


“Ask Dr. Judy”
Strategies for Maximizing Student Memory

Judy Willis, October 14, 2010




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Goals for This Presentation


The brain is designed to learn and remember when predictions are made and feedback is received.

When you increase student prediction opportunities, you can correct their misconceptions and strengthen their accurate memories.



Poll Question

Respond in 20 seconds



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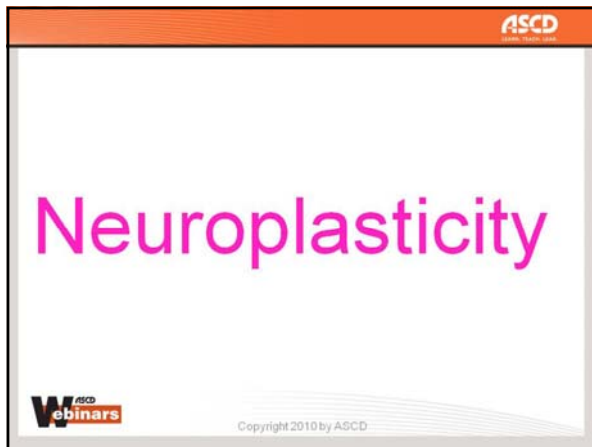
Recall a time as a student when you were very embarrassed or upset after making a mistake or being criticized in front of your peers by a teacher for your work, athletic skills, performance, or other creative efforts.

What was your approximate age?

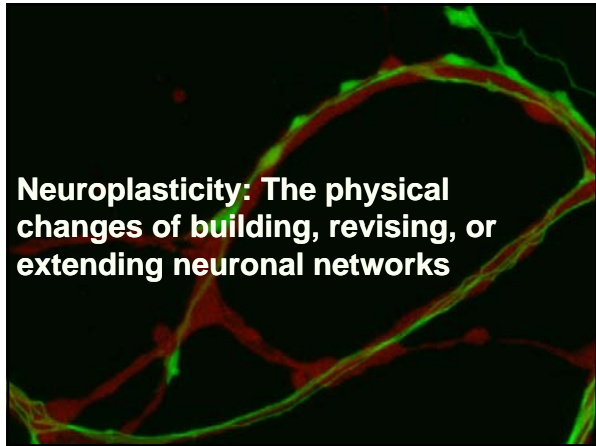
1. 4–8
2. 9–17
3. 18–20

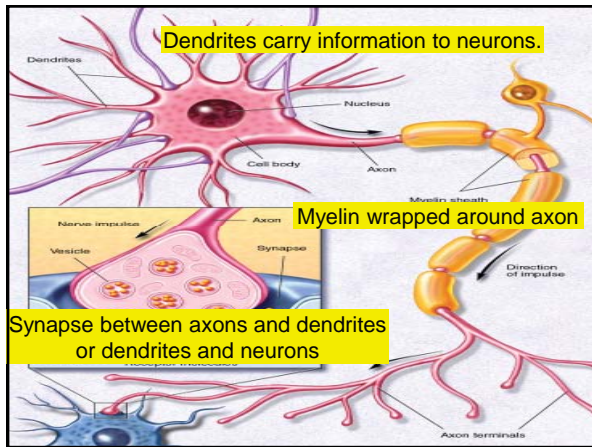
I predict most of you were 9–17.

Stay tuned to find out why I made that prediction...



Neuroplasticity: The physical changes of building, revising, or extending neuronal networks





CURIOSITY promotes interest and attention.



Prediction sustains attention and constructs memory.



Neuroplasticity constructs neural networks, but without active participation and making mistakes, faulty networks will not be revised.

That faulty foundation can severely restrict future learning.

Mistakes are critical to learning.

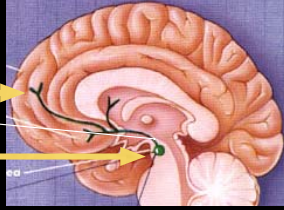
When predictions are correct, there is a chemical reaction that promotes

- **Pleasure and satisfaction.**
- **The desire to “bet again.”**
- **Strengthening of the neural network used to make the prediction.**

Source: Histed, M. H., Pasupathy, A., & Miller, E. K. (2009, July 30). Learning substrates in the primate prefrontal cortex and striatum: Sustained activity related to successful actions. *Neuron*, 63(2), 244–253.

Prefrontal Cortex (PFC)

Dopamine-Reward Center
Nucleus Accumbens



Dopamine release to PFC drops with error recognition.

Dopamine release to PFC increases with feedback that the prediction was correct.

Correct predictions promote increased dopamine pleasure response in the PFC.

Networks used for that prediction are reinforced.

Each time the improved, extended network is restimulated with practice and feedback, it becomes stronger (neuroplastic changes).

Survival and “intelligence” increase.

The drop in dopamine pleasure with a recognized mistake is the way the brain changes itself to avoid future mistakes.

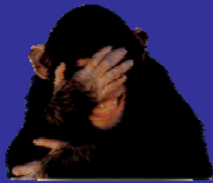
Timely feedback is needed to provide students with the accurate information with which to change their misdirecting neural networks.

Then, they need opportunities to **use** the revised network and build understanding to maintain the correct long-term memory.

Increasing participation with prediction changes the BRAIN, but . . .

What do you think is the greatest fear reported by students?

Making a Mistake in a Whole-Class Setting



Recall **your** mistake negativity to recognize its **power**.

Why ages 9–17?

The reward nucleus is most reactive (highs and lows) during those years.

**Consequence of
mistake fear is
low participation.**

**Reduce participation
fear and stress.**

**Supportive Classrooms
where students.....**
Feel safe enough to take the “risk” of
participating and being “smart”
*....and even risk making
mistakes*

To promote participation/prediction
comfort and mistake tolerance . . .

Provide opportunities to
predict safely, and develop
flexible perspectives.



ONLY THE PERSON WHO
THINKS **LEARNS**.

Instead of having students raise their
hands to respond to questions...

Reduce
Mistake
Fear

To Increase the
Risk-Taking of
Participation



Have all students respond to your questions using individual whiteboards.

- hand signals
- clickers
- cardboard inside plastic sleeve and dry erase pen

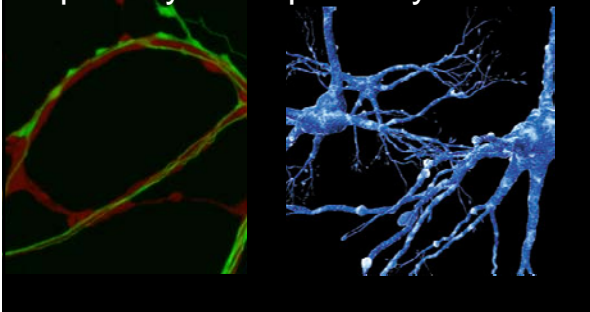


Brain Owner's Manual

Explain the brain changes that let students learn from mistakes.

(It's how they learned to walk, talk, and ride a bike.)

Teach students how their brains turn data into knowledge—especially neuroplasticity.





Brain Owner's Manual

Link from my website (www.RADTeach.com) or <http://edge.ascd.org> to my two "Brain Owner's Manual" articles published in *Educational Leadership* online:

How to Teach Students About the Brain
<http://bit.ly/9i9UmE>

What You Should Know About Your Brain
<http://www.radteach.com/page1/page8/page45/page45.html>

Prediction

**based on prior knowledge +
timely corrective feedback +
Neuroplasticity**

is how the brain promotes survival
and how your students can
change their brains and change
their INTELLIGENCE.

**Judy's
Mistake
Animoto
Next slide**

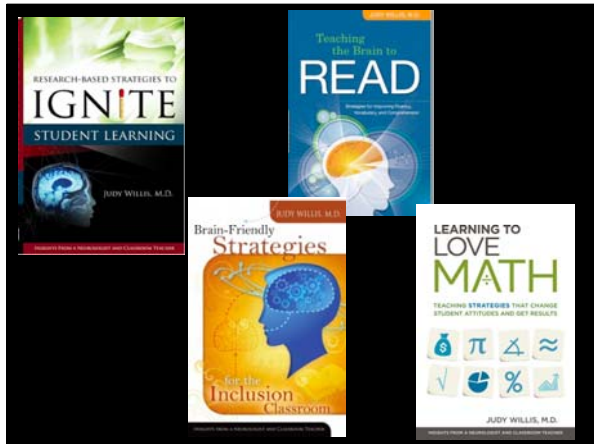
My website, for access to articles and book chapters I've written and to contact me via e-mail:

www.RADTeach.com



Thank you for joining the Webinar.

I hope to "see" you again soon!





After the webinar, Ask Dr. Judy, share ideas, and brainstorm with other professional educators on the ASCD EDge discussion group, How the Brain Learns:

<http://groups.ascd.org/groups/detail/110564/how-the-brain-learns/>

I'll look for questions or comments, especially those tagged in the title with "**Ask Dr. Judy Question**," and I'll often respond to them on the website and/or in an upcoming webinar.
