NEUROPEDAGOGY: WHAT IS IT AND WHY IS IT IMPORTANT TO EDUCATORS

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In this presentation

• The definition of neuropedagogy
• Different views of learning
• The definition of neuroplasticity
• The structure of neurons and how this applies to teaching and learning
• The role of neurotransmitters in learning
• How neurons process information
• The brain and memory
• Basic brain structure and how it applies to teaching and learning
• ...
Also in this presentation

- How the brain processes reading
- The brain and vocabulary
- Strategies to harness the brain’s power to learn such as
  - ---exercise
  - ---visual organizers (including Lexstars) and EVRG’s
  - ---character substitution
WHAT IS NEUROPEDAGOGY (TALK TO YOUR ELBOW PARTNER)

• Neuropedagogy is the harnessing the brain and its nature to enhance learning.

• Brain based learning
WHAT IS LEARNING?

• Talk to a different learning partner
LEARNING---

• BEHAVIORALIST--- A change of behavior or response to a stimulus
• PIAGETIAN--- The brain’s search for equilibrium
• RECONSTRUCTIONIST---The learner engages with his/her environment to negotiate some sort of meaning.
• NEUROPEDAGOGICAL---The brain is constantly changing and rewiring itself to better process new information
Signal travels along axon to synaptic knob

Myelin sheath protects axon and facilitates conduction of electrical signal

Neurotransmitter crosses synapse

Synaptic knob

Receptor cells are activated

Axon carries electrical signal

Nerve cell sends electrical signal along axon
<table>
<thead>
<tr>
<th>Chemical</th>
<th>Factor or Neurotransmitters</th>
<th>Source</th>
<th>Responsible for</th>
<th>Too little</th>
<th>Too much</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetylcholine</td>
<td>Neurotransmitter</td>
<td>Synthesized from choline</td>
<td>Memory, information processing, attention, motivation</td>
<td>Memory deficits,</td>
<td>Paralysis of involuntary muscles,</td>
</tr>
<tr>
<td>Serotonin</td>
<td>Neurotransmitter</td>
<td>Metabolized from Triptophan in some foods</td>
<td>Controls mood, Relaxation, moderates dopamine production, cognition</td>
<td>Depression,</td>
<td>Serotonin syndrome, ADHD like symptoms,</td>
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<tr>
<td>Norepinephrine</td>
<td>Neurotransmitter</td>
<td>Exercise</td>
<td>Alertness, retention, increases blood flow,</td>
<td></td>
<td>ADHD like symptoms,</td>
</tr>
<tr>
<td>Dopamine</td>
<td>Neurotransmitter</td>
<td>Synthesized in the brain</td>
<td>Alertness, attention, pleasure,</td>
<td>Parkinsonian symptoms, boredom</td>
<td>Nervous ticks, addiction?</td>
</tr>
<tr>
<td>Melatonin</td>
<td>Neurotransmitter</td>
<td>Produced by the pineal gland</td>
<td></td>
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<td>Sleepiness</td>
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<tr>
<td>BDNF</td>
<td>Protein</td>
<td>Exercise</td>
<td>Neuroplasticity</td>
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<tr>
<td>Glutamate</td>
<td>Neurotransmitter</td>
<td>Exercise</td>
<td></td>
<td></td>
<td>Excitotoxin</td>
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</table>
LET’S PLAY A GAME
LET’S TAKE A TOUR......
Our senses pick up information and convert it into electrical signals. Electrical signals are relayed through the neurons to the amygdala. The amygdala determines the urgency of the information.
IF THEAMYGDALA ENCOUNTERS STRESS

1. Signal is sent to the limbic system.
2. The hypothalamus initiates fight or flight.
3. Cortical systems are shut down.
The amygdala relays the information to the appropriate cortex.

Different areas of the brain communicate with each other.

The information is sent to the Central Executive.
The new information is compared with previous information.

If information is similar to previously known information, it is stored.

IF information is not similar, rehearsal is initiated.
<table>
<thead>
<tr>
<th>COMPREHENSION REQ.</th>
<th>FLUENCY</th>
<th>CONTEXT</th>
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<tbody>
<tr>
<td>FLUENCY</td>
<td>ESSENTIAL TO COMPREHENSION</td>
<td>IRRELEVANT AT BEST, DETRIMENTAL AT WORST</td>
</tr>
<tr>
<td>EYE MOVEMENTS</td>
<td>LETTER SUPREMACY</td>
<td>WORD SUPREMACY</td>
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<tr>
<td>CONTEXT</td>
<td>DETRIMENTAL</td>
<td>ESSENTIAL</td>
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<tr>
<td>METHODOLOGY</td>
<td>BOTTOMS UP</td>
<td>TOP-DOWN</td>
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<tr>
<td>PHILOSOPHY</td>
<td>BEHAVIORALIST</td>
<td>CONSTRUCTIONIST</td>
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Pre-reading strategies most significant in successful readers were:

• Previewing graphics
• Reading captions to those graphics.
• Previewing text organization and structure
• Reviewing genre characteristics
• Previewing titles and headings.
Successful reading comprehension strategies noted in the study were:

- Paraphrasing
- Visualizing
- Comparing to previously read books.
- Emotional involvement
- Rereading
- Character substitution
• Looking at how paragraphs come together.
• Making predictions based on context.
• Pausing for understanding.
• Charting and organizing content
Successful post reading activities involved:

• Checking for understanding
• Reviewing main ideas
• Applying new information
Test taking habits included:

- Paraphrasing and “translating” a question
- Previewing questions before reading the passage
- Previewing choices prior to reading the passage.
HOW CAN THIS BE APPLIED IN OUR CLASSROOMS?

• Exercise
• Reflective Writing
• Kinesthetic/tactile activities
• Sensory experience
• Graphic Organizers/Thinking Maps
I see the shiny car.

I hear the motor start.

I smell the new car smell.

I taste

I feel happy that I don't have to walk anymore.
<table>
<thead>
<tr>
<th>Pg.</th>
<th>picture</th>
<th>caption</th>
<th>memory</th>
<th>Sensory anchor</th>
<th>significance</th>
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12 principles of brain based learning

- The brain is a complex adaptive system.
- The brain is “plastic.”
- The search for meaning is innate.
- Learning occurs through “patterning.”
- Emotions are critical to patterning.
- Every brain simultaneously perceives and creates parts and wholes.
- Brain chemistry affects behavior.
- We are what we eat.
- Movement affects learning.
- We at least two ways of organizing memory.
- Complex learning is enhanced by challenge and inhibited by threat.
- Every brain is uniquely organized.