - Full Jill Bolte Taylor talk at TedxYouth: https://www.youtube.com/watch?v=PzT_SBl31-s
  - Sandra van Aalderen talk at TedxAmsterdamED: https://www.youtube.com/watch?v=Wz87r90Tf1I
  - SciShow’s youtube video, The Teenage Brain Explained: https://www.youtube.com/watch?v=hiduiTq1ei8

- **Books:**
  - Jill Bolte Taylor: *My Stroke of Insight*, (general book about the brain and injury written by a neuroscientist who experienced a stroke)
  - Any book by Oliver Sacks

- **Good Website for free, vetted, lessons:**
  - http://betterlesson.com/ (need to sign up, free, NGSS, Common Core Math and ELA relevant)