Introduction

Transforming Static Information Into Active Knowledge

BLIND INSIGHTS

The moment I knew that the visual tools described in this book were deeper than the facade of the boxes, ovals, and arrows that we have seen for years was during a return visit to a school in Mission, Texas, in the early 1990s. I had been leading the implementation in this school over time, using a language of visual tools that I developed as a foundation for facilitating thinking skills and for directly improving teachers' instruction and students' performance. During a previous workshop at the school, a participant had asked a question that stopped me in my tracks. At first the question seemed to indicate a resistance to change that we have all felt at one time or another, but then the question turned to a deeper level: "These visual tools may work for most students, but not for my students." I asked, "Why not?" She hesitated and then spoke softly, "They are *blind*. How would you use visual tools with blind students?" As quiet settled across the crowd (and "wait time" proved to be no great strategy at that moment), all I could do was respond with a promise to return with the question in mind.

When I did return a month later, the teacher who had asked the question handed me the answer: a videotape and several pale yellow, bumpy pages. And then I knew: her students were using a Braille machine to generate visual tools on this special paper. We popped the video into the machine, and the whole faculty watched with a focused fascination rarely found in a workshop setting. One of her students, particularly taken by "visual" tools, had created several Braille maps for generating context information about a writing topic using a Circle Map and then prioritizing the ideas into a Flow Map for sequencing. On the video, this boy led his seeing peers in a discussion about the use of the maps and a reading of his description about a visit to a beach as his hands moved over the pages, sensing the spatial display of the bumps. The product was a beautifully descriptive piece of writing. The teacher was delighted with the outcome, and the student was improving his writing *and* thinking abilities. Of course, his "seeing" peers had been using the same array of visual tools: they could see the patterns . . . but he could *feel* them.

What I learned from this teacher, and the key concept that propels this book, is that most *high-quality* brainstorming webs, graphic organizers, and conceptual mapping approaches are not simply isolated visual techniques to be handed out in preformed worksheets. These tools, now often referred to as *nonlinguistic representations*

(Marzano, Pickering, & Pollock, 2001), are not just a few more tools for the proverbial teacher tool belt, but a new foundation for rigorous learning, higher-order systems thinking, metacognition, and formative assessments in classrooms.

Visual tools, in the best cases, are generated from a blank page *by students* for transforming text-based content information into active knowledge using a rich integration of modalities—visual, spatial, verbal, and numerical—to create conceptually rich models of *their* meaning. These acts of transformation take students from the basic information found in texts to the highest orders of thinking seamlessly, from building concrete content facts and vocabulary directly to the abstract conceptual understandings that are the basis for learning knowledge in every discipline. Visual tools offer a third way through the great dichotomies and supposed polar opposites on which we as educators endlessly query: What should we focus on in the context of "too much information" in "too little time" requiring "too many intended outcomes?" Here are some of the dualistic dilemmas we question:

Content or Process?

Factual Information or Conceptual Knowledge?

Linear or Holistic Thinking?

Analytical or Creative?

Recall or Understanding?

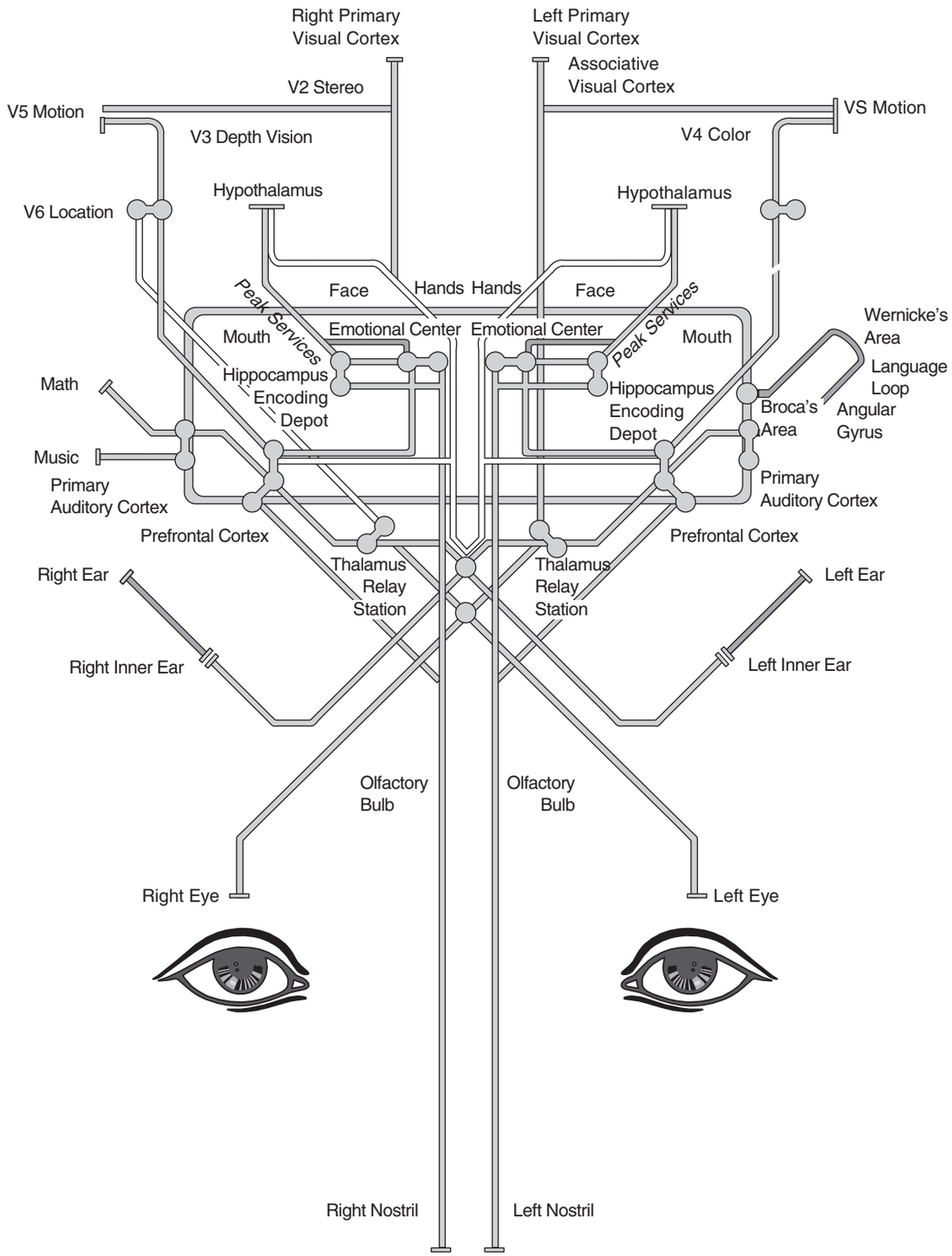
The Basics or Higher-Order Thinking?

As shown in this book, educators are seeing in practice and in the research that these tools for transforming information into knowledge are facilitating diverse learners who require differentiated instruction, multiple intelligences, habits of mind, and higher-order thinking. *But most important, students are transforming information into knowledge using "mapping" in dynamic congruence with what is already going on in the brain.* As Pat Wolfe, a leader in the translation of brain research for practitioners, says: "Neuroscientists tell us that the brain organizes information in networks and maps" (Wolfe, 2004). The brain, we have come to understand, is an organism that has a specialized, continuously evolving, multidimensional, and dynamic *spatial* architecture that networks and maps information. Information is stored in distributed circuits—maps—across the brain (Introduction Figure 1).

Most important, the brain is also *dominantly* visual as most brain researchers believe that we receive around 70% of information from our environment through our eyes. We make and store images and pictures of incoming information in our brain, and now our new technologies—mostly visual—are merely reinforcing the visual dominance of the brain.

The breakthroughs shown in this book establish the importance of visual mapping that in many ways replicates what the brain does so well. High-quality visual tools are basically used for surfacing dynamic schemas, graphic representations that externalize in blueprint form the conceptual knowledge structures bound within the architecture of the brain. This is why visual tools are a breakthrough in education and not just another tool on the sagging tool belt of endless and uncoordinated "best practices" for teachers. It is now clear that the traditional linear strings of words students see in textbooks and hear from teachers in dominantly linear-auditory

Introduction Figure 1 Overview



Source: Adapted from Carter, R. (1998). *Mapping the mind.* Berkeley, CA: University of California Press.

classrooms do not even come close to approximating the complex visual-verbal-spatial patterning of what is going on in their heads. Thus, there is cognitive dissonance between

> what is going on in students' minds as their brains are *naturally* mapping information and
>
> what is happening in classrooms as teachers talk and student see linear strings of information in texts.

Visual tools are a natural bridge between the brain and mind and high intellectual performance on tasks requiring more than linear processing. As one third grader stated about the use of a language of visual tools: "Thinking Maps . . . are the paper of my mind" (DePinto Piercy & Hyerle, 2004). The paper of the mind is not linear text, it is a map.

I now believe even more strongly than ever that visual tools provide one of the most direct routes for most learners—and maybe all but a few learners in our ever more inclusive classrooms—to show and communicate *their* rich patterns of thinking about content vocabulary and conceptual knowledge. These tools leverage learning well beyond the common *linear* presentations of information that are presented in classrooms and that are but a shallow facade of the holism of human thinking based on conceptual understandings.

RIGHT NOW: JUMPING THE ACHIEVEMENT GAP FOR ALL CHILDREN

It is surely an understatement that this book of collected, high-quality uses of visual tools is important for the age we live in right now: the age of information. But schools are not interested in just how to help students remember information, but in how to teach students to transform information into active knowledge. Today's students are the ones who will be responsible for knowledge creation and knowledge transfer in the future—as so-called knowledge workers—so we need to give them tools *right now* for learning how to construct meaningful knowledge from information, not merely regurgitate information.

Of course, this philosophical and political stance has been the foundation for both progressive and conservative educators' seemingly endless critique of public school education for generations: We don't teach children to think. The "ends" of differing political-educational doctrines seem the same in the sense of wanting to create an internal capacity in our children within our democratic system for higher-order thinking, but the "means" always seem in dispute. My concern is that there have been few if any breakthroughs to concrete solutions for *how* to give all students the wherewithal to meet this challenge. Visual tools as documented in this book and in the research have now proven to be such a breakthrough in education: the means to the outcome of facilitating content-specific acquisition of information *through* higher-order thinking through visual representations.

As we come to believe more and more that knowledge is not only interconnected but also interdependent, then we will see how much we need to provide students with these dynamic new mental tools. These tools will help them unlearn and

relearn what we have taught them so that they may build knowledge and also have the experience and capacity to create new tools for making their world. It is all too clear, though, that for many children of color and children in poverty, the overriding focus, right now, is often on making it to the next rung of minimum standards through repetitive, basic skills instruction and not on the mediation of deeper learning and thinking abilities. In his newest book, Jonathan Kozol documents the resegregation of schools, especially in urban centers (Kozol, 2005). Kozol documents how it is not just the separate and unequal funding of schools that affect African American, Latino, and other children who may not be empowered in the mainstream language, culture, and economy. It is that which is less visible: the tracking of these children into rote-learning classrooms that ultimately dooms them to an educational and economic underclass.

Unfortunately, some schools are attempting to jump test scores in the short run so that they can make the next rung of *adequate yearly progress*, but in the meantime, many students are receiving instruction that is not matching their natural mental capacities to do higher-order work. My focus on the use of visual tools for promoting higher-order thinking in low-achieving schools, most recently with my own work with Thinking Maps, Inc., and also in collaboration on projects with the nonprofit group National Urban Alliance, has proven to me that educators can deliver a standards-based curriculum that integrates "the basics" with higher-order processes while engaging students' diverse cultures and languages.

Out of necessity, high-quality "knowledge tools" are desperately in demand with students' access to new technologies and communication tools. Teachers, parents, and employers face pressing questions: How are all students *right now* processing and filtering the vast amounts of information they confront through endless media outlets? How are students *right now* working fluidly with the newest technologies to rapidly generate, change, and communicate meaningful knowledge? The concern is real: *right now* few classroom practices or tools exist to explicitly support learners in filtering, organizing, and systematically assessing raw slices of information. Reading comprehension, in the traditional sense of reading a text, is not enough: students must *right now* grapple with data in many forms delivered in high-speed chunks through numerous technologies. At the same time, they must perform at high levels of thinking in high-stakes gatekeeping exams. Few tools provide a concrete means to transform unprocessed information into useful patterns of knowledge that are at once usable and easily communicated to others. And few tools, once mastered, can help learners manage the unknown overflow of information for a lifespan.

While visual tools have been shown to be effective in schools, educators need to become aware that visual tools and software programs are now commonplace throughout the world of work, *around* the world. Graphical software tools for organizing information are now added to word-processing and database spreadsheets to help workers and clients communicate smoothly as novel ideas, information, inventories, and solutions to problems are moved through systems.

The question that drives this investigation of visual tools is this: How may we introduce students to and support their use of visual tools so that they can capably handle continuous change and become lifespan learners, as they progress from kindergarten throughout their senior years and across their work lives? The promise of this book, and the proof within, shows that all students may be engaged with visual tools at the highest levels. It has become ever clearer that visual tools as

high-quality nonlinguistic representations are designed as practical, effective, dynamic, collaborative, and learner centered. Importantly, these proven tools are theory embedded, transferable across disciplines, and are becoming part of the assessment and self-assessment processes of learning. As we will investigate, graphic *languages*—which go well beyond simplistic brainstorming activities and generic "blackline master" graphic organizers—offer teachers and students a rich and coherent synthesis of isolated visual tools. Languages such as Mind Mapping®, STELLA® Systems Thinking, Concept Mapping™, Rationale® Software, and Thinking Maps®, when used with depth over time, bring about significant transformations in student performance and offer a pathway for long-term development of their thinking abilities.*

OVERVIEW OF THE BOOK

This book is a synthesis of two prior books, new research in the field, and also new applications with a language of visual tools I developed called Thinking Maps. In *Visual Tools for Constructing Knowledge,* published by the Association for Supervision and Curriculum Development (Hyerle, 1996), I offered a more theoretical overview of visual tools, broken into three basic and sometimes overlapping categories: brainstorming webs, "task-specific" graphic organizers, and conceptual mapping (that I called *thinking-process maps*). This first book was supported and guided by Dr. Art Costa, who wrote the prologue, and who has graciously let me republish it in this edition as a rich framework for seeing visual tools as extensions of what makes us human.

I had explored these three types of tools, highlighting that in practice they sometimes had common visual *forms*, but often significant differences in purpose and *function*. This theoretical work, some of which is still useful, was based on my doctoral research at the University of California at Berkeley and at Harvard University, and is synthesized in my dissertation, *Thinking Maps as Tools for Multiple Modes of Understanding* (Hyerle, 1993). The book you have in your hand is also grounded in the sequel *A Field Guide to Using Visual Tools* (Hyerle, 2000a), a compilation of more practical examples from the field that included excerpted writings and stories from many educators, parents, and businesspeople who had created novel applications of visual tools. The work also showed, in explicit terms, how each of these different tools was used and gave examples from classrooms and publishers.

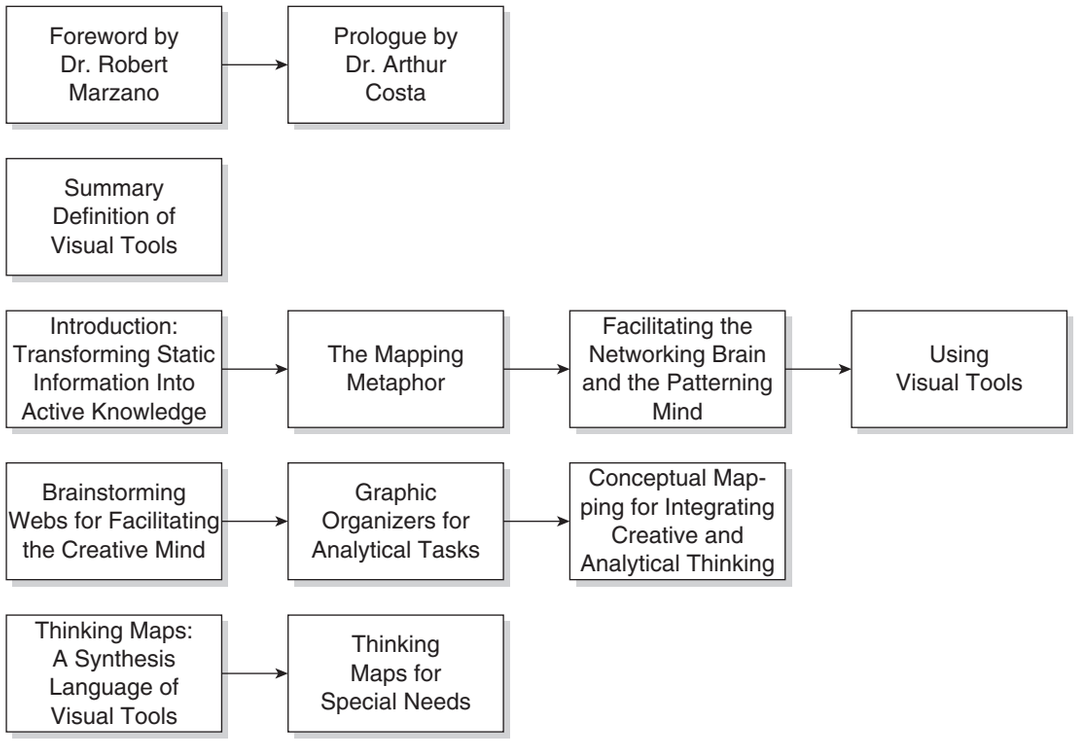
In this book, I have included excerpts from many of these sources and expanded the "overview" synthesis pages for many of the tools so that teachers can try out the tools with students as a starting point to move from isolated uses to more comprehensive, schoolwide uses of visual tools. These overview pages include a model document that is an exemplar of how to take the tool into practice, but I have not

*Many isolated, generic forms of visual tools presented in this book have been used by educators and businesspeople for generations. When a developer or researcher of a set of visual tools, or visual tools software, and/or a language of visual tools that requires specialized techniques, resources, and training has a registered copyright, I have used the appropriate symbol that legally and professionally recognizes their work, and I hope that readers will investigate and honor these distinctions.

provided blackline masters for duplication. Why not? I have learned from over 20 years of experience with visual tools of every kind—and I have tried most of them with students—that if you have to duplicate a blackline master for students, you are asking them to duplicate your pattern of thinking, and not draw out and construct their own. I also have learned from my own experience and from observing other educators that we often *severely* underestimate students' capacities. This occurs especially in those schools and classrooms where teachers are working with students who land in the lower quartiles of testing and those with special needs. For many different and complex reasons, many educators end up coddling and thus inhibiting these students' cognitive development, rather than explicitly mediating their thinking toward high levels and into their own zone of proximal development (Vygotsky, 1936/1986).

This book is most easily understood as having three stages. The first three chapters, as shown in Introduction Figure 2, introduce you to, respectively, the metaphor of mapping, the research on the effectiveness of visual tools, and three types of visual tools, including general guidelines for using them. Chapters 4, 5, and 6 focus in on three basic types of visual tools, with pathways for applying them: brainstorming webs, graphic organizers, and conceptual mapping. The final two chapters document the now extensive use of a synthesis language of visual tools I developed, called Thinking Maps. Chapter 7 introduces Thinking Maps and then reveals how these tools, as a language, have been used successfully for English-language learners, for Mapping the Standards, and for leadership practices across

Introduction Figure 2 Flow Map of Book



whole schools. After my introduction to the tools, three authors—Stefanie Holzman, Sarah Curtis, and Larry Alper, respectively—give us insight into these three applications. The final chapter documents how a school in West Newton, Massachusetts, Learning Prep School, with elementary through high school students and all with language-based special needs, has fully implemented Thinking Maps over multiple years. The well-documented results show changes in students' cognitive development, performance on classroom tasks and the Massachusetts Comprehensive Assessment System (MCAS) test, as well as profound shifts in how these students *see themselves* as learners through the differentiated uses of Thinking Maps.

This last chapter, written by Cynthia Manning, Coordinator of Thinking Maps at Learning Prep School, is a testament to what can happen when a whole school faculty explicitly and systematically, with coherence and sustained effort, delivers to their students a visual language for learning based on fundamental cognitive processes. One student is quoted as saying that these tools "get me to think." The demonstrated successes described in detail in the final chapter reverberate back across the book as the effort and outcomes portrayed heighten the central premise of this book: empowering students at every level to transform *static* information into *active* knowledge. These visual tools offer direct pathways from lower-order applications to higher-order thinking, from remembering content information to transforming information into conceptual understandings, from being able to map out and write transitional sentences in an essay to envisioning and planning students' dramatic transition from school into the often daunting new world requiring self-knowledge.

The students who are quoted in the last chapter represent the vision of this book: showing how visual tools are enabling students to take control of their own thinking and actions so they can transform information into knowledge that, in turn, leads to these same students' being able to transform the daily journey of their lives into a continuous process of self-knowing and renewal.