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Thinking Maps® as a Transformational Language for Learning

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Topics to be discussed:

- introducing a common visual language for learning
- describing five essential characteristics of Thinking Maps using a Bubble Map
- overviewing the book using a Tree Map for revealing themes of transformational learning using Thinking Maps

Much like a momentary respite before jumping back into an exciting journey, this book represents a resting place for present research, results, and models of practice from over 15 years of bringing Thinking Maps into schools. The authors of the chapters before you bring forth insights grounded in practical examples and experiences from their

travels. Together, their work creates a compelling display of what can happen when Thinking Maps are used as a language for learning by students across different cultures and languages, for deepening instruction by teachers in classrooms, and for raising the quality of professional development and change processes within whole schools.

This is because as a language of visual tools grounded in thinking processes, Thinking Maps ultimately unite a school faculty around a well-documented need in classrooms and a central organizing principle for twenty-first century education: *equity of access to—and explicit teaching of—higher-order thinking tools for every child and every adult on the journey of lifelong learning.*

Thinking maps are eight fundamental thinking skills defined and animated by maps, and introduced as *a common visual language* for thinking and learning across whole learning communities (Figure 1.1). From the beginning, the focus of the work using Thinking Maps has been on *all* teachers immediately training *all* of their students across their *whole* school to become fluent with the tools. Over the years, approximately 4000 whole school faculties have implemented the maps, thus representing a great multiplier effect as large numbers of students from kindergarten to college have become fluent in Thinking Maps. From first introductions to complex applications over time, students, teachers, and administrators move from novice to expert use in these tools, using maps independently, in cooperative groups, and as participants in schools for visually sharing ideas and for creating final products.

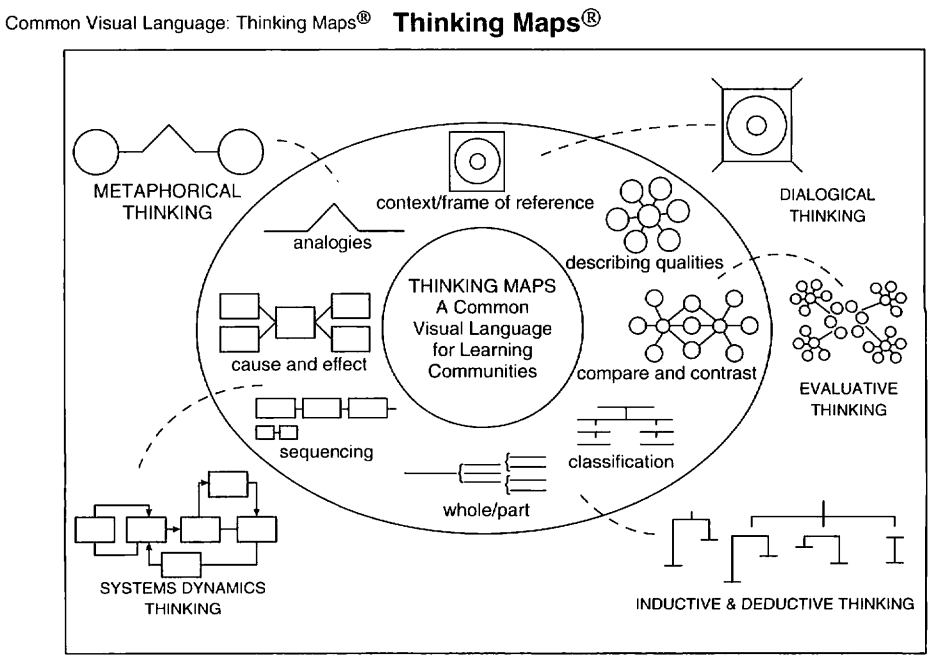


Figure 1.1 Introducing the Thinking Maps Model

From the authors of these chapters, you will learn about schoolwide changes in teachers' perspectives and student performance in an inner-city elementary school in Long Beach, California, where 85% of the students entering classrooms speak Spanish as their first language; special education students in a middle school in North Carolina making performance leaps of over three years' growth in mathematics; girls from a single-sex, independent, K–12 school in New Zealand rising over four years to the top of that nation's educational ladder; and entering junior-college students in Mississippi significantly shifting reading comprehension scores, while those in the nursing program dramatically outperform their peers of previous years.

THE BIG PICTURE

The purpose of this introductory chapter is to give you a big-picture overview of how the wide-ranging stories across the 16 chapters weave together to create a unified theme of Thinking Maps as a transformational language for learning. It also offers readers who are not familiar with Thinking Maps a brief history and theoretical background for the work, definitions of the tools, and a wider description of how the tools support teaching, learning, and leadership in schools. Upon first glance, some educators perceive the maps as just an interesting set of graphics, rather than as a cohesive, theoretically grounded language. One author, the principal of the inner-city elementary school mentioned above, even begins her chapter with this experience: When she first introduced her staff to the idea of implementing the maps across their school, they looked at the maps and said, "But we already do that!" By the end of the school year and into the second year the school had transformed itself into a learning community where students were making performance leaps well beyond teachers' expectations.

Together, the authors share wide-ranging outcomes including *significant* quantitative performance shifts by students and qualitative changes in instruction from schools within cityscapes and sprawling new suburban neighborhoods to rural landscapes and into multiple countries. The chapters come together under four major sections, as shown in the table of contents Flow Map (Figure 0.1), and descriptions below:

Section 1 integrates research on best practices, brain research, and a range of other models such as habits of mind, multiple intelligences, and learning styles with practical examples of how Thinking Maps mediate students' thinking, learning, and metacognitive behaviors. The background offered in the first section lays the foundation for showing how Thinking Maps are used for content-specific learning in Section 2. Applications in the areas of reading comprehension, writing processes, mathematics, and technology offer a view of how thinking skills may be taught directly to students for independent transfer across the disciplines, while directly meeting state standards. This focus on content learning leads into

Section 3, which shows how Thinking Maps work across whole schools for improving teaching and learning, from descriptions of elementary, middle, and K–12 schools that have implemented the tools for multiple years, to research from a junior college revealing significant results, to direct training of students in Singapore. The fourth and final section broadens the focus to look at Thinking Maps as tools that simultaneously support student as well as organizational learning. Thinking Maps facilitate the transformation of professional development within schools by "inviting explicit thinking" by teachers, in the mentoring processes with beginning teachers, and by uniting whole school faculties around a common visual language for "constructivist conversations."

From a big-picture point of view, the successes that shine through the research and results discussed in this book reveal the development of rich content knowledge and, more important, reflections on the continuous cognitive development of every learner—student, teacher, and administrator—in a school. Many educators, as described in this book, brought Thinking Maps into their schools because they believed that there would be an impact on teacher instruction and student performance. They were proven right. Yet many of these teachers and administrators did not foresee that Thinking Maps would also transform the culture of learning across the whole school.

A BRIEF INTRODUCTION TO THINKING MAPS AS A LANGUAGE

Every one of the authors of this book has contributed in different ways over the years to the continuing evolution of Thinking Maps. The themes that emerge here go way beyond the first musings I had back in the spring of 1986. I remember a moment of clarity immediately followed by a humbling awareness. I was eagerly generating ideas for a workbook I was writing, meant for middle school students from underachieving schools. The focus was on the direct facilitation of their thinking skills abilities. I thought I knew what I was doing—and then *I realized what I didn't know.* Two core questions jumped from my mind, the first more theoretical, the second more practical:

> What are fundamental thinking skills?
>
> How do we support all learners to transfer these skills across disciplines?

These questions came directly from my frames of reference: I had been teaching in inner-city classrooms in Oakland, California, while studying the continuing underachievement in inner-city schools within low socioeconomic communities (serving mostly African American children). I was also becoming increasingly more aware of the implications of the (still

existing) inequalities of access to quality education and the systemic achievement gap. I was looking at the past research on cognition, cognitive styles, and mediation of thinking and learning, while trying to make sense of the array of new theories and practices of thinking skills instruction. During this time, the proponents of the nascent constructivist paradigm were challenging the strict behavioralist mindset. As these many frames of reference converged in my mind, another insight arose, first hurriedly scrawled across a paper napkin. My response was not a grand theory or model, nor a program of developmental lessons with a complex instrument for assessing thinking. It was a language called Thinking Maps.

Calling Thinking Maps a *language* was a clear expression of how these eight visual tools, each surrounded by a visual frame of reference, work in unison, enabling all learners to communicate what and how they are thinking. Through this language, we have found that all learners convey, negotiate, and evolve meanings with others, and within themselves, through visual patterns of thinking.

As human beings, we thrive, creatively and analytically, largely because of our innate capacities for communicating through languages: alphabets, numerical systems, scientific symbols, musical notation, software programs, international sign language, and braille. Yet all of these languages have a foundation of fundamental cognitive structures such as sequencing, categorizing, comparing, etc. Thinking Maps is really a meta-language for learning—an interrelated set of thinking patterns—for communicating and synthesizing our thinking from across these other languages. Because of the universality of the cognitive skills upon which this language is based, and the visual-spatial, nonlinguistic form of the tools, the maps are used fluidly across content areas and cultures as shown in this book.

Thinking Maps, as a language, are eight cognitive skills, each represented and activated by "graphic primitives" as displayed in static form in Figure 1.2 and expanded through our individual and cultural frames of reference. These graphic primitives are used together, linked together, and visually scaffolded to create other products of learning such as a piece of writing. Learners and teachers alike transfer and adapt the maps to shape and re-form otherwise static content knowledge and enter interdisciplinary problem-solving, knowing they have tools to organize their thinking. Ultimately, as the maps expand and integrate with words, numbers, and other symbols on a page, colorfully across a white board, or on computer screens, learners face the boundless nature of their own thinking.

Thinking Maps as Visual Tools for Constructing Knowledge

On a global level, Thinking Maps also may be defined as a synthesis of three types of visual tools that educators and business people have used for generations: mind mapping–brainstorming webs, graphic organizers,

Graphic Primitives and Definitions

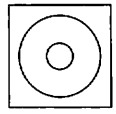
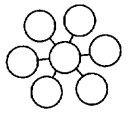
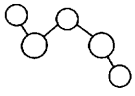
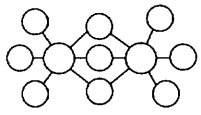
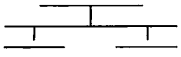
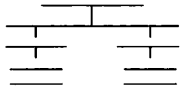
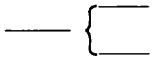
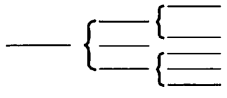
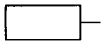
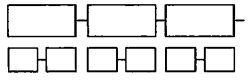
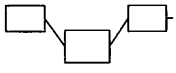
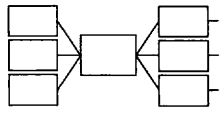
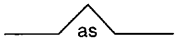
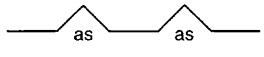
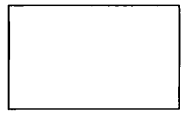
primitives	Thinking Maps and the Frame	expanded maps
	The Circle Map is used for seeking context. This tool enables students to generate relevant information about a topic as represented in the center of the circle. This map is often used for brainstorming.	
	The Bubble Map is designed for the process of describing attributes. This map is used to identify character traits (language arts), cultural traits (social studies), properties (sciences), or attributes (mathematics).	
	The Double Bubble Map is used for comparing and contrasting two things, such as characters in a story, two historical figures, or two social systems. It is also used for prioritizing which information is most important within a comparison.	
	The Tree Map enables students to do both inductive and deductive classification. Students learn to create general concepts, (main) ideas, or category headings at the top of the tree, and supporting ideas and specific details in the branches below.	
	The Brace Map is used for identifying the part-whole, physical relationships of an object. By representing whole-part and part-subpart relationships, this map supports students' spatial reasoning and for understanding how to determine physical boundaries.	
	The Flow Map is based on the use of flowcharts. It is used by students for showing sequences, order, timelines, cycles, actions, steps, and directions. This map also focuses students on seeing the relationships between stages and substages of events.	
	The Multi-Flow Map is a tool for seeking causes of events and the effects. The map expands when showing historical causes and for predicting future events and outcomes. In its most complex form, it expands to show the interrelationships of feedback effects in a dynamic system.	
	The Bridge Map provides a visual pathway for creating and interpreting analogies. Beyond the use of this map for solving analogies on standardized tests, this map is used for developing analogical reasoning and metaphorical concepts for deeper content learning.	
	The Frame	
	The "metacognitive" Frame is not one of the eight Thinking Maps. It may be drawn around any of the maps at any time as a "meta-tool" for identifying and sharing one's frame of reference for the information found within one of the Thinking Maps. These frames include personal histories, culture, belief systems, and influences such as peer groups and the media.	

Figure 1.2 Thinking Maps Graphics and Primitives

and thinking-process tools such as concept mapping. During my later research on Thinking Maps, I became intrigued by different types of visual tools, finally writing two comprehensive books on the theory, practice, and degree of effectiveness of these tools (Hyerle, 1996, 2000). I discovered through research, my own teaching, and experiences that each of these types of visual tools offered useful ways of visually accessing knowledge.

I also found that each kind of visual tool also had some weaknesses that could not be overlooked. Early mind-mapping techniques that surfaced in the early 1970s facilitate open-minded thinking yet lack the consistent structure and deeper levels of complexity required for today's classrooms. The now familiar "graphic organizers," which surfaced in the 1980s, help students organize large amount of information and scaffold thinking but fail when they become static, blackline masters focused on isolated content tasks selected by the teacher, rather than initiated by the learner. These tools are task-specific organizers because they usually focus on a specific content task and are often confined to the task at hand rather than easily transferable across disciplines.

A third kind of visual tool, "thinking-process" maps, is based on facilitating well-defined thinking processes. Two of these forms, concept mapping and systems diagramming, richly convey complex interdependencies in concepts and systems, respectively. Embedded in the strengths of these two models are also limitations: These models are each dependent on one form of visually structuring knowledge, hierarchical forms for concept mapping and feedback loops for systems diagrams. This leads to an underrepresentation of other thinking processes. In addition, in practice, the translation of these complex models is often daunting to students and teachers alike.

The combined practical, theoretical, and critical attributes of these different types of visual tools have informed the continuing evolution of Thinking Maps into a twenty-first-century language for learning, synthesizing many of the best qualities of these other types of visual tools: an evolution from the generative quality of brainstorming webs, the organizing structure of graphic organizers, and the deep cognitive processing found in concept maps.

FIVE QUALITIES OF THINKING MAPS

The key characteristics of different types of visual tools led to Thinking Maps becoming a language of cognitive patterns that is analogous to the key or legend of symbols that you will find on *any* map. The graphic symbols are the simple visual starting points for generating complex maps for cognitive networks that link together content using a range of thinking processes. Each of the eight maps is theoretically grounded in a fundamental cognitive process or thinking skill. Awareness of five critical attributes of Thinking Maps (Figure 1.3), and a close look at just one of the eight maps (the Flow Map), will clarify how all the maps work, and how they work together.

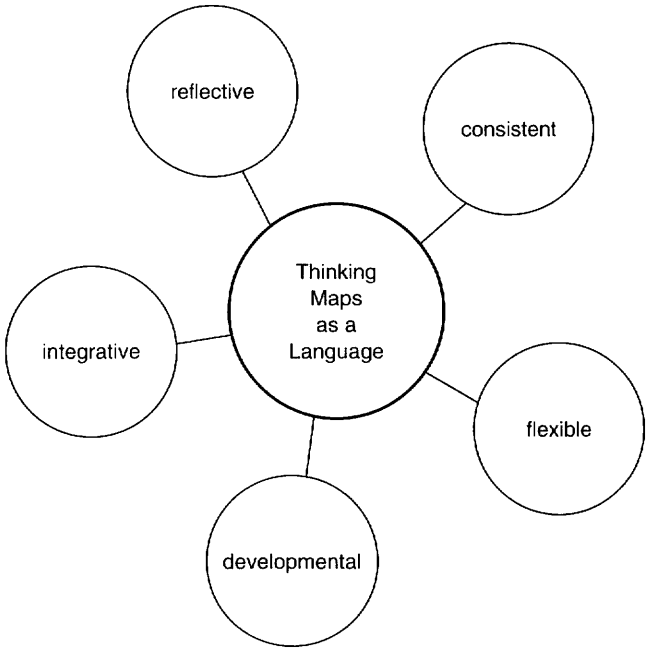


Figure 1.3 Qualities of Thinking Maps Bubble Map

Consistent. The symbol grounding each map has a unique, but consistent, form that visually reflects the cognitive skill being defined. For example, the process of sequencing is represented by the Flow Map starting with one box and one arrow. This is the graphic primitive upon which the map is used to show linear concepts. Thus a Flow Map might show just the three boxes, with key information written inside, showing the beginning, middle, and end of a story.

Flexible. The cognitive skill and the graphic primitive for each map lead to a flexibility in form and to the infinite number of ways the map can grow and be configured. So a Flow Map of a story may start at the beginning but grow in complexity to show many stages and substages of the story. This map could be drawn rising from the bottom left to top right of the page, reflecting the rising action of a story.

Developmental. Because of the consistent graphic primitives and flexible use, any learner (of any age) may begin with a blank sheet of paper and expand the map to show his or her thinking. A Flow Map can be a few boxes long or evolve over time to fill a whole page. The learner—and the content of the learning—determines the complexity of the map. Every learner, from early childhood on, can use the Flow Map to show what he or she knows about a story and thus produce a different configuration of the content.

Integrative. There are two key dimensions of integration: thinking processes and content knowledge. First, all of the maps may be used and integrated together. Using the example of a story, a learner could use the Flow Map to show the plot, a Double Bubble Map to show

a comparison of characters, and then a Tree Map to identify the main ideas and supporting details. Multiple Thinking Maps are used for solving multistep problems, for comprehending overlapping reading text structures, and for use during phases of the writing process. Second, the maps are used deeply within and across content areas. For example, the Flow Map is used for plot analysis in reading comprehension, order of operations in math, historical timelines in social studies, and studying recurring natural cycles in science.

Reflective. As a language, the maps unveil what and how one is thinking in patterns. Not only can the learner look down and reflect upon the pattern of content, but the teacher also reflects on and informally assesses the content learning and thinking processes of the learner. In addition, at any time and with every map, learners may draw a rectangular frame around a map. This represents one's frame of reference, or metacognitive frame. For example, a high school student may have sketched out a Flow Map and identified a half dozen turning points in the flow of a novel. By drawing the frame around the map, the student can jot down what influenced this analysis and the references in the text. The framing tool goes beyond merely referencing *what* one knows, to ask the learners *how* they know the information within each map.

These five characteristics are exemplified by the work of Bob Fardy, a science curriculum coordinator in the Concord, Massachusetts, schools. Below, Bob discusses how he used multiple maps and the frame during an action research design to help second grade students in learning about how to understand different types of rocks and how to develop a rubric for further scientific discoveries. He reveals how these consistent and flexible visual tools are integrated together in classrooms through practice that is developmentally appropriate and reflective.

Developing a Rock Rubric using Multiple Thinking Maps

(by Bob Fardy)

At the beginning of a "rocks and minerals" unit, I introduced second-grade students to three Thinking Maps: the Circle, Bubble, and Double Bubble Maps. In our school district, classroom teachers often use the K-W-L strategy (Ogle, 1988) when their students begin a new topic or unit of study. The strategy is an effective way for students, at the beginning of the unit or lesson, to identify what they already know (K) and what they want (W) to know about a topic, and to identify what they have learned (L) at the conclusion. As both teachers and students were familiar with this approach, I introduced the students to the Circle Map and asked them to share what they already knew about rocks.

The Circle Map (Figure 1.4) proved to be an effective brainstorming tool for the students. I recorded and displayed the students' responses between the concentric circles of the map. This tool helped me to carefully avoid any kind of linear listing, clustering, or linking of their responses that might imply or infer some kind of hierarchical ordering of their ideas and/or making connections between and among their comments. In this way, the Circle Map served as a classroom mirror, reflecting the fluency and flexibility of students' thinking, ideas, and information at that moment in time. As the students continued to brainstorm what they knew about rocks, I began to see the Circle Map as more than a mirror that reflected the students' responses. The map was also serving as a window, providing a means to access and assess the students' thinking. I could identify their prior knowledge and surface some possible misconceptions and alternative conceptual frameworks. Indeed, the Circle Map was emerging as an effective tool for both assessment and brainstorming.

For me, the distinguishing feature of the eight Thinking Maps, as compared with more traditional visual tools, is the "Frame" of reference which, as a metacognitive device, added another dimension to the lesson. As the students and I reviewed the Circle Map, we acknowledged the fact that "we already knew many things about rocks." Transferring our attention to the Frame, I asked the students, "*How* did you learn what you already know ?" In responding to this question, the students were reflecting on their own learning and at the same time were informing me as to the diversity of learning experiences that had been their avenues for acquiring knowledge and constructing meaning. The students identified their "ways of knowing and learning" in the outside frame.

Having surfaced and assessed the students' prior knowledge, I distributed rock samples (granite) to each student and introduced the Bubble Map. With the aid of hand lenses, the students examined the samples of granite using multi-sensory observations, and, using the Bubble Map, recorded their descriptions of the properties of granite. After a few minutes, the students shared their map (Figure 1.5).

Most important, as they shared their maps, the second graders identified the discrete types of properties that they had been observing: color, texture, shape, patterns, luster, minerals in the rock (composition), size, smell. We defined the generated list of rock properties as "Our Rock Rubric." The students subsequently referred to the "Rock Rubric" as they began to observe more rock samples (gneiss) and recorded their observations using a new Bubble Map and Frame.

Having shared their Bubble Maps about granite with their classmates and by using the rock rubric as a guide, the students made and recorded even more observations about the gneiss samples. As *the students* increased the number of observations, they began to expand their map, adding more "bubbles" of properties as needed. Now the students were beginning to take greater ownership of the visual tool, using and adapting it to meet their needs. For the students, the Bubble Map was not a static "fill-in-the-bubbles worksheet." Instead it became a dynamic, versatile,

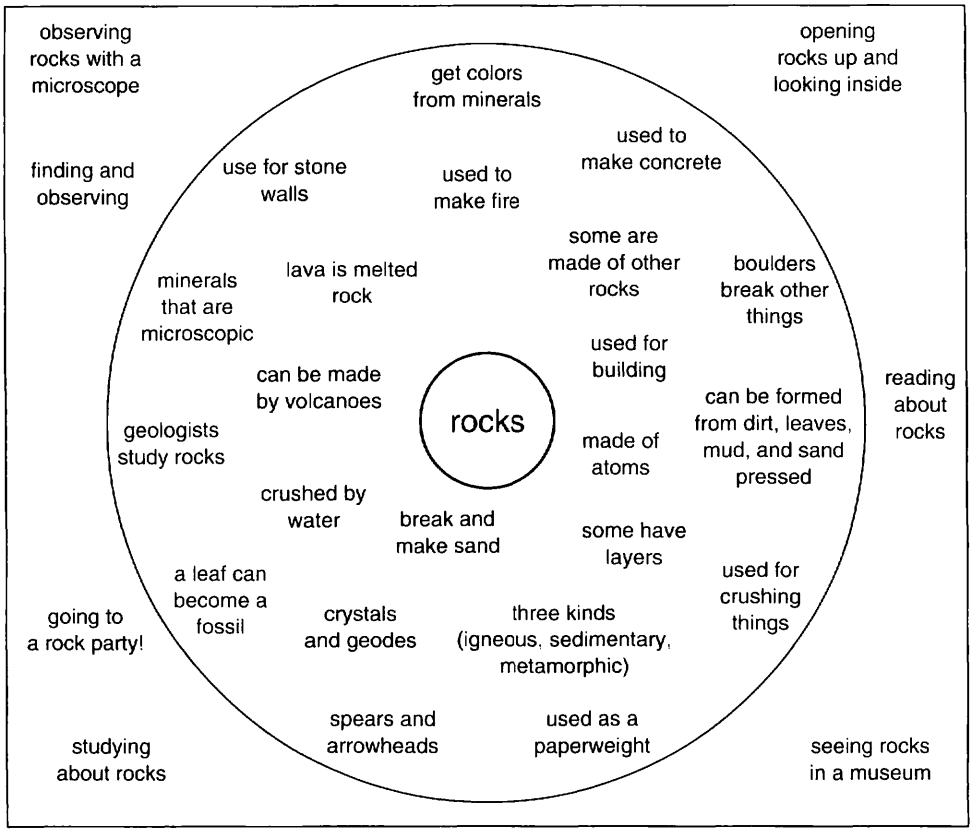


Figure 1.4 "What Do You Know About Rocks?" Circle Map

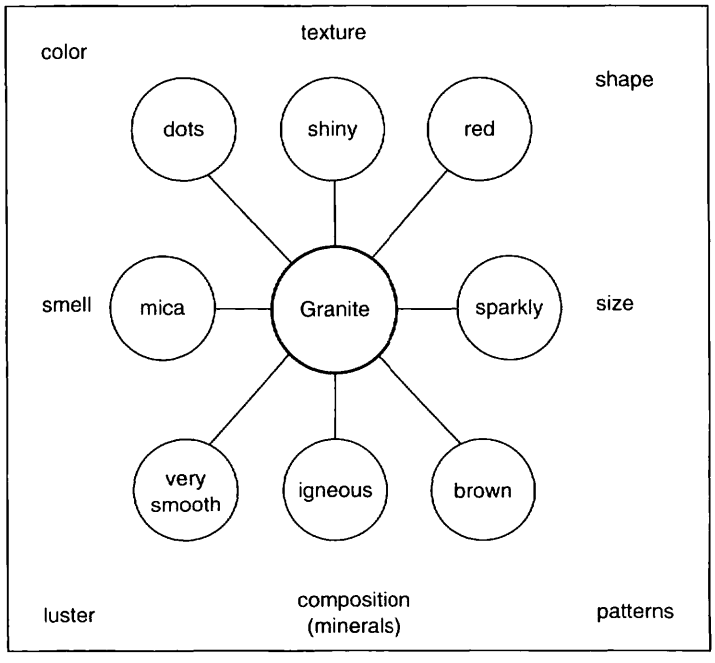


Figure 1.5 Describing Properties of Gneiss Bubble Map

open-ended graphic with a certain "elasticity" that could be stretched in tandem with their thinking.

In the concluding moments of this lesson, I asked the students, "How are granite and gneiss alike and different?" Each student literally had both samples in hand in order to compare and contrast these two types of rocks, but in order to facilitate our discussion, the students also had two Bubble Maps which could be merged into a third Thinking Map, a Double Bubble Map (Figure 1.6).

In the area of science, students are constantly comparing and contrasting objects, organisms, phenomena, events, and ideas within and about the natural world. It has been my experience that we as teachers often use Venn diagrams as "the" graphic organizer for compare–contrast. However I have observed that often certain graphic organizers—such as Venn diagrams—can be problematic. Children, particularly young children, as concrete learners can at times become focused on the seemingly fixed format and nature of the graphic. For example, if the Venn diagram is drawn with a relatively narrow area of intersection, does that imply that there is a limited commonality between the objects that are being compared? If I had asked the students to compare granite and gneiss by constructing and using a Venn diagram, how would they determine to what extent to overlap the circles?

The Double Bubble Map clearly was a more "user-friendly" tool for the students to manipulate as they compared granite with gneiss, developing naturally from the separate Bubble Maps they had created and more in keeping with a constructivist approach to learning. Following this first lesson with rocks and minerals, the students had additional opportunities to observe and describe the properties of ten other types of rocks including conglomerate, sandstone, pumice, obsidian, slate, shale, limestone, marble, basalt and granite schist. These additional rock explorations set the stage for the second lesson (a week later), when the students sorted and classified the twelve kinds of rocks according to their own classification systems. I then introduced the Tree Map that supported students with another key scientific process, categorization, or the creation of taxonomies.

As I reflect on my efforts at using these four visual tools, I find that the insights gained and discoveries made about the relationship between visual tools and teaching, learning, and assessment to be both rewarding and challenging.

As this practical experience shows, Bob and his students were able to fluidly move *with* their thinking and to the conceptual outcomes of this discovery process through the use of multiple Thinking Maps. The kind of scientific thinking and discovery required was not a linear process: The students needed to flexibly pattern information in order to construct understandings. They could evolve ideas from brainstorming to the

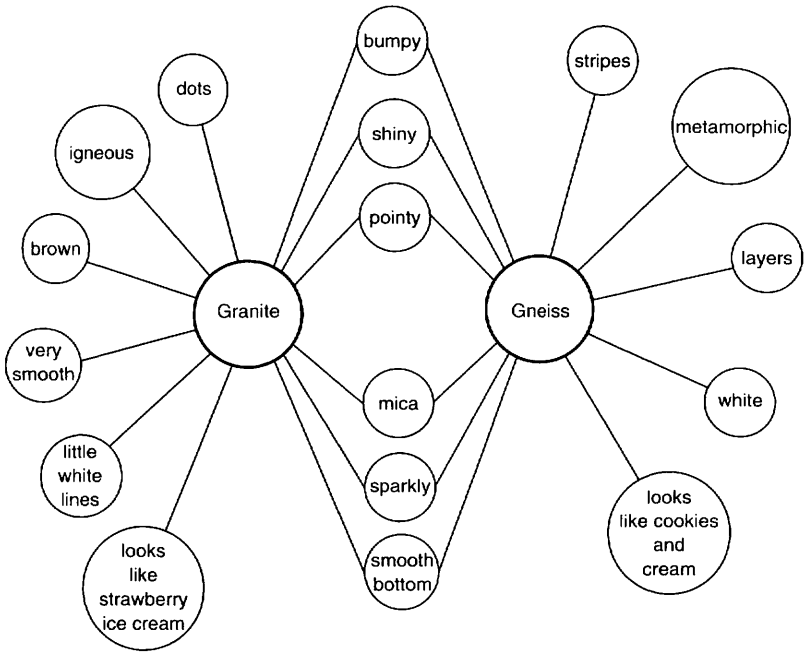


Figure 1.6 Comparing and Contrasting Gneiss and Granite Double Bubble Map

development of a rubric and finally on to the creation of a taxonomic Tree Map. During this process, the class also used the Frame to reflect on the content and experiential background that influenced their perceptions.

This experience in a second-grade classroom—an exemplar of the five qualities of Thinking Maps—may be a guide to reading this book, as all of the authors describe how the consistent, flexible, developmental, integrative, and reflective dimensions of this language draw learning deeper while creating a common form for collaborative problem solving and discovery across content areas.

Thinking Maps as a Transformational Language for Learning

As you review the five qualities of Thinking Maps in the Bubble Map, the Circle Map showing the language in Figure 1.1, and the Flow Map of the contents of this book, you can see the character and sequence of this book. As you read the book, no doubt you will begin to create in your mind an evolving picture of the association of ideas, applications, and results with some of the same findings revealed in Bob Fardy's action research detailed above. With each chapter you read, this picture may shift as you interpret the findings. This certainly happened with me as I read, reread, and began editing these chapters. The themes, large and small, began to emerge in my mind, and I could not keep track of all of the information and concepts, finally leading me to create a Tree Map as one expression of the complex, overlapping discoveries made by the authors (Figure 1.7).

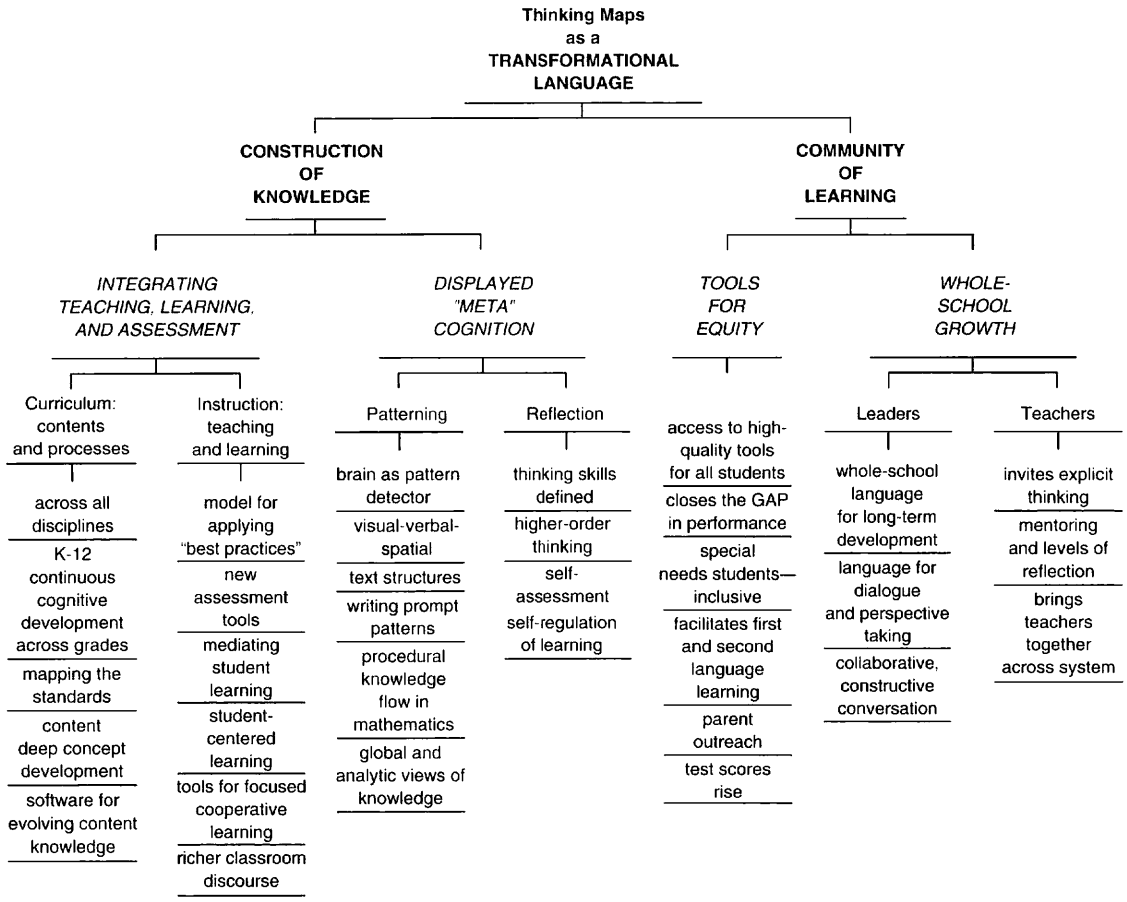


Figure 1.7 Thinking Maps as a Transformational Language

On a blank piece of paper, starting at the bottom of the page, I began associating details that kept growing in clusters, like leaves on a tree, from across chapters. These informal groupings drew me inductively up to the lower branches, revealing seven basic categories near the middle of the page. I finally reached to a new layer of limbs: four generalizations that for me most clearly represented a more expansive view. This structure enabled me to think about and summarize what I interpreted as key concepts: integrating teaching, learning, and assessment; displayed metacognition; tools for equity; and whole-school growth.

Integrating teaching, learning, and assessment. One of the greatest concerns in schools today is how teachers can bring together curriculum and instruction in a way that is meaningful for student learning, while focusing on content standards and assessments. Almost every author in this book addresses this issue in some way, investigating how Thinking Maps become an integration point for these areas, especially across the most crucial areas of performance: reading and writing across disciplines, and mathematics (Chapters, 7, 8, and 9 respectively). For example, in Chapter 8, Jane Buckner shows how the maps support the development of writing processes across disciplines and all grade levels, from emergent writers to

high school levels, by providing clear "structures for organization." She emphasizes the need for teachers to model the integrated use of the maps across writing prompts and links this work to specific state assessments.

Displayed metacognition. This term was coined by Dr. Art Costa as a description of the power of visual tools, because these tools display before the learner a range of cognitive patterns of thinking, thus enabling richer reflections. This phrase also captures a central point made by many authors: When using Thinking Maps, students, teachers, and administrators become self-reflective, looking into their own thinking, and become self-regulated learners. These patterns, as Chris Yeager discusses in Chapter 2, are extensions of how the brain works. The brain actively binds data together through neural patterns and networks information, pruning as needed, chunking information, grasping bits of linked information in working memory, and then holding onto them in long-term memory. Chris also dovetails Robert Marzano's research on best practices with brain research using a description of a fifth-grade social studies class. Bonnie Singer follows in the next chapter by telling the "Story of David," a boy with severe learning disabilities who, through the use of these tools over two years, was transformed from being a student with low performance to a self-regulated learner.

Tools for equity. While the idea of facilitating cognitive and metacognitive development has been central to the past 50 years of educational psychology and neuroscience, often the promise of thinking skills instruction remained elusive and inaccessible to those in the greatest need. Another theme that arises from this book is an understanding that the maps directly support teachers in mediating students' thinking. In Chapter 5, Yvette Jackson discusses how the maps become tools for mediating thinking and literacy development, especially when supporting children of color who are struggling to learn in underachieving, inner-city schools. As Yvette points out, these children are often merely remediated through repetitive cycles of content learning but not deeply mediated through their thinking abilities.

Ultimately, the issue here is about equal access to high-quality tools for thinking and instruction that support *all* students' thinking abilities, across languages and cultures at the highest level. This call for equity is answered throughout the book, most clearly in the stories by Stefanie Holzman in Chapter 10 from a school in California and by Marjann Ball in Chapter 13 from a junior college in Mississippi. Both of these chapters present research and results showing significant gains for closing the achievement gap.

Whole-school growth. The field of education is now faced with the complex problem of teaching to the "whole child" while also attempting to transform "whole schools." We are moving away from seeing students as individual learners in straight rows of desks to a model of learning based on a circle of learning. Many schools are directly teaching to the social and

emotional needs of all children, understanding that these are not just pathways to learning content, but are important in and of themselves. This involves consciously integrating conflict resolution and cooperative and social-emotional learning into the classroom context.

A similar shift is now occurring in the area of organizational change across whole schools as educators are becoming aware of how learning and leadership are intimately connected. An undercurrent of every chapter in this book is the depth of self-learning attained by students, teachers, and administrators *in the context of working across whole schools.* In Chapters 10–12, we are offered detailed histories of how three very different schools across the K–12 spectrum implemented Thinking Maps as a language in their whole schools, clearly demonstrating how learning, teaching, and leadership are united through these common tools. In the last three chapters, the authors focus on how educators learn to work together by visually surfacing perceptions and ideas through their interactions with each other. So often the conversations that happen in meetings in schools become procedural rather than reflective, sometimes combative rather than constructive. Larry Alper closes his chapter and this book by offering the term *constructivist conversations* as an expression of how Thinking Maps become a new language for deepening conversations so that people come together through the maps, facing their own and each other's thinking, "opening the space" for problem-solving and transforming the quality of thinking and learning across the whole school.

The four central ideas discussed above joined together for me as two major themes: "construction of knowledge" as a framework for learning and "communities of learning" expressing the communal quality of the educational experience. I finally reached the top of the tree, discovering the overarching view from which I could see and make sense of the details within the whole of the book *Thinking Maps as a Transformational Language for Learning.* The authors show us that Thinking Maps are a transformative language for learning for personal growth, for collaborative work across complex and increasingly "virtual" technological organizations and societies, and as common pathways for communicating across diverse languages and cultures. As you may see in the written and graphic forms throughout this book, these maps have simple starting points and spread organically as a seed maturing to full growth, providing for the creation of infinitely complex patterns of knowledge for every child, drawing out our multiple frames of reference and mirroring the richly textured landscape of our lives.