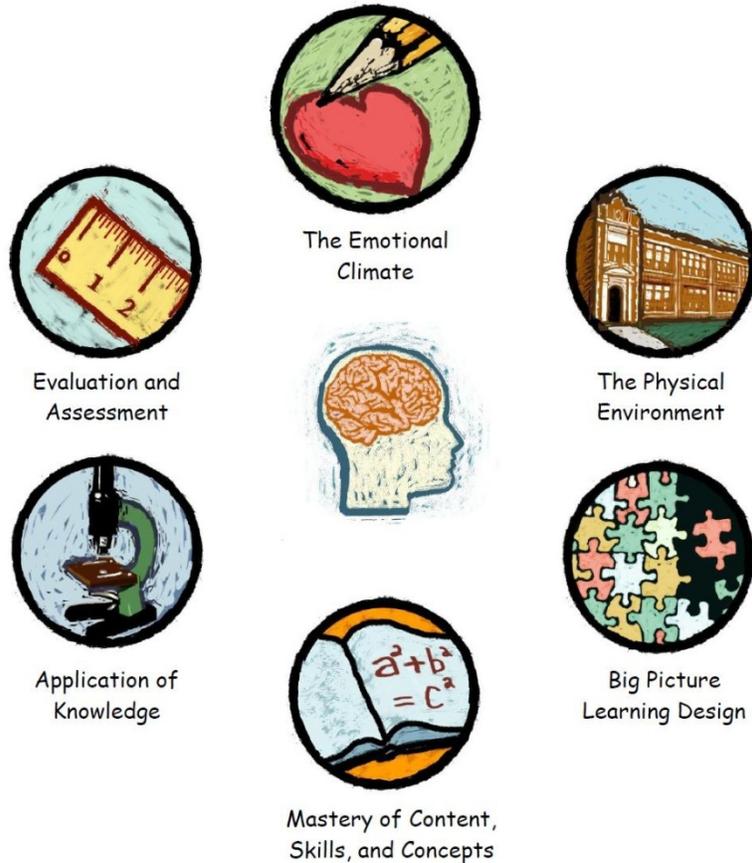


Overview: The Brain-Targeted Teaching Model for 21st Century Schools

Dr. Mariale Hardiman



The Brain-Targeted Teaching Model

The Brain-Targeted Teaching Model is an instructional framework designed to assist teachers in planning, implementing, and assessing a sound program of instruction informed by research from the neuro- and cognitive sciences. The model consists of six stages of the teaching and learning process that I refer to as *brain targets*—that is, teaching targeted to what we know about how we think and learn.

Scientific discoveries in cognition and learning can and should inform the work of educators. However, without a guiding framework, making sense of usable knowledge from this

research and integrating it into instructional practices can become challenging. This model synthesizes relevant research into a cohesive pedagogical system for using effective practices in any instructional program from early childhood to adult learning and in any content area. As such, it is not a curriculum nor a stand-alone product and most sound teaching programs and practices align with one or more of the brain targets, such as the Universal Design for Learning (Rose & Meyer, 2002) or Framework for Teaching (Danielson, 1996). (See Appendix I: Alignment of Brain-Targeted Teaching with Cognitive Taxonomies, and Teaching Standards and Frameworks).

While each of the targets is presented as a separate component, all six are interrelated. Thus the model should not be viewed as linear, but 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. Fundamental to that approach are teaching practices that lead all students not only to demonstrate mastery of content but also to apply knowledge in creative problem-solving, now referred to as “21st century skills.” Also central to the model is the purposeful focus on the emotional and physical learning environments, designing instruction so that students understand “big picture” concepts, continuous evaluation of learning, and the integration of the arts to foster retention, conceptual development, and higher-order thinking. The section below provides a brief description of each of the brain targets.

Overview of the Brain-Targeted Teaching Model

Brain Target One: Establishing the Emotional Climate for Learning

Our study of the Brain-Targeted Teaching (BTT) Model begins with Brain Target One, an exploration of the interconnection of emotions and learning. As research from the brain sciences continues to shed light on the neural systems underlying emotion, it is important for

educators to understand the influence of emotional arousal, both positive and negative, on attention, memory, and higher-order thinking. For example, research is demonstrating the negative effects of stress on learning from pre-natal stages to early childhood, adolescent, and adult learning. On the other hand, positive emotion has been shown to improve learning outcomes. This research informs instructional strategies designed to promote a positive, joyful and purposeful climate for learning. We also consider ways to embed into learning units specific activities to provide an emotional connection to the subject matter in order to make learning more meaningful and relevant for students.

Brain Target Two: Creating the Physical Learning Environment

Just as the emotional environment in a classroom can shape learning, elements in the physical environment—the focus of Brain Target Two—can influence students’ attention and engagement in learning tasks. We explore how novelty in the classroom engages students’ attention and how it can be achieved by using strategies such as changing seating arrangements and classroom displays. We also look at ways to encourage movement and bring a sense of order and beauty into the classroom environment.

Brain Target Three: Designing the Learning Experience

The learning sciences delve into the cognitive processes associated with information processing—how we make meaning and find relationships amidst input from various senses. Brain Target Three is informed by the notion that we use prior knowledge to categorize stimuli and combine this prior knowledge with new knowledge to create patterns of thinking and learning. Rather than lists of facts, cognitive science tells us that knowledge is organized around global understanding or big ideas. Therefore, we design the learning experience with the use of visual representations to show students “big picture” concepts and connections between new

ideas and prior knowledge. We demonstrate to students how learning goals and objectives connect with daily activities and lead to the attainment of targeted content, skills, and concepts.

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

Educating students assumes that they acquire knowledge and master skills and concepts so they can lead full and productive lives and become lifetime learners. Learning content, skills, and concepts requires that students retain information and use it meaningfully. Brain Target Four explores the connection between learning and memory, reviewing how information and experiences are processed, encoded, stored, and retrieved in the brain's memory systems. Research from cognitive science and psychology demonstrates various manipulations that influence long-term memory. We consider these "memory effects" as we explore how retention of knowledge is supported through teaching that integrates the visual and performing arts into content instruction.

Brain Target Five: Teaching for the Extension and Application of Knowledge—Creativity and Innovation in Education

Teaching and learning in 21st century classrooms must not only lead students to mastery of content, skills, and concepts but also must promote the application of knowledge in real-world problem-solving tasks. The hallmark of 21st century learning is the ability to demonstrate creative and innovative thinking. Brain Target Five focuses on the growing body of research in creativity and how findings can inform instructional practices so that learning experiences foster divergent thinking and problem solving.

Brain Target Six: Evaluating Learning

Evaluation of learning is a critical component of the teaching and learning process. In Brain Target Six, we explore research that demonstrates how continuous evaluation can enhance

learning and memory. We consider how to expand traditional types of assessments to include the use of student portfolios, student-generated products, and performance-based assessments.

Brain-Targeted Teaching: Research to Practice

In Chapters Four through Nine, we take an in-depth look at each component of the Brain-Targeted Teaching Model. For each brain target, we first review the neuro- and cognitive science as well as educational research that informs the brain target. Then, to demonstrate application of the research into practice, each chapter is followed by strategies that logically stem from the research. These strategies are embedded in the text and also are offered in special sections written by *expert teachers* who have used the model in PK-12 and higher education settings. Additionally, below we meet two teachers whose complete Brain-Targeted Teaching units are threaded through the chapters. Clare O'Malley Grizzard describes a language arts unit for elementary grades and Suzanne McNamara demonstrates a unit implemented in a high school biology classroom. As these units unfold through each chapter, they provide rich examples of how traditional methods of teaching can be enhanced and student learning deepened through the use of strategies associated with the stages of the Brain-Targeted Teaching Model.

What Does a Brain-Targeted Teaching Unit Look Like in the Classroom?

Learning Unit: Surviving Alone in the Wilderness: A study of the novel *Hatchet* by Gary Paulsen

Grade/Content: 5th Grade/Language Arts

Author: Clare O'Malley Grizzard

Overarching Goal of Unit: Students will increase language arts skills of reading for understanding through analysis of character, plot, main idea, and symbolic language.

As a visual art teacher and arts-integration specialist, I look for opportunities to bring the arts into traditional classrooms through cross-curricular planning. This unit involved collaboration with Linda Bluth, a veteran fifth-grade language arts teacher, who, in her 29th year

of teaching, realized a whole new way of engaging her students through Brain-Targeted Teaching.

Our goals were simple:

- to bring the students back to *a love of reading*, which had been lost in an era of high-pressure test preparation and technology;
- *to teach empathy*—enable students to connect emotionally with the character in a novel; and
- *to re-kindle the educator’s enthusiasm* for sharing a journey with her students through a deep and meaningful exploration of literature.

Hatchet by Gary Paulsen tells the story of a young teenage boy named Brian who is the lone survivor of a plane crash in the Canadian wilderness; he finds that he is left with only a small hatchet in his possession.. He experiences an exciting adventure of survival that includes learning to respect the natural environment and his integral place in it and discovering the power of ingenuity in problem solving and self reliance. Complete with a tornado, moose attack, food poisoning, skeletons, bears and desolation, this novel offers a rich opportunity to explore coming-of-age themes, literary objectives and empathy.

Linda Bluth and I realized the transformative power of the arts as we planned activities to teach this novel.to the students. Without shortchanging academic content and reading objectives, students participated in creative work because they were engaged in the adventure of the novel, actively and purposefully. Their writing expressed a deeper involvement with the story with an effortless use of descriptive language and their personal voice. Ms. Bluth and I were transformed, too. Using the BTT model, we developed strategies and approaches to planning collaboratively that spoke to our individual strengths. I hope you enjoy seeing our unit come to life through the study of each of the brain targets through this book.

Clare Grizzard

Learning Unit: Genetics and Heredity – Thinking Outside the Punnett Square

Grade/Content: 10th Grade/Biology

Author: Suzanne P. McNamara

Overarching Goal of Unit: Students will apply their understanding of genetics and heredity in discussions centered on current medical and social issues as well as an appreciation for human diversity.

Having worked in Baltimore City for my entire teaching career, I have constantly struggled to meet the diverse needs of my high school students. I saw the Brain-Targeted Teaching Model as a method to help engage more of my students and motivate them to take ownership of their learning. When I first decided to implement a Brain-Targeted Unit in my classroom, I was especially attracted to Brain Targets One, Two and Five. I thought that introducing these elements into my instruction would help me better reach out to my diverse learners. After planning for this Unit, however, I realized that this model provided much more than mere student engagement. The Brain-Targeted Teaching Model is an authentic and holistic approach to instruction. It not only forced me to provide opportunities for students to truly engage with the material, but it helped me to focus less on the “facts” and more on how students would engage with the unifying concepts of the unit.

As a science teacher, I have always been an advocate for a hands-on interdisciplinary approach to learning in my classroom. From my observations, students are more engaged in the learning experience when the lesson is interactive, meaningful, and relevant. Most important, these practices help students to develop versatile skills that enable them to become lifelong learners. Having implemented the Brain-Targeted Teaching Model for the past two years, I have seen how its use can have a major impact on student motivation and achievement. At first, I was afraid that this type of holistic teaching may not prepare students for high-stakes testing— but this has proven otherwise in my class. When students immerse themselves in hands-on learning,

they develop critical thinking skills that can be applied to various tasks; they have demonstrated that learning on assessments from unit tests to Advanced Placement exams. From my experiences, this model has helped students understand and explore content deeper and promotes better retention of content.

I designed and implemented a high school Brain-Targeted Teaching unit on the topic of genetics for my 9th grade students titled “Genetics and Heredity – Thinking Outside the Punnett Square.” The goal of the unit was for students to apply their understanding of genetics and heredity in discussions centered on current medical and social issues as well as the appreciation of human diversity. Instead of using traditional extension projects to help students better understand the material, I forced myself to find ways to incorporate “21st century skills” into the unit. My students were constantly required to apply the material to real-world applications in order to solve problems. Without realizing it, I was helping them to make true meaning of the content. While the Brain-Targeted unit helped me accomplish my initial goal of student engagement, it also made me realize that this non-traditional teaching method is not just an alternative, but a more effective way to meet the developmental needs of my students. It was clear to me that my students had truly mastered genetics.

Although I was a little wary of integrating the arts into my teaching methodology, I soon realized that it was an extremely powerful way to foster creativity among my students and encourage divergent thinking. Once I found ways to incorporate the arts into genetics topics, I found that these learning opportunities especially helped students to understand the content and apply their learning in meaningful ways. I hope you enjoy learning more about my unit in each of the chapters that follow.

Suzanne P. McNamara