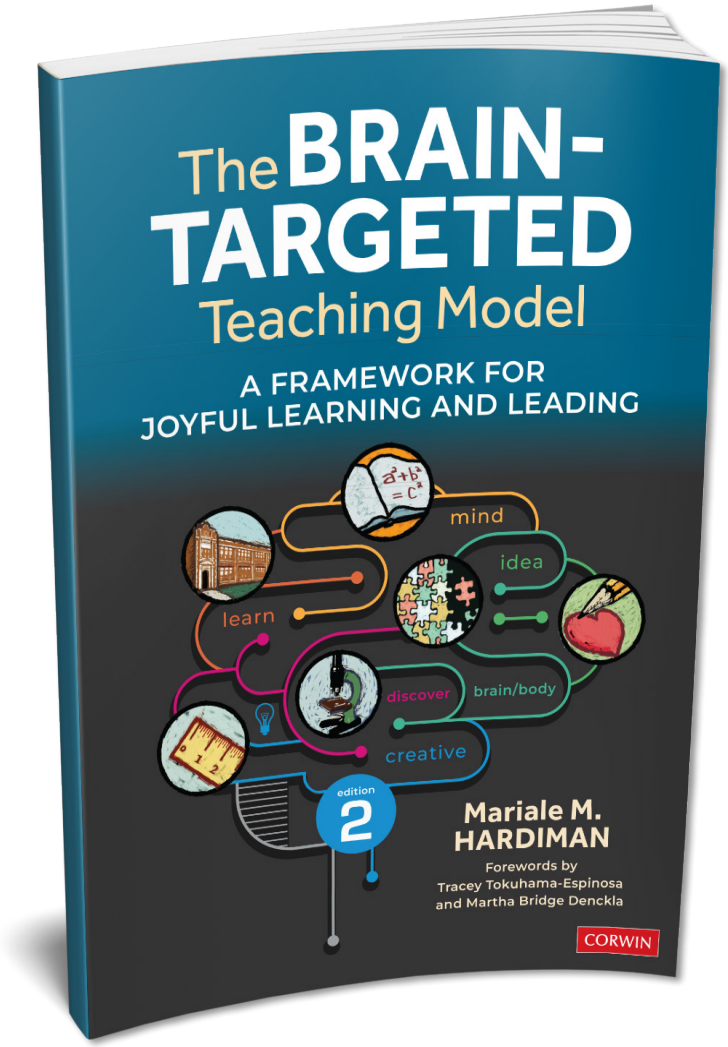

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The Brain-Targeted Teaching Model

A Framework for Joyful Learning and Leading

Second Edition

Mariale M. Hardiman

Forewords by Tracey Tokuhama-Espinosa and
Martha Bridge Denckla

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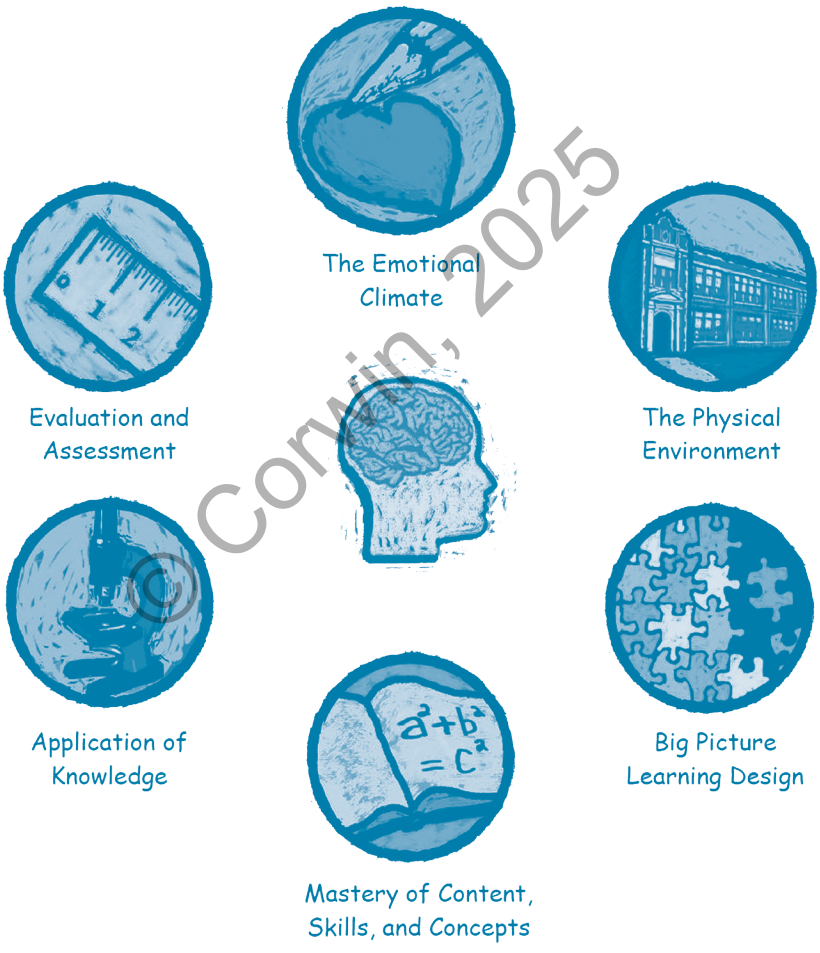
Preface



The Brain-Targeted Teaching Model

I am pleased to present *The Brain-Targeted Teaching Model: A Framework for Joyful Learning and Leading* and offer this book as a new edition of *The Brain-Targeted Teaching Model for 21st-Century Schools*. Since the publication of the first edition in 2012 and my first book in 2003, the field of neuroeducation has continued to evolve, becoming a recognized interdisciplinary approach to education. Research from the learning sciences has produced numerous findings that are increasingly viewed as important to expanding an understanding of how we best acquire and apply knowledge (see Ozernov-Palchik et al., 2024). Like professionals in other emerging *neuro* fields—neurolaw, neuroeconomics, neuroaesthetics, neuroethics—many practitioners seek to not only become familiar with the advancing knowledge of human cognition and learning, but also to understand how this knowledge can inform their work.

Still, research from the scientific community that is *specifically intended* for practitioners must continue and accelerate. Findings from neuro- and cognitive science research in areas such as attention, memory, emotions, creativity, executive function, embodied cognition, sleep, exercise, and more must continue to expand our understanding of cognition and learning. This growing knowledge, however, creates the need for translation of relevant research findings to determine appropriate connections to practical applications within multiple fields (Hardiman et al., 2012).

Who Should Read This Book

This book is intended to serve as a bridge between research and practice by providing any practitioner with a cohesive, usable model of effective instruction informed by education research as well as findings from the learning sciences. The research and instructional strategies presented are designed to be relevant to a wide range of practitioners.

Since the publication of the 2012 edition, I have been amazed at the array of professionals—nationally and internationally—who have used the Brain-Targeted Teaching® (BTT) Model in their work. Some have enrolled in our academic courses at Johns Hopkins University. Others attended professional development sessions, conference presentations, or simply read the book and adopted the model for use in their own context. Many who have used the BTT Model have been educators, from early childhood practitioners to higher education faculty. Others include organizational leaders, corporate trainers, strategic planners, policymakers, athletic coaches, home school practitioners, and parents. Based on their work, feedback, and research, it is a great honor to present this current book on the Brain-Targeted Teaching® Model as a tool to inform teaching, leading, and learning.

For practitioners in any field, it is critical that relevant research on cognition and learning be approached systematically and realistically, rendering a better understanding of the developing child and adult learner, greater precision in instructional techniques, and enhanced educational outcomes.

In my own work as a school principal in an urban school district and now at the university level, I have found that too often practitioners are handed an ever-changing array of initiatives and programs that rapidly come and go. Well-meaning leaders may not understand how this serves only to dilute productivity rather than support it. Practitioners may *wait out* one initiative in hopes that a better one will come along or feel confused as they try to meld a new program with the previous one.

Accordingly, without a cohesive model, practitioners may easily be confused by the plethora of strategies that claim (some appropriately, some not) to be based on research from the learning sciences. Usable knowledge may be confounded with myths that divert time and waste valuable resources.

The Central Purpose of This Book

A Pedagogical Framework—The Brain-Targeted Teaching® Model

The basis of this book is to bring relevant research from the learning sciences to practitioners through a pedagogical framework, the Brain-Targeted Teaching® (BTT) Model (Hardiman, 2003; 2012). The model provides a cohesive structure for interpreting research findings from the learning sciences and applying them to their own practice. The BTT Model is neither a curriculum nor a marketed product. Rather, it is a way to plan effective learning and leading informed by research from the learning sciences and research-based effective instruction. It was designed, in part, from the thinking skills frameworks of Dimensions of Learning (Marzano, 1992), Multiple Intelligences (Gardner, 1983, 1993), and Bloom's Taxonomy (Bloom & Krathwohl, 1956). It aligns with the Universal Design for Learning (Cast, 2011; Rose & Meyer, 2002) with an emphasis on reaching all learners through techniques that honor culturally relevant pedagogy and neurodiversity. At the core of the BTT Model is a focus on activities that tap into creative thinking, problem-solving, and application of content to real-world contexts. Practitioners also have recounted how meaningful integration of the arts into learning activities leads to heightened student engagement and more effective retention of content.

The model presents six important domains, or *brain targets*, of the teaching and learning process. These include the following:

- Brain-Target One—Establishing the emotional climate for learning
- Brain-Target Two—Creating the physical learning environment
- Brain-Target Three—Designing the learning experience for *big-picture* understanding
- Brain-Target Four—Teaching for the mastery of content, skills, and concepts
- Brain-Target Five—Teaching for the extension and creative application of knowledge
- Brain-Target Six—Evaluation *for* learning, not just *of* learning

Special Features of the Second Edition

Similar to the 2012 version, this book reviews research from the learning sciences; discusses how the findings can inform practice; and shares activities from practitioners who have used the model in classrooms, higher education courses, corporate training sessions, strategic planning, and more. It begins with a consideration of current practices and how the emerging field of neuroeducation can promote innovative and creative problem-solving. It then examines themes from the learning sciences that practitioners should know, including discerning the differences between meaningful uses of research and common misapplications of findings, known as *neuromyths*. Next, in order to help with understanding of research in subsequent chapters, the book provides fundamental information of how the brain works, including its structure and function. Chapter 3 provides an overview of the BTT Model, and the chapters that follow focus on each of the six brain targets, including research supporting the target as well as concrete examples of applications from educators and practitioners from related fields. Finally, readers will see how the model can be used as a unifying framework in a school or any organization.

Those familiar with the first edition will note that the components of the BTT Model have not changed. In fact, research that supports each of the brain targets described above has continued to grow. Thus, this edition includes newer studies along with some of the seminal research studies described in the last edition. In addition, I have invited researchers and colleagues to share their knowledge and experiences with the BTT Model, resulting in multiple new "Expert Practitioner" excerpts that appear in

each of the chapters describing the six brain targets and offer rich new approaches to learning and leading.

I present four new chapters for this edition, written or cowritten by colleagues who have used the BTT Model in their work. The new chapters include Chapter 11, which focuses on Culturally Relevant Pedagogy within the BTT Model and how this content informs online and hybrid learning. Chapter 12 addresses how parents and home school entities such as microschools can align strategies with the BTT Model. Cutting-edge technology in the form of Virtual Reality is discussed in Chapter 13 along with more common forms of technology as it is used in educational applications. I am excited to share Chapter 14, which demonstrates ways in which the BTT Model has been examined in research studies nationally and internationally, providing evidence of its effectiveness in programs servicing early childhood to adult learners. Chapter 15, "Last Words," recount the inspiring story of the late Gordon Porterfield and how his graduate students responded to an activity that required them to learn in a way outside of their comfort zone yet triggered a meaningful learning experience. The Appendices include a checklist of instructional strategies to help guide practitioners and leaders in implementing each of the components of the BTT Model. In addition, the two sample learning units that threaded through each of the chapters of the first edition (Hatchett and Genetics & Heredity) are now offered in Appendices II and III.

It is important to note that in many cases, you will see the model shown within teaching and learning environments. To any reader who is not in the field of education, I would like to point out that broadly, educators exist in every walk of life. Beyond the traditional role of classroom teachers, educators include leaders of any organization, corporate trainers, athletic coaches, parents, consultants, and many more and varied professionals. In fact, we are all educators when we impart information to students, colleagues, workers, and our children. As you move through the various chapters of this book, think about how the content applies within your own context.

Finally, it is important that I explain why I find the concept of *brain-targeted teaching* (a description I coined in the last book) to be more useful than the term *brain-based learning*. A number of people have justly criticized the use of the term *brain-based* as an adjective describing learning. The silliness of the term is exemplified by the question, "Doesn't all learning occur in the brain? After all, we don't think with our feet!" I concur that labeling learning as *brain-based* seems uninformative, as learning indeed occurs in the brain and embodied memory systems. In contrast, *all teaching does not result in learning*, so while all learning is

brain-based, all teaching is not. Accordingly, I wanted to focus on how pedagogy can be informed by knowledge of how the brain learns—how people perceive, process, and remember information. Therefore, the term *brain-targeted teaching* seemed particularly apt.

Research from the learning sciences has demonstrated that the essence of learning is about biological changes. In view of that, focusing on the *science of learning* should be as central to discussions about education as the focus on accountability for the *product of learning*. It is time that policy and practices reflect a focus on the way humans think and learn. The emerging field of neuroeducation and the Brain-Targeted Teaching® Model can be the linchpin in this work.

Introduction

The Emerging Field of Neuroeducation

Because of its broad implications for individual and social well-being, there is now a consensus in the scientific community that the biology of mind will be to the twenty-first century what the biology of the gene was to the twentieth century.

—Eric Kandel, *In Search of Memory,* p. xiii

How do we prepare our learners, from young children to adults, for a rapidly changing world? How do we ensure the effective transfer and creative application of knowledge for learners at all levels and in multiple contexts from education to the world of work and general life endeavors? As technology has enabled a global, interconnected world, how do we prepare for greater cultural awareness? How do we support the well-being and mental health of our students and workers? How can we address the inequities in opportunities and accessibility to quality education? All of these issues and more have clearly come to light, especially in the wake of the pandemic, which has changed how we think about schooling, employment, and lifestyles.

There are no simplistic answers to addressing these questions. Yet with the resolve and collaboration of educators, leaders, policymakers, parents, and all related constituents, no challenge is beyond our knowledge and wisdom. But we must be open to conducting our work in different ways. In education, for example, despite the calls for greater emphasis on critical and creative learning, traditional approaches to curriculum and instruction still dominate what happens in our nation's schools. While higher pay and working conditions may address the teacher shortage, my experience with practicing professionals points to their desire for more agency in what and how they teach. And in increasing numbers, educators are pursuing professional learning experiences to increase their

knowledge of how the human mind thinks and learns, focusing on the needs of the learner rather than how they score on standardized tests (Privitera, 2021).

Indeed, efforts to reform American schools should begin by changing the very notion of how to measure educational success, driven by the movement of 21st century learning, and ultimately informed by new knowledge from the learning sciences. At present, with no national consensus on what makes an effective school, policies have largely reduced the notion of measuring successful schooling to merely tracking achievement scores in reading and mathematics.

Clearly, educators must not shrink from accountability for student performance. The current practices that measure educational effectiveness, however, are driving school policies and practices and have resulted in a well-documented narrowing of the curriculum, reducing time spent on the social studies and the sciences and—at the same time—diminishing opportunities for many children to participate in the visual and performing arts, physical education, and even recess. This is especially true in under-resourced schools, where budgets are tight and many educators believe that children require more time to work in the tested subject areas. Narrow accountability measures fail to give the public, from parents to policymakers, the broad measures of school effectiveness they want and deserve.

While the practice of high-stakes accountability helps identify expectations of student learning, it also cuts down on the time they have to provide students with deeper and more engaging learning experiences (Guggino & Brint, 2010). Practices that support narrow, *spoon-fed* thinking are incompatible with our nation's need for workers capable of collaboration, innovation, and creative problem-solving—the hallmark of 21st century skills. Educating the citizens of tomorrow will require the redesign of school policies and practices so that students do not merely acquire information, but also are provided with opportunities to apply what they have learned in novel, creative ways.

As we redefine American education, the emerging field of neuroeducation can play an important role by focusing educators on *how students learn* rather than on merely *what they learn*. As neuro- and cognitive science researchers continue to accrue knowledge about the science of learning, it is important that relevant findings reach educators in a manner that allows them to incorporate this knowledge into policies and practices. As is the norm in medicine, neuroeducation can bring to educators the *bench to bedside* approach through which research informs practice and the needs of practitioners drive research questions.

Interest and research into the field of neuroeducation has continued to grow internationally. Examples include the Organization for Economic Co-Operation and Development (OECD) panel on how the learning sciences can change the nature of teaching (Guerriero, 2017), and two Delphi panels of scientists and educators address how the learning sciences should shape education practices and policies (Tokuhama-Espinosa, 2017). Other reviews examined the impact of neuroeducation training on teachers' beliefs and pedagogical practices. For example, Privitera (2021) reviewed existing research on how neuroscience training influenced instruction. He found that teachers who received training in topics related to neuroeducation were more likely to adopt pedagogical practices that reflected students' cognitive development and diverse learning needs. Moreover, teachers' general and personal self-efficacy beliefs—the power of education to reach all children—significantly improved after they participated in professional development in the learning sciences (JohnBull & Hardiman, 2023). It is clear that a growing number of educators see the potential of the science of learning to inform the field of education. During the last fifteen years, teacher attendance at national, regional, and local conferences related to learning and the brain has grown significantly (Privitera, 2021), and teachers report that information from the learning sciences is highly relevant to their work (Howard-Jones et al., 2007).

As professional development programs, books, and journal articles have proliferated, however, there has emerged a strong need for some way to separate the wheat from the chaff when it comes to commercial products and textbooks that increasingly tout the use of *brain-based* strategies to improve student achievement (Sylvan & Christodoulou, 2010). Practitioners must have ongoing information that helps them become informed consumers of research claims and a cohesive way to apply relevant research to effective practice.

The BTT Model is presented as a tool for applying the learning sciences to educational practice that is consistent with the skills associated with 21st century learning—preparing all students to become the creative and innovative thinkers and learners of tomorrow.