6 Thinking Maps® for Reading Minds

Uniting Processes, Products, and Assessment

During a recent presentation to their school board, two 5th grade students and their teacher Sarah Curtis used three Thinking Maps as tools to show their assessment of Thinking Maps as tools for learning at Hanover Street School in Lebanon, New Hampshire. On the front of the handout to the board, she wrote:

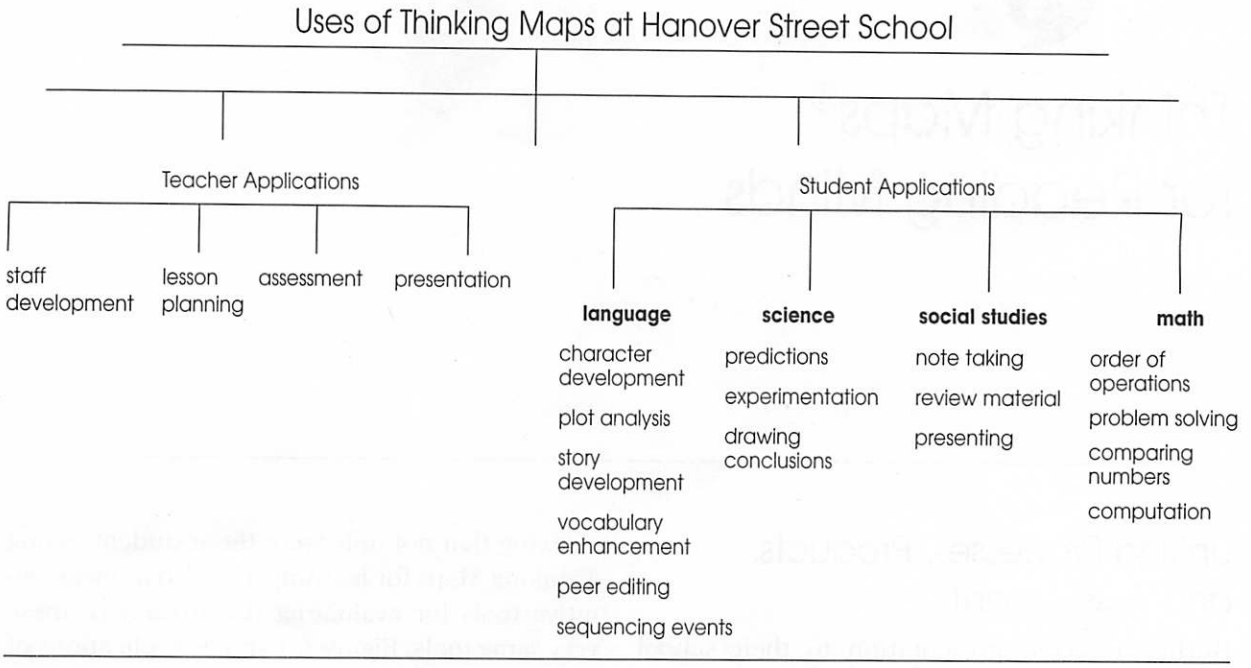
> As a 5th grade teacher, I am thrilled about the process and products that my students and I have demonstrated in response to the implementation of Thinking Maps. The best way I can convey the flexibility and vast utility of this language and set of visual tools is through their use. The following maps were generated by our 5th grade class as we thought about Thinking Maps. The type of map used is determined by the organization and thought processes behind the reflections.

Behind the reflections of these visual presentations by students is a richly evolved capacity showing that not only were these students using Thinking Maps for learning, but also as metacognitive tools for evaluating the efficacy of these very same tools. Figure 6.1 shows applications of Thinking Maps by teachers and students. Figure 6.2 illustrates how the use of Thinking Maps evolved from being entirely teacher directed to being a shared teacher-student responsibility, to students constructing their own maps.

As students such as these within whole schools become fluent with Thinking Maps, this array of eight visual tools becomes a common visual language for thinking, collaborative learning, curriculum design, assessment and self-assessment, and, most important, *continuous cognitive development* over an individual's lifespan of learning.

While educators are beginning to map the integrated alignment of content curriculum and skills beyond mere scope and sequence, there are few if any attempts—or even the understanding—that we must align the development of the most fundamental array of skills that will carry our students from kindergarten to college,

FIGURE 6.1



across multiple careers, and for lifespan learning: thinking skills. Most colleges now require critical thinking skills courses, probably because our schools have not yet systematically integrated these skills into the yearly flow of learning from kindergarten to graduation.

Students may exit our schools with the ability to read text, but not build meaning. Our students' *cognitive skills* development—the foundation of every school's goals or mission statement—are randomly supported, rarely raised to the level of fluency, and nearly absent as a distinct dimension of assessment. We now know that "information doubling" abounds beyond our students' capacities or necessity to learn all the new content. And, as we know from brain research, we must facilitate the *patterning* of content knowledge as a foundation for learning. Thinking Maps, as a language of visual tools based on fundamental thinking skills, has been proven as one route for *unifying* content and process instruction, and assessment of products. Figure 6.3 provides a description of Thinking Maps.

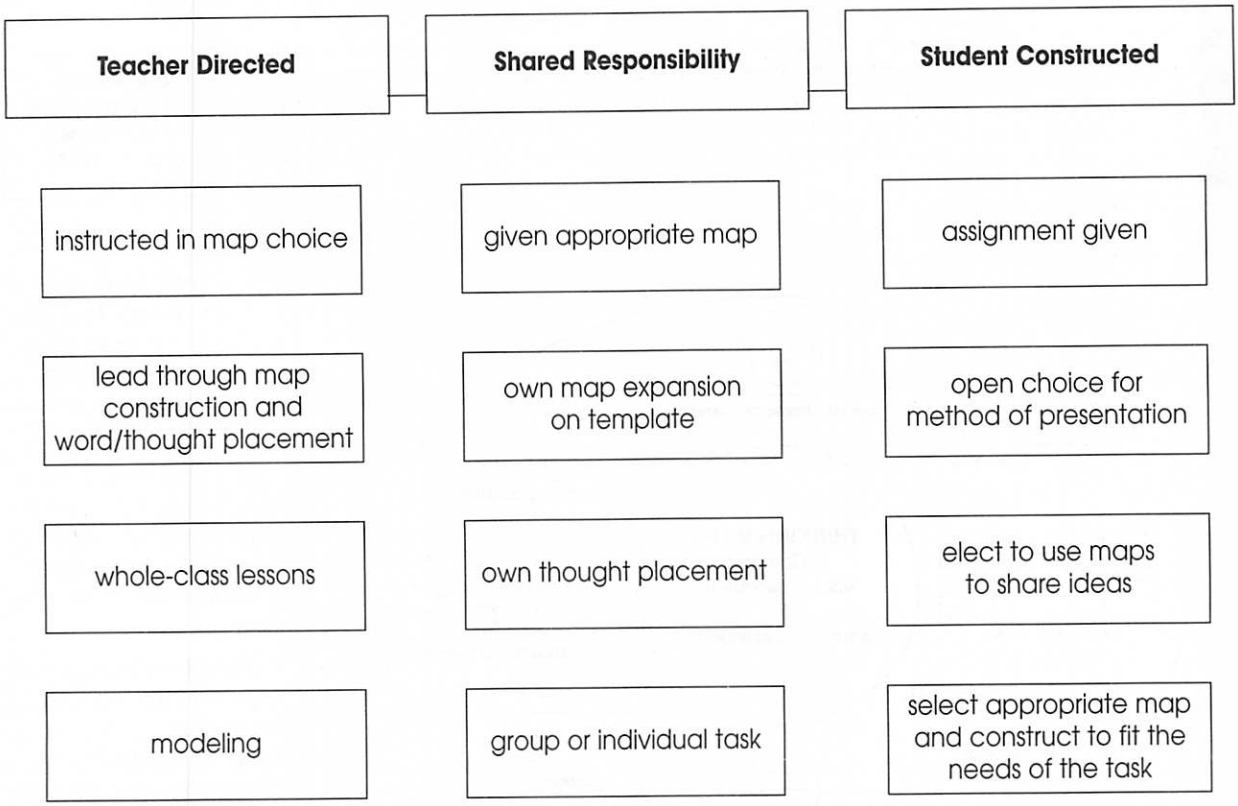
Jeffrey Spiegel, the principal of Hanover Street School—where Sarah Curtis, her colleagues, and students have used Thinking Maps for several years—put it succinctly, "Thinking Maps are the glue that holds it all together."

Reading Texts

Human scholarship, and thus much of what is taught in schools, deals with our capacity to interpret texts. Imaginary characters abound in fictional texts, but in schools most texts are non-

FIGURE 6.2

How the Use of Thinking Maps Evolved at Hanover Street School



fiction and data-based. Even so, students are still constantly *interpreting* for themselves the meaning of a scientific concept, a problem in mathematics, an ethical dilemma in social studies, a point in history.

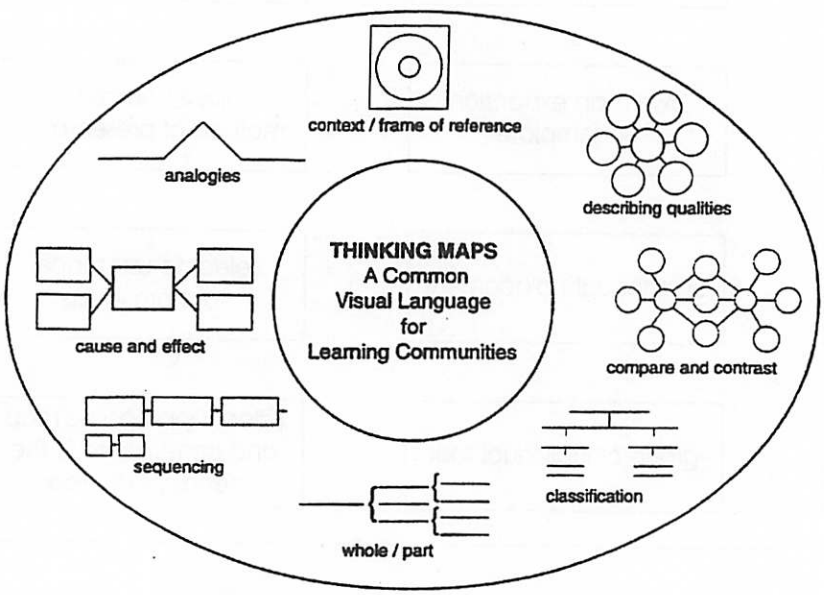
In classrooms, the sources and forms of "texts" have changed. Log on to the Internet, open a new textbook, or access a CD-ROM, and you will not just see walls of texts—where strings of text blocks build one upon another—without graphic support in either picture or symbolic support. The pervasive use of graphics is now unmistakable. With the wealth of information available in so many forms, we need to refine and maybe redefine what we call a "text." We need new tools that support the interpretation of information that comes to our students in different forms.

Texts are patterns of information, layered, found in many forms, and requiring interpretation. In fact, the idea of "reading" goes well beyond normal text. To be able to "read" a situation—such as a conflict in a cooperative group—is, in a symbolic sense, to read a text. Texts are all

FIGURE 6.3

Thinking Maps Overview

BACKGROUND: Thinking Maps is a language, or tool-kit, of eight thinking process maps, developed by David Hyerle. Each map is graphically consistent and flexible so that students may easily expand the map to reflect the content pattern being learned. Thinking Maps are introduced to students as tools for reading and writing, content-specific learning, and for interdisciplinary investigations. Over time, students learn to use multiple maps together and become fluent in choosing which maps fit the immediate context of learning. Thinking Maps and Thinking Maps Software are used in whole schools through faculty training and follow-up.



BASIC TECHNIQUES

- Begin with an application of each of the maps to a concrete object in order to understand the relationship between thinking processes and Thinking Maps.
- Expand each map to show big picture and then prioritize information by deleting ideas from maps for reading comprehension and writing.
- Use multiple maps together to construct related patterns of learning, and use "frame" to identify frames of reference.

NOVICE is able to identify the thinking process related to each map and use single maps for different content tasks.

APPRENTICE is able to use multiple maps together in order to develop a product, such as writing an essay.

PRACTITIONER is able to independently choose and fluently apply the maps in cooperative groups.

EXPERT is able to independently use the frame of reference with the other maps to self-assess learning.

Source: Hyerle, D. (1999b). *Visual tools video and guide* (p. 15). Lyme, NH: Designs for Thinking. Copyright © 1999 by David Hyerle.

around us for us to read. Gary Synder—poet, teacher, and naturalist—may have found the origin of text and gives us a way of defining text in this new century (see quote in box).

> **A text is information stored through time. The stratigraphy of rocks, layers of pollen in a swamp, the outward expanding circles in the trunk of a tree, can be seen as texts. The calligraphy of rivers winding back and forth over the land leaving layer upon layer of traces of previous riverbeds is text.**
>
> **In very early China diviners heated tortoise shell over flame till it cracked and then read meanings from the designs of cracks. It's a Chinese idea that writing started from copying these cracks.**
>
> **(Snyder, 1990, p. 66)**

In schools, the texts are information stored through time and more formalized:

- The layering of story and poetry,
- Histories from different cultures overlapping,
- The current events of daily life winding together,
- Expanding numerical strings and traced circles,
- Molecular designs building fractal-like into new forms, and
- The outward expanding relationships between participants in a learning community.

Texts are information stored through time—often permanently in libraries and now often fleetingly on the Internet—and interpreted or "read meanings" by the minds of our students. Meaning is created through the interaction of the mind of each individual learner and these overlapping texts. When we are good at "reading situations," we have the capacity to shift from text type to text type, from cultural context to different contexts, and fluently "read" new situations.

Thinking may be understood as the capacity of the learner to read patterns embedded in text, much like the Chinese diviners reading the cracks of the tortoise shell in the Gary Snyder quote. And the process of thinking is the capacity to abstract from and construct concepts from the shards of stored information in the text overlapping with the stratified "prior knowledge" stored in the brain.

Reading Minds

From this discussion, we can now enter the ambiguity in the title of this chapter: "Reading Minds." Thinking Maps, as presented in this chapter, are tools for

- Students to mindfully "read" and interpret information,
- Teachers to "read" and assess their students' minds by the maps that they create,
- All learners—students and teachers alike—to "read" and reflect on their own minds and thus become self-assessing.

It is important to emphasize not only the application of these tools as shown for content and process learning, but also for use in the moment and summary assessment of basic knowledge and conceptual understandings.

Visual tools of different sorts have been presented in this book as patterns for making sense

of our own stored knowledge and to assimilate new information and concepts. So it is reasonable—practical—to consider how these tools could be synthesized, coordinated, and organized in a meaningful way for learners. This is the idea behind a common visual language of Thinking Maps.

These eight patterns of thinking are designs that expand, overlap, and layer information for making meaning (Hyerle, 1988, 1990, 1991, 1993, 1995, 1995/1996, 1996). This language of thinking-process maps is in many ways a synthesis of each of the three types of visual tools presented in this book. As a *language* of visual tools, each of the eight Thinking Maps embodies the generative quality of *brainstorming webs,* the organizing and consistent visual structure of *graphic organizers,* and the deep processing capacity and dynamic configurations found in *thinking-process maps.* At anytime learners can access this thinking tool kit—using it on paper or through software—to construct and communicate networks of mental models of linear and nonlinear concepts.

The Thinking Maps were created during the generative stage of my writing a student workbook for facilitating thinking skills (Hyerle, 1988) and as a model is analogous to the key or legend of symbols you will find on a typical road map. Each graphic primitive is a unique starting point for mapping thinking. But why only eight maps? I became aware that fundamental thinking skills (Upton, 1960) might be more easily understood as a visible, concrete *pattern of thinking,* not merely an abstract skill performed solely "in the head" and represented by writing or speaking. Each map is based on, respectively, one of eight fundamental human cognitive processes identified by cognitive scientists from Piaget to present times.

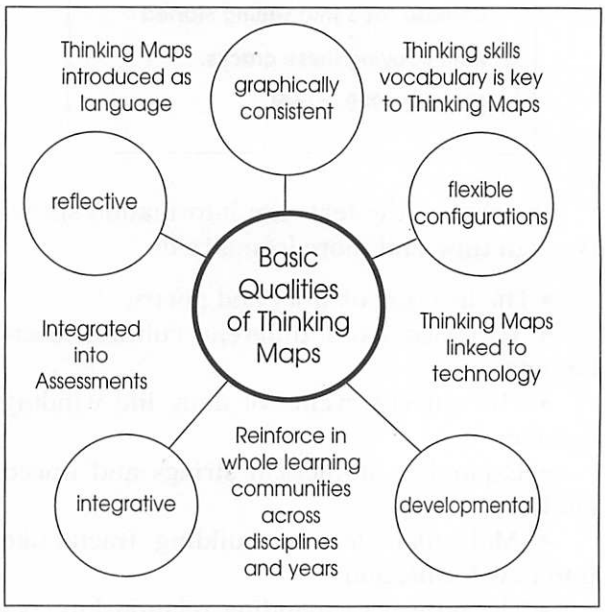
While there are *only* eight maps, there is an infinite number of configurations of each map, much like the English language, which has *only* 26 letters in its alphabet but a vast number of combinations. Five essential qualities of Thinking Maps are key to seeing how these tools are infinitely expandable and used simultaneously, as a carpenter would use multiple tools for constructing buildings (see Figure 6.4).

These qualities of each tool lead to more complex orders of thinking, such as evaluating, thinking systemically, and thinking metaphorically. When students are given common graphic starting points, *every* learner is able to detect, construct, and communicate different types of patterns of thinking about content concepts.

After participating in Thinking Maps "basic training," conducted over a year's time, teachers and students become independent and coopera-

FIGURE 6.4

Bubble Map of Five Qualities of Thinking Maps



tive tool users, fluently linking content knowledge and working together to build maps on the way to final products. At this writing, over 1,000 whole school faculties have had in-depth training and follow-up coaching in these tools. Teachers, students, and administrators report some or all of these outcomes after using Thinking Maps over time:

- Increased memory of content knowledge when reading,
- Well-organized final products, particularly written work,
- Deeper conceptual understandings,
- Greater capacity to communicate abstract concepts,
- Heightened metacognition and self-assessment,
- Enhanced creativity and perspective-taking, and
- Transfer of thinking processes across disciplines and outside school.

These outcomes are also supported by test results in reading, writing, and mathematics. Some of these results are discussed in the next sections in context (for details, please see Appendix A, p. 134).

Reading, Writing, and Researching Using Thinking Maps

The remainder of this chapter will focus on practical applications of Thinking Maps. Thinking Maps are used for reading comprehension across disciplines. The training manual *Thinking Maps: Tools for Learning* (Hyerle, 1995) contains content correlations and examples of Thinking Maps applications to mathematics, science, social studies, reading, and writing. As a filter for what follows, here is a "quick correlation" to the area of communication skills (see Figure 6.5). While each map is based on a defined thinking-process, teachers and students use this correlation to fully integrate the reading, writing, and thinking connection necessary for full comprehension and expression of ideas.

Use this correlation to think about the processes and products discussed in the coming pages: phonemic awareness for young children in Los Angeles, research using Thinking Maps Software by a 1st grader after a visit to a North Carolina zoo, research on a famous African American by a 5th grader in New York City, an analysis of Julius Caesar by a 9th grader from Los Angeles, a closer look at lesson planning using essential questions as applied to social studies research in a New Zealand classroom, and successful reading comprehension for adult literacy in a junior college in Mississippi.

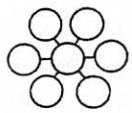
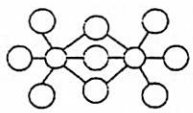
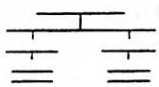
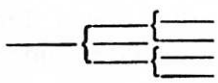
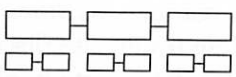
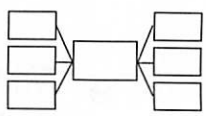
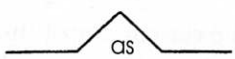
Phonemic Awareness

The great debate in education of this passing century has been between "content" and "process" teaching. The most recent derivation of this fractious, dichotomous argument is between phonics and whole language. This debate is much like the Sufi parable from the first page of this book: it has prevented us from seeing another side, and the deep connections between the two, which will help solve the problem. In this new century, educators will be looking for theoretically grounded and useful practical models as tools that explicitly integrate content and process instruction, including phonemic awareness and comprehension.

Sasha Borenstein, director of the Kelter Center, works closely with the Los Angeles City Schools and with teachers all over California in the area of literacy development. The Kelter Center staff work with students who need to master "the basics." And what are the basics? As Sasha draws from her direct experience and research

FIGURE 6.5

Quick-Reference Content Correlation to Eight Thinking Maps for Communication Skills

Circle Map	• Representing and brainstorming ideas • Defining words by showing context clues • Identifying audience and author's point of view	
Bubble Map	• Expanding descriptive vocabulary • Describing characters using adjectives • Providing descriptive details for writing	
Double Bubble Map	• Comparing and contrasting characters • Prioritizing essential characteristics • Organizing a compare-and-contrast essay	
Tree Map	• Identifying main idea, supporting ideas, details • Organizing topics and details for writing • Taking notes for lectures and research papers	
Brace Map	• Comparing physical setting in stories • Analyzing physical objects from technical reading • Organizing and writing technical manuals	
Flow Map	• Sequencing story plot by stages and substages • Analyzing and prioritizing important events • Sequencing paragraphs for writing	
Multi-Flow Map	• Analyzing causes-effects in literature • Predicting outcomes from previous events • Organizing "if-then" persuasive writing	
Bridge Map	• Comprehending analogies, similes, and metaphors • Preparing for testing using analogies • Developing guiding analogies for writing	

Source: Hyerle, D. (1995). *Thinking maps: Tools for learning* (Section 3, p. 4). Raleigh, NC: Innovative Sciences, Inc. Copyright © 1995 by Innovative Learning Group. All rights reserved. Used with permission.

with students and teachers, we find that the basics are supported by using Thinking Maps as bridges between phonemic and metacognitive awareness. (Words in bold are the explicit cognitive skills being facilitated using Thinking Maps.)

Phonemic Awareness and Metacognition

BY SASHA BORENSTEIN

The recent research in the area of literacy done by the National Institute of Child Health and Devel-

opment has documented the need for explicit, systematic instruction in "breaking the code," phonics and word study, as well as in making-meaning strategies for comprehension. The research supports an active, thoughtful instructional approach rather than a return to repetitive, passive work.

Thinking Maps are flexible, active tools for exploring literacy. The maps are highly interactive and provocative, pushing learners to discern patterns and interactions in materials and concepts.

Thinking Maps are used in constructing knowledge and discerning the concepts that organize the expectancies and rules of phonics. Dorling [knowing] the sounds of the past tense, /t/, /d/, and /id/ can lead to the understanding that the sound of this morpheme is based upon the last sound in the root word to which it is affixed. Using the Brace Map, students identify these part-whole *relationships. Finding the* similarities and differences *between syllable types using Double Bubble Maps leads to the understanding that each syllable is defined by its vowel. Creating a Flow Map for* sequencing *the spelling of /ch/, ch or tch, /j/, ge or dge, and /k/ k or ck, at the end of a word can lead to the concept that the spelling depends upon what type of vowel is in that word.*

I use a "step card" strategy with learners for defining, organizing, and promoting self-monitoring and metacognition. A step card is a basic skill of sequencing *using the Flow Map. A step card simply states the steps or thinking process as a physical Flow Map for solving a problem. Examples might include knowing how to read or spell a multisyllable word, knowing how to pronounce the letter* C, *being able to summarize a paragraph or paraphrase a passage, or following the steps of reciprocal learning when reading a passage. The step card includes questions as well as decision points. Each student creates a description of the process in his or her own words. Eventually students collect their own compendium of step cards for literacy, which becomes a resource for writing and reading experiences.*

Thinking Maps also provide concrete tools for teachers as they make the direct link between phonemic awareness and reading comprehension strategies. During teacher training for the California Literacy Initiative, I asked middle school teachers to read a short story, "Salvador, Early and Late," by Sandra Cisneros. The directions were to read the passage, visualizing the images of Salvador and in small groups to cooperatively create a Bubble Map to describe *the main character. The teachers also were to present their maps and their thinking-process to the entire class.*

As the teachers worked, they naturally began to sort and categorize *their thoughts and ideas, which lead to the creation of a Tree Map. Other teachers began seeing similarities and differences between Salvador's behavior at school and at home, creating the thought process for a Double Bubble Map. Others began to hypothesize why this main character felt and behaved as he did, a* cause-and-effect *pattern developed through the Multi-Flow Map. All of these thought patterns were mediated by questions, Thinking Maps, and guiding suggestions. This simple assignment became a meaningful, interactive process that engaged and enhanced each participant's comprehension of the material. This Thinking Maps activity was the foundation for direct use of these tools by students and a bridge between phonemic awareness and metacognition.*

Thinking Maps Software

The development of phonemic awareness overlaps with the growing capacity of students' reading comprehension abilities. Unlike the example above, the two are often on separate tracks. But, underlying the two is students' fundamental capacity to think in patterns. Reading is often facilitated in reading groups and through one-on-one instruction, but in the past 10 years a growing number of students have been learning to read

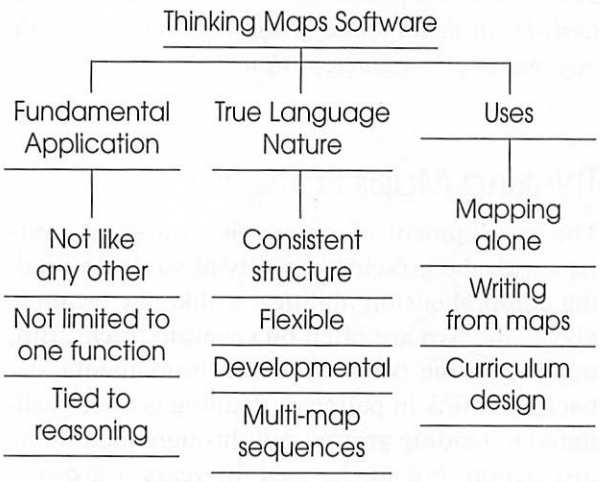
with support from software programs. As these are not high-end artificial intelligence programs, it's not surprising that few actually provide a way for students to actively and consciously apply thinking patterns as text structures.

In the next example, a 1st grader uses Thinking Maps and Thinking Maps Software to collect, organize, and then write a book on a special topic. Thinking Maps Software is not a reading comprehension program, nor is it a "content"-specific program. Rather, it is a unique visual processor, with three windows: one for teacher questions to students, a second for students to create Thinking Maps, and a third window that is a basic word processor (Figure 6.6).

William Waste, a computer science teacher at Lebanon High School, in Lebanon, New Hampshire, has used Thinking Maps Software with his students. In Figure 6.7, he describes the capabilities of the software.

FIGURE 6.6

Thinking Maps Software Tree Map



As stated above, "reading" the world is more than just reading text, and often a field trip is an experience that blends language and experience into a wealth of understanding for a young student. Here is a description of the process and the product by Terri Riley, parent of 1st grader Jackson Riley (Figures 6.8, 6.9, and 6.10 show Jackson's maps and drawings about monkeys).

A Field Trip

BY TERRI RILEY

Before a field trip to the North Carolina Zoo, Jackson was assigned an animal to observe and research. After carefully observing the animal at the zoo and reading books about it, he was asked to describe it and find out about its habitat, food, enemies, and some interesting facts. Because he had recently learned to use a Bubble Map and a Tree Map, it made perfect sense to use them for taking notes. Jackson would stop as he read to place appropriate information into each map. I was amazed how easily he completed the research. He was excited about using the Thinking Maps Software to make maps for his presentation at school. He became so captivated with his findings that he decided to write his own book using his maps.

This example shows how experiential learning, reading from texts, drawings, Thinking Maps and Software, and writing may be synthesized into a final product. While the field trip and reading alone provided a rich learning experience, the Thinking Maps supported the student to make sense of the experience by patterning the information. The maps also became part of a final product. These multiple ways of expressing information show a richness of information, motivate the reader to read on, and guide readers to a full comprehension of the information. For Jackson, this product gave much greater meaning to the experience of learning

FIGURE 6.7

Thinking Maps Software: A Tool for Expanding Thinking

by William Waste

Just as word processors have been specifically designed to apply the capabilities of computers to written language and spreadsheet programs are designed for numbers or database applications for files of information, so has Thinking Maps Software (TMS) been created to facilitate the use of Thinking Maps as a visual language. Unlike other graphic applications, such as "draw" programs, TMS can help students apply Thinking Maps in an extensive number of ways from map creation for personal organization, to cooperative map-based communication, to the combination of both maps and writing. The software thus extends the basic strength of Thinking Maps by being grounded in the connection between specific visual patterns and discrete reasoning patterns.

By providing the structure to map building, TMS makes it far easier to create clear, effective maps, and to make changes to them just as a word processor has made it easier to create and then edit text. This also supports the developmental qualities of Thinking Maps. Effective map use can be seen by both preschool children and by adults, albeit with clear developmental differences in complexity and use.

The software also has a variety of ways it can be used to fit the needs of novice to expert users. If each Thinking Map represents an element of vocabulary in the visual language, then the ability to create multiple maps in sequence allows for the building of "visual sentences" that expand the power of the eight graphics into a true visual language for thinking. TMS greatly expands the ability of people to use Thinking Maps together and is bringing about new applications of the maps that have not been realized before. One of these areas is in the use of the maps by themselves as a form of communication. It is now much easier for teachers to write and share curriculum, and for students to quickly generate, save, swap and reconfigure maps and writing as the patterns are transmitted from classroom to classroom, across districts, and around the world.

Thinking Maps have established a new level of use for graphics, and the Thinking Maps Software builds upon these strengths and unique qualities, enabling learners to expand their thinking in ways that have been unimaginable until now.

about an animal. It also improved his capacity to seek, organize, and express information, just as students in Bob Fardy's 2nd grade classrooms were able to think through information about rocks and create a Rock Rubric using multiple Thinking Maps (discussed in Chapter 2).

Researching a Famous African American's Life

Unfortunately, *rarely* are students able to visit the sites that give them a hands-on experience. This is especially true in the area of history. Although the Internet, CD-ROM, and video mate-

FIGURE 6.8

A 1st Grader's Bubble Map About Monkeys

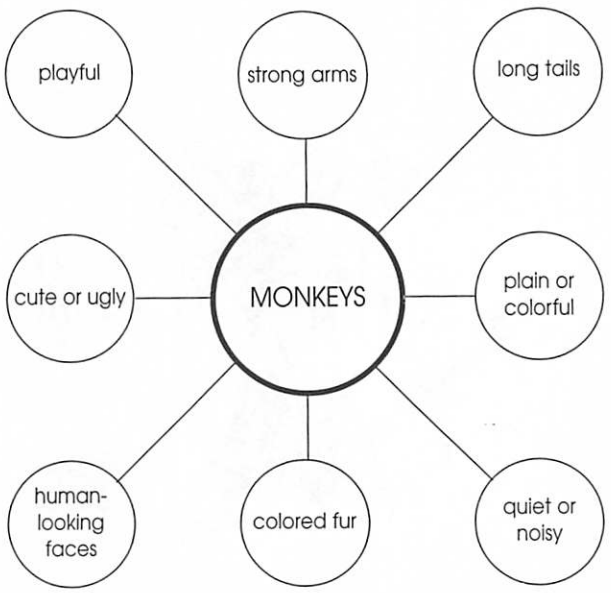
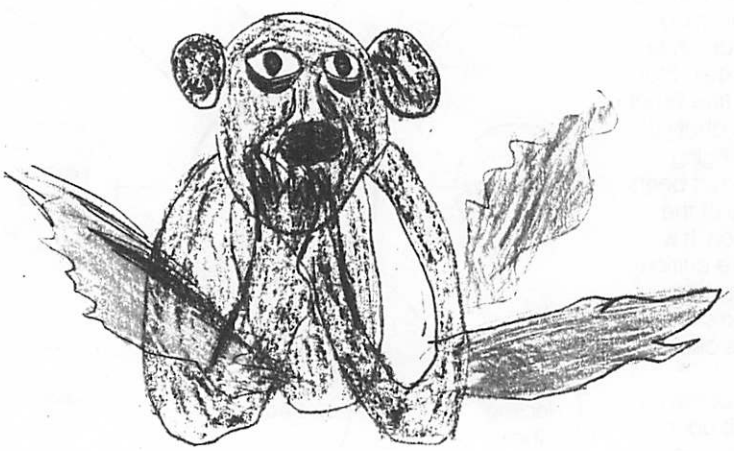


FIGURE 6.9

A 1st Grader's Drawings and Writings About Monkeys

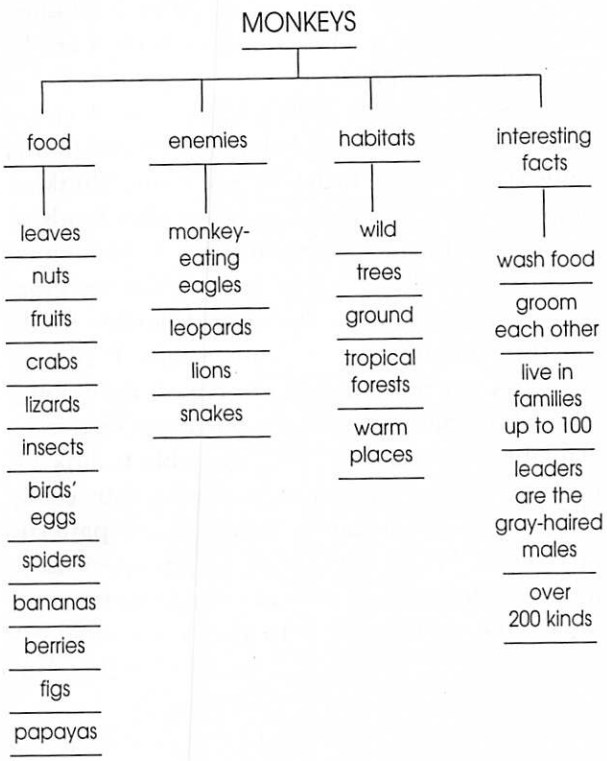
Monkeys have strong arms and long tails. They have human-looking faces.



Monkeys like different kinds of foods. Some like nuts, leaves, and fruits. Other monkeys like birds' eggs and insects.

FIGURE 6.10

A 1st Grader's Tree Map on Monkeys



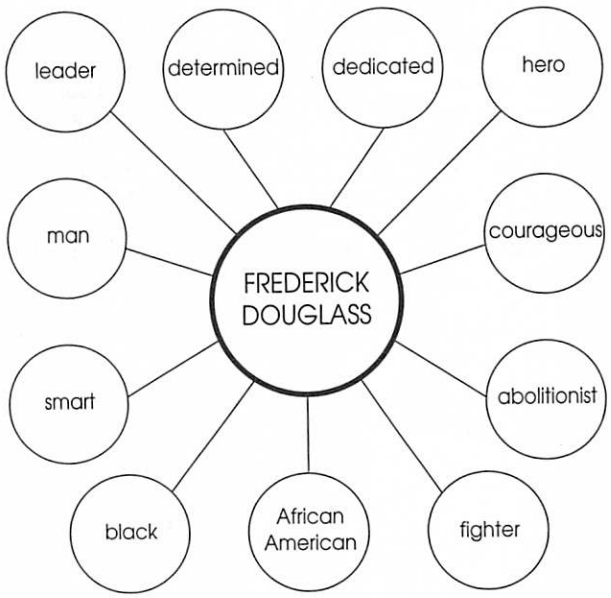
rial are providing a richer resource than history textbooks, most of the learning in classroom is text based. The "cognitive load" required by students to sustain a lengthy research project using texts is daunting. For example, consider this learning objective presented by a New York City 5th grade teacher to her class: *In celebration of Black History Month, research and write a report on a famous African American.*

This teacher knew that the first attempt at a multi-step research process was going to be difficult for her students. But all teachers and students in this inner-city K–5 school had been trained for years in the use of Thinking Maps and had applied these tools across disciplines. By the time the 5th graders faced this objective, they had become fluent with all eight tools for patterning thinking in reading, writing, and mathematics. They had also learned how to use multiple maps together in order to create final products. Let's look at how one student independently used Thinking Maps to generate, organize, and sequence information before writing her essay about the life of Frederick Douglass.

First, the student used a Bubble Map to identify key attributes of Frederick Douglass (see Figure 6.11). This map is based on the cognitive skill

FIGURE 6.11

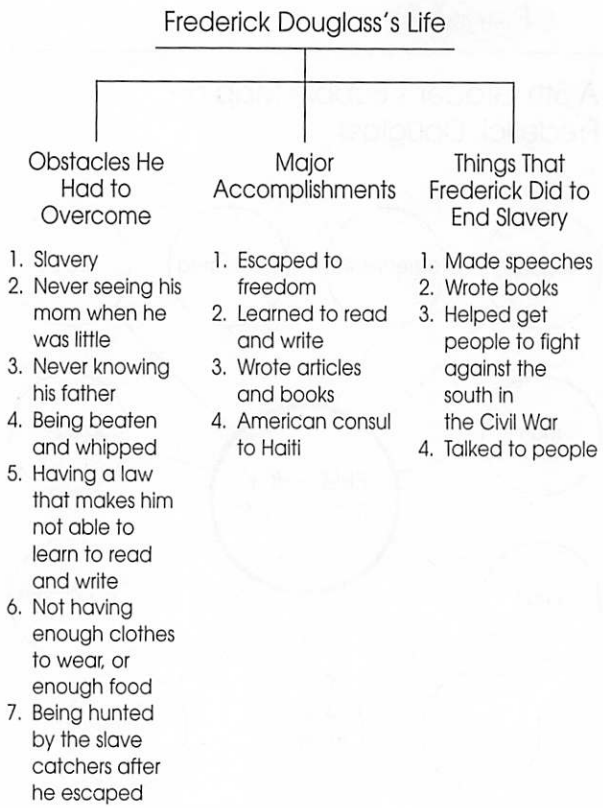
A 5th Grader's Bubble Map on Frederick Douglass



of identifying attributes of things and developing a descriptive cluster of qualities of the man: dedicated, smart, courageous, determined, and so on. She then used a Tree Map for categorizing, or sorting the information into the paper topic, the supporting ideas, and a detailed factual record (see Figure 6.12). The Tree Map helped her synthesize a vast quantity and varying qualities of ideas while deleting extraneous details. Last, to create a logical progression of ideas for writing, she used the Flow Map (Figure 6.13). The outcome from these Thinking Maps was a highly scored 10-paragraph essay that mirrored the Flow Map you see. Additionally, the student submitted the three maps in typed form, providing evidence of the thinking process she used on the way to the final product.

FIGURE 6.12

A 5th Grader's Tree Map on Frederick Douglass



Let's look back at the three types of visual tools and the clusters of behaviors related to this student's work in order to see how Thinking Maps act as a synthesis of these other kinds of visual tools for facilitating intelligent behaviors.

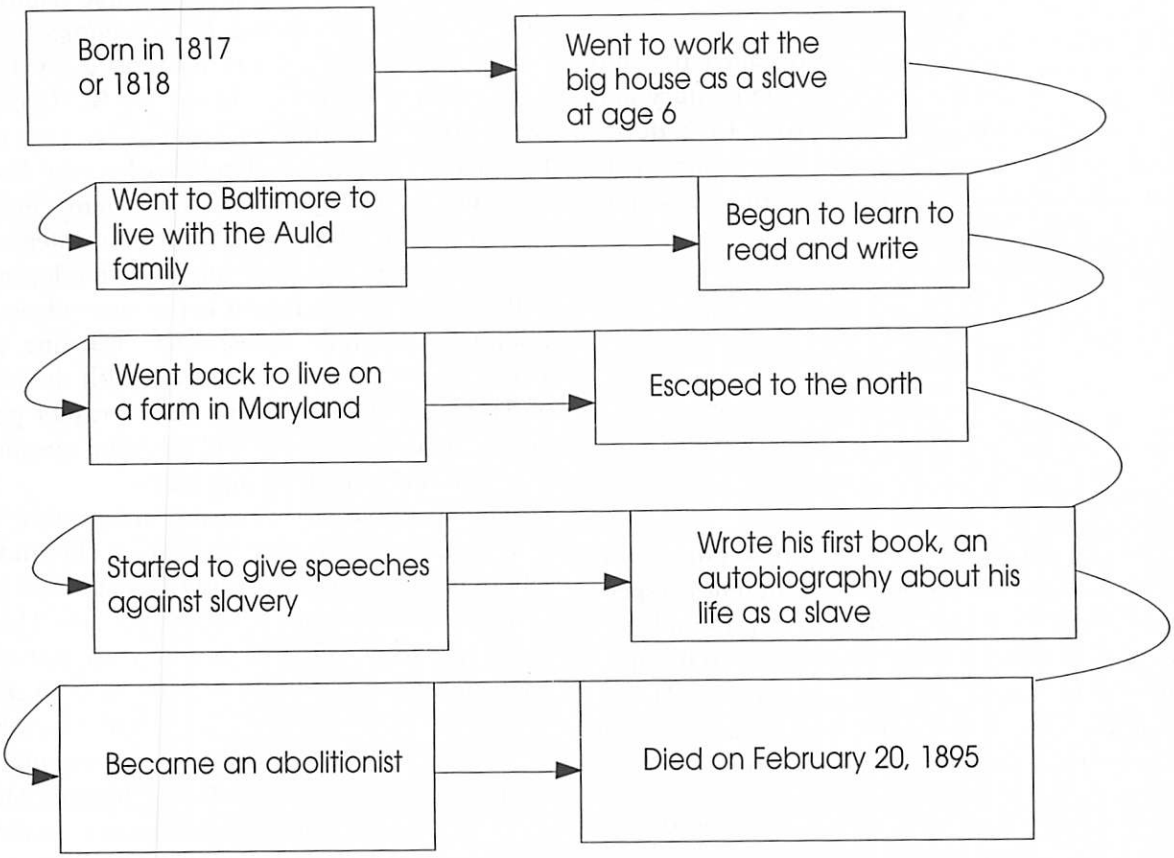
First, much as when using *brainstorming webs,* which support creative and flexible thinking, this student was able to investigate Frederick Douglass starting with blank pages, developing map after map of ideas drawn from resources available in the school. She was able to link information from map to map as well, thus easily *transforming* information into different patterns of thought. While the Bubble Map is specifically used for identifying attributes or characteristics, it gave the student a way to abstract from linear textual sources the essential qualities of Douglass into a rich cluster of information.

Second, much as with the use of *graphic organizers,* this student shows that the starting points—or common graphic primitives—for each Thinking Map effectively facilitate perseverance in the task. The student was able to stay focused on the lengthy, multi-step requirements of the project: collection of research, organization, and, finally, production of a piece of writing. The design of the Tree Map and Flow Map gave support to this kind of systematic integration of knowledge. She could create a hierarchy of ideas using the Tree Map and a sequence for paragraph structure using the Flow Map. These two tools also supported the precise relating of information.

Third, as with other *thinking-process maps,* it is clear that this student had become aware of

FIGURE 6.13

A 5th Grader's Flow Map on Frederick Douglass



the multiple cognitive tools necessary for completing the task. While she may have had guidance from the teacher along the way, this student's fluency with the tools enabled her to configure the Thinking Maps to her evolving understandings about Frederick Douglass. She was able to chunk the information and consciously form the information into different cognitive patterns that enabled her to write the essay. Most students are unable to do these tasks, especially when confronted with the otherwise daunting learning objective of first researching, then organizing, and finally writing an essay report.

Lesson Planning and Essential Questions

As discussed, the eight Thinking Maps are used together much as a carpenter uses a tool kit: in-

dividual and multiple maps may be used in very flexible configurations in order to construct patterns and make meaningful networks of knowledge. More important to classroom practice, as we shall see, an essential question is embedded in each visual tool.

Deborah Meier, along with colleagues and students at Central Park East Elementary and Secondary Schools in New York City, developed a few essential questions that became central to their curriculum design and classroom interactions:

> The question of evidence, or "How do we know what we know?"; the question of viewpoint in all its multiplicity, or "Who's speaking?"; the search for connections and patterns, or "What causes what?" supposition, or "How might things have been different?"; and finally, why any of it matters, or "Who cares?" (Meier, 1995, p. 50)

These questions are based in fundamental ways of seeing the world from different perspectives, requiring students to seek patterns and connections *within* multiple frames of reference. Like the questions above, each Thinking Map—along with the "frame" of reference around each map—represents a reflective question:

1. Circle Map: What are the context and frame of reference?
2. Bubble Map: What are the attributes?
3. Double-Bubble Map: How are these alike and different?
4. Tree Map: How are these grouped together?
5. Brace Map: What are the parts of the whole?
6. Flow Map: What was the sequence of events?
7. Multi-Flow Map: What were the causes and effects?
8. Bridge Map: Is there an analogy between these ideas?

By linking concrete maps with essential questions and abstract thought processes, students can deal with more complex thinking because they know *what it looks like*. Importantly, they come to know how to link multiple Thinking Maps together in response to the *multiple* essential questions that teachers ask most every day.

A clear example is found at St. George's School in Wanganui, New Zealand. Over the past few years, the whole school has become fluent with the essential questions and dynamic graphics of Thinking Maps. St. George's has integrated Thinking Maps into its ongoing development with Art Costa's intelligent behaviors, rubric development, learning styles, action learning, and a high-tech school environment. With the entry of Thinking Maps into this rich array of practices, curriculum design and essential questions are often linked to Thinking Maps.

One example of this ease of integration is a lesson plan designed for students at the middle school level for investigating two explorers (see Figure 6.14). Students are fluent with the Thinking Maps, so as you can see, they are not even given questions—only the requirement to *show their thinking* using the maps, write an evaluation, and present the maps to the classroom.

This mental fluency with the Thinking Maps by all administrators, teachers, and students in the school led several teams of teachers to create a rubric for using Thinking Maps (see Figure 6.15).

Professional portfolios developed by many teachers on using Thinking Maps in the school also show the developmental aspects of the maps across grade levels and content areas.

Alan Cooper, former principal of the school, describes the background on how this rubric was developed. This rubric and Cooper's writing reveal the power of the development of rubrics by a school faculty and the depth to which this rubric shows the effectiveness of Thinking Maps.

FIGURE 6.14

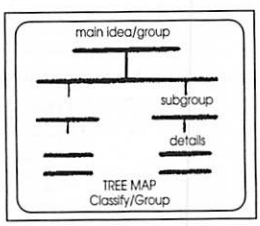
A Middle School-Level Social Studies Activity: Thinking Maps and Explorers

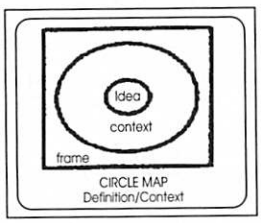
SOCIAL STUDIES TOPIC (Term 4, Weeks 1–4)
Two Famous Explorers with a Focus on Thinking Maps

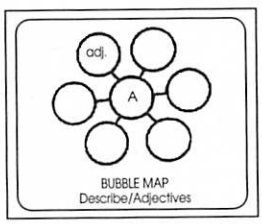
- We will study people distant in time and space by reading and studying two contrasting explorers.
- Our context for study will be: "When confronted with difficulties . . ."
- We will study such contexts as
  - Tolerance
  - Aspirations
  - Conflict
  - Control
  - Influence
  - Participation
  - Respecting
  - Success
  - Courage
  - Endurance

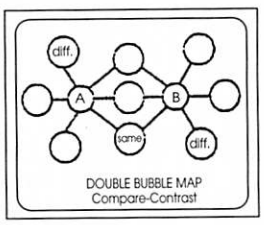
You will need to choose your two explorers and the appropriate Thinking Map to

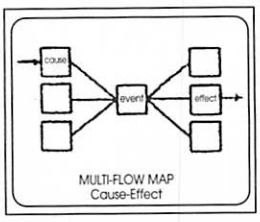
- Define them in context
- Classify and organize your information
- Compare and contrast your two explorers using descriptives
- Show cause and effect of each exploration
- Show the sequences of steps leading to the highest achievement of each of your explorers
- Show the environment that your explorers experienced in wholes and parts
- See analogies using explorers in general and the environment that they have explored (or achievement)

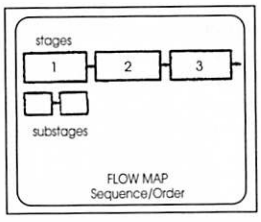


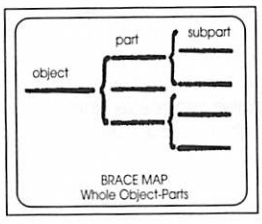


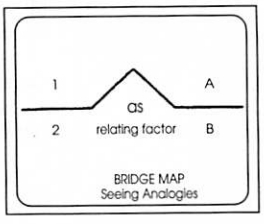












—Used with the permission of Alan Cooper, Gill Corballis, and Georgette Jensen, St. George's School.

FIGURE 6.15

Rubric for Using Thinking Maps

	Teacher Responsible	Learning Community	Outcome
NOVICE	1. Attend inservice courses. 2. Observe classroom. 3. Put standardized maps on the wall. 4. Read the Manual. 5. Introduce each Thinking Map to the Learning Community.	1. Children introduced to each Thinking Map separately. 2. Children are given specific maps for related work. 3. Students can recall names of each Thinking Map. 4. Children present work on standardized Thinking Maps.	1. Introduction of concepts of Thinking Maps by expert (a) to staff and (b) to students. 2. "Tools for Learning" Manual distributed to each class.
APPRENTICE	1. Model Thinking Maps in various contexts of a curriculum area. 2. Conduct class and group discussions on thinking processes of each map.	1. Children are demonstrating an awareness of which map to use. 2. Children are beginning to distinguish and use relevant maps. 3. Children are beginning to understand and define processes of Thinking Maps.	1. Use more than one Thinking Map regularly in one area of the curriculum. 2. Beginning to grasp concepts, processes, and definitions for each Thinking Map.
PRACTITIONER	1. Incorporate Thinking Maps into set work rather than using them in isolation. 2. Apply Thinking Maps to classroom activities (e.g., cooperative learning, routines). 3. Explore different ways of using Thinking Maps. 4. Display maps on walls and in books covering all subject areas.	1. Children are using Thinking Maps in many subject areas without prompting. 2. Children can justify the thinking processes in discussions. 3. Children are transferring Thinking Maps to content learning. 4. Thinking Maps are more detailed and creative. 5. Maps are revisited and added to, or edited, as tasks are worked through.	1. Use Thinking Maps regularly in many subject areas. 2. Ownership of Thinking Maps as tools for transferring thoughts, ideas, and information to content learning. 3. Explain how Thinking Maps help as tools for learning.
EXPERT	1. Team work: Mentor to Novice. 2. Take demonstration lessons with staff and students. 3. Raise to the conscious level of the student the thinking processes that are taking place. 4. Display versatility with Thinking Maps (e.g., use maps in reverse). 5. Encourage expanded thinking (e.g., idea formation). 6. Continually assess progress of students' thinking processes and abilities through metacognition and portfolios.	1. Students are integrating Thinking Maps into all classroom activities (e.g., curriculum, classroom routines, daily/weekly outlines). 2. Students are becoming mentors to other students. 3. Students use more than one type of Thinking Map for multi-step problems and/or content learning. 4. Students are diversifying Thinking Maps yet still keeping to thinking processes and concepts. 5. Students are able to assess their own thinking processes through metacognition.	1. Use all Thinking Maps consistently over all subject areas. 2. Integration of Thinking Maps into other areas of Innovative Learning such as Learning Styles and Intelligent Behaviors.

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Thinking Maps Rubric

BY ALAN COOPER

Successful teachers are craftsmen and craftswomen. Not only do they have the necessary skills for the teaching required of them, but they also have a passionate pride in what they are doing that transcends the meaning of the job. They achieve this by familiarizing themselves thoroughly with what they are doing so that they become positive models, set standards, and are practical in what they do, along with artistic, aesthetic input as well. This has happened with Thinking Maps.

Familiarization with the Tools. *Familiarization requires practical usage. It will happen quicker if all aspects of the school culture embrace it. For teachers and myself, this means using Thinking Maps in teacher plans, both long and short term; in the routine notices about the classroom walls and the corridors of the school; and in the actual teaching. In other words, Thinking Maps need to become an important part of the school culture. Both peer, administrative, and parent support may be needed, as tension will be engendered—as always occurs—when the old paradigm is replaced or significantly added to. A side effect is that teachers may well have a new empathy for students, as they too struggle to learn how to apply the new language of Thinking Maps deeply.*

Thinking Maps Rubric for Standards. *Rubrics are a very satisfactory way of setting standards. While it is somewhat innovative to set rubrics for teacher growth, it is also logical. We have done this with Thinking Maps. The notion of integrity at least suggests that if rubrics aid the growth of students, then they will also aid the growth of teachers. In our rubrics teachers have a clear progression from the novice to the expert model. In addition, we have constructed a rubric for the learning community. Thus, on the one hand, we are aiding the individual teacher's professional development using Thinking Maps, while on the other we are ensuring that our efforts fit within the vision of the school and are not simply an add-on, which in the past teacher professional development has often been.*

Perhaps a little more explanation is necessary. Even where whole school development is undertaken, individual teachers frequently are concerned only with the progress that they are making with their students. But Thinking Maps facilitate long-term development of students' thinking over multiple years. The idea behind the second column of the rubric (Figure 6.15) *is a whole school overview so that the parts (teachers' and students' progress) are integrated into the whole (the school). This effect could easily translate beyond the school to the district. Portfolios can become very important artifacts here, especially so when the teacher's reflection and metacognition are integrated with those of the student, a mentor, and supervisors.*

Interpreting Texts over Time: Shakespeare

Fifteen years ago, I had the opportunity to teach *Romeo and Juliet* to an 11th grade "remedial reading" class at McClymonds High School in the inner-city of Oakland, California. There were not enough copies of the play for every student, the students' reading level averaged from the 4th to the 6th grade, and they had never heard of an author by the name of Shakespeare. To say the least, the text as it stood was way outside of their context, but the story and themes were not. After I read Act 1 out loud for the class—with many starts and stops—and asked some basic comprehension questions, I realized that they could not follow the plot and were not able to recall the confusion of characters, anti-

quated language, and shifting settings. Somehow I needed to support them in seeing the evolving story line.

After a week of frustration, I brought in butcher paper and wrapped the inside walls of the room much like the artist Cristo wrapping the outside of a building in colored ribbons. We reviewed Act 1 by making a Flow Map, chunking the sequence of events, and introducing key characters and family relationships. By the end of the play we had butcher paper flowing around the room, visibly wrapped around our minds. I could then ask interpretive questions, students could access the essential events of the whole play in the turn of a head. While we did not get to the level of analysis I expected, these students, maybe for the first time, had mapped out a whole story. They had a tool for making sense of any text and saw that the interpretive process requires the patterning of a story's pieces. Without this Flow Map, these students could not have held the whole play in their minds and been able to abstract themes—which they realized reached into their own lives—from across this romance.

Some years later, after introducing the eight Thinking Maps to a group of teachers, I received a unit of study created by a 9th grade student in Los Angeles who was required to use Thinking Maps as note-making tools for comprehending *Julius Caesar.* While the space is not available for all 12 maps created by this student, his reflections on the process reveal not only the initial response to these tools, but his immediate transfer of the tools across the high school, and his vision of future possibilities (see Figure 6.16).

A 9th Grader's Metacognitive Statement

Making these Thinking Maps has helped my understanding of Julius Caesar immensely. Before I completed the maps, I understood the basic concepts and context of the play, but if I were given a test on it I wouldn't have done very well. I have an outline in my head and a better comprehension of the important characters of the play. . . .

At first I thought these maps were just busywork. . . . [But] the maps have helped me to study and to learn the materials. They help us to organize our thoughts and improve the comprehension of anything we read.

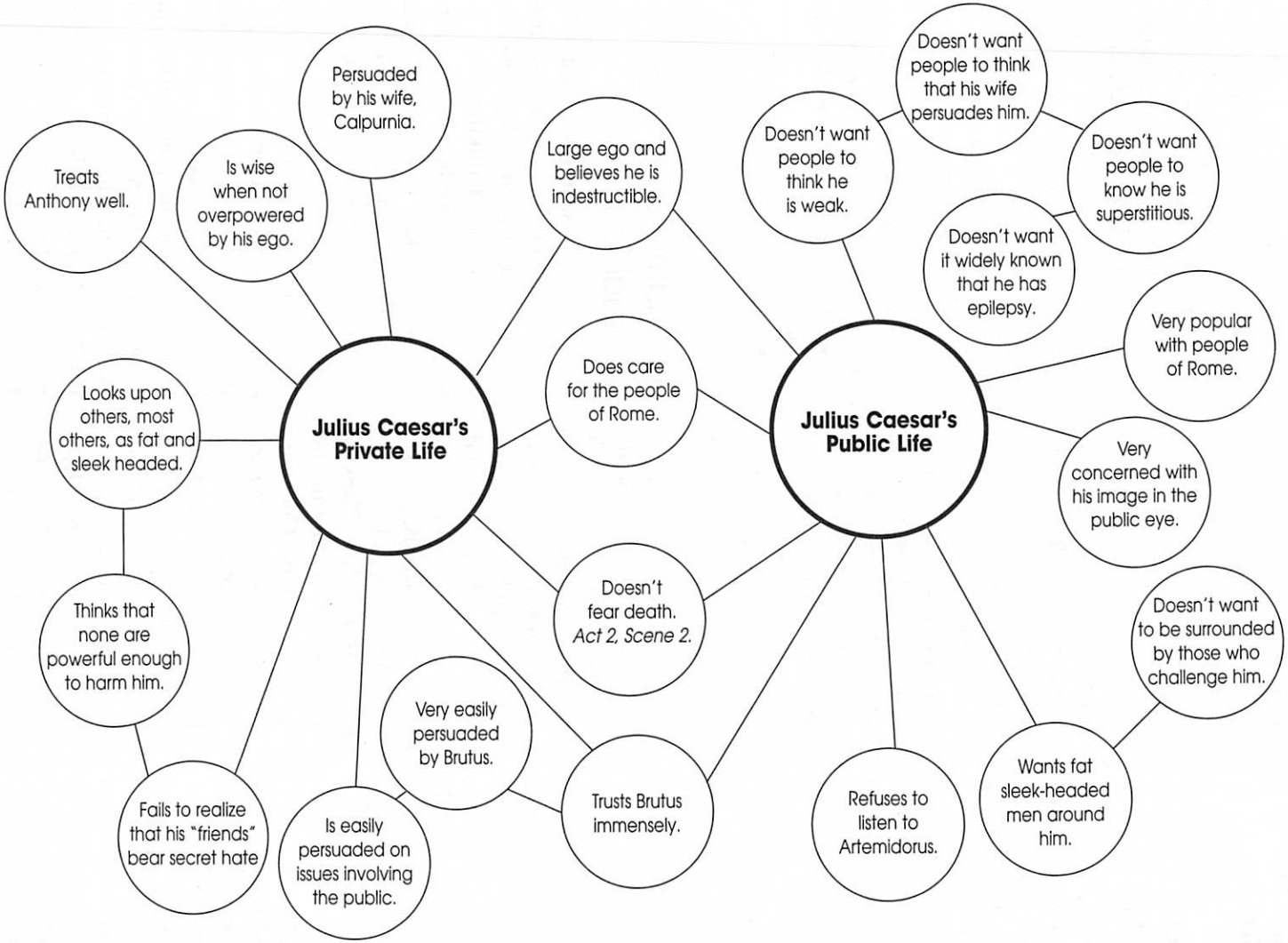
Adult Literacy

The visual tools and language of Thinking Maps presented above provide a new avenue for students and teachers. In the examples we may see that students can develop their capacities to be creative and flexible, to persevere and to be systematic, and to be reflective and self-aware of cognitive patterns to the degree that they can readily apply these patterns to challenging performance. Yet, we also now know that like our brains, our students must continue to grow and adapt over their lifespans.

At Jones Junior College, in Laurel Mississippi, Dr. Marjann Ball has used Thinking Maps for several years with her adult learners, many of whom are returning to school to advance their life skills and step into new professions. Many students

FIGURE 6.16

A 9th Grader's Double Bubble Map on Julius Caesar



enter Marjann's reading class barely able to read. Here is her story:

Reading in Junior College

BY MARJANN BALL

As an instructor of reading, study skills, and English for the past 19 years in a junior college, I have seen many students confront difficulties in processing information. Their variances in reading abilities from the 4th grade upward, as well as in their range in ACT scores, have added to the complexity of the problem. In spite of the disparity in abilities, a commonality exists between the students who can read well and those who cannot: very few possess the thinking strategies necessary to process what they read.

Some years back I tried various thinking skills approaches, but I discovered that there was very little transfer to reading across disciplines. Since I began using Thinking Maps seven years ago, my observations, testimonials from students, and my doctoral research have confirmed that my search for a vehicle to transfer and integrate thinking skills in all areas is over. My research confirmed what my experience showed: a highly significant correlation between the use of Thinking Maps and improved reading comprehension scores of my students (Ball, 1999). [See Appendix B, p. 137, for information about her lesson plan.]

Students who learn to use Thinking Maps in my reading and study skills course continually bring in examples of their applications. One nontraditional student, returning to college after 20 years in the workforce, was failing economics. He began using the maps to organize the voluminous material and, by the end of the semester, had made an A. A "traditional" nursing student was having difficulty remembering details in an anatomy course. After using the Thinking Maps and Software to organize the information, her scores on tests increased as well as her retention of the information later in the year.

At the end of every semester I have students evaluate the course and identify the most helpful strategies they learned. Over the past three years (nine classes), between 85 to 90 percent of the students identified Thinking Maps as the most helpful tools for learning and transfer across their other classes.

Some of my students also elaborated with comments about the Thinking Maps, such as:

- *"Thinking Maps are the best strategy I have ever used to organize and help me recall information."*
- *"The Thinking Maps allow me to see what I'm thinking and then reflect on what I thought."*
- *"Why didn't we learn these in elementary school? Or on the job?"*
- *"May I take these home to my children?"*

A Dynamic Language of Visual Tools

As you visually scan this chapter, from applications for phonemic awareness in kindergarten to advanced work in college-level courses, it becomes clear that Thinking Maps is a dynamic language that may be flexibly used from early childhood to late in life. This is evident in the above quote: a parent in a junior college course wanting to take these tools home to use with her children.

The structure and theory of this visual language is based on eight fundamental cognitive skills that human beings use and improve upon *lifelong.* The maps provide a dynamic visual representation and graphic starting point for applying these skills as patterns of thinking. The dynamism and developmental capacity of Thinking Maps reveals that, unlike mostly singular visual tools reviewed in this book, students learn to independently and cooperatively apply these eight maps as interdependent pat-

terns for transforming information into knowledge and products of thinking.

The teachers, parents, administrators, and students who have used these tools see direct benefits in content-specific learning and processes that are standardized and tested, but something more is evident. All learners are improving their thinking in a very conscious way *over time* as they use this language year after year in whole schools. This common visual language is not only challenging assumptions about abilities to think, but also is giving learners the practical tools for shifting these mind-sets from seeing deficits to seeing the power of the human brain and mind to seek and create meaningful patterns in different contexts.

Chapter 7 Overview

Openness is composed of two basic parts. The first depicts a high plateau, wild and barren. It implies emptiness. The second part originally symbolized two humans standing back to back on a mound, a vantage point from which they could see in all directions. (Lao-tzu, 1986 trans. by R. L. Wing)

Drawing by K. P. Lau.