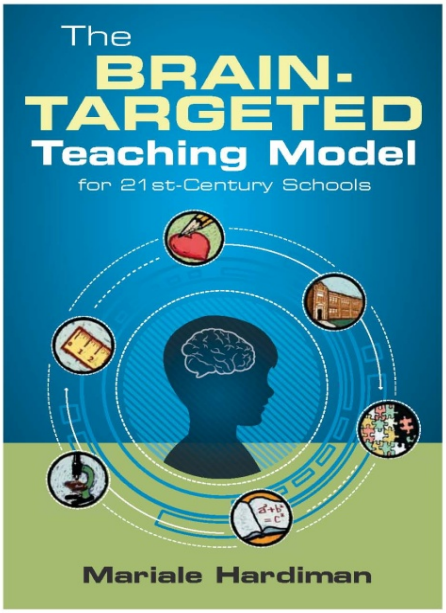
The Brain-Targeted Teaching® Model for 21st Century Schools

Reading Companion and Study Guide



By

Mariale M. Hardiman, Ed. D

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Reading Companion and Study Guide compiled by

Mariale Hardiman
Sharon Delgado
Clare O'Malley Grizzard
Stephanie Novak
Julie Stella
Kait Gentry

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PREFACE

Organization of the Reading Companion and Study Guide

This guide is intended to supplement and expand the content presented in *The Brain-Targeted Teaching Model for 21st-Century Schools* (Hardiman, 2012).

The first section of the guide briefly summarizes each chapter of the book and provides a series of discussion questions that can be used in a variety of ways. They can be developed into prompts for online courses for individual or group responses, discussion topics for face-to-face courses, activities for professional development, topics for reading circles, or simply they can enhance and expand the reader's experience. The questions are not intended to include every component of the content; instructors or seminar leaders may be inspired to expand on the questions based on the objectives of their course or professional development experience. Embedded into this series of questions are "Stop & Jot" reflective writing prompts, which can be used by individuals or small groups to reflect and respond to the content they are learning through a written response, an artistic representation, or further discussion. In addition, this section includes links to many online text and video resources that extend and enrich the topics covered in the book.

The second section provides resources that teachers and administrators may find useful as they implement the Brain-Targeted Teaching® (BTT) Model in schools and classrooms. This section includes lists of strategies for each brain target in the *Instructional Activities and Strategies Charts.* Next, this section includes two templates for designing a BTT learning unit. The *Planning Templates* help teachers think about the key concepts of each target and brainstorm activities consistent with the features of the target. The next resource is the *BTT Unit Template* which can be used as the final plan for recording each section of the learning unit. Finally, the resource section includes a sample unit by Stephanie Novak, an author of this guide.

We hope this guide is a useful tool as you study the Brain-Targeted Teaching® (BTT) Model and design your own BTT learning units.

Chapter 1: Information from the Neuro- and Cognitive Sciences That Educators Should Know—Separating Neuromyth from Neuroscience

Chapter Overview

Chapter 1 describes general themes from the neuro- and cognitive sciences that should inform teaching practice, and dispels some common misapplication of research known as "neuromyths." The chapter describes the origins of popular neuromyths and provides context and insight regarding their pervasiveness in the field of education. The chapter then highlights important themes from the brain sciences that should inform teaching practice and indicates where these themes are more deeply explored in upcoming chapters.

Discussion Questions

1. Why is it important for educators to have knowledge of neuromyths?
2. What neuromyths did you think were true? How might you have come to this information?
3. How might a teacher's beliefs in neuromyths negatively impact teaching and learning?

Stop & Jot 1: Reflect on a time when one of the neuromyths had an impact on you (i.e. did you ever believe that you had all of the brain cells you would ever have?). How did debunking this neuromyth make you feel? What are the implications of this new understanding for your practice?

4. Briefly explain the following topics from the text and how they can inform teaching practice.

Plasticity:
Neurogenesis:
Emotion and Stress:
The Role of Attention in Learning:
Executive Function:
The Importance of Movement and Learning:
Arts and Learning:

Adolescents, Sleep, and Learning:
Creativity:

5. The text suggests that high-stakes testing has the potential to crowd out creativity in our schools. How could educational leaders address the need for accountability yet still give teachers support and time to be able to teach students in ways that allow for creative problem-solving?

Stop & Jot 2: Which of the themes discussed in this chapter (e.g. plasticity, neurogenesis, emotion and stress, attention and learning, executive function, movement and learning, arts and learning, sleep and learning, creativity) would you like to pursue for further study? How might your educational practices change as a result of reading this chapter?

Chapter One Online Resources

Articles/PowerPoint/Side Show
A Slide Show overview of neuromyths: the use of 10% of our brain, benefits of listening to classical music, neurogenesis, critical periods, learning styles, diet, and right versus left brain.

Articles/Websites with Additional Information & References
For additional neuromyth information, review the *Educational Research* article, Neuromythologies in Education on 10% brain usage, left- and right-brained thinking, VAK learning styles, and multiple intelligences.

Read the article Neuromyths: Why Do They Exist and Persist? in the Mind, Brain, and Education journal. This article focuses on the benefits of a bridge between neuroscience and education and the negative impact of neuromyths. The potential benefits include effective educational methods and increased understanding of such methods; however, studying the cause and propagation of neuromyths is critically important before the benefits of a relationship between neuroscience and education can be appreciated.

The OECD website is complete with information about neuromyths and a Neuromythologies article that gives a good explanation for the existence of neuromyths. The article also details three neuromyths, and makes suggestions for how educators can review literature more critically. **Recommended for Professional Development.**

This research article, Neuromyths in education: Prevalence and predictors of misconceptions among teachers, explains what makes teachers susceptible to neuromyths and how to better inform educators to prevent the perpetuation of the myths. **Recommended for students.**

An article by Dr. Daniel Willingham, Have Technology and Multi-tasking Rewired how Students Learn? covers the hot-button topics of engagement, technology, and multi-tasking in education.

A *Time Magazine* article, The Multi-tasking Generation covers changes due to technology that have occurred over the last twenty years and assumptions we make about our youngest multi-taskers.

The article, "Measurement and evidence of computer-based task switching and multitasking by 'Net Generation' students" explores the frequency and demographics of frequent media multitaskers and dispels certain assumptions about the efficiency of "Generation M" and the need for multitasking. **Recommended for students.**

Videos
Learning Styles Don't Exist is a video by Dr. Daniel Willingham presenting his research showing that "Learning Styles" don't exist. He provides some strong examples, explains what "visual" and "auditory" information truly is, and why those types of information are not important to teachers. **Recommended for Professional Development.**

Beware of Neuromyths is a video interview which discusses reasons to beware of neuromyths. The video discusses the myths of using 10% of the brain, a "cognitively rich" childhood environment, and learning styles.

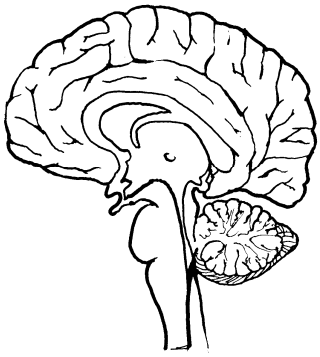
A Neurobunk TED Talk presented by neuroscientist, Molly Crockett is terrific for educators. While her focus is not on educational neuromyths, she entertainingly describes the role advertisement plays in perpetuating simplistic, overly generalized neuromyths.

Self-quiz
Take a quiz on neuroscience and neuromyths. This quiz includes topics of gendered strengths in spatial tasks, "cognitive training," emotion and learning, brain systems, and adequate hydration.

Other Media
Follow Brain Facts on Twitter and Facebook for regular and interesting updates on the brain.

iTunes Podcast: Psychology in Everyday Life Channel Episode 90 "The Learning Styles Myth: An Interview with Dr. Willingham" Episode 58 "The Mozart Effect: Is there Anything There?"

Chapter 2: Brain Structure and Function



Chapter Overview
Chapter 2 provides an overview of brain structure and function and explains why educators need a basic knowledge of the brain in order to better understand and incorporate findings from research from the brain sciences into teaching practices. The functions of brain cells are explained, as are the workings of the three major brain sections: the hindbrain, the limbic system, and the cerebrum.

Discussion Questions

(Pre-reading) Stop & Jot 1: Why might it be important for educators to understand brain structure and function?

1. Think about this statement: *On a personal level and a biological level, humans are wired to communicate.* Explain this statement in light of the chapter's overview of how neurons transmit information.

Stop & Jot 2: Why might a cerebellum that is reduced in size manifest in Attention Deficit Hyperactivity Disorder in children? What might an implication of this knowledge be for educators?

2. Which of the systems of the brain play a major role in emotional processing? What four structures support this processing?

Stop & Jot 3: According to the text, "the amygdala receives stimuli 40 milliseconds before the cortex. This finding indicates that fearful responses precede any conscious, thoughtful responses to stimuli" (22). What might an implication of this knowledge be for educators?

3. In which system of the brain is the frontal lobe located? What is the function of the frontal lobe?

Stop & Jot 4: Why might research addressing the development of the frontal lobe be of particular interest to educators?

4. With more information about the brain from chapter 2, but before we fully explore the Brain-Targeted Teaching Model, what teaching strategies might you change immediately to better enable students to learn in your classroom?

Chapter Two Online Resources

PowerPoint/Side Show
The Power Point presentation, The Brain 101 covers the hemispheres, lobes' structure and function, and levels of the brain. It details the physical, chemical, and electrical systems of the brain, as well as the functions of neurons, neurotransmitters, axons, and dendrites. A brief overview of typical neurodevelopment is explained. A pre-and post-quiz are included as well.

Articles/Websites with Additional Information & References
The Brain Structure and Function I article includes an overview of the brain's hierarchy and key functions of the brain including the integrating, processing, storing, and controlling actions. It also clearly describes the major divisions in the brain, their functions, and the constituents of the divisions. Finally, it overviews the function of neurons in the brain.

Videos
This animated tour around the brain was commissioned by Brain Awareness Week. The 3-D tour covers neurons, chemical communication, and brain structure and function.

UCLA Brain Research Institute shares How the Brain Works, focusing on the general organization of the brain. This is the first of four available videos from UCLA on how the brain works. The series also covers pathology and brain diseases, practicing and learning, and adaptation after injury.

Building a Circuit-Diagram for the Brain helps bridge the gap between individual synapses and whole-brain learning and memory. Professor Raymond explains the connections among function, circuitry, and cellular levels of the brain and the importance of greater understanding of our circuitry.

Stanford University shares Introduction to Neuroscience to extend understanding of neuroscience. It provides a brief context for neuroscience within general science through answering the question of "Why did the chicken cross the road?" as well as a general overview of structures, functions, and communication among neurons. The lecture ends with a humorous rap video produced by Stanford students about communication at the synapse.

Self-quiz
This quiz is connected with the Brain Rules for Babies book. It looks at some parenting misconceptions in a humorous way.

Take this neuroscience quiz to see if you know more about neuroscience than high school "Brain Bee" contestants.

Other Media
An interesting Brain Rules podcast by John Medina is available on the associated webpage.

How does brain structure relate to brain function? Participate in the MIT Open Courseware project. This site includes videos, lectures, and short comprehension quizzes.

The Brain From Top to Bottom is a comprehensive, free website describing the structure and function of the brain. The site is clearly laid out with sections covering brain basics, the brain and mind, and brain disorders. The text in each section is well supported with diagrams, charts, and images. Each level of explanation can be viewed as a "beginner, intermediate, or advanced," allowing the reader to customize the learning experience.

The Secret Life of the Brain is a website associated with the PBS series. It includes video clips from episodes, additional brain development resources, and several web features. These features include "History of the Brain," "3-D anatomy," "Mind Illusions," and "Scanning the Brain."

The Whole Brain's Atlas is an in-depth look at the brain through different imaging techniques. The "primer" is a helpful review of imaging techniques and is recommended before viewing the images. The typical and diseased brain with associated structures is available to view. **Recommended for students.**

Information on Topic for Students, Educators, and Parents
A Piece of Your Mind provides interactive lessons and activities about brain anatomy. These lessons are designed for 6^{th}-8^{th} graders. It includes overview sections, background information, management suggestions and enrichment resources.

Neuroscience for Kids is a great website designed to introduce neuroscience to students. The "Explore" page clearly lays out the ample online resources and the "Experiment" page includes interactive activities and games.

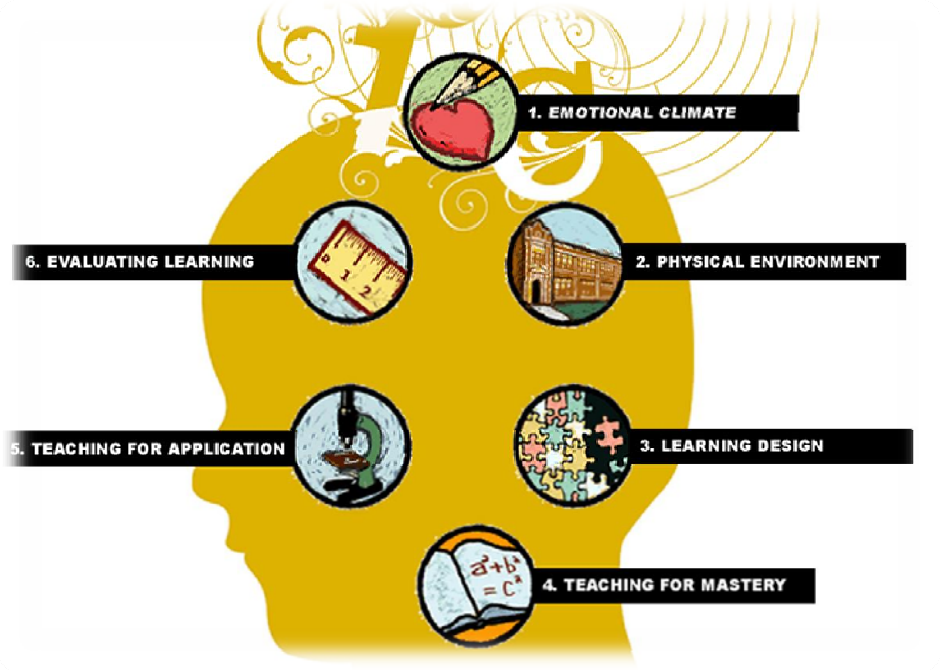
The Learning Brain is an informative video for kids with interesting facts about the brain. It covers brain size, neurons, emotions and learning, nutrition, and brain plasticity.

BrainWorks: Neuroscience for Kids is an excellent introductory video on the brain for young students. It covers the nervous system, automatic functions, and communication in the brain.

Brainy Kids Online contains interesting and challenging activities for students as well as lesson plans for educators.

Parenting for the Science Minded is an online resource for parents of young students who want to learn about the “brain science of parenting.”

Chapter 3: The Brain-Targeted Teaching Model for 21st-Century Schools



Chapter Overview

Chapter 3 suggests that, in order to facilitate the use of research in instructional practice, teachers need a framework to assist with planning, implementing, and assessing a sound program of instruction. The chapter presents the BTT model as a cohesive pedagogical framework that supports the implementation of Common Core State Standards and curriculum scope and sequences. The BTT model is not a curriculum or a packaged product; rather, it is the "how" of teaching (instruction) that supports the "what" of teaching (standards and content). This chapter provides a brief overview of the six components of the model, referred to as brain targets—that is, ***teaching targeted*** to how the brain thinks and learns. Although presented as separate components, the targets are interrelated and should be viewed as an organic system that guides and informs an approach to instruction both at the level of the classroom and as a unifying school-based system.

Discussion Questions

1. Describe how using the Brain-Targeted Teaching model might help in instructional planning and delivery.

2. How is the BTT model alike or different from instructional programs or activities you currently employ?

Stop & Jot 1: Why would providing a framework support teachers in applying neuro- and cognitive science research in practice?

3. How might this model inform an approach to instruction at the (a) classroom level, (b) the school-wide level, and (c) the district level?

4. After reading the summaries of the brain targets, which one(s) do you feel you use regularly; which do you feel you would like to incorporate more into your instructional program?

Stop & Jot 2: What supports do you need from both within the school and from the school district or community to implement the BTT model's components?

5. The components of the BTT model are interrelated (pg. 26). Describe which targets you think are most related and explain why.

Chapter Three Online Resources

Articles/Websites with Additional Information & References
Teaching for the 21st Century contains articles focused on 21st century skills. It includes free articles about what how Socrates would view the 21st century, the challenges and importance of the 21st century skills movement, and an article by Sir Ken Robinson about creativity. Additional articles and resources are available for Educational Leadership members or for purchase.

Dr. Mariale Hardiman's Brain Targeted Teaching website contains resources for teaching with the six brain targets in mind: Emotional Climate, Physical Environment, Learning Design, Teaching for Mastery, Teaching for Application, and Evaluating Learning.

A free online resource, Education for Life and Work provides text regarding 21st century skills and deeper, more transferable learning. **Recommended for students.**

Videos
Dr. Hardiman's Brain-Targeted Teaching Model TED Talk discusses that while all learning is brain based, all teaching is not, and what we can do to change this in education.

The Brain Targeted Teaching Model Overview provides an overview of Brain Targeted Teaching by Dr. Hardiman as well as insights from educators who have successfully implemented the Brain Targeted Teaching model.

In Study on Arts Integration and Creativity in the Classroom Dr. Hardiman and Dr. Rinne focus on the importance of arts integration from a research standpoint and how to bridge the gap between research and education.

Science Unscrambled: Education for Life and Work is focused on the importance of 21st century, deeper learning. It discusses the importance of being able to transfer knowledge among areas in our ever-changing world. Additionally, it suggests that learning should not exist in a vacuum and instead should be focused around three domains, the cognitive domain (critical thinking and problem solving), the interpersonal domain (communicating), and the intrapersonal domain (self-regulating), to allow for transfer of skills and knowledge.

Chapter 4: Brain-Target One
Establishing the Emotional Climate for Learning

Chapter Overview

In-depth study of the Brain-Targeted Teaching Model begins with Chapter 4, which describes research associated with Brain-Target One, "Establishing the Emotional Climate for Learning." The chapter begins by asking readers to reflect on a time when they were made to feel embarrassed in an academic setting and consider the implications of this incident. This reflection sets the stage for a chapter that closely examines connections between emotions and learning including the neural systems underlying emotion. It also examines research from the cognitive and psychological sciences that highlights the negative impact of stress on learning and the benefits of positive emotions on cognition and learning. The chapter provides readers with insights about how to establish emotional climates that support optimal student learning.

Discussion Questions

(Pre-reading) Stop & Jot 1: *(Derived from the original text)* Think of a time when you may have been publically embarrassed by an insensitive remark by a teacher or classmate. How did you feel immediately after the incident? How did this incident affect your ability to perform in class that day? Did this incident affect later academic performance? How so?

1. How do emotions play a role in learning?

2. What are some implications of this knowledge for struggling students?

3. Describe the relationship between poverty and stress. What are some implications for educators?

Stop & Jot 2: Why might it be important for educators to know and understand students' emotional triggers? What are some ways to obtain this information from students?

4. How might teachers motivate students that are not typically motivated by achievement goals?

5. What is behavior-specific praise? Why might behavior-specific praise be more effective in reinforcing and shaping positive behaviors than generalized praise?

Stop & Jot 3: According to research, "children who were instructed to disengage performed better on educational tasks than those who were instructed to process their feelings or those who received no acknowledgement of the emotional event" (44). How might this look in practice? Describe how you might redirect a student entering class after an emotional event.

6. The use of control and choice in the classroom gives students a sense of agency and a feeling of ownership in their learning. How might a teacher offer control and choice in assignment and assessments and still manage instructional time (e.g. students' time on task and the teacher's preparation time)?

7. Teachers do not need to be yoga experts to bring mindfulness training to the classroom. What is mindfulness training and how would you incorporate it into the school day?

Chapter Four Online Resources

Articles/Websites with Additional Information & References
Brain Research, Learning, and Emotions discusses emotional influences on learning, literacy development, timing of language learning, the biological influences on mathematics learning, and how neuroscience can inform many areas of education.

Mindfulness-Based Stress Reduction for School-Age Children is an online resource focusing on mindfulness with anecdotes and activities that are appropriate for students of all ages. It includes at several weeks of lessons with stated intensions, classroom activities, and follow-up mindfulness activities for home.

How Laughter Works discusses what laughter is, how it impacts the brain, and the social connections created through laughter.

A series of high school Emotion Lesson Plans focuses on the neuroscience of emotion, types of emotion, emotional experiences, and emotional communication. Each lesson is introduced with background information and includes an activity for students to complete. The activities are clearly outlined with preparation notes and suggestions for educators.

Science and Human Play founded by the National Institute for Play details types of "play" and how it contour our brains, improve our competencies, and support our emotions. Each type of play is clearly defined and also includes subsets of play with descriptions and references when appropriate.

Videos

How the Body Works: Center of Emotion & Memory details the functions of the structure in the limbic system. It overviews the system of memory, learning, and emotional response before identifying and describing each structure of the system.

In The Heart-Brain Connection, neuroscientist Richard Davidson presents his research about the connection between emotions and learning. He covers neuroplasticity, emotional regulation's connection to social cognition, the role of the prefrontal cortex, and the importance of social-emotional learning.

Feelings Count - Emotions and Learning is a video focused on how teachers create emotionally safe classrooms. It discusses how educators have begun to understand the connection between emotions and learning. A safe emotional climate is created four our students through developing awareness of emotions, instilling emotional management techniques, cultivating empathy, and teaching social problem solving.

5 Keys to Social and Emotional Success overviews how SEL (social and emotional learning) programs can benefit students and their learning. SEL includes self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. The video details examples of SEL instruction and discusses how cultivating social and emotional awareness leads to better learning.

In 6 Steps to Build Kindness and Resilience in Children Dr. Dan Siegel discusses building kindness and resilience in children in a six part video series. In the first video he discusses the importance of teaching adults and children about how their brain works in order to impact growth and change.

Self-quiz

Take this quiz to find out how well you "read" people and what your "EQ" is.

Other Media

An iPad App What Did Your Parents Teach You about Emotions teaches children and parents about emotions and the brain.

Dr. Michael Posner's NPR podcast discusses how mindfulness and meditation can promote learning.

Download the iTunes U app to find the Edutopia podcast on Social and Emotional Learning as well as many other educational podcasts and courses.

Information for Students and/or Parents

Feelings webpage for younger children focusing on emotions at school or at home. It includes stories, questions, and answers relating to challenges students face with feelings.

Chapter 5: Brain-Target Two
Creating the Physical Learning Environment

Chapter Overview

Chapter 5 opens with a story about a student who moved from another city and was starting at a new school. The story focuses on the student's positive reaction to her new environment and highlights the features of the physical environment, including the gardens, sculpted fence, and playground, that elicited the positive response. This story leads the reader to an examination of how features of the physical environment can influence learning, including promoting student attention and engagement. The chapter explores how novelty in the environment influences the alerting and orienting systems and focuses on research that supports how lighting, sound, scent, and aesthetics can enhance the environment, giving child a "sense of place."

Discussion Questions

(Pre-reading) Stop & Jot 1: What does your school's external appearance communicate? Consider the physical appearance of your current school or place of work. What message is communicated by the physical appearance of the building? What physical features communicate this message?

1. How might novelty in the environment influence learning?

2. According to research, how does daylight impact student achievement? What are some implications of these findings for educators?

Stop & Jot 2: According to the text, sounds in classrooms can and should vary widely from the purposeful chatter that comes from cooperative learning or project-based learning tasks to the quiet necessary while students are engaging in learning a new skill that requires concentration, and from relaxing background sounds during routine tasks to periods of quiet that promote

purposeful control and reflective practices (66). How will you balance sounds in your own classroom? What strategies will you use to ensure a wide range of auditory settings?

3. Why might scents produce such vivid memories?

4. Describe the impact of movement on attention. How can you incorporate movement into daily instructional practices and routines?

Stop & Jot 2: According to the text, learning is optimized when children are in environments that are free from clutter and are aesthetically pleasing. What are some obstacles that might hinder educators from achieving these clutter-free and aesthetically pleasing environments? How might educator overcome these obstacles?

5. How might the features of learning environment studied in this chapter be reinforced at home?

6. How might the features of the learning environment studied in this chapter be implemented in an online learning environment?

Chapter Five Online Resources

PowerPoint/Side Show
Classroom Arrangement Case Study from Vanderbilt University details student cases and possible solutions based on classroom arrangements. It focuses on minimizing distractions, maximizing access, matching arrangement with purpose, and moving with ease throughout the room.
A PowerPoint presentation describing an action research project surrounding classroom setup. Six classroom arrangements were investigated and rated by students and teachers. Additional research is briefly discussed and research resources are provided at the end of the PowerPoint.

Articles/Websites with Additional Information & References
Classroom Architect provides an interactive site that helps teachers virtually design their classroom using room dimensions, student and teacher desks, shelves, rugs, and other classroom items. The design can be printed out for use during classroom preparation.

Classroom Arrangement is a site that offers desk arrangements based on numbers of students and types of activities.

"Give Your Space the Right Design" explained how a teacher used the principles of feng shui in his classroom design.

Classroom Arrangements on Pinterest include pictures, websites, and suggestions from teachers on their favorite classroom arrangements.

Environmental Engineering is a useful website for planning your classroom. It overviews a variety of important factors to consider when arranging a classroom, including: rows versus clusters, the position of a teacher's desk, and learning centers. It also includes activities, checklists, and discussion topics which could be helpful for pre-service learning.

"A Comfortable Truth" explores the debate surrounding learning and comfort in classrooms through "8 comforting truths".

Videos

Run, Learn, Jump! is a TED talk by Dr. Ratey discussing the connection between movement and brain function. He discusses the improvement in health, test scores, and behavior after successfully implementing exercise programs into schools.

Room Arrangement shares organizational ideas from a classroom teacher in Texas. She covers many classroom topics, including frequently used materials, reading corners, and even classroom routines.

Positive Learning Environment discusses if a room can be too busy. While "dull classrooms" are not the aim of the video, new layouts are being proposed for educational reasons in creating "communication friendly" spaces that are uncluttered and calm.

Self-quiz

Take this quiz to test knowledge of positive classroom environments. It overviews the key components to keep in mind when designing a classroom, age appropriate considerations, bringing color into classrooms, and ways to cultivate responsibility and pride in a classroom.

Chapter 6: Brain-Target Three
Designing the Learning Experience

Chapter Overview

Chapter 6 underscores the importance of holistic planning and creating a visual "road map" for a unit of study. The text highlights the "big picture" approach, and argues that both teachers and students need a deep understanding of the unit goals as well as the connections within the unit to other concepts. This knowledge of outcomes and connections promotes deep conceptual understanding and guides overall instructional planning. The concept map, a graphic organizer explained in depth in this chapter, is one tool that teachers can use to organize their unit and share content and concept connections with students.

Discussion Questions

(Pre-reading) Stop & Jot 1: Why is it so important for educators to plan with the "big picture" in mind? Why might it be important to share this "big picture" with students?

1. What is a concept map? Why is the concept map a useful unit planning tool?

2. Describe in your own words schema theory. What are some of the implications of schema theory for educators?

Stop & Jot 2: The text refers to an "inch deep and mile wide" approach to curriculum that does not allow for deep understanding through interactive learning. Yet, many teachers continue to teach their content with a focus on "coverage". What are some of the reasons teachers may continue to teach with a focus on covering content rather than deep understanding? What are some ways educators can balance covering content while helping students develop deep and enduring understanding?

3. Why might graphic representations of unit goals, objectives, and content connections be useful to students? How might you incorporate a graphic representation of your unit in the content classroom?

4. How do you think the use of concept mapping can enhance memory for the content?

5. What other approaches to planning are you aware of that are similar to Brain-Target Three? What are the similarities and differences?

Stop & Jot 3: Design a simple concept map of a unit you are teaching or plan to teach. What information do you need to have before you begin? If you do not teach, create a simple concept map of the important ideas you have learned in the Brain-Targeted Teaching Model.

Chapter Six Online Resources

Articles/Websites with Additional Information & References
An article offering a definition of graphic organizers, examples of different types and their applications, a discussion of the research evidence for their effectiveness, some useful Web resources, and a list of referenced research articles.

Videos
A RSA Animate video on the history and "The Power of Networks." It is suggested that "trees" and mapping are important for order, symmetry, hierarchy, simplicity, balance, and unity in our complex world.

A video tutorial describes how a teacher uses Inspiration software in her classroom. She details not only the technology benefits behind Inspiration, but also clearly covers the steps taken for each lesson. There are two additional tutorials provided by the same teacher. In the second tutorial, she explains how she has used Inspiration for classroom jobs and literature circles. In the third tutorial, she overviews how Inspiration can be a resource for teachers to plan and organize their own learning.

Graphic Organizer Tools
The developers of "Gliffy" describe it to be "An online diagramming service that helps users communicate with a combination of shapes, text, and lines." *Gliffy* is a "social, collaborative brainstorming wiki."

Read, Write, Think provides several graphic organizers including Venn Diagrams, Essay Maps, Comparison and Contrast, Drama Maps, Graphic Maps and more. These graphic organizers can be used for organizing, analyzing, writing, or publishing purposes.

Cacoo is a website that provides diagrams with online, real-time collaboration. It has a range of membership options, including one that is free. This site has the support of stencils to help create graphic organizers and automatic aligning features to keep the organizers balanced.

Diagrams can be made public, created collaboratively, or made available for exporting as a pdf or PNG.

Graphic organizers are provided with simple explanations and engaging titles that will appeal to teachers new to graphic organizers or students who are ready to select their own organizers.

Wikipedia Mind Map information overviews free and paid software options for mind mapping resources. This resource will help educators understand the range of graphic organizers while identifying their favorite styles for different purposes.

Chapter 7: Brain-Target Four
Teaching for Mastery of Content, Skills, and Concepts

Chapter Overview

Chapter 7 focuses on instruction that promotes mastery of the content, skills, and concepts students should know for lifetime learning. The chapter explains that, "like twin stars, learning and memory are intricately connected' (96). The chapter provides an overview of the brain's memory systems and defines types of memory processes, including sensory memory, short-term and working memory, and long-term memory. The chapter demonstrates the information processing model and draws connections between research on memory and implications for instruction. Specifically, arts integration is shown as a way for to enhance memory for content by providing opportunities for elaborations of information and repeated rehearsals. Several strategies for integrating art into instruction are explained, and connections between these strategies and long-term memory are discussed. Finally, "expert teachers" provide insights into how they incorporate this brain target into their classroom instruction.

Discussion Questions

1. Describe the reciprocal relationship between memory and learning.

Stop & Jot 1: Create a concept map that visually represents memory processes using some or all of the following terms:

- Memory
- Sensory Memory
- Short-term Memory
- Long-Term Memory
- Explicit Memory
- Episodic Memory
- Semantic Memory
- Implicit Memory
- Procedural Memory

2. What is the role of consolidation in long-term memory?

Stop & Jot 2: Reflect on a time when you were asked to convey information in an artistic form. What was the task? How did the completion of this task impact your understanding of the content?

3. According to research, "when people are not just provided information in written or oral form, but rather generate that information themselves in response to some kind of prompt, their recall of that information is significantly improved" (107). What are some implications of this information for instructors?

4. How is art education different from arts integration? How would you integrate the arts into a middle-school algebra class?

4. Consider the following memory strategies listed in the text:

- Repeated Rehearsal
- Elaboration
- Generation
- Enactment
- Production

How might you utilize one of the above strategies in your instruction and especially with arts infused learning tasks? What instructional task or activity might you develop to support deep understanding of content?

5. The text discusses several memory aids, including mnemonics, desirable difficulties, chunking, and interleaving. Describe how one or more of these memory aids could be incorporated into your content instruction.

Chapter Seven Online Resources

Articles/Websites with Additional Information & References

Making it Stick is a webpage that presents some great information on memory strategies for teachers. The webpage overviews the memory process, the "RIP" toolbox (repetition, imagery, patterns), motor images, and discusses demystifying students' difficulties with memory.

How Human Memory Works provides a brief overview of the memory process, memory encoding, short and long-term memory, memory retrieval, effects of aging, and suggestions for additional resources. It breaks down the "complex construction" of memory while explaining that researchers have further to go to have a complete understanding of the memory process.

The Information Processing Theory webpage contains information and diagrams related to sensory memory, working memory, and long-term memory components of Information Processing Theory (IPT). It also includes implications for instruction and a bibliography.

Test-Enhanced Learning: Taking Memory Tests Improves Long-Term Retention is an interesting article which studied the effects of studying and testing for information retention. Roediger and Karpicke completed two studies looking at the difference in short-term and long-term retention of material. In each study, students either studied and restudied material, or studied and

underwent testing on the material. The results indicate that "re-reading" promotes short-term (5 minutes) retention of the material, but that frequent testing of the material enhances memory over longer periods of time (2 days or 1 week). This strongly suggests that testing should not just be used to assess learning, but to enhance it. **Recommended for students.**

Four Principles of Memory Improvement: A Guide to Improving Learning Efficiency. This article describes recent memory research with suggestions on how these findings can be applied in the classroom. The authors discuss four principles of memory improvement suggested by current research. The strategies covered are actively processing material, retrieval practice, distributed practice, and the use of metacognition.

Understanding Working Memory is written for teachers to define working memory, explain how it is measured, and offer suggestions describing how educators can support children with working memory problems.

Working Memory in the Classroom describes the cognitive and behavioral characteristics associated with working memory issues in children. It overviews how poor working memory is identified and assessed and reviews potential interventions in the classroom.

Long Term Memory is a webpage reviewing information on Long Term Memory. It overviews the basics of long-term memory (LTM), types of LTM, long-term memory capacity, encoding and retrieval.

PNAS, a respected scientific journal, published Improving Fluid Intelligence with Training on Working Memory, which reports that a particular memory task called dual n-back may actually improve working memory and fluid intelligence. While some commercial enterprises state that their computer games improve memory, their claims have come under question. The Brain Workshop website includes a tutorial of the n-back game and additional resources related to this topic.

Mnemonics and Students with Disabilities webpage contains information related to three mnemonic strategies: letter strategies, keyword strategies, and pegword strategies. These techniques could be effective for any student and the explanations of when to employ each strategy are clear.

Using the short term memory test, students can test their short term memory. The test briefly shows letters over six trials and the students can test how many letters they can remember correctly. If you are interested in other memory activities, you can visit Neuroscience for Kids to access games, information, and other memory strategies for students.

Videos

How Your Memory Works is the BBC/Discovery co-produced show reviewing the development of memory. It discusses the potential connection seen between a mirror self-recognition test and auto-bibliographical memory. There is discussion of a man born with hippocampal damage,

which caused devastating issues with long and short-term memory. There is coverage of the connection between memories of the past and conceptualizing the future. Recent research surrounding traumatic memories and potential treatments for PTSD are also investigated. Finally, memory loss associated with aging is discussed.

How to Train Your Memory is a BBC excerpt from the documentary "Human Mind." It covers how to effectively store and retrieve memories. One particular memory strategy is discussed in associating memories with locations (a strategy once used by ancient orators) as brains are more successful at remembering routes than disconnected facts.

Memory, Elaboration, Review, and Recording is a video associated with "Learner-Centered Teaching" book. It overviews reasons why students forget information: blocking, misattribution, and transience. Long-term repetition and practice as the keys to memory retention are discussed. Additionally, it is suggested that integrating memory through multiple memory pathways is helpful. Finally, the importance of students being able transferring memory instead of relying on rote memorization is also discussed.

Improving Students' Long Term Memory is a video which features teachers demonstrating strategies that enhance memory. From strategies such as building models of dream bedrooms or practicing the word of the day, students' memories are bolstered. It touches on ways to integrate memory training in the classroom through semantic, episodic, procedural, automatic, and emotional memory strategies.

In the fascinating TED Talk, Feats of Memory Anyone Can Do, science writer, Joshua Foer, describes the "Memory Palace" technique. He discusses how cultivating a strong memory was conventional in ancient times, and how we can utilize these older techniques to strengthen our own memories. He discusses the fMRI results from studying people who compete in memory contests and how to implement the strategies used by these memory experts. He speaks from experience, as he attempted these techniques and after only one year won a memory competition!

Self-quiz
Take the Brain Quiz to test your knowledge about the inner workings of the brain. It covers nerve cells, sensory neurons, brain areas affected by disease or damage, and brain structures' function.

Other Media and Games
APPS in iTunes for iPad/iPhone on memory:
Memory Matches is the application versus of a card matching game.
Brain buddies is a game on Facebook to test your brain power. It is a memory, logic, and math game.
Memory Game is a game-based website filled with a wide-range of timed or training activities.

Chapter 8: Brain-Target Five
Teaching for the Extension and Application of Knowledge

Chapter Overview

In the Brain-Targeted Teaching Model, once students master content, skills, and concepts, instruction of a learning unit topic is not complete. This chapter explains that lasting learning occurs when students can apply knowledge in real-world tasks that require creative thinking and problem-solving. Chapter 8 opens with a story form Cory, a seventh-grade student who is not regularly engaged in school; he cites lectures, textbooks, handouts, and questions as the culprits for his disengagement. Cory does, however, discuss one instructional task in which he was fully engaged. In one class, he was asked to create a community survey, compile data, and use the data in authentic, persuasive writing. Cory's experience underscores the main idea of the chapter - learning must provide students with the opportunity to "think creatively by applying skills and content in meaningful, active, real-world problem solving tasks" (126). The chapter sites the need for this type of thinking as twenty-first century skills evolve, and argues that creativity should be regularly and explicitly taught in the classroom. The chapter provides examples of activities that support students in extending and applying knowledge.

Discussion Questions

1. What is divergent thinking? How might incorporating tasks that require divergent thinking enhance creative problem-solving?

2. According to research, how does the brain respond to explicit instruction in creativity? What are some implications of this research for educators?

3. Describe the role of improvisation in creativity.

Stop & Jot 1: Reflect on the following quote from Ulrich Kraft: "Fresh solutions result from disassembling and reassembling the building blocks in an infinite number of ways. That means

the problem solver must thoroughly understand the blocks" (135). How does this quote connect to classroom instruction?

3. Why might an instructional shift that promotes divergent and creative thinking be "uncomfortable" for some educators?

4. When students become accustomed to teaching that emphasizes the recall of "right" answers and a focus on high-stakes testing, they may be resistant to engaging with curriculum that teaches creative problem-solving, knowledge generation, and critical thinking. How can teachers guide the resistant student?

5. Why might a student who has been less successful in generating the right answer benefit from activities that require divergent thinking? How could divergent thinking activities boost confidence and learning for the student with special learning needs?

Stop & Jot 2: How is the content of this chapter related to other initiatives you have experienced in education (e.g. problem-based learning, experiential learning, expeditionary learning)?

Chapter Eight Online Resources

Articles/Websites with Additional Information & References

21st Century Skills for Students and Teachers is a literature review that synthesizes recent research on 21st century learning skills. Now students are facing a world where they have to communicate and collaborate in new ways to solve ever-evolving issues. In addition to traditional subjects, students are now responsible for developing civic literacy, global awareness, financial literacy, health literacy, and environmental literacy. This article discusses new ways of introducing these skills through project based learning, game-based learning, and design-based learning. Additionally, it covers 21st century assessments and professional development.

"ArtsEdge" is the Kennedy Center's free digital resource for teaching and learning through and about the arts. To learn more about integrating the arts, click on "How To" for articles and tips. In "Lessons," educators can search for lesson plans by grade level, art form, or by another subject. The lessons include overviews, extensions, and application activities.

Go to The President's Committee on the Arts and the Humanities website to learn about national programs that are promoting creativity in our youth, the national poets program, and other educational partnerships that "encourage creativity, instill a love of learning, and nurture critical thinking skills."

Edutopia has long supported innovation educational practices, including project based learning. The site overviews project based learning, the history of project based learning, and research supported project based learning. Additionally, there are in-depth articles with videos about

schools following a project based model and a variety of resources for educators looking to implement project based learning.

The NEA Review of Project based Learning provides the handbook on project based learning created by Buck Institute, articles connecting PBL with appropriate standards, and several articles reviewing the research behind project based learning.

The Buck Institute for Education (BIE) focuses its work on Project Based Learning. This site provides resources for educators interested in project based learning. These resources include videos, tools, research, and a blog. The tools include letters to parents, assessments, essential tips for PBL, rubrics, and even project overviews and calendars.

The Dana Foundation Report on Learning, Arts, and the Brain comprehensively covers cognition and the arts, music and cognition, brain imaging and the arts, and dance and the brain.

MindShift explores the future of learning in all its dimensions – covering cultural and technology trends, groundbreaking research, and innovations in education. Mindshift provides teaching strategies for educators who want to implement digital tools into their curriculum.

Videos

Changing Education Paradigms is an RSA Animate created from a talk by Sir Ken Robinson. In the video he discusses how the design of education was a revolutionary idea created during the industrial revolution. He also proposes that the arts are a way to wake up students and cultivate divergent thinking, which is a critical component of creativity. He also suggests rethinking education to prepare students for a new century.

Project Based Learning Explained was created by cutting-edge advertising agency, Common Craft. This short animated video explains in clear language the essential elements of Project Based Learning (PBL). It challenges some common notions about education and proposes a new approach to learning. PBL suggests that projects deepen students' knowledge and put them on a path to greater future success by cultivating 21st century skills.

Spotlight is an initiative funded by the MacArthur Foundation. It investigates the intersections of technology and education and shows how digital media can be used in and out of classrooms to expand learning. Spotlight will cease new publishing in October, 2013, but it is worth reviewing many of the cutting edge technologies and educational advancements reviewed on the site.

Rethinking Learning is a short video on the 21st century skills our students will need to be successful in the future. It discusses that while content is still the focus of the 21st century, it is now seen through the lens of being the creator or producer of the content, not just a consumer. It also covers that while 21st century skills are seen as work skills, they should also be seen as skills necessary for creativity and engagement.

Engage Me is a video message from "digitally native students" to their teachers. It shows how students are engaging with technology and ways in which educators could bridge the gap between home and school. Blogging, podcasting, and relying on new resources could change the way we have students connect with content.

MS 223: The Power of Arts Education is a video about how Middle School 223 in the South Bronx is incorporating the arts to transform their school. The school has progresses from a high risk school to one in which "Thinking flourishes and ideas are rewarded." During the transformation, the school focused on financial literacy and technology, but now it is also known for its arts program. Finally, the video touches on the importance of professional development for its teachers and how that has helped to improve the school and especially the arts program.

Human Body: London Taxi Driver is a video describing how the drivers navigate the labyrinth of thousands of streets, landmarks and other locations. This video describes how these drivers' hippocampi are impacted by the unique nature of their jobs. Being able to navigate this ever changing world is a critically important skill for these drivers, but it also causes viewers to wonder if navigation technology might be negatively impacting certain skills.

Other Media

Education for Life and Work: Deeper Learning and Twenty-First-Century Skills is a webinar presented by The Alliance for Excellent Education. It focuses on creating policies that promote the learning of core content and the application of that content to collaborate and solve problems while being self-reflective in the learning process.

Information for Students and/or Parents

21st Century Learning Creates New Roles for Students and Parents is a webpage that provides a free online guide about 21st century learning, tips on how to connect with 21st century classrooms, as well as online communities for parents to share ideas and resources about 21st century learning and parenting.

Tools and Resources is a webpage created by Partnership for 21st Century Skills. It includes articles and resources for parents regarding 21st century skills and how and why they should be implemented.

Creativity Matters offers parents videos, activities, and ideas to teach creativity to their young children at home. It explains why creativity is such an important skill and how developing creativity will help start students on the path to success.

Chapter 9: Brain Target Six
Evaluating Learning

Chapter Overview

In Chapter 9 evaluation is shown to be a valuable technique for learning and not merely a tool to determine how much students have learned. Brain target six focuses on techniques to provide feedback to increase student learning. Frequent and timely feedback is identified as one of the best ways to promote student achievement. Moreover, the chapter highlights that students who are told that they will be receiving timely feedback tend to perform better than students who know that feedback will be delayed. Additionally, active retrieval of information is identified as a critical way to benefit long-term retention. Spacing effects are defined and the chapter provides guidelines for optimal intervals to revisit previously taught material to support student retention. Finally, three kinds of assessments (portfolios, student journals, and performance assessments) are described.

Discussion Questions

(Pre-reading) Stop & Jot 1: What was the most powerful or important feedback that you have ever received? What made this feedback so powerful? How might this experience inform your instruction?

1. What is scaffolded feedback? Why might scaffolded feedback produce better long-term retention than other types of feedback?

2. Describe how performance is linked to the proximity of feedback. What are some implications of this research for educators?

Stop & Jot 1: What are some obstacles to providing timely feedback to students? How might educators overcome these obstacles to ensure all students get meaningful and timely feedback?

3. What is the difference between active retrieval of information and studying? Why might active retrieval result in better retention?

4. What is the spacing effect? What are some implications of research on the spacing effect for educators?

Stop & Jot 2: Think of a performance task that you have implemented in your class. How can the task become an assessment of performance with the use of rubrics? How is an assessment rubric similar to a concept map?

Chapter Nine Online Resources

Articles/Websites with Additional Information & References

Assessing 21st Century Skills: Summary of a Workshop is a free online resource which provides the assessment information developed for the third National Research Council (NRC) workshop. This summary includes assessment of cognitive, interpersonal, and intrapersonal skills. It also provides several related resources for anyone interested in 21st century assessments.

Portfolio Assessment Guide is a webpage excerpted from *A Classroom Teacher's Survival Guide* that covers the essentials of portfolio assessment. It overviews examples of items included in a portfolio, teacher-student portfolio reviews, benefits of portfolios at parent-teacher conferences, and portfolio organizational ideas.

Authentic Assessment Toolbox is a site created to explore authentic educational assessments. It includes information on standards, authentic tasks, portfolios, and rubrics. Additionally, it provides examples of each type of assessment for elementary through university levels in several different content areas. The site also includes "workshops" which follow the process of authentic assessment development and also provide examples and models for educators.

The Creating a Rubric: Tutorial webpage answers what rubrics are and why they are beneficial in education. Additionally, it provides easy to follow steps with examples of how to create your own rubric. Finally, there are completed rubric examples for written research proposals, oral presentations, and online discussions.

RubiStar is a free tool to help teachers create quality rubrics. Rubrics are created from templates and filled in by selecting items from a drop-down menu or entering in specific text. Once an item is select, RubiStar completes the row automatically with grade percentages and explanations.

Rubrics for Teachers provides completed rubrics based on subjects or skills for a range of students' ages. The rubrics vary in scoring and format, but provide a good starting point for educators interested in integrating rubrics into their assessments.

Game-Based Learning to Teach and Assess 21st Century Skills is a webpage with information relating to game-based learning. Andrew Miller talks explains the role of game-based learning and assessments in developing 21st century skills. It provides examples of games that teach collaboration, communication, and critical thinking skills as well as other resources for educators interested in game-based teaching and assessment.

What Makes a Portfolio a Portfolio is a helpful article with suggestions for portfolio integration and excerpts from actual portfolios. It highlights the benefit for students of self-directed learning and self-reflection.

Metacognitive Control of the Spacing of Study Repetitions is an article regarding the selections and impact of those selections in study strategies and spacing effects. This relates not only to the importance of proper study techniques, but also to educating the learner about appropriate techniques. **Recommended for students.**

Videos

21st Century Skills Assessment is a video focusing on why and how to develop 21st century assessments. Using the motto, "What gets measured, gets done," this video focuses on how to teach and assess 21st century skills. The video suggests that skills including collaboration, public speaking, or complex problem solving need to be taught and assessed for students to succeed. The video includes footage from Napa New Tech High School which has founded their assessments and grading structure on 21st century readiness.

Authentic Assessment is a "GoAnimate" video about authentic assessments. They refer to authentic assessments as "direct assessment of student performance on intellectually worthy tasks." It challenges some more traditional assessments and calls into question the purpose behind these assessments. Finally, the video highlights some authentic assessments and application of content.

Chapter 10: Implementing Brain-Targeted Teaching in a School and Classroom; Appendices I and II

Chapter Overview

Chapter 10 offers some concrete strategies for implementing the Brain-Targeted Teaching Model in a school and classroom. The text emphasizes the importance of buy-in on the part of the instructional leadership, the need for standards-based curriculum, and the value of collaborative planning. The chapter provides a "Look For" list for each target that assist readers in conceptualizing what effective implementation of the model looks like. The chapter closes with a story of how Gordon Porterfield, a faculty associate at Johns Hopkins University School of Education, implements the BTT model in his class and ends with a lovely poem by Emily Dickinson, *The Brain is Wider Than the Sky*.

Discussion Questions

1. The Brain-Targeted Teaching Model can be used as an overarching framework to provide consistency, structure, and cohesion among various seemingly unrelated school programs and activities. Could this model assist your school in unifying various initiatives? How would you go about using the model in this way?

2. What are the challenges of implementing the BTT model in any school? How could the school benefit?

3. How would an administrator address a faculty member who wants to continue to maintain only a traditional style of teaching?

Stop & Jot 1: Consider the implications for implementation of the Brain-Targeted Teaching Model in your school. What is your school already doing well? Where would your school need to improve? What actions would you take to ensure effective implementation of the Brain-Target Teaching Model

See also:
Appendix I: Alignment of Brain-Targeted Teaching with Cognitive Taxonomies, Teaching Standards, and Learning Frameworks.

Appendix II: Brain-Targeted Teaching Implementation Checklist

Resources for the Brain-Targeted Teaching® Model

1. Instructional Activities and Strategies Charts
2. BTT Planning Templates
3. BTT Learning Unit Template
4. Sample BTT Learning Unit

The first resource provided in this document are charts titled **Instructional Activities and Strategies.** The charts highlight practices that can support teachers in the effective implementation of each of the targets in the model. Because the components of the six brain targets are related, many of the instructional activities and strategies overlap. The lists are not intended to be exhaustive; they were compiled from instructional activities and strategies used by many teachers over the years. Teachers may add to these lists as they develop Brain-Targeted Teaching learning units and increase their instructional repertoire.

Note that Brain-Target Three, which applies specifically to the planning component of the model, is not represented in the Instructional Activities and Strategies Charts. The next two resources address that target by providing tools to assist with planning a BTT learning unit.

The second resource included in this section are BTT Planning Templates help teachers view the key components of the model and take notes about strategies related to each target. The third resource is the BTT Learning Unit Template that is typically used to compile activities that address each of the targets. Finally, a sample unit is included that was designed by Stephanie Novak, one of the authors of this study guide.

Brain-Target One: Establishing the Emotional Climate for Learning Instructional Activities and Strategies	
▪ Anticipation Guides ▪ Artifacts ▪ Book Pass ▪ Book Talk / Meet The Author ▪ Class Calendar ▪ Class Celebrations ▪ Classroom Library ▪ Cold Call Protocol / Student Popsicle Sticks ▪ Conflict Resolution Role Play ▪ Data Charts/ Class Progress Charts ▪ Diagnostic Assessments ▪ Do Now / Warm-Up / Bell Ringers ▪ Emotional Inventory/ Temperature Check ▪ Individualized Learning Goals ▪ Journal Prompts / Writing Prompts ▪ K-W-L, B-K-W-L-Q ▪ Literature Circles ▪ Meditation ▪ Morning Message ▪ Movement Exercises ▪ Multiple Assignments ▪ Positive Language	▪ Posted Class Values / Expectations ▪ Posted Objectives / Unit Goals ▪ Procedure Posters ▪ Real-World Observations ▪ See Three Before Me ▪ Sharing Essential Question ▪ Specific Commands ▪ Story Impression / Predict-o-Gram ▪ Student Avatars ▪ Student Collages ▪ Student Conferences ▪ Student Discussion ▪ Student Folders ▪ Student Interest Survey ▪ Student Office/ Student Supply Corner ▪ Student Rewards/ Recognition Events ▪ Student Roles/ Classroom Jobs ▪ Student-friendly Rubrics ▪ Student-Selected Groups ▪ Tableau ▪ Think-Pair-Share ▪ Tic-Tac-Toe Assignments ▪ Video Clip/ Film Clip ▪ Work Stations

Brain-Target Two: Creating the Physical Learning Environment Instructional Activities and Strategies	
▪ Artifacts ▪ Artwork ▪ Banners/ Borders ▪ Bean Bags ▪ Blinds / Curtains ▪ Bulletin Board ▪ Circular Seating / Group Discussion Seating ▪ Class Mural ▪ Classroom Announcements Board ▪ Classroom Makeover (newsroom, courtroom, etc.) ▪ Color-Coded Word Wall ▪ Concept Map ▪ Dance Explorations/ Movement Exercises ▪ Fishbowl ▪ Furniture Placement ▪ Gallery Walks ▪ Hot Seat ▪ Interactive Concept Map ▪ Lamps / Natural Lighting ▪ Maps ▪ Meditation / Mindfulness Exercises ▪ Music	▪ Musical Instrument ▪ Nature Walks ▪ Nature Walks/ Real World Observations ▪ Need It, Got It Wall ▪ Oils/ Natural Aromas ▪ Outdoor Learning Experiences ▪ Painted Walls / Wall Coverings ▪ Pillows ▪ Posted Essential Questions ▪ Posted Expectations / Procedures ▪ Posted Plot Lines ▪ Posted Timelines ▪ Posted Unit Objectives ▪ Process Charts ▪ Quote of the Day ▪ Rubric Poster ▪ Socratic Seminar Seating / Inner Circle-Outer Circle ▪ Student-created posters ▪ Table Groups ▪ Transition Music/ Instrument ▪ Unit / Period Artwork ▪ Wind Chimes ▪ Word Wall

Brain-Target Four: Teaching for Mastery of Content, Skills, and Concepts Instructional Activities and Strategies	
▪ Analogies ▪ Anticipation Guide ▪ Artifacts ▪ Book Pass ▪ Book Talk / Meet The Author ▪ Brainstorming ▪ Class Discussion ▪ Comic Book / Graphic Novel ▪ Concept Mapping ▪ Cornell Notes ▪ Data Collection ▪ Experiment Design ▪ Fieldtrips ▪ Film ▪ Fishbowl ▪ Flip Books ▪ Hot Seat ▪ Illustration ▪ Jigsaw ▪ Journal Prompts / Writing Prompts ▪ Journals ▪ K-W-L, B-K-W-L-Q ▪ Lab Experiment ▪ Literature Circles ▪ Memorize a song / passage / poem	▪ Mock Trial ▪ Posted Objectives / Unit Goals ▪ Practice Quizzes ▪ Predicting ▪ Questioning ▪ Read Aloud ▪ Real-World Observations ▪ Research ▪ Sharing Essential Question ▪ Socratic Seminar ▪ Story Board ▪ Story Impression / Predict-o-Gram ▪ Student Collages ▪ Student Conferences ▪ Student Discussion ▪ Student Surveys ▪ Survey Design ▪ Tableau ▪ Text Annotation ▪ Think Aloud ▪ Think-Pair-Share ▪ Venn Diagram ▪ Video Clip/ Film Clip ▪ Visualizing ▪ Vocabulary Maps / Frayer Models ▪ Writing Process

Brain-Target Five: Teaching for the Extension and Application of Knowledge Instructional Activities and Strategies	
▪ Analogies ▪ Author Study ▪ Brochure ▪ Class Discussion ▪ Class Mural ▪ Comic Book / Graphic Novel ▪ Concept Mapping ▪ Data Collection ▪ Debate ▪ Design a Product ▪ Dioramas ▪ Experiment Design ▪ Fieldtrips ▪ Film ▪ Flip Book ▪ Illustration ▪ Interviews ▪ Lab Experiment ▪ Learning Map ▪ Literature Circles ▪ Memorize a song / passage / poem ▪ Mock Trial	▪ Model Design ▪ Museum / Exhibit Design ▪ Newscast ▪ Poem Writing ▪ Poetry Portfolio ▪ Poetry Slam / Spoken Word ▪ Poster Presentation ▪ PowerPoint ▪ Presentation ▪ Prezi ▪ Public Service Announcement ▪ RAFT Writing ▪ Research ▪ Script Writing ▪ Shadow Box ▪ Socratic Seminar ▪ Song Writing ▪ Story Board ▪ Student Collages ▪ Student Conferences ▪ Survey Design ▪ Tableau ▪ Writing Process

Brain-Target Six: Evaluating Learning Instructional Activities and Strategies	
▪ Blog Posts / Online Discussion ▪ Book / Publication ▪ Brochure ▪ Class Discussion ▪ Class Mural ▪ Comic Book / Graphic Novel ▪ Concept Mapping ▪ Critical Analysis ▪ Data Collection ▪ Debate ▪ Design a Product ▪ Dioramas ▪ Essay ▪ Experiment Design ▪ Flip Book ▪ Illustration ▪ Interviews ▪ Lab Experiment ▪ Learning Log ▪ Learning Map ▪ Literature Circles ▪ Memorize a song / passage / poem ▪ Mock Trial ▪ Model Design ▪ Multiple Choice Assessments	▪ Museum / Exhibit Design ▪ Music Video ▪ Newscast ▪ Newsletter ▪ Peer Evaluation ▪ Poem Writing ▪ Poetry Portfolio ▪ Poetry Slam / Spoken Word ▪ Portfolio ▪ Poster Presentation ▪ PowerPoint ▪ Presentation ▪ Prezi ▪ Public Service Announcement ▪ Quizzes ▪ Reflection Survey ▪ Reflective Journal ▪ Research ▪ Script Writing ▪ Self-Evaluation ▪ Shadow Box ▪ Socratic Seminar ▪ Song Writing ▪ Story Board ▪ Student Film ▪ Unit Test

Brain-Targeted Teaching® Model

Planning Templates

Brain Target 1

#1 Setting the Emotional Climate for Learning

#2 Creating the Physical Learning Environment

#3 Designing the Learning Experience

#4 Teaching for mastery of skills, content & concepts

#5 Teaching for Extension and Application of Knowledge

#6 Evaluating Learning

Features:

- ☑ **Predictability/routines**
- ☑ **Personal connection between teacher and student**
- ☑ **Personal connection between content and student**
- ☑ **Trust and acceptance**
- ☑ **Warm and supportive environment**
- ☑ **Control and choice**
- ☑ **Humor**
- ☑ **Music, visual art, dance, drama, creative writing**
- ☑ **Celebration**
- ☑ **Family and community connections**

- How does a positive climate encourage a sense of industry and competence?
- What are some factors that create a negative climate in the classroom and what are the consequences of that climate?
- How can teachers create a positive emotional climate?
- What routines in the classroom offer a sense of security and order?
- How can teachers use behavior-specific praise of effort throughout the unit?

BT #1 ACTIVITIES

Brain Target 2

#1 Setting the Emotional Climate for Learning

#2 Creating the Physical Learning Environment

#3 Designing the Learning Experience
#4 Teaching for mastery of skills, content & concepts

#5 Teaching for Extension and Application of Knowledge

#6 Evaluating Learning

Features:

- ☑ **Novelty: Change displays often**
- ☑ **Aesthetics: Visually appealing classroom, color and design**
- ☑ **Sensory: Sound, lighting, scents**
- ☑ **Order: Establish class routines**
- ☑ **Movement: Facilitate organized movement**
- ☑ **Inviting Surroundings: Bulletin boards, lamp light, plants, furniture, multicultural themes, master art work, photography**
- ☑ **Display students' work attractively**

- How can the environment help learning?
- What sensory conditions in a classroom can foster attention or inattention?
- How can the teacher balance novelty and consistency in the classroom?
- What elements of the physical environment can block learning?

BT #2 ACTIVITIES

Brain Target 3

#1 Setting the Emotional Climate for Learning

#2 Creating the Physical Learning Environment

#3 Designing the Learning Experience

#4 Teaching for mastery of skills, content & concepts

#5 Teaching for Extension and Application of Knowledge

#6 Evaluating Learning

Features:

- ☑ **Use of Common Core State Standards and curriculum scope and sequences**
- ☑ **Articulation of key learning goals and objectives**
- ☑ **Assessment of prior knowledge**
- ☑ **Design of concept map through graphic organizer that demonstrates overarching content and concepts; employs tenets of mind mapping, non-linguistic structures, and curriculum mapping**
- ☑ **Demonstration of connections among concepts**
- ☑ **Design of "big-picture" activities**
- ☑ **Promotion of students' personalized learning goals**
- ☑ **Activities that align with summative assessments**

- What **Common Core State Standards** are to be taught during the learning unit?
- What **learning goals** can develop from the content standards?
- What **main concepts** can derive from the learning goals?
- How can **concept mapping** promote a global understanding of the main concepts?
- How can mapping help the teacher determine the students' **prior knowledge** of those concepts?
- How can mapping give a preview of what is to come in the instruction?
- How can mapping use familiar concepts/terms to relate to new concepts/terms?
- How can mapping give concepts in general terms before presenting the specifics?

BT #3 Concepts Maps and Learning Goals

Brain Target 4

#1 Setting the Emotional Climate for Learning

2 Creating the Physical Learning Environment

#3 Designing the Learning Experience

#4 Teaching for mastery of skills, content & concepts

#5 Teaching for Extension and Application of Knowledge

#6 Evaluating Learning

Features:

- ☑ **Emotional connection to content**
- ☑ **"Big Picture "concepts**
- ☑ **Repeated rehearsals**
- ☑ **Elaboration through arts integration: Visual arts, Music, Theater, Dance, Creative writing**
- ☑ **Spacing time for consolidation of learning**
- ☑ **Varied and novel learning activities**
- ☑ **"Chunk" and space learning tasks**
- ☑ **Mnemonics**
- ☑ **Summarize/ rephrase**
- ☑ **Student choice in activities**
- ☑ **Meaningful movement integration**
- ☑ **Technology integration**

- Based on content standards, learning goals and main concepts, what **content, skills and concepts** must students **master** in this learning unit?
- What **instructional objectives** will facilitate mastery of the content, skills and concepts?
- What **activities** will facilitate learning?
- What **variety** of activities will allow for repeated rehearsal and allow for elaboration of learning

BT #4 Objectives and Activities

1. OBJECTIVE:

-ACTIVITIES

2. OBJECTIVE:

-ACTIVITIES

Brain Target 5

#1 Setting the Emotional Climate for Learning

#2 Creating the Physical Learning Environment

#3 Designing the Learning Experience

#4 Teaching for mastery of skills, content & concepts

#5 Teaching for Extension & Application of Knowledge

#6 Evaluating Learning

Features:

- ☑ **Comparisons**
- ☑ **Classifications**
- ☑ **Divergent thinking tasks**
- ☑ **Creative application of content**
- ☑ **Analysis and synthesis**
- ☑ **Metaphors and analogies**
- ☑ **Cause and effect**
- ☑ **Investigations**
- ☑ **Experiments**
- ☑ **Problem-solving using real-world contexts**

- What learning goal(s) will be selected for students to **apply knowledge** in real-world problem-solving?
- What activities can promote **divergent thinking**?
- What activities promote **investigation and experimentation**?
- What learning goals will allow students to **design and solve** problems?

BT #5

1. OBJECTIVE:

-ACTIVITIES

2. OBJECTIVE:

-ACTIVITIES

Brain Target 6

#1 Setting the Emotional Climate for Learning

#2 Creating the Physical Learning Environment

#3 Designing the Learning Experience

#4 Teaching for mastery of skills, content & concepts

#5 Teaching for Extension and Application of Knowledge

#6 Evaluating Learning

Features:

- ☑ **Immediate, frequent, relevant feedback**
- ☑ **Feedback that verifies correct responses**
- ☑ **Feedback that requires students to extend thinking**
- ☑ **Tasks that require students to actively retrieve information**
- ☑ **Spacing of evaluation probes at appropriate intervals**
- ☑ **Authentic performance assessment**
- ☑ **Anchor papers; models of exemplary response**
- ☑ **Rubrics, scoring tools**
- ☑ **Self-reflection and journals**
- ☑ **Task revisions**
- ☑ **Formative and summative assessments**

Base your evaluation on the numbered objectives in Target #4 and #5

BT #6 ACTIVITIES

1. Evaluation Activities

2. Evaluation Activities

3. Evaluation Activities

UNIT TEMPLATE: BRAIN-TARGETED TEACHING MODEL

Source: http://www.braintargetedteaching.org/sampleunits.html

Teacher: **Dates:**

Unit Topic:/Title: **Grade Level:**

Content Standard(s):

Brain Target #1: Emotional Climate

Emotional Connection:

Brain Target #2: Physical Environment

Brain Target #3: Learning Design

Concept Map / Advanced Organizer:

Learning Goals:

Introductory "Big Picture" Activity/Assessment of Prior Knowledge

Brain Target #4: Teaching for Mastery

Activities for Teaching for Mastery:

Brain Target #5: Teaching for Application

Activities for Extension and Application of Knowledge

Brain Target #6: Evaluating Learning

Evaluation Methods:

SAMPLE UNIT: BRAIN-TARGETED TEACHING MODEL

Teacher: S. Novak **Dates: Fall 2012**

Unit Topic: What Are the Advantages and Disadvantages of Conforming?

Unit Text: *The Crucible* by Arthur Miller **Grade Level: 11**

Content Standard(s):

CCSS Reading Literature

RL.11–12.4: Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (Include Shakespeare as well as other authors.)

RL.11–12.9: Demonstrate knowledge of eighteenth-, nineteenth-, and early twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics.

CCSS Reading Informative

RI.11–12.6: Determine an author's point of view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness, or beauty of the text.

CCSS Writing

W.11–12.2: Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

CCSS Speaking and Listening

SL.11–12.1: Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

CCSS Language

L.11–12.3: Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

Brain Target #1: Emotional Climate

Emotional Connection:

Predictability
-Daily use of "Do Nows" to begin each class
-Posted daily agenda and objectives with homework

Praise and Specificity
-Positive language in the form of praise ("Thank you for taking out your notebook and getting started on the Do Now")
-Explicit directions and instructions delivered in declarative sentences
-Declarative objectives ("Today, you will…)

Brain Target #2: Physical Environment

Instructional Environment
-Posted Essential Question, Unit Objectives, and Unit Concept Map
-Interactive Word Wall (Student Created) with correlating symbols and situations for each word
-Student posters

Sensory Environment
-Use of lavender essential oils to create an overall sense of calm
-Removal of the blinds to allow in as much natural light as possible
-Use of lamp lighting to decrease the presence of the fluorescent lighting
-Use of folders and work stations to organize space and reduce clutter

Brain Target #3: Learning Design **Concept Map / Advanced Organizer:**

The Crucible by Arthur Miller
What are the advantages and disadvantages of conforming?

Literary Analysis
- Characterization
- Setting
- Conflict
- Theme

Historical Context
- McCarthyism
- Puritans

Skill Development
- Speaking and Listening: Act Out a Scene
- Writing: Analytical Essay

Learning Goals:
By the end of the unit, students will:
-Identify emerging themes in early American literature, such as a "new Eden," "salvation," and "cooperation and conflict."
-Compare and contrast the experiences of America's earliest settlers, as conveyed through primary source documents and literature of the Colonial period.
-Identify and explain elements of Puritan literature.
-Explain the role of religion in early American life.

Introductory "Big Picture" Activity/Assessment of Prior Knowledge
Essential Question: What are the advantages and disadvantages of conforming?
Activity: Scenario Analysis (attached)

Students will consider the advantages and disadvantages of conforming through completing a scenario analysis. Students will read through several scenarios and reflect on whether or not conforming is the best option. They will then discuss their opinions with a partner, and then share out with the class.

Through this class discussion, the teacher can assess student knowledge of the term "conformity," and guide the discussion to the unit text. For example, one question that the teacher may pose to students might be "Why might it have been more difficult not to conform during the Puritan Era?" Teachers could assess prior knowledge based on student responses.

Brain Target #4: Teaching for Mastery
Activities for Teaching Declarative/Procedural Knowledge

Activity 1:
Strategy: Modified K-W-L (K-L-Q) (attached)
Students will complete a K-L-Q (K=What I Know, L=What I Learned, Q=What Questions Do I Still Have?) chart at the beginning of the unit.

Student will fill out the K section with any background knowledge they have with regards to the Salem Witch Trials. Then, the class will view a film clip about the witch trials and take notes in the L section of their chart. The teacher will review what we now know after watching the clip. Then, students will complete the Q section with questions that they still have about the Salem Witch Trials prior to reading *The Crucible.*

Activity 2:
Strategy: Character Facebook Page
Students will demonstrate understanding of characterization through creating a Facebook page for a main character from *The Crucible*. Students will have to use textual evidence to determine the character's likes and dislikes, as well as what they would say to other characters in the play. Students may choose to create these Facebook profiles individually or with partners. They may use chart paper or and electronic template. Facebook pages will be posted to enhance the learning environment.

Activity 3:
Strategy: Act Out a Key Scene / Key Scene Tableau
Students will select a key scene from The Crucible. In small groups, students will determine whether they would like to act out the scene or create a tableau for the scene.
Option 1: Act Out a Key Scene
Students will be responsible for memorizing the lines from the play. Their scene should be no less than five minutes in length. They may choose to film themselves and show a video to the class. They will be scored according to the performance rubric (attached).
Option 2: Students will be responsible for creating a tableau scene from The Crucible. They will present their tableau to the class. They will be responsible for explaining the reasoning behind their tableau placement. They will be scored using a modified performance rubric.

Activity 4:
Strategy: RAFT Writing (Role-Audience-Format-Topic)
Students will be writing an obituary for Giles Corey using the RAFT writing format:

Role: A member of the Puritan Community who deeply respected Giles Corey
Audience: The Puritan Community, including those who sympathize with Corey, and those who agree with the high court.
Format: Obituary
Topic: The Honorable Death of Giles Corey

Task: Students will write an obituary celebrating the life and death of Giles Corey. They will use knowledge gained from the text to inform their writing. One of the goals of the obituary should be to persuade those who killed Mr. Corey that they were wrong in their assessment.

Brain Target #5: Teaching for Application
Activities for Extension and Application of Knowledge

-Socratic Seminar: Was John Proctor's decision honorable or foolish? (Speaking and Listening)

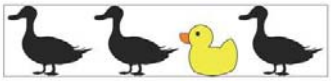
-Research Project: McCarthyism and its connection to the Salem Witch Trials (Research Paper or Class Presentation)

-Public Service Announcement: What have we learned?

Brain Target #6: Evaluating Learning

-Typed Analytical Essay: What are the advantages and disadvantages of conforming? After reading *The Crucible*, write an essay that addresses the question and support your position with evidence from the text.

-Unit Test (Multiple Choice and In-Class Writing/ Passage Analysis)



Name: _____
Date: _____

To Conform or Not To Conform: That Is the Question

<u>Directions</u>: Read the following scenarios closely. Then, decide whether the character in the scenario should conform or not conform to his or her surroundings. Finally, explain your reasoning in the space provided.

1. Shelby has been studying for the past two weeks for her final in chemistry. Her grade in the class is much lower than it should be, and her mother has warned her to improve it or there will be consequences. Shelby has done a lot to prepare for the exam; she has declined party invitations, restricted time with friends, and spent hours in the library.

On test day, Shelby sits next to her friends at lunch. She notices that friends are creating cheat sheets and hiding them in their back packs. Shelby is confident in her ability to do well on the test, but considers that she might do better if she had a cheat sheet as well. What should Shelby do? Should she **conform** to her group and create a cheat sheet? Why or why not?

_____
_____
_____
_____
_____

2. David was always a responsible young adult in high school. He worked hard for good grades, and participated in sports. He never drank or did drugs. This paid off, and David was accepted into a prestigious college. He told himself he would not drink until he was 21 and it was legal.

However, now that David is 18-years-old and in college, he finds himself surrounded by friends who drink regularly even though they are not 21. David re-thinks his promise to himself. He doesn't intend to do anything dangerous when drinking, just have a couple beers when he goes

out with his new friends. Is there really a problem? Should he **conform** to his group and drink before he turns 21? Why or why not?

_____
_____
_____
_____
_____

Name:
Date:

K-L-Q

What do I Know about the Salem Witch Trials?	What did I learn about the Salem Witch Trials from the video clip?	What questions do I still have about the Salem Witch Trials that I want the text to answer?

PRESENTATION RUBRIC

Student Name:_____ Total Score: _____ Grade: ____

CATEGORY	**4**	**3**	**2**	**1**
Speaks Clearly	Speaks clearly and distinctly all (100-95%) the time, and mispronounces no words.	Speaks clearly and distinctly all (100-95%) the time, but mispronounces one word.	Speaks clearly and distinctly most (94-85%) of the time. Mispronounces no more than one word.	Often mumbles or cannot be understood OR mispronounces more than one word.
Memorization	Part is completely memorized. The student does not need support during the performance.	Part is mostly memorized. Student may forget one or two lines.	Part is somewhat memorized. Student forgets more than two lines.	Part is not memorized. Student must read or be given lines.
Preparedness	Student is completely prepared and has obviously rehearsed.	Student seems pretty prepared but might have needed a couple more rehearsals.	The student is somewhat prepared, but it is clear that rehearsal was lacking.	Student does not seem at all prepared to present.
Volume	Volume is loud enough to be heard by all audience members throughout the presentation.	Volume is loud enough to be heard by all audience members at least 90% of the time.	Volume is loud enough to be heard by all audience members at least 80% of the time.	Volume often too soft to be heard by all audience members.

Enthusiasm	Facial expressions and body language generate a strong interest and enthusiasm about the topic in others.	Facial expressions and body language sometimes generate a strong interest and enthusiasm about the topic in others.	Facial expressions and body language are used to try to generate enthusiasm, but seem somewhat faked.	Very little use of facial expressions or body language. Did not generate much interest in topic being presented.
Artistic Interpretation	Student has made the piece "their own." They are comfortable and believable in the role they are playing.	Student is fairly comfortable and believable in the role they are playing.	Student is somewhat uncomfortable in the role. The audience may have some difficulty believing in their role.	Student is very uncomfortable in the role. The audience has difficulty believing in their role.