What do you already know about Brain Research and Learning?

Please read each statement and circle T if you think the statement is True and F if you think it is False.

1. T F
   Brain development is complete by about age 3 or sooner.

2. T F
   By the time a child enters school, his/her intelligence can be measured and rarely changes over time.

3. T F
   Music by Mozart has been shown to increase a baby's intelligence.

4. T F
   We only use 10% of our brain.

5. T F
   Some of us are "left-brained" and some of us are "right-brained."

6. T F
   Because of hormones during puberty, adolescents will learn at a different rate during this time.

7. T F
   By the age of 10, we no longer grow new brain cells.

8. T F
   Teachers should find out each child's learning style and design activities specifically geared to auditory learners, visual learners, and kinesthetic learners.

9. T F
   When preparing for a test, we will remember the information best by rereading the content rather than by quizzing ourselves.

10. T F
    Motivation and performance generally improve for children when we let them know that we think they are smart.

Arts integration naturally incorporates many **cognitive activities** that have been shown to improve long-term memory (Rinne, et al., 2011).	
Elaboration	**Adding meaning to, and/or incorporating, information that is to be remembered. Example: Create stories, pictures, or nonverbal expressions that express and/or integrate the content being learned in elaborated expressions.**
Rehearsal of Meaning (in a variety of nonverbal forms)	Repeating content over and over until it is memorized; however, rereading, or even elaborating upon meaning, is not as effective as recalling and reconstructing the information from a cue (Karpicke & Blunt, 2011). Example: Watch a movie or listen to a song about mathematical equations.
Generation	Generating information (pictures, stories, songs, poems) in response to a visual or physical cue. Retrieving and reconstructing the information has been shown to be more effective in promoting learning than elaboration (Karpicke & Blunt, 2011). Example: Take a photograph showing a law of physics.
Enactment	Performing action phrases, as in drama or dance, improves memory. Example: Co-create and/or participate in a dance that incorporates understanding of the structure of ancient Egyptian society.
Oral Production	Singing or theatrical production that requires information to be remembered and recited

	orally promotes retention. Example: Create a three-minute skit or song that helps teach the Pythagorean theorem.
Effort After Meaning	**Briefly puzzling over the meaning before figuring it out can lead to better memory. (If students must decode meaning from art, they are more likely to remember the meaning.)** **Example: Museum visit - analyze paintings and describe what the artist was trying to express, citing specific details in the work to support your claims.**
Emotional Arousal (vs. neutral)	Content that generates higher levels of emotional arousal can promote memory for that content, but arousal needs to be at an optimal level. Too much arousal distracts from the content, and high levels of negative arousal (fear or stress) can lead to impaired learning. Example: Write about a personal experience that relates to a cultural or social issue that you feel needs to be addressed, and then design a poster or performance to represent your knowledge and feelings about the topic.
Pictorial Representation (a.k.a. picture superiority effect)	**Visual information is better retained than information presented verbally or as text. In other words, people tend to better remember things they have seen than things they have heard or read.** Example: Use striking visual images, such as artworks, historical artifacts, scientific images, or graphs to represent important concepts.
For planning arts-integrated lessons, Hardiman's Brain-Targeted Teaching Model (2012) also provides a useful reference for translating findings from cognitive neuroscience into instructional practices.	

The Brain-Targeted Teaching Model ™ by Mariale Hardiman

Braintargetedteaching.org

Brain-Targeted Teaching® designates six "brain targets" for the teaching and learning process and describes brain research that supports each stage. While each brain target is presented separately, the components are interrelated.

Target 1 – The Emotional Climate

Brain-Targeted Teaching® encourages teachers to deliberately plan for positive emotional connections within the framework of a specific unit of study, referred to as a learning unit. Such connections include specific activities that will connect the students emotionally to the content. The infusion of the visual and performing arts is an effective way to tap into children's emotional response systems to enhance learning and should be included within the activities of every learning unit.

Features:

- ☑ Predictability
- ☑ Personal connection between teacher and student
- ☑ Personal connection between content and student
- ☑ Trust and acceptance
- ☑ Warm and supportive environment
- ☑ Control and choice
- ☑ Humor

Target 2 – The Physical Environment

Brain-Targeted Teaching® encourages teachers to carefully plan the physical learning environment by deliberately planning for novelty, order, and beauty within each learning unit.

Features:

- ☑ Novelty: change displays often
- ☑ Aesthetics: visually appealing classroom, color and good design
- ☑ Sensory: sound, lighting, scents
- ☑ Order: establish class routines
- ☑ Inviting surroundings

Target 3 − The Big Picture Concepts

Brain-Targeted Teaching® encourages teachers to use content standards and curriculum guidelines to design overarching goals and concepts, then to display these learning goals in non-linguistic representations such as concept maps or graphic organizers. Activities are then designed to allow students to understand how the objectives they will learn during the unit relate to the big picture concept. As they continue through the content, students are referred back to the concept map to reinforce the relevance of each learning activity.

Features:

- ☑ Content standards and Learning goals as basis for plan
- ☑ Assessment of prior knowledge
- ☑ Concept mapping: conceptual framework; graphic organizer; mind mapping; non-linguistic structures, and curriculum mapping
- ☑ “Big-picture” activities

Target 4 – Teaching for Mastery

By providing students with multiple ways to manipulate content, skills, and concepts, teachers are not only promoting long-term memory but are providing the opportunity to differentiate instruction based on students' emotional needs, academic goals, and cognitive learning styles.

Features:

- ☑ Repeated rehearsals through arts integration: visual arts, music, theater, Dance
- ☑ Consolidation of thinking
- ☑ Varied and novel learning activities
- ☑ “Chunk” learning tasks
- ☑ Technology integration

Target 5 – Teaching for Application and Extension of Knowledge

In Brain-Targeted Teaching® Brain-Target Five focuses on real-world activities like conducting investigations, designing experiments, creating metaphors and analogies, examining cause and effect patterns, analyzing perspective, and engaging in creative thinking through the visual and performing arts.

Features:

- ☑ Investigations, experiments, comparisons, classifications, analysis
- ☑ Real-world contexts
- ☑ Inductive thinking: drawing general conclusions from the specific
- ☑ Deductive thinking: predictions based on generalizations
- ☑ Metaphors and analogies

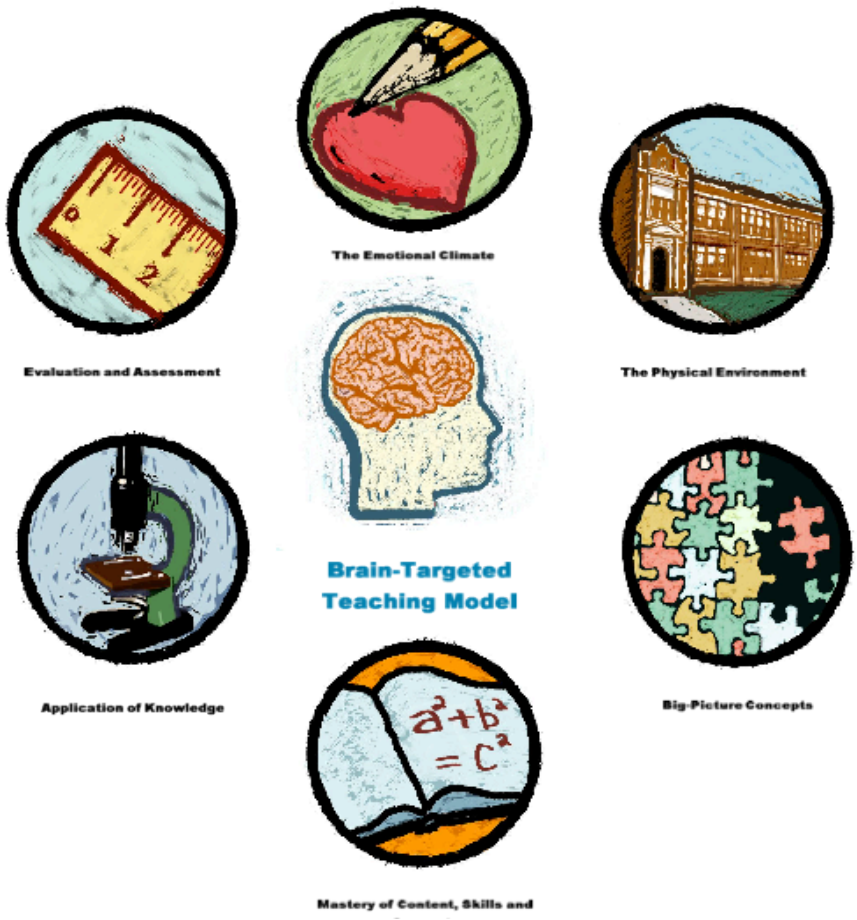
Target 6 – Evaluating Learning

Brain-Target Six encourages teachers to align learning objectives, instructional activities, and evaluation methods while considering other brain targets. In addition to using selected-response test items such as multiple-choice, matching,

and true-false, teachers include constructed-response assessment activities such as performance tasks, exhibitions, projects, and portfolios. Constructed-response assessments measure the kind of student performance promoted by Brain-Targeted Teaching® that typically is not measured well by selected-response test items. And teachers use scoring rubrics, keys, checklists, self-evaluations, and reflections to measure what students know, perform, and construct to demonstrate content standards in constructed-response assessments.

Features:

- ☑ Immediate, frequent, relevant feedback
- ☑ Authentic performance assessment using rubrics, scoring tools
- ☑ Self-reflection and revision
- ☑ Use the arts as a record of achievement



The Brain-Targeted Teaching Model for 21st-Century School
by **Mariale M. Hardiman**