1

Theories

Change your thoughts and you change the world.

—Norman Vincent Peale

WHY BOTHER?

Why Bother?

What will students need to know and be able to do 25 years from now? What skills will they need for the 21st century? What big ideas will help them for the rest of their lives? Futurists believe that students in the 21st century will need greatly enhanced communication skills, including speaking, listening, and writing, and higher-order thinking skills that will allow them to be critical and creative. Other skills they will need are those of perpetual learning and accessing, researching, and organizing information. And, they will need strong, healthy self-concepts with self-management skills, self-initiating postures, and high levels of self-responsibility to ensure their health and wellness, which will help them work cooperatively with others to solve problems. Not only will students need to master all of these skills, they will also need to be able and willing to use new technologies in creative ways.

There is a distinctive link between how these skills are learned and certain brain-compatible models, such as Gardner's (1993) multiple intelligences theory and Fogarty's (1991a) curriculum integration models based on Caine and Caine's (1991) findings on teaching and the human brain. This chapter elaborates the extensive findings regarding brain research gathered by the Caines (1991). The rest of the chapter revolves around Gardner's multiple intelligences and Fogarty's models of integration.

WHO SAYS?

CAINE AND CAINE'S TWELVE PRINCIPLES

Who Says?

Renate and Geoffrey Caine reviewed significant studies on the brain and how we learn, and compiled their findings in *Making Connections: Teaching and the Human Brain* (1991). These findings have provided the basis for the types of brain-compatible learning presented here. The twelve principles discussed in their work are paraphrased in this chapter (see also Figure 1.1).

Principle One

The Brain Is a Parallel Processor

The brain ceaselessly performs many functions simultaneously. The implication is that, like the brain, good teaching should "orchestrate" all the dimensions of parallel processing; simultaneous happenings are brain compatible.

Principle Two

Learning Engages the Entire Physiology

Because learning is as natural as breathing, teaching must fully incorporate stress management, nutrition, exercise, drug education, and other facets of health into the learning process. It is essential, thus, to infuse

Figure 1.1 Brain-Compatible Learning

PRINCIPLE	EDUCATIONAL IMPLICATION
1. Parallel Processing	1. Orchestrate All Dimensions
2. Entire Physiology	2. Incorporate Health
3. Search for Meaning	3. Provide a Stable Learning Environment
4. "Patterning"	4. Encourage the Brain to Pattern
5. Emotions	5. Use the Affective Domain
6. Parts/Whole	6. Include Both
7. Focused/Peripheral	7. Organize Outside Focus
8. Conscious/Unconscious	8. Stimulate "Active Processing"
9. Spatial/Rote Memory	9. Develop Both
10. Facts Embedded	10. Actualize "Real-Life" Learning
11. Challenge/Threat	11. Promote "Relaxed Alertness"
12. Uniqueness	12. Incorporate Multifaceted Technology

SOURCE: From Caine, et al. (2004).

active strategies that permit physical movement and relief from long stretches of passive listening.

Principle Three

The Search for Meaning Is Innate

The search for meaning—the pursuit of making sense of our experiences—is a matter of survival and basic to the human brain. To facilitate this process, brain-based education must furnish a learning environment that provides stability and familiarity. For students, having access to materials and supplies enhances this stability and familiarity.

Principle Four

The Search for Meaning Occurs Through Patterning

In a way, the brain is both scientist and artist, attempting to discern and understand patterns as they occur and give expression to unique and creative patterns of its own. If learners are not attempting to impose patterns, information needs to be presented in a way that allows brains to extract patterns. For example, a teacher can foster the construction of knowledge and meaning by having students inductively learn about different types of poetry through the reading of several poems.

Principle Five

Emotions Are Critical to Patterning

Emotions and cognition cannot be separated. Therefore, teachers must understand that student feelings and attitudes are involved in learning and determine future learning. An illustration of the affective domain's connection to the cognitive domain is the positive effect on student achievement and self-esteem that results from the team spirit felt in cooperative learning.

Principle Six

Every Brain Simultaneously Perceives and Creates Parts and Wholes

The two hemispheres of the brain are inextricably interactive, irrespective of whether a person is dealing with words, mathematics, music, or art. The implication is that people have enormous difficulty learning when either parts or wholes are neglected. Therefore, when doing math calculations, students need to see how those same computations are applied to real-world problems. Learning must be contextual and purposeful so that discrete skills become tools for more holistic, problem-based learning.

Principle Seven

Learning Involves Both Focused Attention and Peripheral Perception

The brain absorbs information that it is directly aware of; it also indirectly absorbs information and signals that lie beyond its immediate focus

Who Says?

of attention. Therefore, the teacher can and should organize materials that will be outside the focus of the learner's attention. Teachers should engage the interests and enthusiasm of students through their own enthusiasm, coaching, and modeling. For example, as students are learning about coniferous and deciduous trees, they might learn about them by walking through a park in the fall, learning at the same time about various birds and animals in the forest.

Principle Eight

Learning Always Involves Conscious and Unconscious Processes

We learn much more than we ever consciously understand. Most of the signals that we peripherally perceive enter our brain without our awareness and interact at unconscious levels. To promote this dual level of brain stimuli, "active processing" allows students to review how and what they learned so that they can begin to take charge of their learning and of the development of their own personal meanings. Using journals and learning logs often fosters this metacognitive reflection.

Principle Nine

We Have Two Types of Memory: A Spatial Memory System and a Set of Systems for Rote Learning

The more information and skills are separated from prior knowledge and actual experience, the more we depend on rote memory and repetition. Educators are adept at focusing on memorization of facts. An overemphasis on such a procedure impoverishes the learner, hinders the transfer of learning, and possibly interferes with the development of understanding. Rather than having students "store and pour" information about a historic event such as the Civil War, why not let them experience it through simulations and role plays and by reading biographies? Then, let them generalize about their own experiences with conflict.

Principle Ten

The Brain Understands and Remembers Best When Facts and Skills Are Embedded in Natural Spatial Memory

Our native language is learned through multiple interactive experiences involving vocabulary and grammar. It is shaped by internal processes and by social interaction. Teachers need to use a great deal of "real-life" activity, including classroom demonstrations, projects, field trips, visual imagery of certain experiences and best performances, stories, metaphors, drama, and interactions among different subjects for youngsters to fully internalize learning. Orchestrating a school store project and publishing a school newspaper are examples of purposeful learning activities.

Principle Eleven

Learning Is Enhanced by Challenge and Inhibited by Threat

The brain learns optimally when appropriately challenged, but "downshifts" under perceived threat. Quizzes, tests, and exams are often seen as

Who Says?

threats, whereas a student's understanding can be fully evidenced through a challenging, yet nonthreatening, portfolio development project. Teachers and administrators should strive to create a state of "relaxed alertness" in which students are intensely involved and meaningfully engaged in learning.

Principle Twelve

Each Brain Is Unique

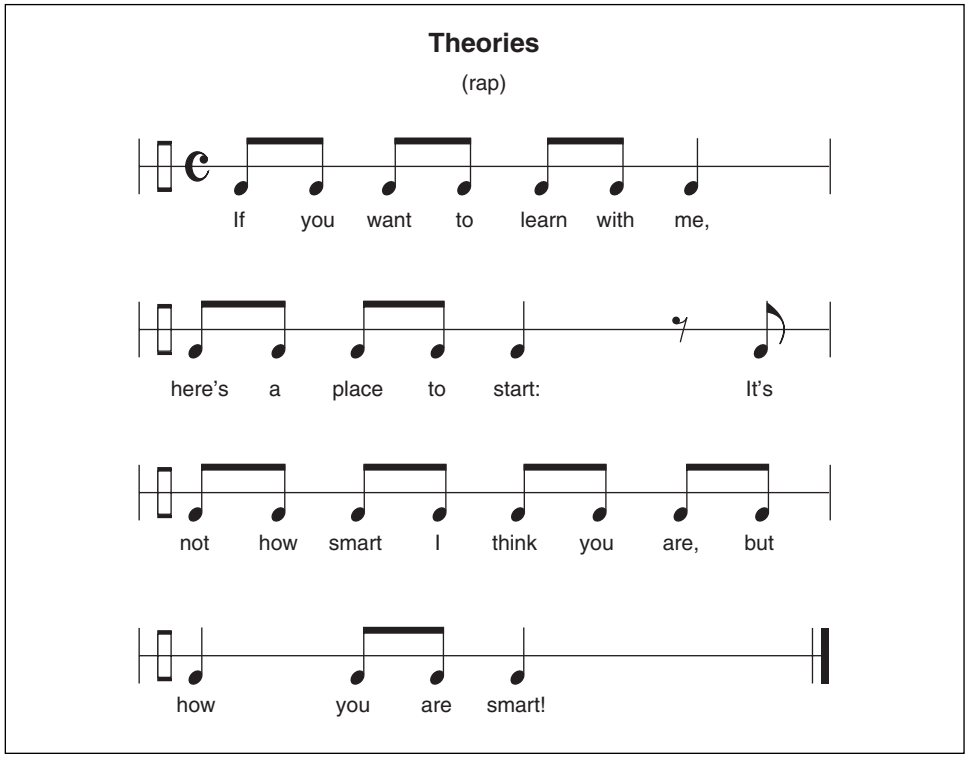
Although we all have the same set of systems, they are integrated differently in every brain. Multifaceted teaching allows students to express visual, tactile, emotional, and auditory preferences. Incorporating multiple intelligences in teaching, learning, and assessment tools helps to foster this multidimensional approach.

Applying the Caines' Principles

Based on the Caines' findings, schools need to strive for meaningful learning through interactive elements, relaxed alertness, immersion, active processing, and high-challenge, low-threat activities. They need to orchestrate the immersion of their students in appropriate experiences and foster active processing through activities such as questioning and genuine reflection, which allow learners to take charge of consolidation and internalization.

I HEAR IT!

I Hear It!



I Hear It!

FROM THE TOWER

GARDNER'S THEORY OF MULTIPLE INTELLIGENCES

It's not how smart you are, but how you are smart. This idea refers to Gardner's theory of multiple intelligences, which first appeared in his seminal piece, *Frames of Mind,* in 1983. Inspired by his work with brain-damaged veterans at the Boston VA Medical Center and with developing minds of children through his work at Project Zero at Harvard's Graduate School of Education, Gardner used what he had learned to formulate a theory advocating seven ways of viewing the world. Rounding out the accepted and established *verbal* and *mathematical* intelligences, Gardner hypothesized that human potential also encompasses *spatial*, *musical*, and *kinesthetic*, as well as *interpersonal* and *intrapersonal* intelligences. He has since added two more intelligences, the *naturalist* and the *existentialist*. His comprehensive view of intelligence further suggested that while the intelligences are independent of one another, they do work together.

Gardner postulated that his theory of intelligences would offer an alternative to the theory of intelligence as indicated by an intelligence quotient (IQ) score. Multiple intelligences theory allows one to assess the talents and skills of the whole individual rather than just his or her verbal and mathematical skills. Indeed, the theory of multiple intelligences does provide a more holistic, natural profile of human potential than an IQ test.

A closer look at the intelligences reveals the complexity Gardner's theory offers in terms of developing human potential. The human mind seems to receive and express ideas in myriad ways. These ways, or as Gardner terms them, intelligences, are listed in Figure 1.2.

Visual/Spatial Intelligence

Like a film projector, visual/spatial intelligence epitomizes the imaginary movies of the mind. As the mind conceptualizes ideas about its surrounding environment, it often employs this intelligence, consisting of images, pictures, and graphical representations. Visual/spatial intelligence might be referred to as the mind's eye—the lens that sees through visual metaphors and memory imprints.

Looks and Sounds Like

The visual/spatial intelligence looks like a child locking in place the final piece to a puzzle, a toppling tower of blocks, or an architect's rendering of a contractor's blueprints. It looks like Rodin's sculpture *The Thinker;* San Francisco's Golden Gate Bridge; the Leaning Tower of Pisa; and Old Faithful at Yellowstone National Park.

The visual/spatial intelligence embodies the talent of a designer/architect as well as the skill of a civil engineer. It manifests itself in CAD/CAM computer programs and software such as Aldus PageMaker. The visual/spatial intelligence provides mental pictures of road maps, faces, and places. Storyboard plans for film shoots, hopscotch grids on

sidewalks, political cartoons, and Sunday comics are all products of the visual/spatial intelligence.

I Hear It!

Figure 1.2 Gardner's Multiple Intelligences Chart

Visual/Spatial: Show Me!

Images, graphics, drawings, sketches, maps, charts, doodles, pictures, spatial orientation, puzzles, designs, looks, appeal, mind's eye, imagination, visualization, dreams, nightmares, films, and videos

Logical/Mathematical: Why Bother?

Reasoning, deductive and inductive logic, facts, data, information, spreadsheets, databases, sequencing, ranking, organizing, analyzing, proofs, conclusions, judging, evaluations, and assessments

Verbal/Linguistic: Who Says?

Words, wordsmiths, speaking, writing, listening, reading, papers, essays, poems, plays, narratives, lyrics, spelling, grammar, foreign languages, memos, bulletins, newsletters, newspapers, e-mail, FAXes, speeches, talks, dialogues, and debates

Musical/Rhythmic: I Hear It!

Music, rhythm, beat, melody, tunes, allegro, pacing, timbre, tenor, soprano, opera, baritone, symphony, choir, chorus, madrigals, rap, rock, rhythm and blues, jazz, classical, folk, ads, and jingles

Bodily/Kinesthetic: Just Do It!

Art, activity, action, experiential, hands-on, experiments, try, do, perform, play, drama, sports, throw, toss, catch, jump, twist, twirl, assemble, disassemble, form, re-form, manipulate, touch, feel, immerse, and participate

Interpersonal/Social: Can We Talk?

Interact, communicate, converse, share, understand, empathize, sympathize, reach out, care, talk, whisper, laugh, cry, shudder, socialize, meet, greet, lead, follow, gangs, clubs, charisma, crowds, gatherings, and twosomes

Intrapersonal/Introspective: What's in It for Me?

Self, solitude, meditate, think, create, brood, reflect, envision, journal, self-assess, set goals, plot, plan, dream, write, fiction, nonfiction, poetry, affirmations, lyrics, songs, screenplays, commentaries, introspection, and inspection

Naturalist/Physical world: I See It!

Nature, natural, environment, listen, watch, observe, classify, categorize, discern patterns, appreciate, hike, climb, fish, hunt, snorkel, dive, photograph, trees, leaves, animals, living things, flora fauna, ecosystem, sky, grass, mountains, lakes, and rivers

Existential: I Wonder . . .

Ponder, think, wonder, question, conceptualize, create, seek, hypothesize, philosophize, search, imagine, immerse, read, invent, write, study the universe, imagine, visualize

SOURCE: From Howard Gardner, *Multiple Intelligences*: New Horizons, 2006

I Hear It!

Visual/Spatial Intelligence

The sounds of the visual/spatial intelligence are heard in analogies, similes, and metaphors: "His teeth were as white as pearls"; "Transfer of learning is like a bridge that connects two things"; or Carl Sandburg's famous line, "The fog comes on little cat feet." Visual/spatial intelligence sounds like an eyewitness testimony given at a trial, a radio announcer's voice giving a play-by-play description of a baseball game, or lingo used by a tour guide to describe the Austrian Alps.

Development

As with all of the other intelligences, the visual/spatial intelligence follows a progressive development. In fact, with early childhood programs, degrees of maturity are sometimes measured by the sophistication of a "draw-a-person" exercise. Drawings that go beyond a large oval head with eyes, nose, and mouth and include details such as five fingers on each hand, strands of hair, freckles, and so on, receive a higher score because they indicate a greater developmental maturity.

The development of the visual/spatial intelligence is often evidenced in sketchbooks and lifetime works of artists, architects, and sculptors. Their early works often show immature execution, yet they also reveal strong signs of content and technique that later appear in their masterpieces. Practice, exercise, and explicit training are necessary for this intelligence to advance. As ideas are structured graphically in one's mind and a hierarchy of sorts is created from seemingly unrelated information (Ausubel, 1978), the novice advances toward more sophisticated and coherent imaging skills.

Notables

Leonardo da Vinci's sketchbooks leave no doubt that he qualifies not only as a true visionary, but also as a person with strong visual/spatial intelligence. He sketched thousands of drawings of scientific phenomena, architectural renderings, and renowned anatomical studies. His visual/spatial intelligence was so finely tuned that his work is unsurpassed even today. Other visual/spatial notables include Frank Lloyd Wright, Auguste Rodin, and Pablo Picasso.

Personal Profiles

Everyone possesses visual/spatial intelligence to some degree. Yet, some are not as tuned in as others to this channel of images, pictures, and graphics. They do not use a lot of metaphorical language, and they often write out directions rather than drawing a map. In general, these people rely on other intelligences to describe or understand the world. On the other end of the spectrum, there are some who have a more fully developed visual/spatial intelligence. They see through their mind's eye, visualizing phone numbers for quick recall, easily picturing how the kitchen will look with new wallpaper, or sketching thoughts in a concept map to see how ideas relate.

People reveal their visual/spatial intelligence in the language they use: "I see what you mean," "It looks good," "Show me," or "Do you see the big

picture?" Visual/spatial intelligence is also noticeable in those who have a flair for matching outfits or a propensity for splashes of color or decorative jewelry. Those high in the visual/spatial intelligence might say things like "The movie was better than the book" or "The comics are the first thing I read in the Sunday paper." Theirs is a world of images, pictures, and graphics. They are able to see themselves 5 years from now and set long-term goals; they remember faces and places, not streets and numbers.

Implications

It is disturbing to see cuts in school programs involving the arts. The visual and performing arts must share center stage with other academic and vocational activities. Training, practice, and exercise in the visual/spatial intelligence is as important as these other activities, and all children deserve the opportunity to hone their skills and talents in this area.

For learners to massage this intelligence, classroom environments must reflect the value placed on it. Paints, crayons, pastels, clay, paper, paste and glue, markers, sand, water, scissors, tape, computer software, and color copiers are the tools of artists. From the primary classroom to the college lecture hall, these tools must be accessible for all to use, experiment with, play with, and mess around with as they envision their world.

Logical/Mathematical Intelligence

Representing data, the logical/mathematical intelligence encompasses an entire range of reasoning skills. From the logic of Sherlock Holmes to the wisdom of Winston Churchill and from the cleverness of the Big Bad Wolf to the sound deductions of Archimedes, the logical/mathematical intelligence charts the data, information, and facts in the human mind.

Looks and Sounds Like

The following are all examples of what the logical/mathematical intelligence looks and sounds like: the reasoning of a scientific hypothesis, the logical progression of a computer program, the dichotomous classification of a species, the sequence of operations in mathematical equations, the cause-and-effect cycle of societal trends, the predictability of a plot in a novel, the patterned complexity of the periodic table of the elements, and the layered textures of an archeological dig. All of these things are sights and sounds of this incredibly *rigid*, yet incredibly *expansive* intelligence. Within this paradoxical intelligence, order reigns supreme.

Development

Beginning with concrete manipulatives and hands-on learning, youngsters soon grasp the concept of one-to-one relationships and numeration. They advance from concrete to representational ideas in the form of symbolic language, working equations, and formulas, and they learn about abstraction through the world of logic and numbers.

Reasoning is the fourth "r" of the developing mind's critical skills of reading, 'riting, and 'rithmetic. As learners construct knowledge and grapple with new ideas, they use their logical/mathematical intelligence

I Hear It!

to make sense of their world. It is the logical/mathematical mechanism in the mind that seeks order by analyzing and compartmentalizing discrete pieces of information into chunks of meaning that can be abstracted into practical applications.

Notables

Perhaps the most frequently mentioned of all logical/mathematical notables is Albert Einstein. His theory of relativity, $E = mc^2$, symbolically represents a complex series of computations that embody a theory of the universe. Others include Polya (1945), who delineated the logic of the mind in his steps to problem solving, as well as Socrates, Plato, and Aristotle, who documented the logic of syllogistic language. More modern notables include Arthur Conan Doyle, Agatha Christie, and Ian Fleming.

Personal Profiles

Personalities that exhibit strong logical/mathematical intelligence enjoy lively discussions, relish the dialogue of controversy and argument, and are often comfortable with paradox and ambiguity. Students adept in this "frame of mind" understand the abstraction of calculus and the logic of statistics. They debate articulately, embrace the study of law, and are eager to analyze, chart, graph, and mathematically extrapolate data to its reasoned ends. They delight in opportunities to deduce and like nothing better than an end to a dilemma that resembles a neatly wrapped package.

Implications

The implications of this intelligence call attention to the need for rigorous curricula and vigorous instruction in the area of critical thinking, mathematical reasoning, and logic. Manipulating objects and working with concrete materials are important to this intelligence. It is also important to gradually move toward the symbolic realm of math, music, or language to secure abstract ideas. Discerning fact from fiction in literature, observation from inference in scientific investigation, and pure data from biased representation are exercises completed by the logical/mathematical mind. Encapsulated in this intelligence are the micro-skills of analysis, including comparison, classification, sequencing, and prioritizing. The ability to analyze, evaluate, and logically surmise are the essence of this intelligence.

Verbal/Linguistic Intelligence

The verbal/linguistic intelligence embodies the ideas of speaking and listening. The power of the word, in its myriad forms, is truly at the heart of this intelligence. Reading, writing, and other forms of communication, such as sign language, also reside under this umbrella.

Looks and Sounds Like

Art and science are the culturally valued targets of receptive language (listening and reading) and expressive language (speaking and writing) that are embedded in the verbal/linguistic intelligence. In the realm of

receptive language, the verbal/linguistic intelligence looks like someone reading Fitzgerald's *The Great Gatsby,* Hemingway's *The Sun Also Rises,* Tolstoy's *War and Peace,* or listening to a presidential campaign speech. On the other hand, expressive language sounds like someone giving directions over the phone to a friend or writing out a grocery list. Signs of this intelligence also include dialogue, arguments, whispers, laughter, handwritten invitations, letters of correspondence, and poems and essays.

Development

Youngsters or novices imitate the sounds, rhythms, and tones of the language they hear, stringing words together into decipherable fragments and then into fully discernible sentences of proper syntax and sense. Oral language is most often followed by written language—nonsense or serial writing that eventually becomes phonetically spelled words, simple sentences, and fully developed paragraphs. Whereas this is the developmental journey of a young learner, older learners are often introduced to language in oral and written forms simultaneously. Yet, the developmental sequence is still evidenced in the progress from simple to complex forms.

Vygotsky (1986) says that thinking is embedded in the language we use and Piaget (1972) uses formal learning stages to signal the development of abstract levels of thinking. These mindful abstractions are communicated through language.

Notables

Of note in the verbal/linguistic intelligence is John Fitzgerald Kennedy and his famous call to action: "And so, my fellow Americans, ask not what your country can do for you; ask what you can do for your country." Or Martin Luther King, Jr.'s, resounding refrain, "I have a dream . . ." or the words of Neil Armstrong, "That's one small step for man, one giant leap for mankind." Words like these become emblazoned in one's memories—not as a written message, but as spoken rhetoric of power and strength and vigor.

Personal Profiles

Although the verbal/linguistic intelligence may not be considered a strength of everyone, most claim success with some aspect of it. For example, a student may have finely developed listening skills, yet may be less adept at speaking and articulating ideas. Or, one may sense a real comfort zone in reading yet feel somewhat inadequate writing down his or her thoughts. Still, there are obvious connections within the complex tapestry of language as suggested by the idea that writers are readers first.

Implications

What does all this mean? It simply points to one of the critical "frames of mind" that Gardner postulates—the verbal/linguistic frame. And, implied in the exploration of this frame is the need to recognize, appreciate, and refine the skills attributed to this intelligence: reading fact and fiction; writing memos, notes, invitations, letters, essays, novels, short stories, and news releases; speaking formally (speech, debate, presentation)

I Hear It!

and informally (conversations and dialogues); and listening to messages, music, and media.

Musical/Rhythmic Intelligence

In primitive times, the beat of the drum carried messages through its patterned rhythms to the minds of tribesmen far and wide. And today, too, the power of music cannot be overlooked as a primary channel for learning and knowing, sharing and expressing, and perceiving and creating pitch and patterns for the human mind.

Looks and Sounds Like

In a June 1982 article in *Psychology Today* titled "The Music of the Hemispheres," Gardner stated that musical ability is packaged in the brain in more varied ways than verbal or spatial skills. So, too, is the intelligence, which can be seen by strolling through the halls of a school that integrates the curriculum with multiple intelligences.

In one classroom, students memorize their multiplication facts by using a steady rhythm and beat: "$3 \times 3 = 9$, $3 \times 4 = 12$, $3 \times 5 = 15$," and so on. Rote memorization of rules of grammar, spelling, or even arithmetic seems to be easier for some through singsong phrases such as the following:

"Con-junction is a junction."

"'I' before 'e' except after 'c'."

"Yours is not to reason why; just invert and multiply."

In the music classroom, students learn melodic sequences that eventually form songs. In the kindergarten room, children find their spots on the rug when the teacher plays transitional music. Music is played in the gym, as part of the P.E. department's "strive to be fit" aerobics program. A steady rhythm is tapped out by students learning keyboarding in the computer room. And in the English-as-a-second-language (ESL) room, students learn folk songs as their model for language development.

Development

The musical/rhythmic intelligence, often regarded as an innate talent, is nurtured and developed in many ways. Typically, youngsters are exposed informally to music in their home environments through a variety of media. At some point, they may begin taking private lessons to learn a musical instrument, and they may join the school band or orchestra. This is how students develop lifetime skills to support their musical/rhythmic intelligence.

Notables

One of the most globally recognized and enduring musicians is Mozart. He describes his relationship to music and its composition in this way:

> When I am . . . completely by myself, entirely alone . . . or during the night when I cannot sleep, it is on such occasions that my ideas

> flow best and most abundantly. Whence and how these come I know not nor can I force them. . . . Nor do I hear in my imagination the parts successively, but I hear them *gleich alles zusammen* [at the same time, all together]. (Peter, 1977, p. 123)

Among those renowned in the musical/rhythmic intelligence are Italian operatic tenor Luciano Pavarotti, and violinist Itzhak Perlman.

Personal Profiles

It is clear that the profile of human potential is incomplete without the musical/rhythmic intelligence, and everyone possesses some degree of aptitude. Gardner is careful to point out that this intelligence meets the rigorous criteria he has set, which therefore qualifies it as an intelligence. Some prefer to consider musical ability a talent rather than an intelligence; nonetheless, it is easily trained and developed.

Implications

Because music, rhythm, and beat are regarded as the elements of one of the nine intelligences, it behooves us as educators to include them as an integral part of the curriculum. Youngsters need to give this intelligence the exercise and reinforcement it needs to develop and blossom. School districts that embrace Gardner's theory of intelligences must also embrace music and the other arts, for they are undeniably interconnected. J. David Bowick, superintendent of the Oakland Unified School District, explains

> During my school days, music was the reason to learn, the access to learning, the joy in learning. For other ghetto kids with whom I grew up and for those whom I later taught, music, art, dance, drama, and other "frills" were the inspiration that led many of them up and out of poverty. (Bowick, 1983, pp. 12)

Bodily/Kinesthetic Intelligence

Action is the key to this intelligence. The body is the conduit for the mind, and muscle memory obtained from experiences is what defines the bodily/kinesthetic intelligence.

Looks and Sounds Like

To envision the bodily/kinesthetic intelligence, imagine the precision of high-flying acrobats in a circus ring or pirouettes performed by a prima ballerina; think of the strength and timing of a prizefighter or the massive, symmetrical, fully toned body of a weightlifter. Hear the sounds of the bodily/kinesthetic intelligence as a typist beats out a rapid and steady rhythm, a pianist's fingers fly across a piano's keys, or a symphony performs a crescendo in dynamic, earth-shattering brilliance.

Development

Perhaps the easiest way to describe the development of this bodily/kinesthetic intelligence is to compare it to Posner and Keele's

I Hear It!

(1973) accepted stages of skill development—novice, advanced beginner, competent user, proficient performer, and expert. These stages can be illustrated by describing the different stages of learning to snow ski.

Novices process pieces, but not necessarily in order. For example, they often learn to go down a hill before they know how to stop or control their downhill run. *Advanced beginners* put together various pieces and practice in sequence. They don't really care about the results; they just want to know if they did it right. As learners become more competent, they care about the relationship of skill to the whole experience. *Competent* skiers are able to put together strings of turns and eventually master the hill. They're in a comfort zone and it's fun. *Proficient performers* have forgotten exactly *how* they ski. Their performance is automatic. *Experts* have also forgotten everything about the step-by-step progression of skiing and often can't explain it to someone else. Instead, they *show* the person how to ski, oftentimes glossing over difficult points.

The stages of learning, while more noticeable in gross motor activities, also apply to fine motor developments such as writing, computing, auto repairing, and playing the trombone. In essence, the bodily/kinesthetic intelligence, whether used with gross motor or fine motor skills, grows and develops in fairly predictable ways.

Notables

The notables in this intelligence span myriad fields, one of which is dancing. A familiar name from this field is Mikhail Baryshnikov. His fantastic leaps across the stage seem to defy gravity, and his exquisite technique astounds audiences. Just as Baryshnikov's image is known to the world of dance, Michael Jordan's gravity-defying image is legendary in the world of sports. Other notables with strong bodily/kinesthetic intelligence include Kristi Yamaguchi, Walter Payton, and Bo Jackson.

Personal Profiles

The "frame of mind" described in Gardner's concept of the bodily/kinesthetic intelligence is evidenced early on in the fine and gross motor skills of youngsters. In fact, a major focus of exemplary early childhood programs is in this kinesthetic arena. Yet, just as with the other intelligences, personal profiles for the bodily/kinesthetic intelligence run the gamut from naturally skilled and proficient learners to the poorly coordinated and obtuse performers.

There are those who can type quite proficiently and there are those who prefer to peck along with two index fingers. There are those who excel in a number of sports and those who choose not to participate in physically oriented activities. Some can play a musical instrument with no problem, whereas others claim to be "all thumbs." Of course, many people fall somewhere in between the two extremes and learn to type competently, play a fair game of tennis, and pick away at their guitars.

Implications

The overriding implications for the full development of the bodily/kinesthetic intelligence lies in a rich classroom that invites hands-on

investigations, immersion in experiential learning situations, and long-term, authentic projects that require manipulation and maneuvering. This intelligence flourishes beyond the classroom walls in outdoor educational trips, field trips, and excursions. Gardner suggests (1983) that through the bodily/kinesthetic intelligence students experience and learn in children's museums, which invite sensory exploration and discovery learning. As discussed in Dewey's (1938) seminal piece, *Education and Experience*, the bodily/kinesthetic intelligence requires fertile territory for growth and development. With this intelligence, needed environmental richness extends naturally from the gym, playground, and track into various playing fields, stadiums, and sports complexes.

Interpersonal/Social Intelligence

The interpersonal/social intelligence embodies people's interactions. It involves the give-and-take of communication and the goal of not only understanding others and their motivations, but also of effectively empathizing with their feelings. Embedded within is the idea that we inquire about our world through our interactions with others, and in the process we learn from one another.

Looks and Sounds Like

Interpersonal intelligence looks like a charismatic leader surrounded by an adoring crowd; a glib salesperson spinning his or her pitch; a football team's trust, camaraderie, and synchronized play on the field; a teacher coaching a child in language skills; and a doctor holding the hand of a suffering patient.

Sounds of interpersonal intelligence include intimate conversations, arousing evangelic praises, lively debates, Socratic dialogues, structured articulations, phone conversations, shared secrets, political rallies, heated arguments, and cries of "surprise!" The sound of this intelligence is the sound of socialization.

Development

Interpersonal skills develop on a sliding scale ranging from isolation to skillful social interactions. Youngsters learn social behavior as they come in contact with others, first in their immediate family circle, then in peer situations, and then in public encounters. It seems, however, that the socialization process is dependent not only on the frequency of the interactions but also on the context and intensity of those interactions. For example, youngsters who attend nursery schools and have opportunities to interact with other children seem to adjust more easily to traditional schooling because they are more likely to know how to converse, share, and get along with their peers.

It's interesting to track the socialization process of young children as they develop into fully functioning adults. Their development begins with the "me/mine" mentality of very young children, whose self-centered worlds revolve only around them. They then move into an adolescent phase and assume a posture of "me/them." Their lives become ruled by

I Hear It!

peer pressure and peer approval. As maturing adults, a "me/we" attitude prevails, and they pragmatically embrace a team-centered approach. There are, of course, many variations of this picture of social development, but, as Gardner states, "the child can come to know himself . . . only through coming to know other individuals" (Gardner, 1983, p. 247).

Social Development	
Young Child	Self-Centered—Me/Mine
Adolescent	Peer Centered—Me/Them
Adult	Team Centered—Me/We

Notables

Among the notables with obviously high interpersonal intelligences are missionaries who devote their lives to others, such as Mother Teresa, or religious leaders, such as Mahatma Gandhi. Also often noted in this category of interpersonal intelligence are the charismatic leaders in the political arena, including John F. Kennedy, Martin Luther King, Jr., and Bill Clinton. Other personalities who qualify as examples of strong interpersonal intelligences are the ultimate interviewers, Phil Donahue, Barbara Walters, and Larry King, who all have a talent for getting others to open up.

Personal Profiles

Personalities are typically categorized as introverted or extroverted. Introverts are more comfortable turning inward and are often seen as asocial. Extroverts, on the other hand, seem to thrive on the company of others and are viewed as social butterflies. In reality, of course, most people fall somewhere in between the two extremes. As with the other intelligences, the spectrum of personal attributes and preferences regarding interpersonal skills is extensive. Yet each has the potential to develop this intelligence to its fullest and call on it when needed.

Implications

Schools fostering the interpersonal intelligence are not didactic, behavioristic models of schooling in which teachers traditionally cover the content and information they want students to know; instead, these schools exemplify a constructivist model of schooling in which students are expected to make meaning in their minds of the subject matter. In this constructivist philosophy, interaction between the students and the teacher is enhanced and extended to include interactions among the students themselves. In essence, this intelligence thrives on active learning within the social context of the classroom.

Intrapersonal/Introspective Intelligence

Metaphorically, the intrapersonal/introspective intelligence is a personal valentine invisibly inscribed with the message "Be Mine." This intelligence

also carries the message "Know thyself." Pragmatically, the intrapersonal intelligence represents a frame of mind in which learners internalize learning through thoughtful connections and then transfer it to novel situations through reflective application. It is with the intrapersonal intelligence that one has the ability to become acquainted with him- or herself.

Looks and Sounds Like

The manifestation of the intrapersonal intelligence is seen most vividly in personal diaries, daily journals, thinking logs, sketchpads, and notebooks. Self-reflection, self-awareness, and self-evaluation are often evidenced in these written formats, which evolve over time. Personal growth, acquisition of knowledge, and development of skills such as drawing and sketching are systematically traced through the pages of these continuing personal records. They provide fertile ground for meaningful reflection and powerful self-analysis and evaluation.

In another modality, the intrapersonal intelligence sounds like self-editing, such as, "No, I think I'm better at this," or the metacognitive monologue, "I must remember to talk more slowly and enunciate my words." As Dr. Art Costa, professor emeritus at California State University, Sacramento, has been heard to say, when you catch yourself talking aloud—to yourself—that's metacognitive. Metacognition is the act of planning, monitoring, or evaluating one's own behavior. Metacognition embodies the frame of mind Gardner labels as the intrapersonal intelligence.

Development

The intrapersonal intelligence develops, according to Swartz and Perkins (1987), in four incremental stages: *tacit*, *aware*, *strategic,* and *reflective*. *Tacit* behavior refers to using a skill or idea in an oblivious state. For example, young students may be able to read, but they seem totally unaware of the strategies they use—or even that they have an exceptional ability in this area. When students enter the next stage, *awareness*, they become cognizant of their strategies and/or their levels of performance. They are able to step back from the action and "freeze frame" their behavior. Subsequently, as they become more introspective, they advance to the *strategic* phase. In this phase, they consciously select particular models of behavior. For example, our readers might deliberately plan to "skim" or "scan" an essay for needed information because they know it is an efficient strategy for certain tasks. In turn, the *reflective stage* occurs when a student is able to reflect upon the degree of success or failure of the strategic method they used.

Whereas the concept of intrapersonal intelligence seems to embody various stages or levels of proficiency, these stages are not locked into a chronological map. On the contrary, individuals embrace this introspective intelligence in similar patterns as Gardner's other intelligences. Although these patterns of occurrence are individually programmed to some extent, they are also dependent upon stimuli from the surrounding environment. If a culture values intrapersonal reflection, as many Eastern countries do, the intrapersonal intelligence is more likely to attract the attention and exercise it needs to develop and flourish.

I Hear It!

Notables

Naturally, notables in the intrapersonal arena often include people in the field of psychology such as Freud and Jung; writers such as Emerson and Thoreau; artists such as Leonardo da Vinci; and philosophers such as Socrates, Plato, and Confucius.

Personal Profiles

The intrapersonal intelligence is present in varying degrees for each of us. There are those who seem totally unaware of their own behavior or how that behavior affects the people around them. Who among us has not been at a party, in the midst of a "braggart" or "blowhard," who drones on incessantly, unaware of a cool reception, total boredom, or a shrinking audience? On the other hand, there are those who are deeply reflective and acutely aware of their actions and words. Remember Dale Carnegie's (1981) message in *How to Win Friends and Influence People*? To paraphrase his intent—find out what the other party wants, then, with that as your goal, proceed with the interaction.

Implications

The intrapersonal intelligence must be fostered and developed if real, significant, and long-lasting transfer of learning is to take place. For it is in the awareness, the strategic planning, and the reflective evaluation that students capture information and apply it in purposeful ways. Journals, logs, and portfolios for self-evaluation and dialogue with others help students articulate their strengths and weaknesses. They are necessary components of schooling that guide the development of the intrapersonal intelligence.

Naturalist/Physical World Intelligence

The naturalist intelligence represents the observations and distinctions made in the natural world. It provides a means to study nature and to compare natural observations with others. Through the lens of the naturalist intelligence, one discovers subtle changes in the environment. It collects, sorts, and categorizes articles and objects from the natural world. It organizes those collections by classifying, labeling, and keeping notebooks.

Looks and Sounds Like

The naturalist intelligence looks like a child catching butterflies, a geologist categorizing rocks, or a fly fisherman standing in the middle of a stream. It may be seen collecting and classifying seashells, planting flowers, or photographing nature. The naturalist may be heard comparing observations with another naturalist, or learning to recreate certain bird whistles or animal sounds.

The naturalist intelligence embodies the talent of a conservationist or environmentalist. It manifests itself in activities such as bird-watching, taking nature walks, forecasting weather, and stargazing. The naturalist understands the ecosystem and appreciates Mother Nature.

Development

Some youngsters seem to prefer studying nature to playing in it. Recess is a prime example. While other kindergarteners swing, climb, and seesaw, a small handful of students may have discovered a bird's nest with baby birds in it. They will become completely engrossed in the birds, not only during recess, but also for the rest of the day. These same youngsters often take a long time to walk to school because they stop along the way to observe bugs, rocks, flowers, and so on. Frequently, they bring some of their "treasures" to school and proudly present them to their teachers as gifts. Many years ago, they would no doubt have received warm welcomes as hunters, gatherers, or farmers. As naturalists develop, they often become collectors of things such as butterflies, rocks, coins, and sports cards. They become florists, nature artists, hikers, veterinarians, or farmers. Their interests and skills often guide them into fields such as forestry, zoology, geology, ecology, biology, and astronomy.

Notables

Two notables in this intelligence are Dian Fossey and Marlin Perkins. Much of Fossey's life was spent studying gorillas in Africa. Perkins was the zoologist on Mutual of Omaha's *Wild Kingdom* television series for many years. Other famous naturalists include Jane Goodall, Jacques Cousteau, John Audubon, and Galileo. Organizations such as the Dian Fossey Gorilla Fund International, World Wildlife Fund, The Nature Conservancy, and others provide opportunities for naturalists to be involved in conservation and environment issues of their choice.

Personal Profiles

Naturalists enjoy activities that connect them with nature. In school, students with strong naturalist intelligence prefer to sit near the window and typically volunteer to take care of classroom plants or animals. They enjoy field trips to museums of natural history, zoos, farms, wildlife protection areas, botanical gardens, observatories, and planetariums. After the trip, the naturalists will spend hours comparing their observations with one another.

Implications

The naturalist intelligence flourishes in an environment that connects the learner with nature. Special projects to beautify the school or community, develop outdoor classrooms, and "bring nature in" with plants, lighting, and animals foster the naturalist's skills, as well as his or her curiosity. Of special interest to the naturalist are hands-on research projects on topics such as the environment, food chain, plants, animals, water/life cycle, endangered species, and constellations.

Existential Intelligence

The existentialist seeks answers to fundamental questions of being, such as: Where do we come from? What happens when we die? Why does war exist?

I Hear It!

Looks and Sounds Like

The existential intelligence looks like a person sitting under a tree immersed in a book, an astronomer studying the stars through a telescope, an artist painting a panoramic view of the sunset, a writer creating a fable or myth, a musician composing music to express a major theme, or a child "just thinking."

Sounds of existential intelligence include philosophical discussions and debates, telling stories, asking questions, interpreting research, predicting outcomes and relationships, and explaining hypotheses.

Development

Youngsters with strong existential intelligence exhibit concerns for cosmic issues at an early age. These students ponder global matters such as the significance of life and death, the fate of the world, and the meaning of love. Gardner has stated that he believes this intelligence develops in sophistication, from apprentice to committed student to budding master. He states that "one can be a novice in a religious system, in philosophy, or in the expressive arts, and one can work to achieve journeyman or expert status" (Gardner, 1999, p. 61). He offers Pope John XXIII as an example who, in his *Journal*, described his long and intensive existential and spiritual training.

Notables

Notables in this intelligence include religious leaders such as Mahatma Gandhi, composers such as Joseph Haydn, artists such as Vincent Van Gogh, and novelists such as Albert Camus. Confucius, Socrates, Plato, and Aristotle were philosophers who, like other existentialists, were concerned with cosmic issues. Other noteworthy existentialists include physicists Albert Einstein and Sir Isaac Newton, as well as astronomers Edmond Halley and Stephen Hawking.

Personal Profiles

Existentialists enjoy contemplating big picture realities such as life and death. In the classroom, students with strong existential intelligence sometimes seem to be in "another world." They may be considering their purpose on earth, what life would be like on another planet, or where their pets go when they die. These students are fascinated with myths and fairy tales and typically enjoy creating their own stories about larger-than-life ideas or subjects. In addition, they are most likely to be engaged and motivated when the learning is concept or theme based.

Implications

The existential intelligence flourishes in an environment that provides opportunities to ask "why" and "what if" questions. This intelligence is particularly engaged when the curriculum is integrated and concept-driven. The existentialist's strengths are affirmed when asked to help other students make connections that lead to global understanding.

FROM THE FIELD

MULTIPLE INTELLIGENCES ■

Whereas Gardner's theory of multiple intelligences is unequivocally the trunk of the mighty oak, branches of interpretive models continue to sprout. In an effort to take Gardner's theory into the practical realm of the classroom, a number of voices from the field offer strategies and frameworks for teachers and students. Among the authors, consultants, and strategists speaking from the field are Lazear; L. Campbell; B. Campbell; Sternberg; Chapman; Armstrong; O'Connor and Callahan-Young; and Bellanca, Chapman, and Swartz.

Lazear

Lazear's books are based on the multiple intelligences theory and include *Seven Ways of Knowing* (1991a), *Seven Ways of Teaching* (1991b), *Seven Pathways to Learning* (1994b), and *Multiple Intelligence Approaches to Assessment: Solving the Assessment Conundrum* (1994a). These books provide awareness, amplification, teaching, and transfer of the intelligences into classroom life and life outside the schoolroom walls. They also include strategies for incorporating the intelligences into assessments.

L. Campbell

Linda Campbell's *Teaching and Learning Through Multiple Intelligences* (1992) focuses on introductory models of five intelligences (visual/spatial, musical/rhythmic, interpersonal, intrapersonal, and bodily/kinesthetic), which are not focused on in schools.

B. Campbell

Bruce Campbell's work *The Multiple Intelligences Handbook* (1994) provides lessons and ideas that evolved directly from his own classroom in Seattle. His "centers" approach offers opportunities for students to exercise seven of the intelligences.

Multiple Intelligences Centers	
William Shakespeare	Linguistic
Albert Einstein	Logical/Mathematical
Martha Graham	Kinesthetic
Pablo Picasso	Visual/Spatial
Ray Charles	Musical
Mother Teresa	Interpersonal/Social
Emily Dickinson	Intrapersonal/Introspective

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His book *Teaching and Learning Through the Multiple Intelligences* (1996), which he coauthored with L. Campbell and Dickinson, includes information about and applications for the naturalist/physical world intelligence.

Sternberg

In his book *Beyond IQ: A Triarchic Theory of Human Intelligence*, Sternberg (1985) presents his Triarchic Theory, which suggests that successful intelligent people are those who have the ability to achieve success according to their own definition of success, within their sociocultural context. Sternberg believes that to adapt to, shape, and select environments, people must capitalize on their strengths and compensate for their weaknesses. To accomplish this, they must balance analytical, creative, and practical skills. Sternberg has authored and coauthored several books about intelligence, including *Intelligence Applied: Understanding and Increasing Your Intellectual Skills* (1986) and *Teaching for Successful Intelligence* (2000).

Chapman

In her book, *If the Shoe Fits . . .* , Chapman (1993) frames eight intelligences in a metaphor of shoes and develops lessons and activities around them. For example, a fuzzy bedroom slipper represents the intrapersonal intelligence. Ideas for self-awareness and self-reflection are depicted with this shoe. A drum major's boot represents the musical/rhythmic intelligence, and a bunch of football cleats illustrates the teamwork required for the interpersonal intelligence. In this work, Chapman presents eight intelligences individually and in integrated combinations as tools for problem solving.

Armstrong

From a more global perspective, or at least from beyond the schoolroom walls, Armstrong's *Seven Kinds of Smart* (1993) and *Multiple Intelligences in the Classroom* (1994) profile Gardner's intelligences through descriptions of them as they are used in everyday life. Included are exercises for readers to use their many intelligences.

O'Connor and Callahan-Young

Targeting the K–3 classroom, O'Connor and Callahan-Young use the multiple intelligences to design activities for primary units of study in their book, *Seven Windows to a Child's World* (1994). Using themes such as spring and winter, they plot appropriate lessons using various disciplines.

Bellanca, Chapman, and Swartz

Bellanca, Chapman, and Swartz provide a full spectrum of assessment strategies for eight intelligences. Unlike Lazear's forms and formats,

Multiple Assessments for Multiple Intelligences (Bellanca, Chapman, & Swartz, 1994) provides in-depth discussions that highlight a set of alternative assessments for each intelligence that is targeted.

FROM THE TOWER

FOGARTY'S MODELS OF CURRICULUM INTEGRATION ■

We have put schooling together in a manner that has appeared to work for many years. But, as we look at the demands of society today, we find it is a different world. Our students are coming to us fragmented and we continue the fragmentation in school. If our vision is one of a whole child, we need to look at ways to teach the *whole* child. Students don't often see the connections among separate and distinct subjects such as science, math, social studies, and literature. We need holistic ways to present information and get students involved in learning so they can apply what they've learned to their lives. Ultimately, we need to integrate the curricula. Several things have happened in education that dictate a more integrated look at schooling, including brain research that didn't exist before. Now, we have supportive evidence that shows how students learn.

Curriculum overload is another important issue. We continue to add things, but we seldom take things out. How can we possibly teach everything when information today doubles every year and a half? One answer is restructuring schools from the inside out by reviewing the curriculum and setting priorities. We need to ask ourselves what it is that kids need to know for the rest of their lives. Then, we need to create models of schooling that focus on the *learner*.

The glory of the model for curriculum integration is that once again teachers become the designers. They can put curriculum and instruction together the way they think it makes sense. They know what to do. They're the experts. They've known for many years what to teach. There are many, many ways to integrate the curricula. Frequently, we integrate within a single discipline or we may integrate across disciplines. Sometimes, integration is simply within the mind of the learner.

Having a class read a novel while teaching about the period in history in which the novel takes place stimulates more powerful learning than just studying literature and history separately. Teaching a math unit on measurement makes an impact on more students and makes much more sense to them if that form of measurement is used in a cooking unit.

These are commonsense ways of putting our curriculum together. They are things we have done in the past, but they are done more deliberately now. Teachers can "selectively abandon" and "judiciously include" things in their curriculum while sifting out the valued goals embedded within various content areas. They can then begin to set priorities in an overcrowded and somewhat splintered curriculum.

I Hear It!

Within a Single Discipline

Integrating curricula within a single discipline provides a platform for making connections from one day's work to the next, from one part of a project to the next, and from one idea to another. A semester-long integrated art project at an inner-city school allows students to create symbolic representations in a permanent wall mural and to connect to the school community. An added benefit to this contribution is that their work is an indelible statement. Making these connections within a discipline is critical to integrating skills and concepts into meaningful life situations. The connection made within a single content area provides a needed context for deeper understanding. The integration of concepts leads to the transfer and application of skills in holistic and natural ways for lifelong use. Students who learn in connected ways see the big picture and have a sense about how ideas fit together. By enabling students to see that what they learn is connected to real-life experiences, they can see that their learning has greater meaning.

Webs Across the Disciplines

Integrating curricula across disciplines may be as simple as resequencing subject matter or looking for a shared concept with another content area. In one classroom, where the preparation of pudding played an important role, students did activities that involved measurement and communication skills as well as the scientific concept of changing matter.

Selecting an overall theme and using it as an umbrella idea that connects various subject areas can also integrate the curricula. The theme, which may evolve from a particular academic area, can be developed in the whole language classroom by using a traditional literature-based approach. Some themes may be schoolwide and web out to every classroom in the building. For example, one school took advantage of available resources with a U.S. postal theme, entitled "Wee Deliver," to involve every classroom. Each month a different class designed stamps and other classes delivered the mail. Underlying this theme were the skills of writing and communication.

Another thematic approach is the personal theme. In one model, individuals selected a theme that was significant to them and used that theme to connect to the content in a personal way. Personal themes can develop naturally from children as they observe and interact with their environment and reflect upon their experiences.

Threads Across the Disciplines

Designing lessons that encourage higher-level thinking naturally leads to integrated learning. Another way of integrating across several disciplines is to thread certain skills and concepts into several subject areas. Following are examples of schools and teachers weaving the thinking skills of theorizing, comparing, and contrasting into their lessons—lessons

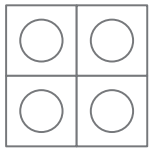
that allow kids to work together, rank ideas, justify decisions, and articulate thoughts freely.

One school selected problem solving as the skill to thread through every classroom and every subject matter content. Another school used both the study and application of technology as its thread to integrate curricula. They electronically connected every classroom to the cable network and even connected some classes to other schools by a FAX modem. Students here are motivated to write and communicate not only within the classroom, but also between schools. Technology here enables and connects.

Inside the Mind of the Learner

Children often have a lens of interest. Anytime we can tap into that interest we are ahead, because it can be an impetus for integrating learning. Whereas teachers can redesign the curricula to make explicit connections between lessons, in the final analysis the true integration of ideas must occur within the minds of the learners.

Model 1: Fragmented



In this model, teachers work in grade-level or departmental teams. Tapping into this traditional, cellular model of discipline-based curriculum gives teachers a chance to examine content priorities. Teachers can begin to map their curriculum by simply focusing on each subject or class "prep" they teach, listing what they include, and prioritizing their resulting lists. This process is enhanced when teachers from all departments and grade levels form job-alike teams to discuss what's important in their curriculum. Decisions are made to "selectively abandon" some things and to "judiciously include" others. Once the job-alike teams come to some agreement about curricular priorities, they are then well prepared to represent their grade level or department on an interdisciplinary team. Teachers who have the backing of their colleagues in their department or grade level bring confidence to their cross-disciplinary teams because they have done the preliminary work. Discussions within their own groups yield a significant degree of consensus, and the interdisciplinary team members become well-grounded in their priorities.

Just one afternoon of inservice devoted to grade-level or departmental meetings that are focused on setting curricular priorities can pay big dividends. It is the first step toward the curriculum mapping necessary for integrating. Obviously, model 1 is not truly an integration of content, but rather a *preparation* for curriculum integration (see Figure 1.3).

Model 1 Example

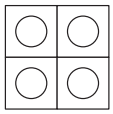
As depicted in the "fragmented" illustration, a technology teacher might list the topics shown as elements or units for one year. Other teachers may create similar lists for their disciplines.

Figure 1.3 Toward an Integrated Curriculum

Ten Views for Integrating the Curricula: How Do You See It?

1

Fragmented
Periscope—one direction; one sighting; narrow focus on single discipline

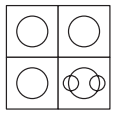


Description
The traditional model of separate and distinct disciplines, which fragments the subject areas.

Example
Teacher applies this view in Math, Science, Social Studies, Language Arts or Sciences, Humanities, Fine and Practical Arts.

2

Connected
Opera glass—details of one discipline; focus on subtleties and interconnections

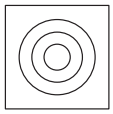


Description
Within each subject area, course content is connected topic to topic, concept to concept, one year's work to the next, and relates idea(s) explicitly.

Example
Teacher relates the concept of fractions to decimals, which in turn relates to money, grades, etc.

3

Nested
3-D glasses—multiple dimensions to one scene, topic, or unitt

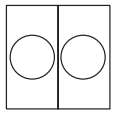


Description
Within each subject area, the teacher targets multiple skills: a social skill, a thinking skill, and a content-specific skill.

Example
Teacher designs the unit on photosynthesis to simultaneously target consensus seeking (social skill), sequencing (thinking skill), and plant life cycle (science content).

4

Sequenced
Eyeglasses—varied internal content framed by broad, related concepts

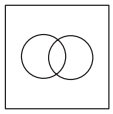


Description
Topics or units of study are rear-ranged and sequenced to coincide with one another. Similar ideas are taught in concert while remaining separate subjects.

Example
English teacher presents an historical novel depicting a particular period while the History teacher teaches that same historical period.

5

Shared
Binoculars—two disciplines that share overlapping concepts and skills

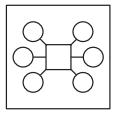


Description
Shared planning and teaching take place in two disciplines in which overlapping concepts or ideas emerge as organizing elements.

Example
Science and Math teachers use data collection, charting, and graphing as shared concepts that can be team-taught.

6

Webbed
Telescope—broad view of an entire constellation as one theme, webbed to the various elements

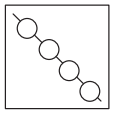


Description
A fertile theme is webbed to curriculum contents and disciplines; subjects use the theme to sift out appropriate concepts, topics, and ideas.

Example
Teacher presents a simple topical theme, such as the circus, and webs it to the subject areas. A conceptual theme, such as conflict, can be webbed for more depth in the theme approach.

7

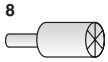
Threaded
Magnifying glass—big ideas that magnify all content through a metacurricular approach



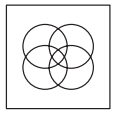
Description
The metacurricular approach threads thinking skills, social skills, multiple intelligences, technology, and study skills through the various disciplines.

Example
Teaching staff targets prediction in Reading, Math, and Science lab experiments while Social Studies teacher targets forecasting current events, and thus threads the skill (prediction) across disciplines.

8



Integrated
Kaleidoscope—new patterns and designs that use the basic elements of each discipline

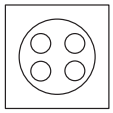


Description
This interdisciplinary approach matches subjects for overlaps in topics and concepts with some team teaching in an authentic integrated model.

Example
In Math, Science, Social Studies, Fine Arts, Language Arts, and Practical Arts, teachers look for patterning models and approach content through these patterns.

9

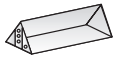
Immersed
Microscope—intensely personal view that allows microscopic explanation as all content is filtered through lens of interest and expertise



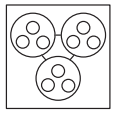
Description
The disciplines become part of the learner's lens of expertise; the learner filters all content through this lens and becomes immersed in his or her own experience.

Example
Student or doctoral candidate has an area of expert interest and sees all learning through that lens.

10



Networked
Prism—a view that creates multiple dimensions and directions of focus



Description
Learner filters all learning through the expert's eye and makes internal connections that lead to external networks of experts in related fields.

Example
Architect, while adapting the CAD/CAM technology for design, networks with technical programmers and expands her knowledge base, just as she had traditionally done with interior designers.

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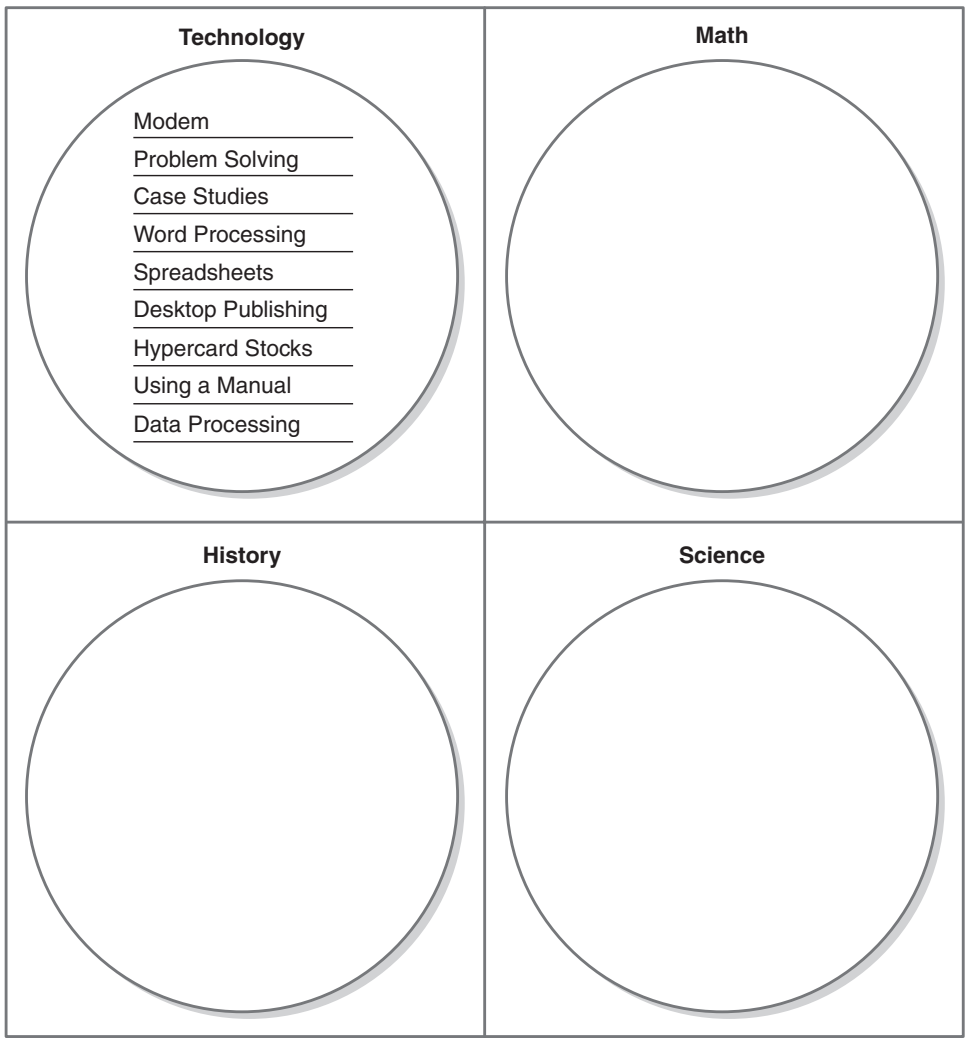

In the ensuing dialogue, the teacher ranks "Using a Manual" as number one. The argument is that students will use new technologies throughout their lives, and, therefore, will need to know how to do the technical reading required to use a manual skillfully. Yet, his counterpart argues that "Using a Manual" should be ranked as last. He claims that the software and hardware are becoming so sophisticated that they are self-correcting. He suggests that the manual is, or will become, a less viable problem-solving tool. A third department member feels that technical reading should be included in the English curriculum.

All three teachers are experts, schooled and experienced in technology, and all three offer valid arguments. Yet, some level of consensus must reign if schools are to make reasoned choices and agree on priorities. While teachers are energized by these discussions, the real purpose is to groom the curriculum with a fine-tooth comb and appreciate subject matter content in the larger context of natural and holistic learning.

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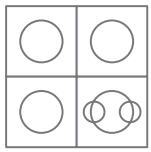
Model 2: Connected



The first time teachers teach a class or grade level, they will probably follow a curriculum guide or text. However, once they have taught the material, they will forever put it together in a way that makes the most sense to them, adjusting it to flow together in natural ways. Interestingly, teachers often manipulate their curriculum so automatically, so intuitively, that when you ask them about it, they have to think it through formally before they can articulate their reasons. Yet, the connections are always there, although implicit. Once they are ferreted out, the connections become obvious and explicit.

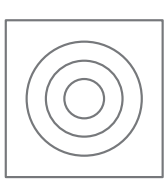
By using the connected model, specific units are taught one after the other because they have natural connections. These connections usually fall into two categories: themes or threads. Themes are big ideas or concepts like *patterns, change,* or *discovery,* whereas threads are more likely to be skills or tools that run through both units, like *thinking skills, social skills,* and *graphic organizers.* As teachers work to find natural linkages between specific content units, the actual connectors may be somewhat elusive. To facilitate the discovery of themes and threads, teachers should discuss their ideas with their colleagues. In the course of their dialogues, teachers will become reflective about their practice and will become better able to make explicit connections for their students.

Model 2 Example

First, the teacher teaches a unit on Canada, our neighbors to the north. This he follows with another unit on Mexico, our neighbors to the south. Both units are connected through the concept of "conversations across cultures." This big idea of "conversation" is used to explore the ideas of dialogue, articulation, and sharing between and among various cultures. This concept of "conversation" is so fertile that it could be used as a thematic umbrella over a number of other cultures.

Often, connected models uncover themes and threads that are far-reaching and complex. It is important, however, to note that teachers put their curriculum together in a natural sequence, allowing the different topics or units to flow into one another. Once the connectors become obvious, it is easier to make the connections explicit to the students. The more overtly teachers can make the connections, the more holistic the content is for the students.

Model 3: Nested



Many teachers in today's classrooms use the nested model without knowing what it is called. With the current mandates for higher-order thinking, cooperative learning, and authentic assessments, the nested model offers an efficient and effective way to organize a somewhat overloaded curriculum.

If teachers ask the question, "What will kids need to know 25 years from now?" their answer invariably encompasses the genre called life skills—the skills of thinking, teamwork, and problem solving. To include these skills in meaningful ways, they must be infused into the context of purposeful assignments and projects. The nested model provides the framework for that kind of contextualized learning.

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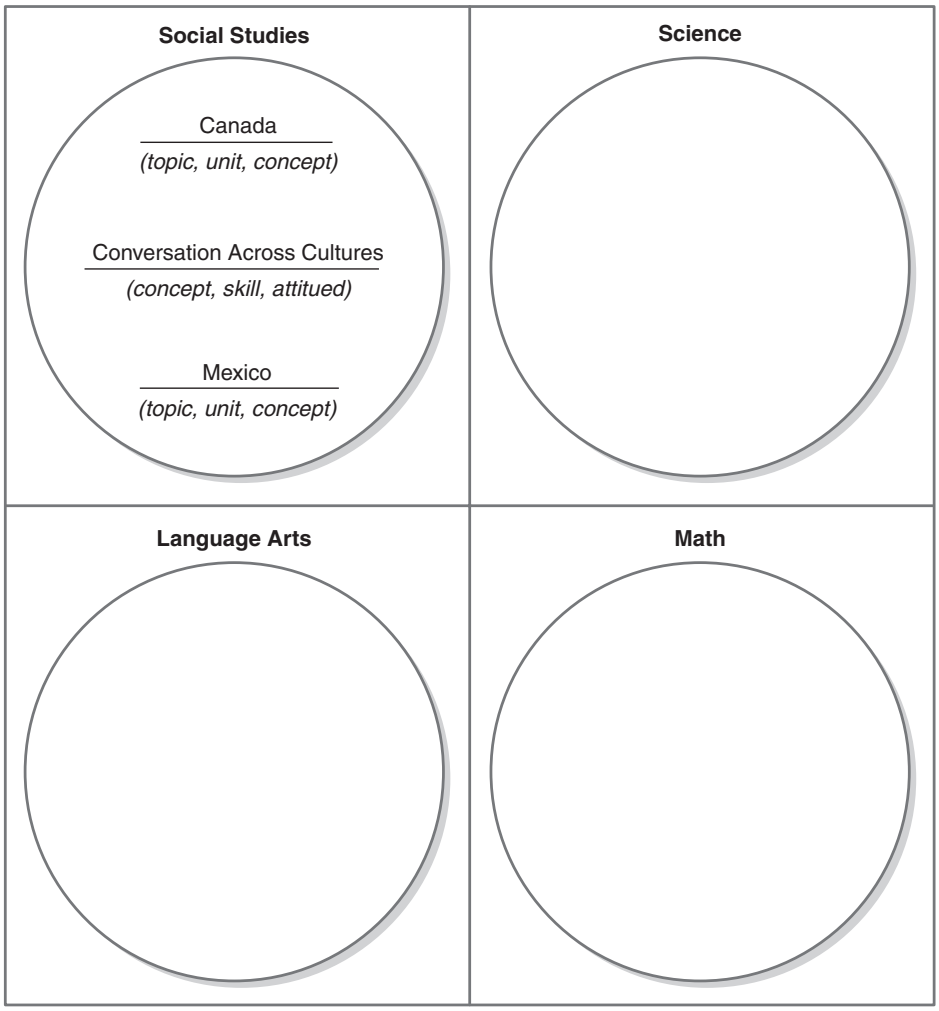


Life Skill Threads		
Thinking Skills	*Social Skills*	*Graphic Organizers*
Creative/Generative Skills	**Communication Skills**	Webs
Hypothesizing	Attentive Listening	Mind Maps
Generalizing	Clarifying	Right-Angle Thinking
Predicting	Paraphrasing	Venn Diagrams
Inferring	Summarizing	Priority Ladders
Brainstorming	Emphasizing	Grids
Summarizing	Sympathizing	Matrices
Visualizing	**Leadership Skills**	Cause/Effect
Surveying	Affirming	Fishbones
Imaging	Encouraging	Thought Trees
Defining		Hexes

(*Continued*)

(Continued)

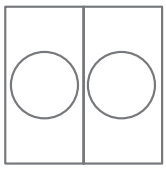
Life Skill Threads		
Thinking Skills	*Social Skills*	*Graphic Organizers*
Critical/Analytical Evaluative Skills Classifying Comparing Contrasting Prioritizing Evaluating Judging Critiquing Criticizing Analyzing Bias Justifying Validating Labeling	Accepting Others' Ideas Including Everyone Delegating Empowering **Conflict Resolution Skills** Reaching Consensus Learning to Agree/Disagree Arbitrating Mediating Voting **Skills in the Arts** Painting Film Design Dance Drama Music Sculpture	5Ws T-Charts M-Charts Agree/Disagree **Technological Skills** Word Processing Spreadsheets Graphics Problem Solving Using a Manual Hypercard Stacks Programming Modem Internet Voice Mail CAD/CAM

Model 3 Example

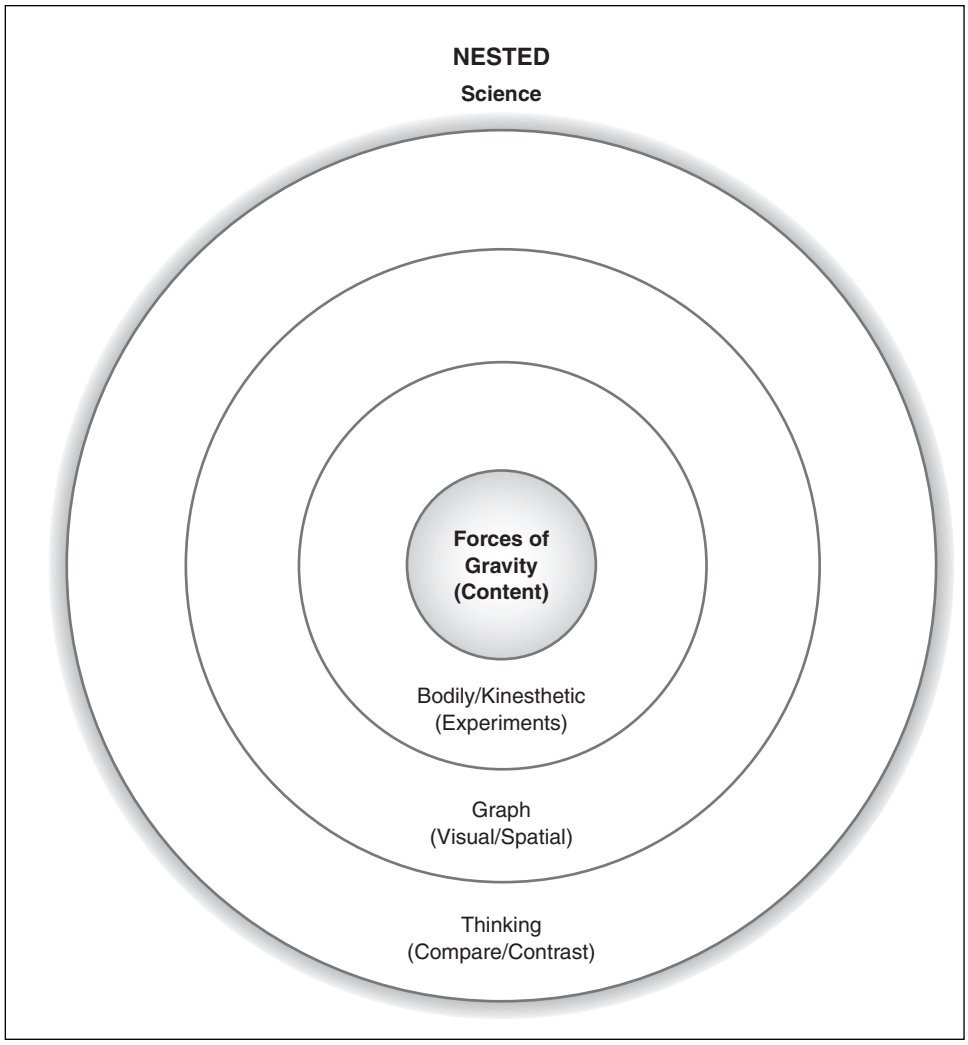
The teacher in this example has created several hands-on activities designed to target the bodily/kinesthetic intelligence while learning about gravity. As the students execute various experiments, they are asked to compare and contrast the forces demonstrated and to think critically about their findings. Their results are then depicted in a Venn diagram, which graphically represents similarities and differences in the gravitational forces studied.

Many teachers might use this very lesson or a reasonable facsimile, however, for its transfer power. In this case, the teacher must talk about the skills of comparing and contrasting and encourage students to reflect upon their uses. Critical to the nested model are metacognitive monologue and reflective dialogue that name, label, and apply life skills within meaningful contexts. This is called purposeful learning, and it helps students create and construct meaning in their minds, as well as provide them with lifelong tools for problem solving and decision making.

Model 4: Sequenced



Sequencing curriculum content by beginning conversations across grade levels and across disciplines is a step toward curriculum mapping. In this model, teachers are asked to survey their content expectations for a semester or even a year. They are asked what units, topics, skills,



and concepts are on the horizon for each subject area or class prep they teach. Then, with partners, teachers map out their subject matter and discuss the most logical or beneficial sequences for their content. Sometimes, just by being aware of the content targeted in other subject areas or disciplines, teachers can rearrange their content to make it coincide in a complementary way.

The benefits of two classes studying the same topic are many. Think about shared films, speakers, and field trips. Or think about complex projects that need chunks of time and teams of experts. Imagine what powerful learning it is for students to read a biography of Winston Churchill while studying World War II or to learn about teamwork with their science lab partner while reading about dogsled teams in Jack London's *Call of the Wild* in English class. One enhances the other as teachers learn to talk to one another about what they teach and when they teach it.

Teachers who take a long look at their curriculum content often find several natural matchups that make sense. As a result, teachers are more than willing to resequence their curriculum, if possible. One note of caution, however, seems prudent. Sometimes after a genuine effort to talk with one another about content, teachers find that there are no natural linkages and that rescheduling would only result in contrived integration. Even if no natural links are found, however, such conversations allow

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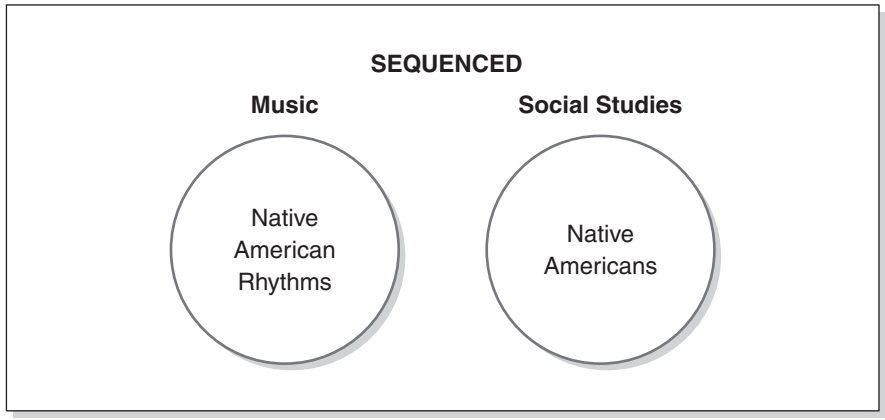
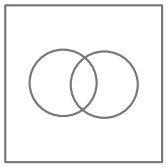
teachers to gain knowledge about other classrooms. With this kind of knowledge, connections are possible at another time or with another subject area. After all, once one knows, one can't *not* know.

Model 4 Example

Sequencing topics from different disciplines may be as simple as studying Native American rhythms in music class while studying Native Americans in social studies. Resequencing *content,* however, may be more complicated. For example, a math department may use the scope and sequence of the science department as a guide to introducing various math skills. This way, math skills are more meaningful when learned within the context of real science applications. Although this may be harder to organize, the results make it well worth the effort.



Model 5: Shared



In contrast to the sequenced model of curriculum integration, which requires a long look at the semester or year, the shared model dictates an in-depth view of a particular content unit. This model requires an intense conversation with someone from another discipline or subject area. Teachers ask one another what they do *specifically* when teaching a certain unit. They describe in detail the activities and learning targeted in a particular unit. After both parties are privy to the real meat of the two units, they look for those concepts and skills that are shared by the topics taught by each teacher. Themes and threads then begin to emerge.

The shared model looks for "roots running underground" or themes and threads that underlie all content. It is an authentic model for integrating curricula through conceptual underpinnings. To share in curricula integration, two disciplines embrace a single idea simultaneously. Remember, the shared model of curriculum integration focuses on an in-depth look at two units in two disciplines, whereas the sequenced model fosters a long-term plan across two different subject areas in an attempt to resequence topics for greater alignment and integration.

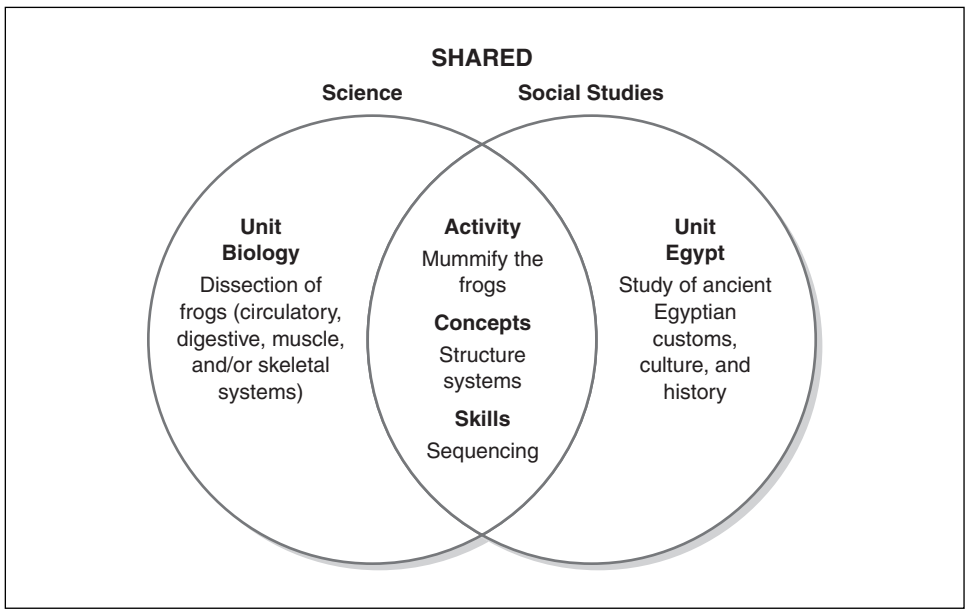
Model 5 Example

The following anecdote illustrates the usefulness of model 5:

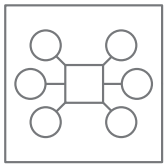
Two high school teachers were talking at lunch one day. The social studies teacher lamented about his students' lack of enthusiasm for

the unit on Egypt and complained that they weren't coming to class prepared and were uninterested and uninvolved. "The only things that intrigue them about Egypt are the pyramids and the mummies," he said. His friend, the science teacher, listened sympathetically; then, he shared his story about how excited his students were about the biology unit he was teaching—the dissection of frogs. Right then, an idea flashed in his mind. "Hey, what if we take what's left of these little critters and have the kids make mummies of them?" he asked.

Using the high-interest topics of dissection and mummies, the teachers orchestrated a day to mummify frogs. In the process of planning their event, significant life skills and big ideas readily emerged, such as the thinking skills of sequencing and problem solving and the concepts of structures and/or systems. These ideas gave more depth and meaning to the biology lesson as well as to the social studies lesson.



Model 6: Webbed



Diversity, fashion, inventions, technology, family, and patterns are all big ideas used in the classroom. In fact, the webbed model of thematic teaching is frequently cited as the most commonly used model of curriculum integration. From the whole language classroom of the elementary schools to the thematic approach of middle school pods to the novel-based thematic instruction of the humanities department, themes provide viable umbrellas for instruction. Themes are used for two distinct purposes: to organize content and to ignite learning. Umbrella themes, or big ideas, act like magnets. Once they are in place,

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themes create magnetic forces that draw ideas for curriculum content and instructional activities.

Developing themes that have rigor and vigor requires a number of critical steps. A brief look at the steps is provided through the use of the acronym THEMES. (This process is developed extensively in Chapter 3.)

T—Think of themes to build a healthy bank of at least 100 themes.

H—Hone the list by coding the ideas as topics, concepts, or problems. Topics may be subject-related, but concepts and problems seem to reach out to multiple disciplines.

E—Extrapolate criteria and discuss reasons and rationale for selecting a theme. Know why it's a worthy, fertile theme.

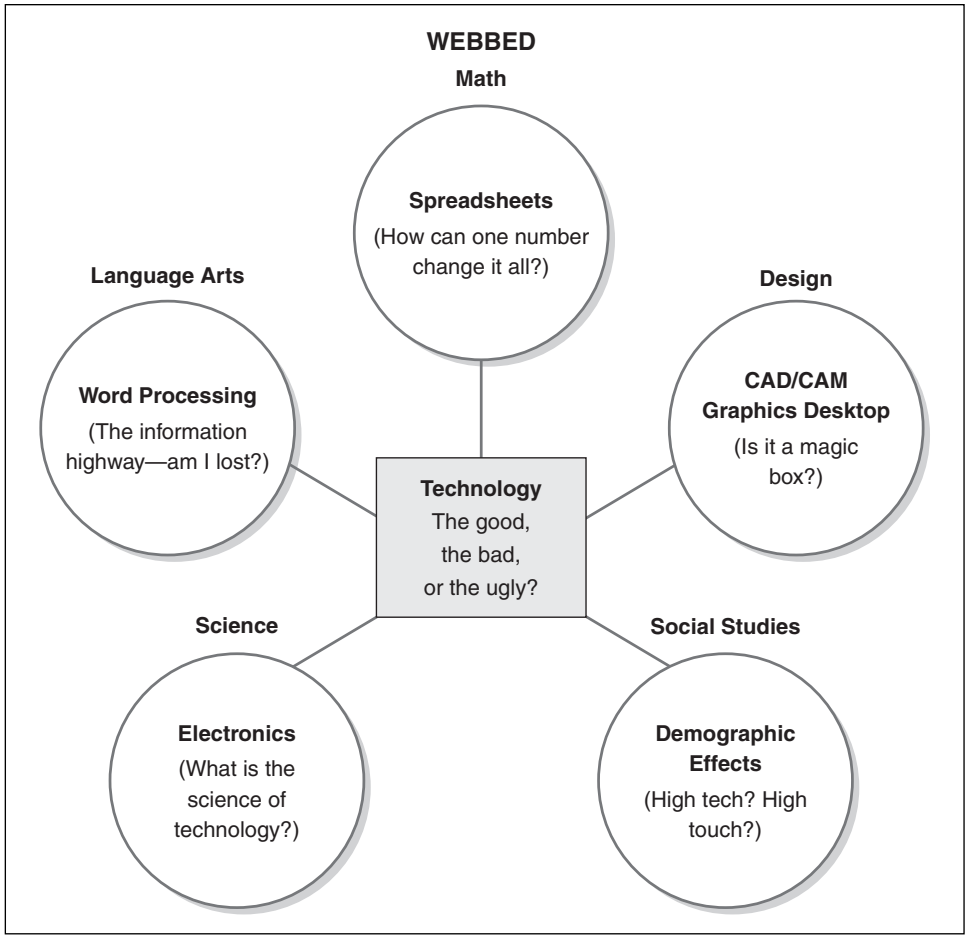
M—Manipulate the theme by generating key questions; explore the many dimensions; find a focus with a "hook" question that drives the thematic investigation.

E—Expand through activities; web the theme to multiple content areas and develop purposeful activities.

S—Select goals and assessments that target learning and report the results of the learning.

Model 6 Example

A simplified example of the thematic model is illustrated using the theme of technology. Teachers embraced the theme of technology as a



"school-to-work" initiative and students embraced it as a natural part of their daily lives. Within this theme, key questions emerged that led the investigation into several curriculum areas.

Several of the questions generated by the teacher team targeted investigations across the disciplines. For example, the key question, "Technology: the good, the bad, or the ugly?" opens the umbrella for a broad investigation into the pros and cons of technology. This becomes the "hook" question for students throughout the unit. The other questions lead to inquiry into various subject areas.

Social Studies: "High tech? High touch?" suggests a possible study in demographics about technology and its effects on society.

Science: "What is the science of technology?" opens the door for the study of electronics and computers.

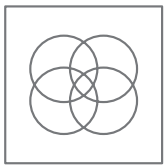
Design: "Is it a magic box?" prompts an exploration into the design capabilities of computers, including CAD/CAM, desktop publishing, and multimedia.

Language Arts: "The information highway—am I lost?" is a natural opening for starting the journey through the maze of technological devices for communication arts (FAX, e-mail, modem, Internet, etc.).

Math: "How can one number change it all?" is the bait for learning how spreadsheets make budget calculations a breeze.

Naturally, this unit can be developed beyond these areas as new questions evolve. Yet, as this unit stands, it presents an encompassing look at the multifaceted phenomenon called technology.

Model 7: Threaded



Sometimes curriculum integration focuses on integrating the life skills of thinking, cooperating, and organizing, rather than intertwining subject matter content. The threaded model does just that. It threads the life skills of the metacurriculum throughout discipline-based instruction. A familiar example prevalent in the schools is often referred to as "writing across the curriculum." Whereas some critics may not regard this as "real" integration, there is no doubt that threading life skills into multiple content areas promotes easy transfer of such things as thinking, cooperating, and technology into relevant situations.

One plus of this threaded model is that it does not disrupt the status quo. In organizations with departmentalized structures, threading critical life skills into subject matter content provides a viable and visible integration of curriculum for students. They see the connective threads and some even comment on the similar things going on in each class. Another benefit of threading is the reality that teachers often incorporate thinking and cooperating into lessons and activities without actually teaching about the skills themselves. In essence, the content becomes the vehicle that carries the skills of thinking, cooperating, organizing, and multiple intelligences. Although a faculty or team must take time in the beginning to meet and

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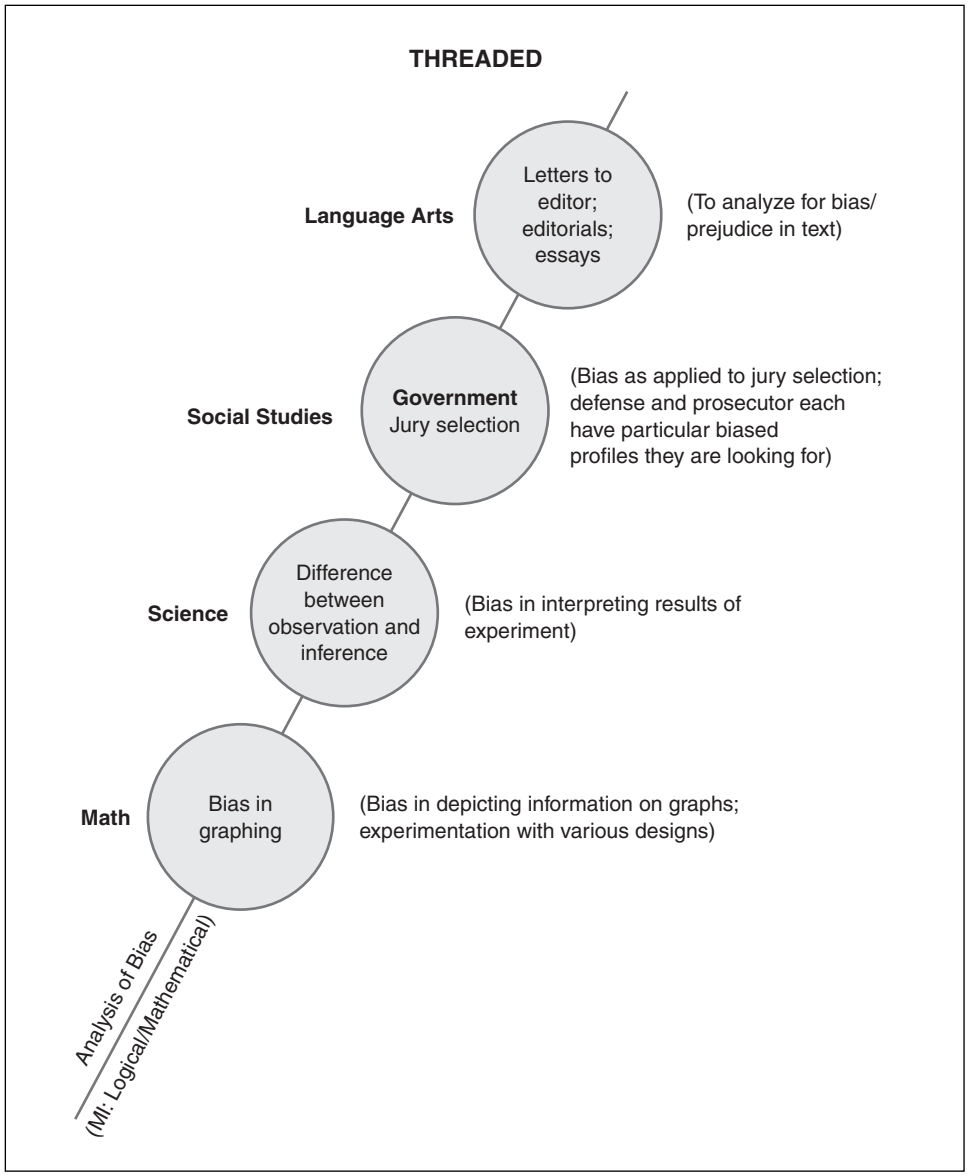
decide upon common threads, the model does not require a lot of team time thereafter. With the threads in place, various teachers throughout the building can incorporate the threads as often as practical.



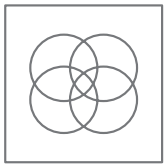
Model 7 Example

To thread skills into course content, one school selected analysis of bias as a thinking thread.

A quick look at the previous diagram shows how easily a thread weaves its way across various curricular content. In a math class, students learn to manipulate information on graphs and thus learn that bias can occur when interpreting what the graph indicates. The difference between observing and inferring is targeted in the science lab as students examine how bias can slip into the interpretation of data. In government class, the paradox involved in selecting a jury offers an ample opportunity to study bias. Students realize that the paradox of jury selection lies in the fact that in an effort to select an unbiased jury, lawyers end up formulating biased

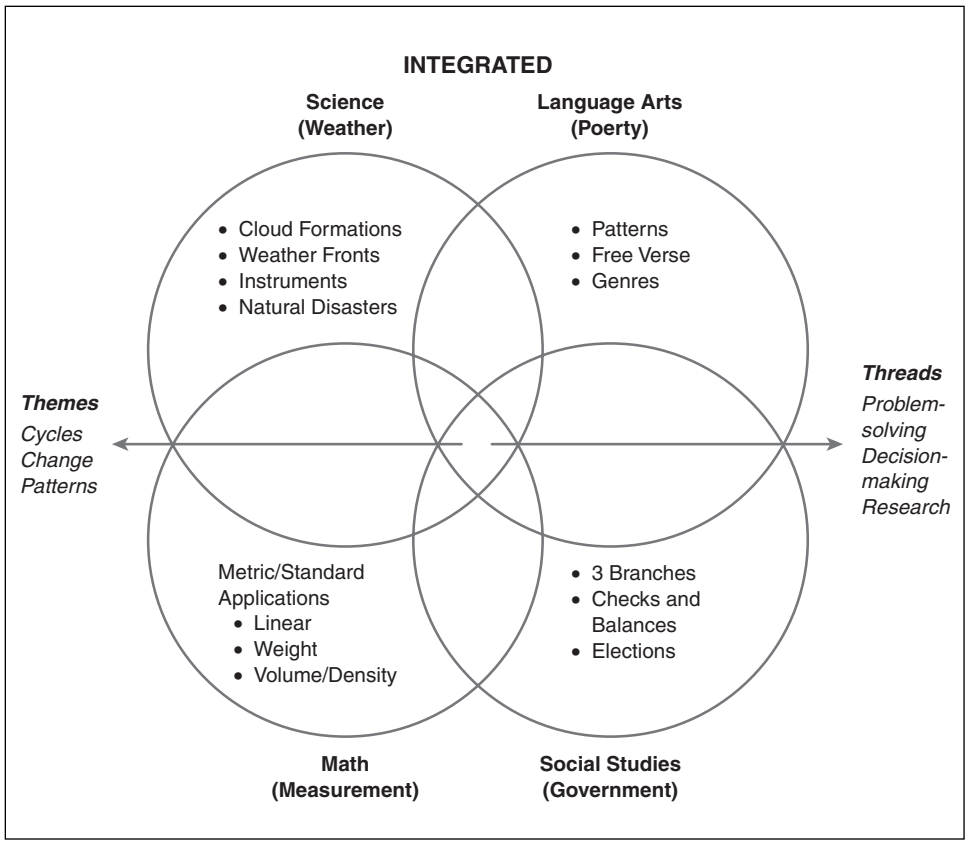
opinions of potential jurors. In a language arts class, students analyze essays for possible bias as they learn to examine the contextual framework of the essay, including who, what, where, how, and why. In all four cases, the thread fosters rigor as well as relevance for life.

Model 8: Integrated



The ultimate model of curriculum integration is often thought of as being a fully integrated, cross-disciplinary approach. In this design, teachers from several disciplines map their curriculum content. As each area of the map develops, a complex design unfolds in which commonalities begin to emerge. These commonalities, which often undergird all content, are discovered under the guise of concepts, skills, or attitudes. These "big ideas" are the themes and threads that connect to various disciplines.

Unlike the thematic approach of the webbed model that starts with a theme, here the integrated design starts with content and a theme or thread emerges. The process is inductive in nature, and it often takes some time and skill to unearth the commonalities. However, the process has great integrity because the content and curricular goals dictate the emergent theme. In this case, there is little question that the theme reaches out to different disciplines since it is derived directly from the content. Whereas both the webbed and integrated models may result in thematic instruction, it is important to note that the process for each is quite polar—one is deductive and the other is inductive.



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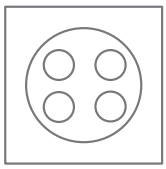
The cross-disciplinary or interdisciplinary approach in this model is, by all means, desirable; however, the sheer number of teachers involved may prohibit extensive use. Remember, however, that model 5, the shared model, replicates the process but with fewer subject areas. If this is the desired approach to curriculum integration, use it with a few or with many disciplines. Tailor the numbers to work for the situation. Then, once a theme is accepted, explore the theme with higher-order questions, expand them into activities, and select goals and assessments just as in the webbed model.

Model 8 Example

Beginning with content, goals, and objectives, the integrated model inductively reveals commonalities in the shape of themes and threads. For example, consider the following four disciplines and their typical units of study. In science, the focus is on weather. Cloud formations, weather fronts, instruments, and natural disasters are included in this study. In language arts, a unit on poetry exposes students to patterned and unpatterned genres of poetry. Social studies highlight the three branches of government, the system of checks and balances, and elections. And, finally, the units of measure in math concentrate on an in-depth comparison of the metric to the standard system. After some discussion, the actual content focus of each area is illuminated and the themes of *cycles* and *patterns* emerge. Several possible skill threads of problem solving and research emerge as well. All of these bubble up in the center, and these big ideas become candidates for integrative themes or threads in this inductive model.

Model 9: Immersed



Stepping beyond the external models of connection making orchestrated primarily by the teacher, model 9 looks at the internal connections learners make. True integration of learning is, after all, the construction of meaning in the mind by connecting new information to past experiences and prior knowledge. If a teacher can help students connect the idea of photosynthesis to other ideas about cycles, their understanding of the concepts—cycles in general and photosynthesis in particular—is enhanced. This "chunking" of information helps form concepts. Thus, in the process of constructing ideas and concepts in their minds, learners must make sense of the myriad stimuli bombarding the brain. They must find ways to take discrete bits of knowledge and facts and build meaningful chunks of information. Once the discrete data are aligned and integrated into meaningful concepts or ideas, the information can be more easily internalized.

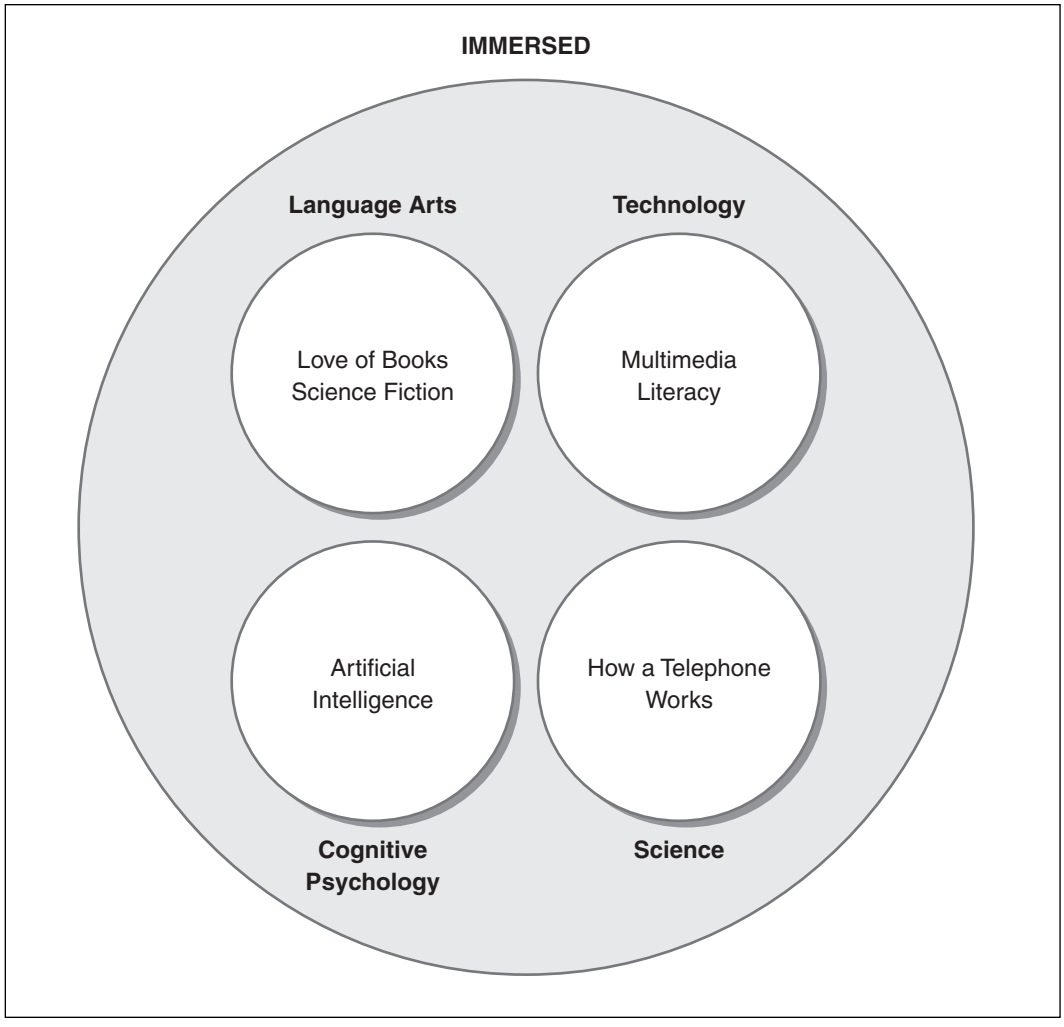
Our mission as educators is to help learners make connections in their minds. Understanding that each learner brings different schemata to the learning situation, teachers in the constructivist classroom know that they have no easy task before them. They must devise thoughtful, instructional episodes that require students to use their minds to assimilate the ideas presented. Model 9 provides a framework for individual learners to immerse themselves in areas of personal interest and growth. In fact, the immersed model is designed to parlay the intense interests, prior knowledge, and past experiences of the individual learners into active learning of new material. In turn, the immersed model of integration fosters an ongoing application

of learnings into novel situations. Model 9 promotes internal connection making through the interest and concept formation of the learners.

Interestingly, teachers must find ways to facilitate that connection making. To do this in a classroom with 25 or 30 kids, teachers find certain cognitive and cooperative strategies helpful. Specifically, in classrooms where teachers use cooperative learning and cognitive tools, such as graphic organizers, students' thinking becomes more accessible. For example, as students talk, discuss, dialogue, and articulate their thinking in cooperative interactions, teachers are able to hear the ideas and thoughts of the students. A similar result can be achieved with the use of graphic organizers. As students present their ideas using Venn diagrams, flow charts, and matrices, teachers become privy to students' ideas. The thinking is visible for all to see and reflect upon.

Model 9 Example

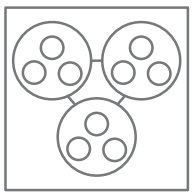
The simplest way to describe an immersed learner is through a specific example that illustrates how an intense interest takes learning into a number of areas. In this example, the learner has an interest in books. In fact, as a youngster she was known as a bookworm. Intrigued by futuristic scenarios, she developed an interest in science fiction novels. This immersed learner then entered the field of library science and was catapulted into the



I Hear It!

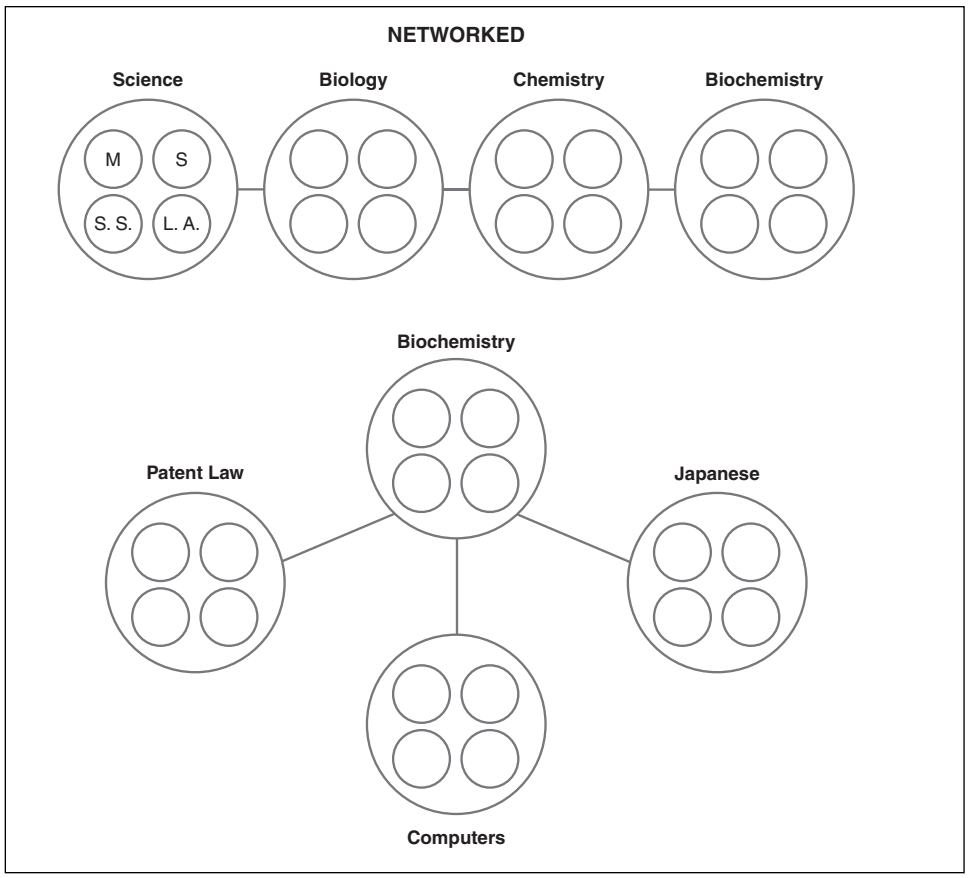
science of technology by breakthroughs in information science. She became computer literate and advanced in her chosen field. Her initial immersion into books and libraries acted as a conduit to other disciplines, directing her to artificial intelligence. Satellite communications and the functioning of the telephone became part of her curriculum. Then, seeking to find out how the mind works and how to connect certain forms of information in the library setting, she submerged herself in books on cognitive psychology, yet another field rooted in her initial area of interest. On and on it goes—the immersed learner reaches out across multiple disciplines and various content areas.

Model 10: Networked



A natural extension of the immersed model is model 10, the networked model. As learners pursue their fields of interests, they are pulled into peripheral areas, as if their interests were meandering paths. Learners begin to network as they explore the depth and breadth of their areas of interest. Following is an example of what a networked learner might experience:

> A small child, Maria, likes rocks and constantly picks up pretty pebbles and stones. Eventually, she has a small collection. In her intermediate years, she establishes an impressive collection of mounted, labeled, and categorized rocks and minerals. Aware of Maria's intense interest, her teacher suggests she visit a local



archeological site that offers weeklong summer camp programs for young people. A week at the archeological dig leads this immersed learner into the heart of the networked model. She meets an archeologist, an anthropologist, and a geologist, as well as other nature and history enthusiasts. A true networked model is illustrated as Maria's interests in rocks and minerals lead her into the related areas of geology, archeology, and anthropology.

In the networked model, the learner's horizons expand as other fields are exposed and explored. Interestingly, the multidimensional aspects of the model often help learners zero in on particular areas of interest and expertise. Yet, the paradox remains. The learner's focus narrows as the learner's initial area of interest is broadened.

Model 10 Example

The figure depicting the networked model represents the initial integration process of an immersed learner who starts out liking science. By the time he reaches high school, his interest seems rooted in the specific field of biology; however, as his university work unfolds, this learner incorporates a chemistry minor into his program. Then, he focuses his doctoral studies in the area of biochemistry, with his dissertation work involving the theory of chemical bonding. Proceeding in his career, this immersed learner now enters into a never-ending network of professional contacts and even learns Japanese to understand and work with suppliers. Soon, he is involved in computer classes, which enable him to simulate investigations electronically before committing his time, effort, and resources to the lab. Continuing in the web of career opportunities, his expertise in biochemistry becomes so valued that he is offered an all-expense-paid internship in patent law. This learner, immersed in a love for science, is now on a path leading to a promising career as a patent attorney.

FROM THE FIELD

CURRICULUM INTEGRATION ■

Although Fogarty's ten models for curriculum integration provide the underpinnings for the ideas developed within this work, there are other voices that provide new, different, and/or complementary directions for authentic integration. Among the proponents of integrated learning are Jacobs, Kovalik, Beane, and Vars. As integrated learning becomes a school focus, teams are encouraged to pursue these resources, as each offers a unique dimension to this complex issue of integrated learning.

Jacobs

Jacobs's *Interdisciplinary Curriculum: Design and Implementation* (1989) lays out a continuum of five options for curriculum integration. Beginning with discipline-based and parallel designs, Jacobs also highlights the multidisciplinary, the interdisciplinary, the integrated day, and the complete program.

I Hear It!

Kovalik and Beane

Kovalik (1993) and Beane (1993) incorporate the use of higher-order questions to instill rigor into the thematic focus. Whereas Kovalik stresses essential questions in integrating thematic instruction, Beane stresses the inclusion of student-generated questions. As students brainstorm issues and concerns about a theme, they search for essential questions to drive the thematic unit.

Vars

Vars's classic booklet on middle school curriculum, *Interdisciplinary Teaching in the Middle Grades* (1987), focuses on the integrated approach. Vars's work provides a succinct and practical guide not only for middle school staff, but also for all interested in this idea.

Lounsbury

Another voice from the middle school movement is John Lounsbury. The editor of the 1992 edition of *Connecting Curriculum Through Interdisciplinary Instruction,* he intertwines the development of interdisciplinary instruction with the idea of teaming. (He says the letters in the word *team* stand for "together everyone achieves more.") In Loundsbury and Vars (1978), Lounsbury uses an interdisciplinary web to create thematic units such as "Chinese culture," "architecture," and "aviation."

Grady

Grady's approach to interdisciplinary curriculum uses themes as umbrella ideas to connect the disciplines. Her work at Mid-continent Research for Education and Learning (McREL) in Colorado utilizes the ideas of standards and benchmarks as guides to integrated thematic learning that targets high-level outcomes. Grady (1994) uses the ideas of developing "chunks" of integrated curriculum with the driving force of "critical content."

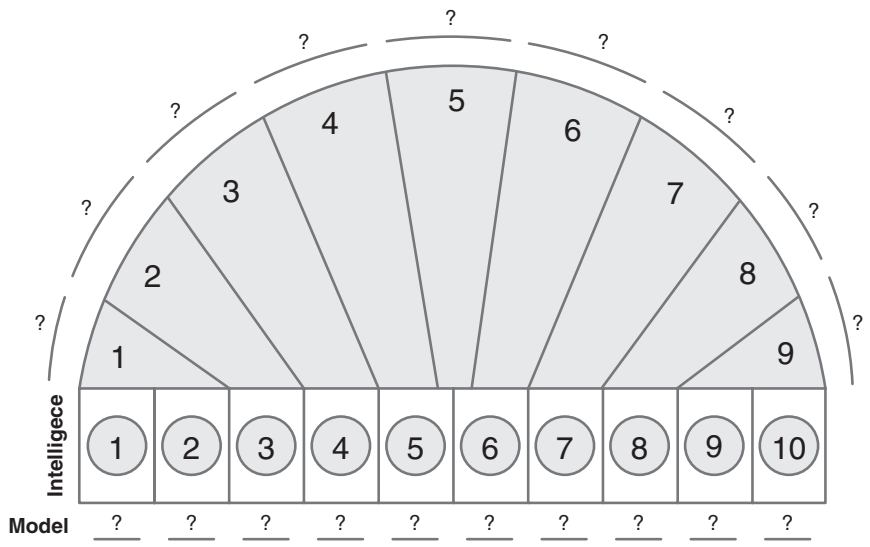
Just Do It!

JUST DO IT!

Study the fan design that represents integrating curricula with multiple intelligences.

Teams, Themes, and Threads	
P (+) (Plus)	
M (–) (Minus)	
I (?) (Interesting)	

Figure 1.4 Fan Chart



Label the nine intelligences and name the ten models of curriculum integration. After the fan chart has been completed, reflect on the pros and cons of combining the two. In the reflection that follows, try to develop an understanding of the concept of integrating curricula with the multiple intelligences. Using a PMI (plus, minus, interesting) chart (de Bono, 1976), speculate on how the three major elements of teams, themes, and threads are enhanced or obscured through these brain-compatible models for integrating curricula with multiple intelligences.

DIFFERENTIATED INSTRUCTION ■

The cognitive research and brain science described in this chapter provide a strong rationale for differentiating instruction. Researchers such as Gardner (1983, 2006**)** and Sternberg and Grigorenko (2000) have helped us realize that intelligence is multifaceted. Through research by the Caines (1997), Jensen (1998), and others, we know that each learner's brain is unique, and that educators must provide varied and rich experiences for learners to make sense of ideas and information. Curriculum should cultivate meaning making through concepts/themes, topics, and governing principles that are of high interest and high relevance.

Differentiated instruction is based on the beliefs that (1) students differ in their learning profiles; (2) classrooms in which students are active learners, decision makers, and problem solvers are more natural and effective than those in which students are served a "one-size-fits-all" curriculum and treated as passive recipients of information; and, (3) "covering information" takes a backseat to making meaning out of important ideas (Tomlinson, 1999). The four methods of planning for differentiated instruction—content, process, product, and manipulation of the learning environment—provide a means for the educator to synthesize and apply cognitive research and brain science in a practical, personal way.

CAN WE TALK?

Using Gardner's multiple intelligences, the following vignettes profile human potential. Among the examples are a 6-year-old entering first grade, a college student majoring in education, and an adult learner. Read the scenarios. Understanding that humans each have a "jagged profile" as unique as their fingerprints, identify several "frames of mind" or "kinds of minds" for each vignette. Then, complete the chart to identify at least three of the intelligences presented in each story.

Multiple Intelligences Vignettes: "Frames of Mind"			
Character	*Frame 1*	*Frame 2*	*Frame 3*
Juanita (6 yrs.)			
Lupe (8 yrs.)			
Alicia (10 yrs.)			
Trevor (12 yrs.)			
Tracy (16 yrs.)			
Heather (20 yrs.)			
Ira (37 yrs.)			

■ FRAMES OF MIND—GRID TALK

After plotting the information culled from the vignettes, look for insights, reflections, and questions that surface about the multiple intelligences profiles of the human mind and the complexities presented in the scenarios. Notice that there is not *one* intelligence that is highlighted, but a number of different intelligences that interact with one another in each of the cases.

Juanita (6 years old)

Juanita is labeled "gifted" in the first grade. Not only can she read at the age of 6, she has also completed J. R. R. Tolkien's *The Lord of the Rings* trilogy. Her vast vocabulary is evident in her speech and writing, and she can spell "spaghetti" as easily as "cat." She loves both nonfiction and the classic literature her father introduced her to. Juanita's verbal skills are extraordinary and her teachers are challenged to keep her moving forward in this area.

Accompanying Juanita's forte for verbalization is her naturally developed musical intelligence, an intelligence Gardner classifies as language related. Schooled in the Suzuki method from the age of 3, Juanita is an accomplished pianist. Her repertoire of classical pieces is impressive, and one senses Juanita's immersion in her performances. In fact, when she

plays the piano, she's happy all day. This musical intelligence spills over into her written work. She writes about the piano and illustrates many of her ideas with musical notes.

Paints, crayons, chalk, and pastels are the favorite tools of this image-conscious youngster. Illustrations fill her written works, regardless of their content. Her science paper is filled with progressive sketches of her beans growing in the window, and her morning sentences and stories are accented with detailed drawings that enhance her words. Even Juanita's printing and lettering are elaborated with scrolls, swirls, and squiggles, and decorative engravings border her daily work. Juanita's images are so strong that she converses with an imaginary friend and playmate, Bunny. Yet, when someone else acknowledges the existence of Bunny, Juanita giggles and says, "Oh, he's only pretend."

Lupe (8 years old)

Lupe, a third grader, is proficient at the highly complex game of Dungeons and Dragons. Beginning with the strategic logic of chess, Lupe quickly moved into the voluminous paraphernalia and many layers of the Dungeons and Dragons episodes. Also indicative of his logical reasoning is his fascination with nonfiction. Lupe often plows through encyclopedia entries, moving from the top of a page right on through to the last entry on the page. His ability with numbers is phenomenal. He makes computations in his head and calls out answers that are usually verified by his calculator.

Lupe's amazing sense of logic is complemented by his keenness for visualizing. Even at a young age, he took an unusual interest in his clothes and often selected colorful sweaters to wear with matching socks and coordinated shirts to assemble a look that was pleasing. Connected closely to his skillful and strategic logic in gamesmanship is his ability to visualize. By picturing possible moves of game pieces, he can "see" the outcomes. His mind's eye, in effect, directs his play.

Lupe prefers to be alone with his books, games, and creative toys. He likes to experiment with chemistry sets and invent electronic devices and gadgets such as burglar alarms. Preoccupied with the concepts of life and death, he often creates stories about living on another planet. Lupe is aware of his own inquisitiveness as well as his likes and dislikes. He appears comfortable with himself and often explains his motivations to his parents. Knowing himself at such a young age, Lupe shows that he has an unusual propensity for self-reflection.

Alicia (10 years old)

If there isn't music or rhythm where Alicia is, she creates her own. At the age of 10, she is taking keyboard lessons and willingly practices an hour every day after school. She loves music in school and has already starred in two musical performances. Alicia and her family live several miles from the nearest large city, which suits her just fine because her family sings and harmonizes all the way there and back.

Alicia's teachers know how much she loves music. When they see her tapping her toe or pencil, they often ask what song she's singing in her

Can We Talk?

head. She is very proud of the perfect score she recently received on a name-the-states test. She gives credit to the song "Fifty Nifty United States," which lists every state alphabetically. Her teacher agrees that the song must have helped, because he noticed that during the test Alicia's head nodded in a steady beat before she wrote each answer.

When she is not creating or practicing her music, Alicia is off and running. Her parents enrolled her in dance at the age of 4. She wants to learn to twirl the baton so that she can become the majorette for the band when she is older. Her favorite day at school is "Track and Field Day," where she enters almost every event. She especially enjoys jumping the hurdles. Settling down seems to take longer for Alicia than some of her classmates, and sitting for long periods of time is sheer torture! She loves being teacher's helper and volunteers to help set up centers, perform science experiments, play classroom instruments, and do anything else that involves active learning.

When Alicia's pencil isn't tapping out a beat, it is usually drawing or doodling. She loves making collages and mobiles and understands best when her teacher uses graphics such as semantic maps and Venn diagrams. Alicia has found that "making pictures in her head," as she calls it, helps her to understand and remember what she is learning. She first discovered the powerful effect of visualizing when she had to memorize a piano solo for recital. She had practiced and practiced, but when she sat down on the piano bench, her mind went blank. She couldn't even remember the name of her solo. Alicia looked straight ahead, wishing there were some music in front of her. Suddenly, she could "see" it, every page of it, in her head, and by the time she finished playing her solo flawlessly, she even remembered its title!

Trevor (12 years old)

Trevor is a seventh grader who is just as proud of his collection of doodles and pictures as he is of his good grades. Many of his drawings are done during school in classes that are lecture based or "just plain boring," as Trevor puts it. Others are a result of long hours of detailed work on sketches and designs. While his classmates make simple book covers, Trevor creates covers with intricate and complex geometrical designs or cartoon characters.

Trevor is drawn to classrooms that are picture rich. Slides, mobiles, photos, overhead transparencies, and other visuals that reinforce the lesson make all the difference in his motivation and understanding. He is easily frustrated by an overdose of words, whether he's reading, writing, or listening to them. His frustration about long writing assignments quickly changes to excitement, however, when he is encouraged to include visuals. He doesn't seem to mind doing required research or writing if he can express himself through his drawings and pictures. Trevor's teacher can identify Trevor's reports without his name because they always have one picture on the front, one on the back, and several throughout.

Trevor spends most of his free time putting together and painting models. Watching him work is truly a "moving" experience, because he begins at a table, then lies on the floor, then stands. He loves math class

this year because, as he says, the teacher "keeps us really busy when we learn. We move around to different centers and use manipulatives."

Trevor is definitely not a social butterfly. He couldn't care less about having a wide circle of friends. Instead, he has a small group of close friends and is happy to spend time alone. His mental and physical well-being are very important to him, as is his academic achievement. Trevor tried out several groups and organizations in school before he settled on OM (Odyssey of the Mind). He seems to have found his niche. The sponsor says that when the group is working on a problem, Trevor asks "why" and "what if" questions that focus on the big picture. He seems to be able to make connections that many of the other students do not see. By understanding the big picture, Trevor is able to visualize what is needed to solve the problem. Then he goes off by himself and makes a prototype, which the group refines and develops.

Tracy (16 years old)

Tracy, a high school junior, is on the pom-pom squad and in the swing choir. She takes dance lessons and also helps teach dance to young children. Tracy operates video equipment for her parents and sets the VCR when anyone in the family wants to record something. She collects Precious Moments figurines and enjoys spending time in the backyard. Tracy loves to go on errands, whether for teachers or her parents, especially if it means driving the car.

Tracy seems to have an endless supply of energy when she is interested and motivated. She is always ready to pitch in on special school and classroom projects. At other times, when she has been sitting too long or when the entire class is engaged in quiet reading, she gets fidgety. Only the teachers who understand Tracy know to suggest that she stand up or move.

Music is a large part of Tracy's world. In addition to being on the pom-pom squad and singing in the swing choir, Tracy plays the piano, sings in the concert choir, and knows every song from the musical her school put on last year. Her current kick in preferred style is country, but that changes fairly regularly. She begs to see every musical production that comes to town, and she can sing or rap to every commercial. If it were up to Tracy, music would be piped into every classroom as a background to learning. It's never off in her bedroom!

Tracy loves people. Almost everything she is a part of involves others. Interacting with people is second nature to Tracy. Not long ago, a boy in one of her classes asked her, "Who are you, anyway? You talk to everybody!" She spends hours on the phone and doesn't feel that a weekend is a success unless she is invited to at least one party. She likes to study with friends and worries when there is conflict. She is the unofficial peacekeeper within each of her groups. Cooperative learning activities and all-group discussions are definitely her cup of tea.

Heather (20 years old)

If ever there were a "perfect coed," Heather would be it. A 20-year-old college student at a large university, she never even seemed to be

Can We Talk?

homesick when she left for her first year of school. Now a sophomore, she has many friends, both male and female, and every one of her teachers knows and likes her. She was recently in charge of a community service event for her sorority. The event needed a high percentage of participation for it to be successful and Heather pulled it off. Speaking of sororities, Heather shares her room with three other girls and loves it. She says the only problem they have is in divvying up phone time. Because of her high grades, Heather qualified for several honors classes. She particularly likes English because it involves a lot of group discussion and problem solving. She plans to major in elementary education and special education.

In high school, Heather was on the soccer team and the cheerleading squad. Now, in college, she jogs and walks every day and is actively involved in campus activities. Last year she was a dancer in a charity production on campus. She likes to sit on her bed to study, with her books and papers spread around her; however, she must get up and move regularly. Her class schedule suits her because she has time to move about during the day.

Heather's strengths in reading, writing, and speaking have helped her fit into both educational and social settings easily. She loves to read and comprehends what she is reading without really trying. When speaking, she uses metaphors, humor, and wit, abilities that aren't usually so well developed in a person her age. She is sensitive to language and responds in tears when she interprets someone's remarks as critical, sarcastic, or belittling. People like being around her because she is careful of others' feelings in her conversations.

Ira (37 years old)

Ira is grounded by an unusual insightfulness, which is partially a result of his self-exploration into his own spirituality. This exploration has led Ira to understand what motivates him. He is clear on what he values and where those values are rooted. This introspective nature spills over to others also, and Ira's intuitive and knowing ways are sought out by trusting family members and friends alike. His advice is valued because it seems to echo an inner voice.

Linked to his introspective nature is his acuity for language. He is a voracious reader and loves to create fictional works of his own. Readers invariably remark about the striking and memorable quality of his written words.

Related to Ira's inward nature is his natural ability to run long distances. In contrast to his love of running marathons is his fondness and skill for team sports. Ira displays above-average athletic abilities from years of playing basketball, baseball, and football. His propensity for athletics is so keen that even now in his adult years he is able to attack new sports such as swimming, skiing, rollerblading, and tennis with the same grace and ease that punctuated his youth.

Interestingly, Ira's gentle way with people is often noted by others. Although he is somewhat shy upon meeting people, he somehow

manages to put others at ease. They seem to sense a genuineness that creates the loyalty and friendship of people he has encountered throughout his life.

In his school career, Ira formed a lyrical opera club. He also has a fondness for the rhythm of rap music. Both opera and rap music are entwined with the language of lyrics.

Ira's writings are frequently punctuated with images and extended metaphors: "You're like a bicycle, as soon as you stop moving, you fall down." This visualization skill surfaces in another realm. Trained as a chef, Ira has an uncanny sense of presentation. He serves the simplest foods in ways that are pleasing to the eye.

Although often overshadowed, another intelligence manifests itself frequently in Ira's exceptional memory for facts, data, and information. At a moment's notice, he can rattle off sports statistics, historical sequences, and film trivia ad infinitum. In addition, the logic he brings to an argument or point of view is, more often than not, right on target.

Frames of Mind Key:
Juanita—Verbal/Linguistic, Musical/Rhythmic, Naturalist/Physical World, Visual/Spatial; Lupe—Logical/Mathematical, Visual/Spatial, Existentialist, Intrapersonal/Introspective; Alicia—Musical/Rhythmic, Bodily/Kinesthetic, Visual/Spatial; Trevor—Visual/Spatial, Bodily/Kinesthetic, Existentialist, Intrapersonal/Introspective; Tracy—Bodily/Kinesthetic, Musical/Rhythmic, Naturalist/Physical World, Interpersonal/Social; Heather—Interpersonal/Social, Bodily/Kinesthetic, Verbal/Linguistic; Ira—Intrapersonal/Introspective, Verbal/Linguistic, Bodily/Kinesthetic

WHAT'S IN IT FOR ME?

Input

Reflection on the multiple intelligences and the ten models for curriculum integration is the key to the chapter. Think about these two complementary frameworks in this way:

Attention to Multiple Intelligences = Diversity of Instructional Strategies

Attention to Integration Models = Holistic, Connected Curricula

Reflection

Think about and then respond in writing to the following:

I think the instructional unit of mine that taps into the multiple intelligences is . . .

_____

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Reflection

Think about and then respond in writing to the following:

I integrated curricula when I . . .