USE IT OR LOSE IT!
BRAINS NEED ACTIVE PROCESSING!

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WEBINAR #4 BEGIN WITH THE BRAIN:
DISCOVERING “BRAIN-FRIENDLY” STRATEGIES TO MAXIMIZE STUDENT SUCCESS!

Think BIG, Start Small: How to Differentiate Instruction in a Brain-Friendly Classroom (Gregory & Kaufeldt, 2015)

Best Practices at Tier 1:
Daily Differentiation for Effective Instruction
Elementary and Secondary (Gregory, Kaufeldt, & Mattos, 2015)

USE IT OR LOSE IT!

1. Neural Plasticity
2. Strengthening Synapses (reflection consolidation)
3. Natural Pruning
4. Active Processing: Multiple Rehearsals
5. Active Processing: Instructional Variety
   • Novelty
   • Cooperative Group Learning
   • Choice
   • Challenge

BRAIN BASIC: NEURAL PLASTICITY

BRAINS KEEP GROWING: Multi-sensory experiences in enriched environments can stimulate brain growth and development at any age.
GLIAL CELLS (GLUE) “HELPER CELLS”

• Glia outnumber neurons anywhere from 10 to 50 times.
• The glial cells surround neurons and provide nutrition, maintenance, and insulation between them.
GLIAL CELLS: Oligodendrocytes:
Oligodendrocytes are large glial cells that produce the myelin sheath that insulates neuronal axons within the central nervous system.

Microglia & Astrocytes
Microglia account for 10-15% of all the cells within the brain and are primarily involved in brain maintenance.

Astrocytes are involved in the maintenance of water and ion homeostasis.

NEURONS THAT FIRE TOGETHER, WIRE TOGETHER
ADAPTABLE BRAINS

• At birth, every neuron in the cerebral cortex has an estimated 2,500 synapses;
• By the age of three, this number has grown to a whopping 15,000 synapses per neuron.
• The average adult, however, has about half that number of synapses. **Neurons that are used frequently develop stronger connections and those that are rarely or never used eventually die.**
• By developing new connections and pruning away weak ones, the brain is able to adapt to the changing environment.

SYNAPTIC PRUNING

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SCIENCE CONFIRMS THAT FORGETTING THINGS IS ACTUALLY A SIGN OF VERY HIGH INTELLIGENCE

People with the best memories tend to forget about relatively unnecessary details.

https://www.physics-astronomy.org/2019/03/science-confirms-that-forgetting-things.html?fbclid=IwAR16cqZRUuYaDNegmVluDnApxWFUZeaf4uTDl9TmPWusP1_46uOjllyQ

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CONSOLIDATION

• When you review or practice something you've learned, dendrites grow between nerve cells in the network that holds that memory.
• To ensure that information is consolidated into long-term memory, rehearse it over several spaced intervals repeatedly.
• During sleep we process and consolidate information.
• Through the consolidation process, the brain creates a sort of neural map, allowing memories to be retrieved when they are needed.
• It takes lots of connections to relate each neuron's tiny bit of information to that of other neurons so that all the bits add up to a complete memory.
• Each time you review that knowledge, this mental manipulation increases activity along the connections between nerve cells.
• Factors such as how the information was learned and how frequently it was rehearsed play a role in how quickly these memories are lost.
• Novelty is one factor that plays a role in why some things are remembered while others are forgotten.

Provide Reflection Opportunities

Any activity through which the brain recalls a concept, skill, or process. Reflection activities will prompt the brain to re-stimulate the new connections among the neurons, which helps strengthen them.

• Journaling
• Role-play
• Discussions
• Reproductions
• Interactive Notebooks
• Guided Note-Taking
• Graphic Organizers
Why the brain actually benefits from reflection..

• Prediction, reflection, and metacognition are pillars for the thoughtful classroom.
• By shifting their reflection from content to thought, students have the chance to put themselves back at the center of the learning process.
• When they reflect, students reimagine what happened in both 1st and 3rd person—as they were seen, and as they saw through their own eyes.

8 Reflective Questions To Help Students Think About Their Learning

1. What surprised you today, and why?
2. What's the most important thing you learned today? Why do you think so?
3. What do you want to learn more about, and why?
4. When were you the most creative, and why do you think that is?
5. What made you curious today? How does learning feel different when you're curious?
6. When were you at your best today, and why?
7. (Assuming we were studying the same thing and you could decide and have access to anything), where would you start tomorrow? Why?
8. What can/should you do with what you know?

“MULTIPLE REHEARSALS”

• Engaging tasks
• Distributed over time

STUDENTS SHOULD HAVE MULTIPLE EXPERIENCES FOR HOW THEY:

• **TAKE IN** new information.
• **Actively PROCESS**
• **MAKE SENSE** of new ideas.
• **DEMONSTRATE** their understanding using a variety of PRODUCTS and PERFORMANCES.
USE IT OR loose it!

ACTIVE PROCESSING: “Use it or lose it” is true! Students must have multiple opportunities to process new learning in a variety of ways to assure long-term retention.

ACTIVE LEARNING

• Active learning refers to the robust research finding that learning is more durable and lasting when students are cognitively engaged in the learning process (Bransford, Brown, & Cocking, 2000; Chinn, 2011).

Using a Fishing Metaphor

Every great angler prepares for fishing by evaluating the weather, location, the time of day, and fish habits & preferences. Based on past experiences, the most appropriate lure is selected that matches the criteria. To increase success, after awhile every great fisherman/woman reels in the line, turns to the tackle box and decides to “change the bait.” We can use this fishing metaphor to illustrate what educators must do as they attempt to “catch” all of the students and get them engaged in learning.

Although we know that "one size doesn't fit all," we must begin the instruction with our best tried-and-true strategy. If we haven't “hooked” all of our students - good teachers must turn to their tackle boxes to select other instructional strategies to increase student understanding and success. Successful anglers continue to build up their tackle boxes with new lures.

Simply put, understanding Differentiated Instruction is a teacher's commitment to build a full tackle box of varied strategies. In this way they will be prepared to "change their bait" as needed. Understanding some human "brain basics" for teaching and learning can be a wonderful foundation to guide educators in preparing their tackle boxes.

ACTIVE PROCESSING MIGHT INCLUDE:

• Relating (connecting) new information to prior knowledge
• Investigating and asking questions about the material
• Writing summaries or outlines of the material
• Discussing ideas with others
• Taking a “do-over”
ACTIVE PROCESSING

• Any instructional method that engages students in the learning process.
• Requires students to do meaningful learning activities and think (and reflect) about what they are doing.
• Students are active and engaged in the learning process.
• The opposite of traditional lecture where students passively receive information from the instructor.

PAUSE & REFLECT

• Breaking a lecture into brief pauses can increase student attention and learning outcomes. The pause procedure is “a good active learning strategy which helps students review their notes, reflect on them, discuss and explain the key ideas with their partners.”
• The use of the pause procedure involves a minimal amount of extra time but can confer significant benefits in comparison to lectures that continue without breaks.

IN CLASSROOM INSTRUCTION THAT WORKS,
MARZANO, ET. AL. SAY:

• Some learners may need up to twenty-four practices to get to 80 percent mastery!
• Some may need only a couple!
Complex Meaningful Tasks
...Students need to take part in complex, meaningful projects that require sustained engagement and collaboration.

NOVELTY
• Engaging
• Playful
• Out of the Ordinary

RULES OF ENGAGEMENT

FUN / HUMOR
Love to Laugh!
Kids Just Want to Have FUN!

COOPERATIVE GROUP LEARNING
• INFORMAL Cooperative Learning Groups
  – “On-the-fly” groups/partners short-term
• FORMAL Cooperative Learning Groups
  – Pre-established groups/partners for routine use. Shared roles & responsibilities
• Cooperative BASE GROUPS
  – Long-term, stable, heterogeneous ”family” groups.
FLEXIBLE STUDENT GROUPINGS

- Triad
- Table talk
- Study Buddy
- Elbow/Shoulder partner
- Appointment Cards
- Learning Clubs

From Lecture to Interactive Learning

From **sage on the stage** ... to **guide on the side** ... to **teacher as activator** ...

HOW CAN WE INCREASE ENGAGEMENT IN THE CLASSROOM?

- Small bursts – limit information
- Unpredictable – variety & novelty
- Visual and auditory cues
- Generate an “action” = do something!

INSTRUCTIONAL VARIETY

- **Novelty** – a New Twist on Something
- **Direct Instruction** with Modeling & Demonstrations – Brief!
- **Visuals/Graphics**
- **Multi-modal Activities** – Movement!
- **Games/Mini-competitions**
- **Discovery Play**
- **Choice Opportunities!**

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**PATTERNS ➔ PROGRAMS**

When learners have an opportunity to do a task or activity more than once, they can:

- Check out multiple results
- See the similarities each time
- Discover patterns
- Look for discrepant events
- Test hypotheses – make modifications
- Form a “program,” “template” or “schema” for future references.

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**“YOU CHOOSE!”**

**THE POWER OF CHOICE IN LEARNING**

- Students should have an element of choice within their learning.

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**WE SEEK AND CHOOSE TASKS THAT …**

- Appeal to our learning preferences.
- Remind us of our past successes.
- Are within our realm of possibilities. (I think I can!)
- Look like they might be fun.
- Might let me get up and move.
- Let me work with others.

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**MAKING CONTENT MEANINGFUL**

- Makes connections to the students’ world
- Authentic learning experiences: real-life tasks
- Work should be WORTH DOING
- Socially relevant: student voice and influence
- Culturally responsive to students’ identity and heritage