# How to Make Teaching More Brain Compatible



Spring 2014 <u>Faculty Academy Presenters</u> Prof. Magdalena Caproiu, Ph.D and Prof. Diane Flores-Kagan Faculty Learning Specialists

## Purpose for this presentation

To encourage the use of brain-based teaching strategies for the improvement of learning

<u>Background</u>

Brain-based research > a "hot" topic Joint forces (neuroscience, cognitive science, educators)

Initiatives/trends affecting education K-12 teaching standards Teacher accountability for student success Student Success Act Media, information surge, technology MOOCS



(Caine et al. xi)

# What we already know that is brain related

- Learning Styles
- Multiple Intelligences



- Metacognition and Self-Regulation
- Challenges of teaching

## Learning Styles

Visual verbal



Auditory مركم

#### Kinesthetic/tactile







## Multiple Intelligences – Howard Gardner



# Metacognition and Self-Regulation

- Connecting new information to former knowledge
- Selecting thinking strategies deliberately
- Planning, monitoring, and evaluating thinking processes

- Executive function of the self: intentions and choices
- Self-knowledge and self-control
- Achievement vs. under-achievement

(Baumeister, Schmeichel, Vohs 3-8)

#### Management of thinking

Alteration of behavior

# **Challenges of Teaching**



- Differences of opinion re: mastery
- Recognizing complexity of student learning
- Technology and learning
- Moving from a teacher-centered approach to a student-centered approach

Making teaching and learning interesting

## **Overview of Learning Theories**

- <u>Constructivism</u>
   Ausubel, Bloom,
   Brunner, Chickering,
   Dewey
- Behaviorism
  SKINNER

- <u>Developmental</u>
   Erickson and
   Piaget
- <u>Gender</u>
   Belenki and Perry
- <u>Social</u>
   Bandura, CROSS,
   Kolb, Maslow,
   McCarty

Constructivism and Behaviorism

Others



#### Natural Human Learning Process Model: The Six Stages - Dr. Rita Smilkstein

 Not knowing how to do it or how it works; just trying it

- Practice, practice, practice
- Starting to get a feel for it

 More practice, getting a better feel for it, starting to feel comfortable



"A ceiling level is as much as a person knows and can do. A learner's ceiling level rises with more practice and processing (attending to, exploring, experiencing, experimenting with, thinking about an object of learning). The learner's ceiling level rises and [his/her] dendrites, synapses, and neural networks are growing at the same time."



(Smilkstein 61)

# How the Brain Processes Information

- Sensory input is received
- Dendrites send electrical and chemical signals to axon



 Synapse (gap between axon and new cell dendrite) receives neurotransmitters

Neural communication can be passed from cell to cell ("firing")

### Interesting Facts – (Wolfe)

- "The "unconscious" brain is in control of the initial filtering of information" (114).
- "The matching of new input to stored information is called pattern recognition and is a critical aspect of attention" (114).
- Sustained attention to something you can't comprehend is not only boring, it's almost impossible" (117).

 "The brain is biologically programmed to attend to information that has strong emotional content first"(120).



#### Brain Filtering Components (Wolfe 115-121)

- Incoming stimulus is different from what is usual
- Intensity of stimuli is different (sounds and movement)
- Same sensory information has been received over and over

Habituation

 Filtered out as unimportant



#### Novelty

## Caine and Caine's Twelve Principles of Learning

- > All learning is physiological.
- The brain/mind is social.
- The search for meaning is innate.
- The search for meaning occurs through patterning.
- Emotions are critical to patterning.
- Every brain processes parts and wholes simultaneously.

Learning involves both focused attention and peripheral perception.



## Caine and Caine's Twelve Principles of Learning (cont.)

- Learning always involves conscious and unconscious processes.
- There are at least two approaches to memory.
- Learning is developmental.
- Complex learning is enhanced by challenge and inhibited by threat associated with helplessness.

Each brain is uniquely organized.

(Caine et al. 4)

## Use of the Executive Functions of the Brain (Caine et al. 9, 12, 26–28, 95)

- Definition of learning
- Description of highly developed executive functions



- Actor/Learner-Centered Adaptive Decision-Making (ACADM) or "Executive Leadership Decisions"
- What enhances executive functions
   What compromises executive functions

### From working memory to long-term memory

#### Aids to recall information:

Annotations

Notes

Flashcards

Visuals (maps, charts, etc.)

Recitation

Recordings

Manipulatives

Games

Study groups

Active learning opportunities

in the classroom



## Dale's Cone of Experience



Source: National Training Laboratories, Bethel, Maine





#### Relaxed Alertness

"The optimal emotional climate for learning."



- It helps students do the following:
- reduce the survival response
- b discover and nourish purpose and passion
- learn to recognize the survival mode
- master the art of scaffolding

(Caine et al. 6, 24-26, 29-31)

#### Immersion in Complex Experience

"Learning and teaching that engages rich, experiential environments."

 Novelty, variety, feedback, opportunity for student choices



- Ideal conditions—projects, research, group work
- Orchestrated immersion to develop higher-order thinking
- Making sure students learn what they need to learn

(Caine et al. xii, 7-8, 114-120)

#### Active Processing

"The art of digesting, thinking about, reflecting on, and making sense of experience and of consolidating learning."

- The processing of experience
- Practice and rehearsal
- Observations and questions
- Self-regulation



## Instructional Approaches

#### **▶** #1

Traditional view of learning: memorization of facts and skills, veridical decision-making



#### ► #2

Intellectual understanding supplemented by memorization, with some opportunities for adaptive decision-making

#### #3

Embedding and consolidating essential knowledge and skills in student-centered learning

(Examples of AVC applications)



## Making learning meaningful

Classroom strategies that promote student-centered active learning.

<u>Think-Pair-Share Activity</u>
1. Think of a strategy you currently use (1 minute).
2. Pair with someone else to discuss it (3 minutes).
3. Share with the whole group (3 minutes).

# Making learning meaningful

Classroom strategies that promote student-centered active learning:

- Setting goals
- Designing graphic organizers
- Projects with real-life applications
- Role plays, enactments
- Group work: problem solving, presentations, experiments, exhibitions, reports, scenarios, evaluations
- Process meetings
- Journals, portfolios
- Learning communities

Flexibility re: lesson plans

#### Works Cited

Baumeister, Roy F., Brandon J. Schmeichel, Kathleen D. Vohs.

"Self-Regulation and the Executive Function: The Self as Controlling Agent." Chapter prepared for A.W. Kruglanski & E.T. Higgins, *Social Psychology: Handbook of Basic Principles* (2<sup>nd</sup> ed.). New York: Guilford, n.d. Web.

Caine, Renate Nummela, Geoffrey Caine, Carol McClintic, and Karl J. Klimek. *12 Brain/Mind Learning Principles in Action: Developing Executive Functions of the Human Brain.* Thousand Oaks, CA: Corwin, 2009. Print.

Smilkstein, Rita. *We're Born to Learn: Using the Brain's Natural Learning Process to Create Today's Curriculum.* Thousand Oaks, CA: Corwin, 2003. Print.

Wolfe, Patricia. *Brain Matters: Translating Research Into Classroom Practice.* Alexandria, VA: ASCD. 2010. Print.