

# **Accelerated Learning: Using Brain Research in the Classroom**

## *A Graduate Course*

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### **Course Description**

The purpose of this course is to make the advances in the field of brain research more accessible to educators. The techniques and strategies of Accelerated Learning will accelerate learning across the curriculum and improve student curiosity and satisfaction with the learning process. Beginning with the neurons, the building blocks of the brain, the focus will be on identifying, assessing and building/strengthening connections between those neurons (neuronal networks). If educators can engage pre-existing neuronal networks in different areas of the brain, then learning is accelerated versus using traditional lecture or even hands-on instruction alone (Zull, 2002).

The Accelerated Learning course will help educators assess the overall classroom environment and possible roadblocks to the higher-order thinking areas of the brain (cortex) from subtle or overt 'fight or flight' responses (Jones, 2000). The course offers insight into the relationship of sensory input and memory including emphasis on the core information the brain receives from the eyes, ears and touch (Wolfe, 2001).

This course explores the neuroplasticity of the brain and how the brain encodes and retrieves memories. It does not represent a new or brain-based curriculum but explores the concepts of the Active Testing of ideas and Errorless Learning (Ylvisaker and Feeney, 1998), which are brain-friendly methods to connect students to new material. This course is based on current brain research and emphasizes and creates opportunities for a balanced approach between traditional teaching approaches and new approaches. A working knowledge of the brain is essential. This course is not weighted with complex terminology because the course rationale advocates and uses learning built upon existing knowledge and understanding. Students who have completed the Teacher Education Institute's Whole Brain Learning class will benefit from this course by adding to their knowledge base the inner workings of the brain; however it is not necessary to have completed WBL to enroll in Accelerated Learning.

### **Course Objectives**

- Assess the composition and function of neurons.
- Assess functions of the brain
- Create strategies to positively enhance brain function in the classroom
- Assess how areas of the neo cortex impact learning.

- Create classroom strategies based on assessing how the neo cortex impacts learning.
- Describe a situation in your classroom where you could employ the Errorless Learning technique
- Analyze the impact of the VAK Learning Styles on teaching and learning
- Assess how teachers can use knowledge of working memory to positively impact student achievement
- Create a lesson for each type of memory
- Complete the learning cycle for a specific topic
- Create activities for the levels of learning
- Design enrichment activities for the classroom
- Develop a plan for creating a brain-based learning school

### **Curriculum Design**

There are a series of major brain-based concepts systematically presented by the instructor using the Socratic or Instructional Conversation method. Each concept acts as a building block to form a basic understanding that teachers can weave into their own classroom strategies and best practices to accelerated the learning of their students.

### **Time Requirements**

Accelerated Learning is a 13 week, three-credit graduate level or 60 hour professional development course taught online. Modules One through Nine will be completed one per week. Module Ten will be completed over a two-week period so students will have time to revise and complete the final integration project.

### **Hardware & Computer Skills Requirements**

Computer and Internet access required. Students must have regular access to a computer and be able to use computer skills to successfully complete this course. Many problems instructors and students run into stem from mis-configured browsers, incorrect software versions, pop-up blockers, and other issues. Most of these issues can be prevented by performing the browser tune up before the course or once a problem arises. Often students find it easier to use Mozilla Firefox, Google Chrome, or Safari rather than Internet Explorer; for some applications Internet Explorer may work well.

### **Course Materials**

Text: Accelerating Learning for All, PreK-8 Equity in Action, by Rebecca McKinney and Colle Wolfe.

### **Outline of topics to be presented in each module**

#### **Module One: Brain imaging, neurons and sub-cortical structures**

1. Introduction to Accelerated Learning
2. Paradigm shifts for thinking about education
3. How brain imaging technology works
4. Interpreting brain imaging for educational purposes
5. Exploring neuron, synapse and sub-cortical anatomy
6. Examining myelination and neural plasticity
7. Synaptic pruning: the case for neural networks
8. How neurons communicate within the brain and body
9. How the brain organizes information and the implications for teachers
10. Assignments: Neuronal analogy exercise, KWL reflection, reflect on must-see websites

#### **Module Two: Exploring the Central Nervous System (CNS)**

1. The Active Testing of new ideas
2. Characteristics of the Spinal Cord and the Brain Stem
3. The seat of power in the brain: The Cerebellum

4. Gateway to the Cortex: The Thalamus and Hypothalamus
5. The brain's alarm system: The Amygdala
6. Remembering your immediate past: The Hippocampus
7. Assignments: Actively test two ideas presented in this module and reflect on must-see websites

### **Module Three: The Cerebral Cortex**

1. The Visual Cortex (the Occipital Lobes)
2. The Auditory and the Sensory/Motor Cortexes (the Temporal Lobes)
3. The Sensory Cortex
4. The Frontal Lobes: The conscious decision-makers
5. The developing Sensory Cortex
6. The role of the Pre-frontal Cortex and adolescent brains
7. Left vs. right and front vs. back cortex
8. Assignments: Select three ideas for classroom application that you would like to incorporate and how you implement them, and reflect on must-see websites

### **Module Four: How Neurons Communicate**

1. Our neurons have Action Potential
2. The Synapse and Neurotransmitters
3. Peptides and the mind-body connection
4. Understanding addiction and the brain
5. Neural networks and prior knowledge
6. How neural networks grow
7. Errorless learning as a means to build upon existing neural networks

8. Assignments: reflect on must-see websites and answer/reflect on the questions from the module (under Accelerate Your Neurons):

- a. How can you make changes to your routine(s)
- b. How can you set targets for each day
- c. How can you establish expectations for your targets
- d. How can you incorporate one or more "intelligences" in your daily lessons
- e. How can you create time and/or opportunities to reflect?

### **Module Five: Making sense of Sensory Memory**

1. Introduction to Sensory Memory
2. Children and ADHD
3. From sensory signals to perception
4. Visual learning strategies
5. Auditory senses and language
6. The kinesthetics of writing
7. Experiential learning and the senses
8. From perception to attention
9. Emotions and attention
10. Emotions and motivation
11. Assignments: Reflect on the must-see websites and answer/reflect on the questions from the "How are you SMART" VAK test:
  - a. Where do you primarily fit on this scale and why do you believe so?
  - b. How would you categorize your learning by percentages of these styles?
  - c. In retrospect, do you find that you teach to fit your own learning style?

d. How could you even out your delivery style?

### **Module Six: Working Memory**

1. Introduction to working memory
2. Personal meaning and memory
3. The multi-tasking myth
4. Memory Tools
5. Memory Tools
6. Teacher Feedback and Working Memory
7. Working within the limits of short-term memory transfer
8. Assignments: Reflect on the must-see websites, and answer/reflect on these questions
  - a. Because working memory resides primarily in the front lobes, why would this be another reason to insure that the amygdala does not take control of the flow of information?
  - b. Based on what we've just covered, what is going on in a student's brain when they say that they're trying to make **sense** of something?
  - c. When they say it doesn't make sense to them, what are some things you can do to bridge that gap?

### **Module Seven: Long term memory**

1. Introduction to different types of long term memory
2. The What and How of Implicit Memory
3. Procedural memory
4. The facts and figures of Explicit Memory
5. Semantic and Episodic memory

6. Lesson Planning using Implicit and Explicit Memory
7. Consolidation and reflection
8. Assignments: Reflect on the must-see websites and fill in the lesson planner for using the memory pathways of Implicit and Explicit memory.

#### **Module Eight: The levels of learning**

1. Concrete Experience begins the learning cycle
2. The physical modality for learning
3. Representational or Symbolic learning
4. Language and images
5. Involving students in problem solving
6. Problem solving from the teacher's perspective
7. Assignments: Reflect on the must-see websites and complete the Learning Cycle exercise.

#### **Module Nine: Enriching the brain through classroom experience**

Content:

1. Defining enrichment
2. The first steps toward an enriched classroom
3. How passion plays (a role)
4. Enrichment and sensory experiences
5. Enrichment in curriculum development, instructional strategies and assessment
6. Enrichment and curriculum compacting
7. Assignment: Reflect on must-see websites, actively test (agree, disagree, incorporate) at least two ideas presented in this module.

#### **Module Ten: The future of brain-based learning and final project**

Content:

1. The future of brain-based learning
2. Brain-based learning and the concept of change
3. Brain-friendly schools
4. Transforming your teaching and your school

### **Grading Criteria**

<b>Assignment</b>	<b>Points</b>	<b>Grade</b>
In-Class assignments	30	80-74 A
Final Project	20	73-68 B
Final Exam	30	67-62 C
<b>Total</b>	<b>80</b>	

### **Student Requirements**

1. Participation: Actively participate in all activities.
2. Reading assignments: Complete all readings and reflection assignments.
3. As a final project, participants will select certain ideas/concepts presented in the class and how they will incorporate into their classrooms/offices/school settings.

### **Student Academic Integrity**

Participants guarantee that all academic work is original. Any academic dishonesty or plagiarism (to take ideas, writings, etc. from another and offer them as one's own), is a violation of student academic behavior standards as outlined by our partnering colleges and universities and is subject to academic disciplinary action.