MULTIPLE INTELLIGENCES IN THE CLASSROOM

4th Edition

THOMAS ARMSTRONG

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Preface

Over 30 years ago, a friend lent me a copy of *Frames of Mind: The Theory of Multiple Intelligences* (1984) by Howard Gardner. I held onto it for a couple of months and then handed it back to my friend, unread. The next year, during a course in cognitive psychology at the California Institute for Integral Studies in San Francisco, our professor used a couple of the visual thinking exercises in *Frames of Mind* to demonstrate the practicality of Gardner's multiple intelligences (MI) theory. Suddenly, I was hooked. Shortly thereafter, I began research on my doctoral dissertation, which focused on assessing the strengths of children diagnosed with learning disabilities using MI theory as an organizing framework (Armstrong, 1987a). In 1987, I wrote my first book on multiple intelligences, *In Their Own Way* (Armstrong, 1987b), and began giving workshops to teachers on using MI theory to understand and help students who learn in different ways. Today, over 30 years and a thousand presentations later, the theory of multiple intelligences retains for me the freshness of vision that it had so many years ago.

I wrote the first edition of this book in 1994. Ron Brandt, the director of publishing at ASCD at the time, was excited about the possibilities of the book being read by many teachers. I hesitated for a time, but then agreed with him, and was delighted when ASCD sent more than 100,000 copies of the

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book to educators around the world as a membership benefit. Throughout the 1990s and 2000s, I crisscrossed the world in a whirlwind of travel—MI theory had become one of the hottest educational theories around. Though the travel sometimes exhausted me, I felt blessed to reach so many educators with this marvelous learning model.

As I write these words in 2017, more than 400,000 copies of prior editions of this book are in print. In this 4th edition, I've made several important changes to make the material of greater value to new teachers, veteran teachers, administrators, and professors of education in colleges and universities. First, I've completely revised Chapter 11, on special education, to incorporate the work I've been doing over the past decade in the rapidly expanding field of neurodiversity. Second, I've added two new chapters: Chapter 12 focuses on the emerging movement toward greater personalization and deeper learning in the classroom, and Chapter 13 provides a survey of some of the many new learning technologies available to educators in the form of software, tablet and smartphone apps, websites, social media channels, and virtual reality tools. Third, I've completely rewritten the lesson plans in Appendix A so that they align with the standards movement, including lessons based on the Common Core State Standards, the Next Generation Science Standards, and the National Art Standards. Fourth, I've changed the names of the eight intelligences in much of the book to more user-friendly terms (e.g., "body smart" instead of "bodily-kinesthetic intelligence"). Finally, I've incorporated information related to Dweck's (2007) concept of the *growth mindset,* which seems to me to be an important adjunct to MI theory.

This is a difficult time for our culture and for education. For almost three decades, there has been a growing climate of rigid accountability, cookie-cutter standardization, and pseudo-scientific quantification in education that threatens to stifle the pluralism and qualitative values inherent in MI theory. In addition, our public schools are becoming captive to a movement that favors the development of for-profit schools that may leave students behind in pursuit of a fat financial bottom line. Now more than ever, we need to embrace a philosophy of education that recognizes the diversity of our students. There's never been a time in U.S. education when we were so in need of a differentiated and personalized approach to learning that gives voice to all students and engages them with the curriculum. I believe it's time for a resurgence in MI theory to counterbalance the pedagogical

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narrowness threatening to overwhelm our culture. I hope that this 4th edition of *Multiple Intelligences in the Classroom* makes a small but significant contribution to that effort.

Thomas Armstrong
Sonoma County, California
August 7, 2017

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1

The Foundations of MI Theory

It is of the utmost importance that we recognize and nurture all of the varied human intelligences, and all of the combinations of intelligences. We are all so different largely because we all have different combinations of intelligences. If we recognize this, I think we will have at least a better chance of dealing appropriately with the many problems that we face in the world.

—Howard Gardner

In 1904, the minister of public instruction in Paris asked the French psychologist Alfred Binet and a group of colleagues to develop a means of determining which primary grade students were "at risk" for failure so these students could receive remedial attention. Out of their efforts came the first intelligence tests. Imported to the United States several years later, intelligence testing became widespread, as did the notion that there was something called "intelligence" that could be objectively measured and reduced to a single number or "IQ" score.

Almost 80 years after the first intelligence tests were developed, Harvard psychologist Howard Gardner challenged this commonly held belief. Saying that our culture had defined intelligence too narrowly, he proposed in the book *Frames of Mind* (Gardner, 1983) the existence of at least seven basic

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intelligences. More recently, he has added an eighth and discussed the possibility of a ninth (Gardner, 1999). In his theory of multiple intelligences (MI theory), Gardner sought to broaden the scope of human potential beyond the confines of the IQ score. He seriously questioned the validity of determining intelligence through the practice of taking individuals out of their natural learning environment and asking them to do isolated tasks they'd never done before—and probably would never choose to do again. Instead, Gardner suggested that intelligence has more to do with the capacity for (1) solving problems and (2) fashioning products in culturally supported, context-rich, and naturalistic settings.

The Eight Intelligences

Once this broader and more pragmatic perspective was taken, the concept of intelligence began to lose its mystique as people began to see it working in people's lives in a variety of ways. Gardner provided a means of mapping the broad range of abilities that humans possess by grouping their capabilities into the following eight comprehensive "intelligences":

Linguistic intelligence: The capacity to use words effectively, whether orally (e.g., as a storyteller, orator, or politician) or in writing (e.g., as a poet, playwright, editor, or journalist). This intelligence includes the ability to manipulate the syntax or structure of language, the phonology or sounds of language, the semantics or meanings of language, and the pragmatic dimensions or practical uses of language. Some of these uses include rhetoric (using language to convince others to take a specific course of action), mnemonics (using language to remember information), explanation (using language to inform), and metalanguage (using language to discuss language).

Logical-mathematical intelligence: The capacity to use numbers effectively (e.g., as a mathematician, tax accountant, or statistician) and to reason well (e.g., as a scientist, computer programmer, or logician). This intelligence includes sensitivity to logical patterns and relationships, statements and propositions (if-then, cause-effect), functions, and other related abstractions. The kinds of processes used in the service of logical-mathematical intelligence include categorization, classification, inference, generalization, calculation, and hypothesis testing.

Spatial intelligence: The ability to perceive the visual-spatial world accurately (e.g., as a surveyor or cartographer) and to perform transformations

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upon those perceptions (e.g., as an interior decorator, architect, artist, or inventor). This intelligence involves sensitivity to color, line, shape, form, space, and the relationships that exist between these elements. It includes the capacity to visualize, to graphically represent visual or spatial ideas, and to orient oneself appropriately in a spatial matrix.

Bodily-kinesthetic intelligence: Expertise in using one's whole body to express ideas and feelings (e.g., as an actor, a mime, an athlete, or a dancer) and facility in using one's hands to produce or transform things (e.g., as a craftsperson, sculptor, mechanic, or surgeon). This intelligence includes specific physical skills such as coordination, balance, dexterity, strength, flexibility, and speed, as well as proprioceptive, tactile, and haptic capacities.

Musical intelligence: The capacity to perceive (e.g., as a music aficionado), transform (e.g., as a composer), express (e.g., as a performer), and discriminate among (e.g., as a music critic) musical forms. This intelligence includes sensitivity to the rhythm, pitch or melody, and timbre or tone color of a musical piece. One can have a figural or "top-down" understanding of music (global, intuitive), a formal or "bottom-up" understanding (analytic, technical), or both.

Interpersonal intelligence: The ability to perceive and distinguish among the moods, intentions, motivations, and feelings of other people. This can include sensitivity to facial expressions, voice, and gestures; the capacity for discriminating among many different kinds of interpersonal cues; and the ability to respond effectively to those cues in some pragmatic way (e.g., by influencing a group of people to follow a certain line of action).

Intrapersonal intelligence: Self-knowledge and the ability to act adaptively on the basis of that knowledge. This intelligence includes having an accurate picture of oneself (one's strengths and limitations); awareness of one's inner moods, intentions, motivations, temperaments, and desires; and the capacity for self-discipline, self-understanding, and self-esteem.

Naturalist intelligence: Expertise in the recognition and classification of the numerous species—the flora and fauna—of an individual's environment. This also includes sensitivity to other natural phenomena (e.g., cloud formations and mountains) and, in the case of those growing up in an urban environment, the capacity to discriminate among inanimate objects such as cars, sneakers, and smartphones.

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Gardner's terms are useful within an academic context. However, because this book focuses on practical applications of MI theory, I'm choosing to use terminology that more clearly and directly reflects the essential nature of each intelligence, as follows:

- Linguistic Intelligence → Word Smart
- Logical-Mathematical Intelligence → Number/Logic Smart
- Spatial Intelligence → Picture Smart
- Bodily-Kinesthetic Intelligence → Body Smart
- Musical Intelligence → Music Smart
- Interpersonal Intelligence → People Smart
- Intrapersonal Intelligence → Self Smart
- Naturalist Intelligence → Nature Smart

I feel that these terms make MI theory more accessible to students, their families, and the community at large. They also make it easier for educators to envision practical applications of the theory in the classroom. Educators are free, of course, to continue using Gardner's nomenclature as they wish, and I myself will at times also be using those terms when they seem to add clarity to the text.

The Theoretical Basis for MI Theory

Many people wonder why Howard Gardner insisted on referring to the eight categories as *intelligences* rather than *talents* or *aptitudes.* Gardner realized that people are used to hearing expressions like "He's not very intelligent, but he has a wonderful aptitude for music"; thus, he was quite conscious of his use of the word *intelligence* to describe each category. "I'm deliberately being somewhat provocative," he once said. "If I'd said that there's seven kinds of competencies, people would yawn and say 'Yeah, yeah.' But by calling them 'intelligences,' I'm saying that we've tended to put on a pedestal one variety called intelligence, and there's actually a plurality of them, and some are things we've never thought about as being 'intelligence' at all" (quoted in Weinreich-Haste, 1985, p. 48).

To provide a sound theoretical foundation for his claims, Gardner set up the following eight basic criteria that each intelligence had to meet to be considered a full-fledged intelligence and not simply a talent, skill, or aptitude:

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1. Potential isolation by brain damage
2. The existence of savants, prodigies, and other exceptional individuals
3. A distinctive developmental history and a definable set of expert "end state" performances
4. An evolutionary history and evolutionary plausibility
5. Support from psychometric findings
6. Support from experimental psychological tasks
7. An identifiable core operation or set of operations
8. Susceptibility to encoding in a symbol system

Potential Isolation by Brain Damage

At the Boston Veterans Administration, Gardner worked with individuals who had suffered accidents or illnesses that affected specific areas of the brain. In several cases, brain lesions appeared to have selectively impaired one intelligence while leaving all the other intelligences intact. For example, a person with a lesion in Broca's area (in the left frontal lobe) might have a substantial portion of his Word Smart damaged and thus experience great difficulty speaking, reading, or writing, but still be able to sing, do math, dance, reflect on feelings, and relate to others. A person with a lesion in the temporal lobe of the right hemisphere might have Music Smart capacities selectively impaired, while frontal lobe lesions might primarily affect the personal intelligences (Self Smart and People Smart).

Gardner, then, is arguing for the existence of eight relatively autonomous brain systems—a more sophisticated and updated version of the "right brain/left brain" model of learning that was popular in the 1970s. Column 5 in Figure 1.1 shows the primary affected neurological systems for each intelligence.

The Existence of Savants, Prodigies, and Other Exceptional Individuals

Gardner suggests that we can see single intelligences operating at especially high levels in certain individuals, much like huge mountains that rise up against the backdrop of a flat horizon. Savants are individuals who demonstrate superior abilities in one intelligence at the expense of full functioning of the others. Such individuals seem to exist for each of the eight

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Figure 1.1
MI Theory Summary Chart

Intelligence	Core Components	Symbol Systems	High End-States	Neurological Systems (Primary Areas)	Developmental Factors	Ways That Cultures Value	Evolutionary Origins	Presence in Other Species	Historical Factors (Relative to Current U.S. Values)
Word Smart	Sensitivity to the sounds, structure, meanings, and functions of words and language	Phonetic languages (e.g., English)	Writer, orator (e.g., Virginia Woolf, Martin Luther King Jr.)	Left temporal and frontal lobes (e.g., Broca's/ Wernicke's areas)	"Explodes" in early childhood; remains robust until old age	Oral histories, storytelling, literature	Written notations found dating to 30,000 years ago	Apes' ability to name things by pointing	Oral transmission more important before printing press
Number/ Logic Smart	Sensitivity to, and capacity to discern, logical or numerical patterns; ability to handle long chains of reasoning	Computer languages (e.g., HTML)	Scientist, mathematician (e.g., Madame Curie, Blaise Pascal)	Left frontal and right parietal lobes	Peaks in adolescence and early adulthood; higher math insights decline after age 40	Scientific discoveries, mathematical theories, counting and classification systems	Early number systems and calendars found	Bees calculate distances through their dances	More important with advent of "coding" skills (computer programming)
Picture Smart	Capacity to perceive the visual-spatial world accurately and to perform transformations on one's initial perceptions	Use of line, shape, form, color, perspective, and so on.	Artist, architect (e.g., Frida Kahlo, I. M. Pei)	Posterior regions of right hemisphere	Topological thinking in early childhood gives way to Euclidean paradigm around age 9–10; artistic capacity stays robust into old age	Artistic works, navigational systems, architectural designs, inventions	Prehistorical cave drawings of Lascaux and other sites around the world	Territorial instinct of many species	More important with advent of mass media, video, the internet, and other image-based technologies
Body Smart	Ability to control one's body movements and to handle objects skillfully	Sports diagrams (e.g., football playbook)	Athlete, dancer, sculptor (e.g., Mohammed Ali, Martha Graham, Auguste Rodin)	Cerebellum, basal ganglia, motor cortex	Varies depending upon skill (strength, flexibility, endurance) or domain (gymnastics, baseball, mime)	Crafts, athletic performances, dramatic works, dance forms, sculpture	Evidence of early tool use in prehistoric times	Tool use of primates, anteaters, and other species	More important in agrarian pre-20th century culture

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Music Smart	Ability to produce and appreciate rhythm, pitch, and timbre; appreciation of the forms of musical expressiveness	Musical notational systems (e.g., modern staff notation)	Composer, performer (e.g., Stevie Wonder, Midori)	Right temporal lobe (left temporal lobe in professional musicians)	Earliest intelligence to develop; prodigies often go through developmental crisis in adolescence	Musical compositions, performances, recordings	Evidence of musical instruments back to Stone Age	Bird song	Was more important during oral culture, when communication had a musical component
People Smart	Capacity to discern and respond appropriately to the moods, temperaments, motivations, and desires of other people	Social cues (e.g., gestures, body posture, and facial expressions)	Family counselor, political leader (e.g., Virginia Satir, Nelson Mandela)	Frontal lobes, temporal lobe (especially right hemisphere), limbic system	Attachment/bonding during first 3 years critical; gradually develops as we acquire social experience	Political documents, social institutions	Communal living groups required for hunting-and-gathering cultures	Maternal bonding observed in primates and other species	More important with the increase in service (as opposed to industrial) economies
Self Smart	Access to one's own "feeling" life and the ability to discriminate among one's emotions; knowledge of one's own strengths and weaknesses	Symbols of the personal self (e.g., in dreams and artwork)	Psychotherapist, entrepreneur (e.g., Sigmund Freud, Richard Branson)	Frontal lobes, parietal lobes, limbic system	Formation of boundary between "self" and "other" during first 3 years critical, gradually develops as we acquire life experience	Self development systems (e.g., psychotherapies), rites of passage	Prehistoric evidence of human burial sites	Chimpanzees can locate self in mirror, experience fear	Especially important in modern times with increasingly complex society requiring choice-making and self-promotion
Nature Smart	Expertise in distinguishing among members of a species; recognizing the existence of other neighboring species; and charting out the relations, formally or informally, among several species	Species classification systems (e.g., Linnaeus)	Naturalist, animal activist (e.g., Charles Darwin, Jane Goodall)	Areas of left parietal lobe important for discriminating "living" from "nonliving" things	Shows up dramatically in some young children; schooling or experience increases formal or informal expertise	Folk taxonomies, herbal lore, hunting rituals, animal spirit mythologies	Prehistoric hunting tools reveal understanding of other species	Hunting instinct in innumerable species to discriminate between prey and non-prey	Was more important during agrarian period; then fell out of favor during industrial expansion; now "earth-smarts" are more important than ever to preserve endangered ecosystems

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intelligences. For instance, in the movie *Rain Man*, which is based on the true story of Kim Peek, Dustin Hoffman plays the role of Raymond Babbitt, a Number/Logic Smart savant. Raymond rapidly calculates multidigit numbers in his head and does other amazing mathematical feats, yet he has poor peer relationships, low language functioning, and a lack of insight into his own life (low People Smart and Self Smart).

There are also savants who draw exceptionally well (e.g., Stephen Wiltshire), savants who have amazing Music Smart memories (who can play a composition after hearing it only once) (e.g., Leslie Lemke or Gloria Lenhoff), savants who read complex material but don't comprehend what they're reading (hyperlexics), and savants who have exceptional sensitivity to nature or animals (see Grandin & Johnson, 2006, and Sacks, 1985, 1995).

A Distinctive Developmental History and a Definable Set of Expert "End-State" Performances

Gardner suggests that intelligences are galvanized by participation in some type of culturally valued activity and that an individual's growth in such an activity follows a developmental pattern. Each intelligence-based activity has its own developmental trajectory; that is, each activity has its own time of arising in early childhood, its own time of peaking during one's lifetime, and its own pattern of either rapidly or gradually declining as one gets older. Musical composition, for example, seems to be among the earliest culturally valued activities to develop to a high level of proficiency: Mozart was only 4 years old when he began to compose, 8 when he wrote his first symphony, and 11 when he wrote his first opera. Numerous composers and performers have been active well into their 80s and 90s, so expertise in musical composition also seems to remain relatively robust into old age.

Higher mathematical expertise appears to have a somewhat different trajectory. It doesn't emerge as early as music composition ability (4-year-olds do not create new logical principles), but it does *peak* relatively early in life. Many great mathematical and scientific ideas were developed by teenagers such as Blaise Pascal and Karl Friedrich Gauss, and both Albert Einstein and Isaac Newton made their major contributions to science by their mid-twenties. A review of the history of mathematical ideas suggests that few original mathematical insights come to people past the age of 40. Once people reach this age, they're considered over the hill as higher

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mathematicians! Most of us can breathe a sigh of relief, however, because this decline generally does not seem to affect more pragmatic skills such as balancing a checkbook.

One can become a successful novelist at age 40, 50, or even later. Nobel Prize–winner in literature Toni Morrison didn't publish her first novel until she was almost 40. One can even be over 75 and choose to become a painter: Grandma Moses did. Gardner points out that we need to use several different developmental maps in order to understand the eight intelligences. Piaget provides a comprehensive map for Number/Logic Smart, but we may need to go to Erik Erikson for a map of how personal intelligences develop, and to Noam Chomsky or Lev Vygotsky for developmental models of Word Smart. Column 6 of Figure 1.1 includes a summary of developmental trajectories for each intelligence.

Gardner (1993a) points out that we can best see the intelligences working at their zenith by studying the "end-states" of intelligences in the lives of truly exceptional individuals. For example, we can see Music Smart at work by studying Beethoven's Eroica Symphony, Nature Smart through Darwin's theory of evolution, or Picture Smart via Michelangelo's Sistine Chapel paintings. Column 4 in Figure 1.1 includes examples of high end-states for each intelligence.

An Evolutionary History and Evolutionary Plausibility

Gardner notes that each of the eight intelligences meets the test of having its roots deeply embedded in the evolution of human beings and, even earlier, in the evolution of other species. So, for example, Picture Smart can be studied in the cave drawings of Lascaux, as well as in the way certain insects orient themselves in space while tracking flowers. Similarly, Music Smart can be traced back to archaeological evidence of early musical instruments, and be heard in the wide variety of bird songs. Column 8 in Figure 1.1 includes notes on the evolutionary origins of the intelligences.

MI theory also has a historical context. Certain intelligences seem to have been more important in earlier times than they are today. Nature Smart and Body Smart, for example, were probably valued more 100 years ago in the United States, when most of the population lived in rural settings and the ability to hunt, harvest grain, and build barns had strong social approval. Similarly, certain intelligences may become more important in

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the future. The computer revolution has certainly enlisted the Number/Logic Smart capabilities of many people who might otherwise have had few opportunities to use these gifts. As more and more people receive their information from films, television, the internet, and video games, the value placed on having a strong Picture Smart intelligence seems to be increasing. There is also now a growing need for individuals who have expertise in Nature Smart to help protect endangered ecosystems. Column 10 in Figure 1.1 notes some of the historical factors that have influenced the perceived value of each intelligence.

Support from Psychometric Findings

Most theories of intelligence (as well as many learning-style theories) rely on standardized measures of human ability to ascertain the validity of a model. Although Gardner is no champion of standardized tests, and in fact has been an ardent supporter of alternatives to formal testing (see Chapter 10), he suggests that many existing standardized tests support the validity of MI theory (although Gardner would point out that standardized tests assess multiple intelligences in a strikingly decontextualized fashion). For example, the Wechsler Intelligence Scale for Children includes subtests that require Word Smart (e.g., information, vocabulary), Number/Logic Smart (e.g., arithmetic), Picture Smart (e.g., picture arrangement), and to a lesser extent Body Smart (e.g., object assembly). Still other assessments tap personal intelligences (e.g., the Vineland Society Maturity Scale, the Coopersmith Self-Esteem Inventory). Chapter 3 includes a survey of the types of formal tests associated with each of the eight intelligences.

Support from Experimental Psychological Tasks

Gardner suggests that examining psychological studies can help us see intelligences working in isolation from one another. For example, in studies where subjects master a specific skill, such as reading, but fail to transfer that ability to another area, such as mathematics, we see the failure of Word Smart to transfer to Number/Logic Smart. Similarly, in studies of cognitive abilities such as memory, perception, or attention, we can see evidence that individuals possess selective abilities. Certain individuals, for instance, may have a superior memory for words but not for faces; others may have acute perception of musical sounds but not of verbal sounds. Each of these

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cognitive faculties, then, is intelligence-specific; that is, people can demonstrate different levels of proficiency across the eight intelligences in each cognitive area.

An Identifiable Core Operation or Set of Operations

According to Gardner, much as a computer program requires a set of operations to function, so too does each intelligence maintain a set of core operations to drive its various activities. Core operations of Music Smart, for example, may include sensitivity to pitch or the ability to discriminate among various rhythmic structures. In Body Smart, core operations may include the ability to imitate the physical movements of others or to master established fine-motor routines for building a structure. Gardner speculates that these core operations may someday be identified with such precision as to be simulated on a computer.

Susceptibility to Encoding in a Symbol System

Gardner notes that one of the best indicators of intelligent behavior is the ability to use symbols. The word *cat* as it appears in this sentence is simply a collection of marks printed in a specific way, yet it more than likely conjures up a range of associations, images, and memories. What has occurred is the bringing to the present (the "re-present-ation") of something that is not actually here. Gardner suggests that the ability to symbolize is one of the most important factors separating humans from most other species. He notes that each of the eight intelligences in his theory meets the criterion of being able to be symbolized. Each intelligence, in fact, has its own unique symbol or notational systems. For Word Smart, there is the great diversity of written languages such as English, Hebrew, and Russian; for Picture Smart, there are a number of graphic languages used by architects, engineers, and designers, as well as some of the ideographs used in Chinese and Japanese communication. Column 3 in Figure 1.1 includes examples of symbol systems for all eight intelligences.

Key Points in MI Theory

Beyond the descriptions of the eight intelligences and their theoretical underpinnings, it's important to keep in mind the following key ideas.

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Each person possesses all eight intelligences. MI theory is not a "type theory" for determining the *one* intelligence that fits each person. It is a theory of cognitive functioning, and it proposes that each person has capacities in all eight intelligences. Of course, the eight intelligences function together in ways unique to each person. Some people appear to possess extremely high levels of functioning in all or most of the eight intelligences—for example, German poet-statesman-scientist-naturalist-philosopher Johann Wolfgang von Goethe. Other people, such as certain severely impaired individuals in institutions for the developmentally disabled, appear to lack all but the most rudimentary aspects of the intelligences. Most of us fall somewhere in between these two extremes—being more highly developed in some intelligences, modestly developed in others, and relatively underdeveloped in still others.

Most people can develop each intelligence to an adequate level of competency. Although individuals may bewail their deficiencies in a given area and consider their problems innate and intractable, Gardner suggests that most typically developing individuals have the capacity to develop all eight intelligences to a reasonably high level of performance if given the appropriate encouragement, enrichment, and instruction. He points to the Suzuki Talent Education Program as an example of how individuals of relatively modest biological musical endowment can achieve a sophisticated level of proficiency in playing the violin or piano through a combination of the right environmental influences (e.g., an involved parent, exposure from infancy to classical music, and early instruction). Such educational models can be found in other intelligences as well (see, for example, Edwards, 2012, for a method that improves one's Picture Smart abilities through drawing). Gardner's emphasis on effort in the development of the intelligences is very much in line with Dweck's (2007) idea of maintaining a "growth mindset" in the classroom (see p. 43 for a discussion of this concept).

Intelligences usually work together in complex ways. Gardner points out that each intelligence is actually a "fiction"; that is, no single intelligence exists by itself in real life (except perhaps in very rare instances among savants and brain-injured individuals). Intelligences are always interacting with each other. To cook a meal, for example, one must read the recipe (Word Smart), perhaps double the recipe (Number/Logic Smart), develop

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a menu that satisfies all members of the family (People Smart), and placate one's own appetite (Self Smart). Similarly, when a child plays a game of kickball, she needs Body Smart (to run, kick, and catch), Picture Smart (to orient herself to the playing field and to anticipate the trajectories of flying balls), and Word Smart and People Smart (to successfully argue points during disputes in the game). The intelligences have been taken out of context in the formal articulation of MI theory only for the purpose of examining their essential features and learning how to use them effectively. We must always remember to put them back into their unique culturally valued contexts when we are finished with their formal study.

There are many ways to be intelligent within each category. There is no standard set of attributes that one must have to be considered intelligent in a specific area. A person may not be able to read, yet be highly Word Smart because he can tell a terrific story or has a large oral vocabulary. Similarly, a person may be quite awkward on the playing field, yet possess superior Body Smart ability when she weaves a carpet or creates an inlaid chess table. MI theory emphasizes the rich diversity of ways in which people show their gifts *within* intelligences as well as *between* them. (See Chapter 3 for more information on the varieties of attributes in each intelligence.)

The Existence of Other Intelligences

Gardner points out that his model is a tentative formulation; after further research and investigation, some of the intelligences on his list may not meet certain of his eight core criteria and therefore be struck from the list. Similarly, we may identify *new* intelligences that do meet the various tests. In fact, Gardner acted on this belief by adding a new intelligence—the naturalist—after deciding that it fit each of the eight criteria. His consideration of a ninth intelligence—the existential—is also based upon its meeting most of the criteria (see Chapter 14 for a detailed discussion of the existential intelligence). Other intelligences that have been proposed by individuals other than Gardner include spirituality, moral sensibility, humor, intuition, creativity, culinary (cooking) ability, olfactory perception (sense of smell), the ability to synthesize the other intelligences, high-tech competency, and mechanical ability. It remains to be seen whether these proposed intelligences can, in fact, meet each of Gardner's eight criteria.

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The Relationship of MI Theory to Other Intelligence Theories

Gardner's theory of multiple intelligences is certainly not the first model to grapple with the notion of intelligence. There have been theories of intelligence since ancient times, when the mind was considered to reside somewhere in the heart, the liver, or the kidneys. In more recent times, theories of intelligence have emerged touting anywhere from 1 (Spearman's "g") to 150 (Guilford's Structure of the Intellect) types of intelligence.

Some educators have compared MI theory to different learning style models. Gardner, however, has sought to differentiate the theory of multiple intelligences from the concept of "learning style." He writes: "The concept of *style* designates a general approach that an individual can apply equally to every conceivable content. In contrast, an *intelligence* is a capacity, with its component processes, that is geared to a specific content in the world (such as musical sounds or spatial patterns)" (1995, pp. 202–203). There is no clear evidence yet, according to Gardner, that a person highly developed in Picture Smart, for example, will show that capacity in every aspect of his or her life (e.g., washing the car spatially, reflecting on ideas spatially, socializing spatially). He suggests that the existence of ''intelligence styles'' remains to be empirically investigated (for an example of a step in this direction, see Silver, Strong, & Perini, 1997).

For Further Study

1. Form a study group on MI theory using Gardner's *Frames of Mind* as a text. Each member can be responsible for reading and reporting on a specific chapter. For an example of how a multiple intelligences school arose from such a study group, see Hoerr (2000).
2. Use Gardner's comprehensive bibliography on MI theory, found in his books *Intelligence Reframed: Multiple Intelligences for the 21st Century* (1999) and *Multiple Intelligences: New Horizons in Theory and Practice* (2006a), as a basis for reading more widely about the model.
3. Propose the existence of a new intelligence and apply Gardner's eight criteria to see if it qualifies for inclusion in MI theory.
4. Collect examples of symbol systems in each intelligence. For example, one might look on the internet for symbols in Picture Smart used by

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designers, architects, artists, or inventors or Music Smart symbols that are different from those used on the base and treble clef.

5. Read about savants in each intelligence. Some of the footnoted entries in Gardner's *Frames of Mind* identify sources of information on savants in Number/Logic Smart, Picture Smart, Music Smart, Word Smart, and Body Smart. In addition, the work of neurologist Oliver Sacks (1985, 1995) provides engagingly written case studies of savants and other individuals with specific brain damage that has affected their intelligences in intriguing ways.
6. Relate MI theory to a learning-style model (e.g., V-A-K-T, Myers-Briggs, Dunn and Dunn) and note their similarities and differences.

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12

MI Theory, Personalization, and Deeper Learning

The more people participate in the process of their own education . . . the more [they] participate in the development of their selves. The more the people become themselves, the better the democracy.

—*Paulo Freire*

Up to this point in the book, I have presented MI theory strategically as a way to enrich virtually any style of teaching or system of learning. In this chapter, however, I'd like to look at the emerging personalization movement and examine how MI theory can help to deepen its practice.

Let me be clear about what I mean by *personalization*. First, I am not talking about personalization in the way corporate education companies that tout "personalized" programs and products do. In essence, these programs use algorithms to collect data about students as they work through computerized course material, and then proceed to customize modules and assignments based on student inputs. There is little of the "person" in any of this (education critic Diane Ravitch calls these "de-personalization" programs on her blog at http://dianeravitch.net). Second, I'm not speaking of teacher-directed programs where instructors assess student interests, preferences, and learning styles and craft curriculum around those factors (the primary

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focus of this book up to this point). When I use the term personalization in this chapter, I'm referring to student-centered, student-driven projects and activities that strongly emphasize student voice and student choice.

Real personalization respects students' aspirations and feeds students' desire for mastery over real-world challenges. The reason this approach is so important to the lives of students is that it represents the best preparation they can receive for life. As Ron Berger, the chief academic officer of Expeditionary Learning (EL) Education puts it,

> In all of my years sitting in classrooms as a student, in public schools that were highly regarded, I never once produced anything that resembled authentic work or had value beyond addressing a class requirement. My time was spent on an academic treadmill of turning in short assignments completed individually as final drafts—worksheets, papers, math problem sets, lab reports—none of which meant much to anyone and none of which resembled the work I have done in the real world. Although I received good grades, I have no work saved from my days in school, because nothing I created was particularly original, important or beautiful. Yet when we finish school and enter the world of work, we are asked to create work of value—scientific reports, business plans, websites, books, architectural blueprints, graphic artwork, investment proposals, medical devices and software applications. This work is created over weeks or months with team consultation, collaboration and critique, and it goes through multiple revisions. The research, analysis, and production involve multiple disciplines, such as reading, writing, mathematics, science, engineering and design. (Berger, 2013)

It stands to reason, then, that the type of curriculum that students should be engaged with in school reflects to a reasonable degree what they're going to be doing once they get out into the workforce. Implementing personalized learning is the best way to ensure this.

MI Theory's Contribution to Personalized Learning

Here are some ways in which MI theory can help guide the personalization process.

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MI theory places Self Smart and People Smart front and center. Instead of regarding Word Smart and Number/Logic Smart as the foundation of school learning, personalized projects require, more than anything else, intrapersonal and interpersonal intelligences. In order to do the envisioning, planning, and organization required to launch personalized projects, students need to frankly assess their own strengths and weaknesses, engage in realistic goal setting, and adjust their goals as the project unfolds. Similarly, in personalized team projects, students must learn how to collaborate and participate in the give- and- take necessary to effectively implement their plans and envision the social connections needed to accomplish their goals.

Here's an example. A senior at Avalon Charter School in St. Paul, Minnesota, decided to engage in a project related to theater production. In the course of the project, he analyzed plays, took a class on stagecraft at a local university, built stage sets, and produced, directed, and acted in plays for the school community. Another senior at Avalon spent more than 800 hours working with a nonprofit educational advocacy group to help pass legislation in Minnesota expanding opportunities for individualized learning programs in the state (Traphagen & Zorich, 2013). Although both of these projects also involved the other intelligences (Logic Smart to analyze, Body Smart to dramatize, Picture Smart to visualize), the key driving power was supplied by the students' use of the personal intelligences.

MI theory helps both students and teachers envision the broad spectrum of possibilities available in developing a personalized project. A teacher who limits her understanding of learning to just words and numbers may facilitate deeply authentic personalized projects in a classroom where students choose their readings and decide on their writing genres and topics. But if this is all that is available to students, then potential gifts that they may possess in musical expression, artistic ability, dramatic sensibility, or ecological sensitivity may go untapped. When we suggest to students the possible tools available to them in developing a personalized project—words, numbers, music, audio, video, drama, nature, photos, and much more—they are more likely to be fully engaged. Figure 12.1 provides a menu of processes that students might select from in developing a project or personalized learning plan.

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Figure 12.1

Processes for Personalized Learning Projects

Word Smart	Number/ Logic Smart	Picture Smart	Body Smart	Music Smart	People Smart	Self Smart	Nature Smart
Writing Reading Journaling Speaking Listening Editing Publishing Blogging Translating Proofing Storytelling Debating Recording (words) Orating Memorizing	Analyzing Collecting data Graphing Measuring Quantifying Coding Thinking critically Calculating Inventing Using heuristics Generating statistics Experimenting	Drawing Photographing Videotaping Painting Sculpting Visualizing Cartooning Sketching Animating Designing Doodling Observing Mapping Envisioning Collaging Showing (e.g., at a gallery)	Building Dramatizing Crafting Making (Maker Movement) Performing Miming Role-playing Coaching Dancing Touching Simulating Mimicking Sculpting Creating mock-ups	Composing Performing Creating musical instruments Listening to music Conducting Analyzing music Singing Synthesizing Recording Broadcasting Rapping Chanting	Mentoring Interning Apprenticing Job shadowing Volunteering Interviewing Marketing Persuading Mediating Counseling Consulting Leading Group organizing Discussing Collaborating Sharing	Reflecting Choosing Organizing Goal-setting Envisioning Self-evaluating Planning Meditating Dreaming Self-monitoring Self-regulating Getting in touch with one's deepest feelings	Classifying nature Collecting nature Observing nature Preserving nature Gardening Farming Ranching Raising or caring for animals Conserving Advocating

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MI theory can help teachers integrate personalized student-driven activities and projects into the traditional curriculum. Many teachers are hesitant to wade into the deep waters of authentic student-centered projects because they fear losing contact with the standards, requirements, and content that form the core of their teaching responsibilities. Kallick and Zmuda (2017) view personalized learning as a continuum, teacher-directed at one end and student-driven at the other. Furthermore, they apply this continuum to several components of the personalized learning process, including goal setting, idea generation, tasks, and evaluation. Students may lead the way in some of these areas, while the teacher takes responsibility for the others. Certainly, many teachers will want to test the waters before they engage in a full-fledged student-directed program. Figure 12.2 suggests how activities in traditional content areas might be designed to begin the process of personalizing work in each of the eight intelligences.

MI theory provides a way to contextualize the learning that unfolds during student-directed projects. Understanding that truly personalized learning reflects the fact that students may change direction as they develop their projects, MI theory provides a conceptual map that can help both teachers and students understand which intelligences are being activated and how they can be further extended into the learning process.

An excellent model being used to personalize learning is the Genius Hour, which emerged from Google's injunction to employees that 20 percent of their work time should be spent on creating their own unique ideas for helping the organization. In Genius Hour classrooms across the United States, teachers have set aside a specific amount of time per day or week for students to engage in passion projects that reflect their own deepest interests. For example, Spencer (2017) writes about a student who focused on studying the history of skateboarding and ultimately designed a model of a hybrid skateboarding museum and skate park. This project integrated the Word Smart, Body Smart, Picture Smart, and Number/Logic Smart intelligences into a Self Smart–directed project. Another student curated (Self Smart) her favorite recipes from around the world (Word Smart, Body Smart) and integrated them with interviews she conducted with immigrants (People Smart). A group of students collaborated (People Smart) on rating (Number/Logic Smart) existing roller coasters and eventually designed (Body Smart, Picture Smart) their own model ride.

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Figure 12.2
Personalized Learning and MI Theory

Personalized Learning **MI Integration**	**My Community (1st Grade Social Studies)**	**Geology (4th Grade Science)**	**Expressive Arts (8th Grade Art)**	**The Novel (11th Grade English-Language Arts)**
Word Smart	Make a book about your favorite things in the community	Read self-chosen books and articles on geology; keep a "geologist's journal" of your explorations	Create art from words and letters in English and other languages spoken by you or your family	Read self-chosen novels.
Number/ Logic Smart	Choose things to count in your community (e.g., houses on your block, street lamps downtown)	Become familiar with field guide tools and strategies used to analyze rocks; study the molecular structure/ elemental composition of rocks	Create art from mathematical representation of personal data (e.g., scatter plot art based on the times you went to bed each night plotted against your test score results the following day)	Create databases to keep track of books read and films watched (with a data field for personal reactions and interpretations)
Picture Smart	Take photos of your town and put them together in a photography exhibit	Put together a photo display of local rocks (for use to help others in their identification)	Put together a "mood collage" representing your feelings during a typical day	Watch films based on novels read
Body Smart	Go on field trips to different areas of your community and create "social stories" of the trips	Learn appropriate techniques for breaking rocks for analysis	Create a self-portrait sculpture	Put on a play, mime show, or improvisation based on scenes from novels read

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Personalized Learning **MI Integration**	**My Community (1st Grade Social Studies)**	**Geology (4th Grade Science)**	**Expressive Arts (8th Grade Art)**	**The Novel (11th Grade English-Language Arts)**
Music Smart	Make an audio recordings of the sounds heard around your community.	Write a song based on your favorite rock or rocks ("rock music").	Use composition software to create an instrumental work representing your opinion about some controversial topic.	Create a musical composition that tells the most interesting stories from each novels.
People Smart	Contact a local historian who can visit the school and talk about the history of your community; interview members of the community about the history of your town.	Establish a "rock hound" club; meet with a geologist; share rock collection with a lower grade.	Get together with a small group of peers to create a drama that acts out a topic of keen interest to participants.	Create a book study group; e-mail or Skype with authors.
Self Smart	Make a list of all the things you like most about your community and all the things you like least about it.	Put together a rock display of your favorite found specimens.	Choose an art form and a topic of special passion and create the work.	Choose the novels you wish to read; work at your own pace; decide how to present the book to others.
Nature Smart	Create a garden to produce food to give to the neediest people in your community.	Study the geology of the local area where you live.	Create a work of art expressing your personal philosophy using only natural materials.	Create a bibliography of novels where nature is one of the key "characters."

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Yes, But How Deep Is the Learning?

Naturally, a big concern of teachers relates to how much learning is actually going on during these student-driven projects. Some teachers have aligned personalized learning exercises directly to state or district standards or developed benchmarks to assess student learning progress. Whether a teacher decides to do this or not, it can be helpful to have some measure of the *level* of learning going on at any given stage of the personalized learning process. Webb's (1997) Depth of Knowledge (DOK) schema provides a template to help educators gauge how deep a student project may go in terms of cognitive complexity for any given learning activity. It consists of the following four levels (Hess, 2013):

1. **Recall and Reproduction—**includes listing, defining, calculating, memorizing, reporting, and identifying;
2. **Skills and Concepts—**includes inferring, categorizing, predicting, interpreting, summarizing, and predicting;
3. **Strategic Thinking and Reasoning—**includes critiquing, appraising, investigating, testing, hypothesizing, assessing, and revising; and
4. **Extended Thinking—**includes initiating, designing, collaborating, researching, synthesizing, self-monitoring, critiquing, producing, and presenting.

It's important to keep in mind that we're not talking here about "good, better, or best" learning or thinking. Each of these levels has significance in its own right. For example, a student's plan during a Genius Hour to learn Mandarin Chinese may exist at Level 1 of Webb's model, but would be more intellectually challenging than another student's Level 4 project to research the background and significance of songs popular during World War I.

Webb's model allows teachers to monitor levels of thinking processes and use that information to help students self-evaluate and improve their learning plans. In the course of developing a robotics project, for example, a student may realize he needs to master a Level 1 skill in coding as a prerequisite for programming the robot for a Level 4 navigation routine. The fact that students can themselves learn to self-monitor the cognitive complexity of their work (and, in addition, understand their multiple intelligences) represents an important metacognitive skill that can carry over into everyday life. Figure 12.3 provides examples of how MI theory can be understood in relation to Webb's DOK model.

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Figure 12.3
Examples of Webb's Depth of Knowledge Model Integrated with MI Theory

Intelligences	DOK-1 – Recall and Reproduction *What is the knowledge?*	DOK-2 – Basic Application of Skills and Concepts *How can the knowledge be used?*	DOK-3 – Strategic Thinking *Why can the knowledge be used?*	DOK-4 – Extended Thinking *How else can the knowledge be used?*
Word Smart	Learn the correct orthographic spelling of English words	Write a poem, short story, or novel	Analyze an author's writing style to help improve one's own writing abilities	Create a weekly radio show based on reportage done during the previous week
Number/ Logic Smart	Memorize algo-rithms to use in doing math problems	Use heuristic strategies in solving math problems	Design a science experiment to measure the amount of sugar in various fast food beverages	Set up a school weather station and monitor data over a period of several weeks or months
Picture Smart	Learn and reproduce graphic images for an artwork	Use knowledge of graphic software to create a website	Create a mock-up (miniature structure) that integrates two architectural styles	Curate a visual art show made up of contributions from the school and local community
Body Smart	Master a motoric routine for a gymnastics class	Execute winning backhand volleys while playing a game of tennis	Choreograph a dance	Develop a football game playbook that can be used by the school's varsity team
Music Smart	Learn how to read musical notation for the piano	Play a violin sonata by Mozart	Compose a piece of music for the electronic synthesizer	Organize a concert where you will perform or conduct your composition and give a lecture afterward on its creation

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Figure 12.3
Examples of Webb's Depth of Knowledge Model Integrated with MI Theory

Intelligences	DOK-1 – Recall and Reproduction *What is the knowledge?*	DOK-2 – Basic Application of Skills and Concepts *How can the knowledge be used?*	DOK-3 – Strategic Thinking *Why can the knowledge be used?*	DOK-4 – Extended Thinking *How else can the knowledge be used?*
People Smart	Remember and reproduce proper social behaviors in the classroom.	Lead a small-group discussion using acquired interpersonal strategies that maximize collaboration.	Create, provide, and evaluate a survey that polls student opinion on the topic of school bullying.	Plan, create, and lead a student voice campaign in school.
Self Smart	Recall and be able to express past memories of failures and successes in school.	Write or create in nonverbal media an autobiographical account of your life.	Create and lead an activity to teach 1st grade students about their multiple intelligences.	Develop a yearlong project to plan and direct your independent learning in school based on Joseph Campbell's hero's journey.
Nature Smart	Memorize the taxonomy of living things created by Linneaus.	Use Linneaus's taxonomy to classify arthropods in the field.	Design an experiment to evaluate the quality of the local drinking water.	Plan and lead a coordinated school–community campaign to test and monitor the water pollution in the local community.

Ultimately, authentic personalized learning should be regarded as a delicate balance between a student's own motivations, interests, and aspirations and the teacher's knowledge of the terrain that can be covered in a learning adventure. The student provides the passion, the background, and the forward motion in exploring an area of great interest, while the teacher brings to the table her own skill set of strategies, resources, suggestions,

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and feedback. A knowledge of MI theory provides a cognitive map that can help lead a student's personalized learning journey toward a successful and meaningful conclusion.

For Further Study

1. Set aside a specific amount of time each day or week for a Genius Hour when students can explore a topic, issue, or pursuit of great interest to them (for more information on setting up a program, go to www.geniushour.com). As students choose their projects, notice whether there is a match or mismatch between a student's most developed intelligences and the intelligences required to do the project, or the intelligences that will be strengthened as a result of the project. Talk with colleagues who are also implementing the Genius Hour about the pros and cons of students choosing projects based on their desire to improve a difficult intelligence, their wish to continue developing a preferred intelligence, or the impetus to explore an intelligence they may only be dimly aware of possessing.
2. Evaluate the level at which your current classroom teaching integrates authentic personalized instruction (not computer-based or teacher-enforced). Consider how you might bring more student-driven personalization into your program and how you could integrate the theory of multiple intelligences into the projects or pursuits that students choose to explore.
3. Develop a student-directed personalized program, or take curricula you've already developed and use Webb's DOK schema and MI theory to keep track of which intelligences are being used and what levels of learning are being engaged. List additional activities that might enhance the intellectual breadth and cognitive depth of the program.

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15

MI Theory and Its Critics

Gardner's theory provides a much needed corrective to the shortcomings of traditional psychometric approaches. Instead of probing the bases of bubble-sheet results, Gardner sought to illuminate the mental abilities underlying the actual range of human accomplishment that are found across cultures.

—*Mindy Kornhaber*

Along with the expanding popularity of multiple intelligences, there has been a growing body of writing critical of the theory. In fact, one of the criticisms lodged against MI theory is that there has not been enough acknowledgment of the critical literature on the part of MI advocates. Willingham (2004), for example, observes: "Textbooks [on MI theory] for teachers in training generally offer extensive coverage of the theory, with little or no criticism" (p. 24). Traub (1998) writes: "Few of the teachers and administrators I talked to were familiar with the critiques of multiple intelligences theory; what they knew was that the theory worked for them. They talked about it almost euphorically" (p. 22). In this chapter, I'd like to review some of the major criticisms of MI and attempt to clear up what I believe are some key misconceptions about the theory.

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Criticism #1: MI Theory Lacks Empirical Support

Most of those making this complaint about MI theory come from the field of cognitive psychology (Waterhouse, 2006) or from the psychometric, or testing, community (Gottfredson, 2004). Waterhouse writes, “To date there have been no published studies that offer evidence of the validity of the MI.” Similarly, Gottfredson argues that the literature on intelligence testing offers virtually no support for the idea of eight autonomous intelligences but overwhelming support for the concept of an overarching single intelligence, frequently attributed to Spearman (1927) and often referred to as “Spearman’s g” or simply “the g factor” (see also Brody, 2006). Gottfredson (2004) writes:

> The g factor was discovered by the first mental testers, who found that people who scored well on one type of mental test tended to score well on all of them. Regardless of their contents (words, numbers, pictures, shapes), how they are administered (individually or in groups; orally, in writing, or pantomimed), or what they’re intended to measure (vocabulary, mathematical reasoning, spatial ability), all mental tests measure mostly the same thing. This common factor, g, can be distilled from scores on any broad set of cognitive tests, and it takes the same form among individuals of every age, race, sex, and nation yet studied. In other words, the g factor exists independently of schooling, paper-and-pencil tests, and culture. (p. 35)

Visser, Ashton, and Vernon (2006) put together a battery of 16 tests ostensibly covering the eight intelligences (two tests for each intelligence) and reported the presence of g running through most of the tests. These researchers argued that what Gardner calls intelligences are actually capacities that are secondary or even tertiary to the g factor. In other words, they exist but are subservient to g. J.B. Carroll (1993), who created his own hierarchy of human cognitive abilities with g at the top, compares Word Smart to “fluid intelligence” and Music Smart to “auditory perception” (a mistake on his part, because the multiple intelligences are not dependent upon the senses), while finding no place at all for Body Smart.

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Response to Criticism #1

MI theory agrees that the g factor exists. What it disputes is that g is superior to other forms of human cognition. In MI theory, g has its place (primarily in Number/Logic Smart) as an equal alongside the other seven intelligences. It appears that the confusion is a matter of semantics. Most critics in the psychometric community agree that the intelligences in Gardner's model exist and are supported by testing. What they disagree about is whether or not they should be called "intelligences." They want to reserve the word *intelligence* for the g factor, while regarding the other seven intelligences as talents, abilities, capacities, or faculties. Gardner (2003) has written that he intended to be provocative in referring to multiple "intelligences" rather than multiple "talents." He wanted to challenge the sacrosanct nature of intelligence as a singular phenomenon and get people to think more deeply about what it means to be intelligent. The fact that he has stirred up so much controversy from the psychometric community suggests that he has at least partially accomplished his goal, even if he has not fully persuaded them to accept his theory.

The reality is that MI theory is supported empirically by a number of sources. In *Frames of Mind* (1993a), Gardner established eight criteria that needed to be met in order for an intelligence to appear in his theory (see Chapter 1 for a discussion of these). Each of the eight criteria provides a range of empirical data, from studies of brain-damaged individuals and "savant" populations, to evidence from prehistoric humanity and other species, to biographical studies of human development and research on human cultures. Davis, Christodoulou, Seider, and Gardner (2011) point out that many criticisms of MI theory pay scant attention to the criteria, which are supported by hundreds of empirical studies in several fields including psychology, sociology, neurology, biology, anthropology, and the arts and humanities. Ironically, the fact that the psychometric community has stayed within the narrow confines of numbers and standardized testing actually limits its ability to give broad empirical support to the notion of a pure g-factor intelligence (Gottfredson's argument notwithstanding, g appears to measure "school-like" thinking; see Gardner, 2006b). On the other hand, MI's multiple sources of empirical data considerably expand its validity as a theoretical construct.

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Criticism #2: No Solid Research Supports the Effectiveness of Using MI in the Classroom

This criticism parallels the first one in suggesting that MI has no empirical support (or, to put it in a more contemporary context, is not research- or evidence-based). Here we are concerned, however, not with pure theory but, rather, with its practical applications in schools. For example, Collins (1998) writes that "evidence for the specifics of Gardner's theory is weak, and there is no firm research showing that its practical applications have been effective" (p. 95). Willingham (2004) writes:

> [H]ard data are scarce. The most comprehensive study was a three-year examination of 41 schools that claim to use multiple intelligences. It was conducted by Mindy Kornhaber, a longtime Gardner collaborator. The results, unfortunately, are difficult to interpret. They reported that standardized test scores increased in 78 percent of the schools, but they failed to indicate whether the increase in each school was statistically significant. If not, then we would expect scores to increase in half the schools by chance. Moreover, there was no control group, and thus no basis for comparison with other schools in their districts. Furthermore, there is no way of knowing to what extent changes in the school are due to the implementation of ideas of multiple intelligences rather than, for example, the energizing thrill of adopting a new schoolwide program, new statewide standards, or some other unknown factor. (p. 24)

Response to Criticism #2

Perhaps the greatest problem with the argument that MI is not research- or evidence-based is that it is founded upon a very narrow conception of what constitutes authentic research. In the wake of the 2001 No Child Left Behind law, the idea of what constituted valid research began to be limited to highly controlled studies comparing experimental classrooms (implementing a specific educational intervention) to control classrooms using standardized tests and quantitative tools based on correlation coefficients and levels of statistical significance. More recently, there's been an increased focus on *effect size* (a measure of the magnitude of the difference between an

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intervention group and a control group expressed in standard deviations) (Slavin, 2013). This has given rise to a list of specific classroom strategies or "influences" that result in positive educational outcomes (see, e.g., Hattie, 2008 for one guide).

There are many problems with using these ostensibly "rigorous" methodologies to validate the success of multiple intelligences in the classroom. First, multiple intelligences do not represent a specific educational intervention such as, for example, Direct Instruction (Marchand-Martella, Slocum, & Martella, 2003), which is implemented uniformly by all trained teachers and frequently receives high marks in rankings of evidence-based teaching methods (see, e.g., Education Consumers Foundation, 2011). MI theory represents a wide range of techniques, attitudes, tools, strategies, and methods, and each teacher is encouraged to develop his own unique approach to implementing them. It is impossible to conduct controlled studies of the kind Willingham demands because multiple intelligences in one classroom could be very different from multiple intelligences in another classroom and because even the control classroom would probably also be using multiple intelligences strategies to some extent. (In other words, how do you find a "pure" MI classroom and a control group that uses absolutely no MI to compare it with?)

Second, to demand a certain level of statistical significance or effect size from a study is to risk rejecting an educational intervention simply for "missing the cut" (e.g., does an effect size of .45 mean an intervention is not as effective as one with an effect size of .52?). While looking very objective, these figures often devolve into subjective impressions after all. Sullivan and Feinn (2012), for example, write: "Cohen classified effect sizes as small ($d = 0.2$), medium ($d = 0.5$), and large ($d \geq 0.8$). According to Cohen, 'a medium effect of .5 is visible to the naked eye of a careful observer. A small effect of .2 is noticeably smaller than medium but not so small as to be trivial.'" We might then dispense with the effect size and simply trust the effectiveness of a study to the "naked eye of a careful observer."

Third, to reduce the success or failure of a study to mere numbers is to reject other valid sources of a program's effectiveness, including individual case studies of children's learning improvement, parent reports of improved attitudes toward school, and documentation of learning progress through

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projects, problem solving, and portfolios (see Chapter 10 for a discussion of multiple intelligences and assessment methods).

The demand for quantitative precision in education is an unfortunate nod toward positivism—the idea that ultimate truth can be expressed only through numbers or similarly precise scientific formulations (see Comte, 1988). There are many other strands of thought in the Western intellectual tradition that argue for the validity of qualitative forms of research (see, e.g., Dilthey, 1989; Gadamer, 2005; and Polyani, 1974), and methodologies derived from these intellectual movements are especially appropriate to use in guiding educational research (see, e.g., Denzin & Lincoln, 2005).

The fact is that there are many examples of successful implementation of MI theory in educational programs around the world (see Chapter 16). In addition to the study mentioned by Willingham (Kornhaber, Fierros, & Veenema, 2003), which also noted increased levels of parent participation, decreased levels of discipline problems, and increased academic performance for students with learning difficulties, a number of research projects initiated by Harvard Project Zero have won accolades over the years, including Project Spectrum (Gardner, Feldman, & Krechevsky, 1998a, 1998b, 1998c), Practical Intelligences for School (Williams et al., 1996), and Arts Propel (Zessoules & Gardner, 1991), which was called by *Newsweek* magazine one of the two best educational programs in the United States (the other was the graduate school of the California Institute of Technology; Chideya, 1991). To celebrate the 20th anniversary of multiple intelligences theory in 2004, an entire issue of the prestigious *Teachers College Record* at Columbia University was dedicated to the work of multiple intelligences researchers and theoreticians (Shearer, 2004).

Shearer (2009) interviewed key education figures for the 25th anniversary of MI theory, including Noam Chomsky, Linda Darling-Hammond, and Deborah Meier, who viewed the theory of multiple intelligences as an important contribution to American education. In addition, the educational literature is replete with examples of individual schools and teachers who have shared their successes with implementing MI theory (see, e.g., Campbell & Campbell, 2000; Greenhawk, 1997; Hoerr, 2000; and Kunkel, 2007). Finally, many of the specific strategies that are used as part of the implementation of the theory of multiple intelligences are, in fact, evidence-based. Marzano's

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(2004) six steps to vocabulary development model, for example, which is viewed as being evidence-based, uses several multiple intelligences strategies. Step 3, for instance—"ask students to construct a picture, pictograph, or symbolic representation of the term"—is a Picture Smart strategy in MI theory. Many of the other strategies covered in this book have been similarly validated by quantitative research. But to expect to quantitatively validate an entire theory of learning consisting of thousands of potential instructional strategies would be a foolish notion, and yet educational researchers who should know better persist in their claim that "MI is not evidence-based."

Criticism #3: MI Theory Dumbs Down the Curriculum to Make All Students Mistakenly Believe They Are Smart

Some critics have accused MI practitioners of using superficial applications of MI theory—strategies of which even Gardner himself would not approve. Willingham (2004), for example, has criticized previous editions of this very book for its "trivial ideas.'' He cites two spelling strategies—singing spelling words and spelling with leaves and twigs—as examples of trivial applications. Collins (1998) criticizes strategies from another multiple intelligences curriculum guide (not by this author) referring to a unit about the oceans in which students build boats and role-play at being sea creatures. He writes of a child using Body Smart to learn U.S. history: "How deeply can a student comprehend a given topic by relying on his strongest intelligence? Using his hands, Dave may be able to learn about the boats of the settlers, but can a kinesthetic approach help him understand central historical issues, like the reasons the Europeans came to America in the first place?" (p. 96). Similarly, critics have suggested that MI theory promulgates an artificial "feel good" attitude where every child is told that he is smart. Barnett, Ceci, and Williams (2006) write: "[M]ere relabeling may not have a permanent curative effect. . . . Focusing on the label rather than on meaningful performances that demonstrate skill may lead children to become further disillusioned once the first blush passes." They indicate that "the focus must be on displaying meaningful skills and competencies, not simply on feeling that one is smart" (p. 101).

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Response to Criticism #3

During my 30 years of training teachers in MI, I have all too often seen teachers take the easy way out—believing, for instance, that "rapping math facts" meant they were "doing" multiple intelligences. But I have also seen many wonderfully original ideas related to MI theory created by experienced teachers over the years. Collins (1998) doubts that it is possible to use Body Smart to teach the historical factors that led Europeans to come to America. However, a well-designed role-play that imaginatively puts students at Plymouth Rock on November 11, 1620, and has them improvise reasons why they decided to leave England, gives the highly dramatic Body Smart learner an opportunity to think through the exercise in a more visceral way than can be accomplished by paper-and-pencil activities.

It is also true that it is not enough merely to tell students that they are smart in eight different ways and expect them to blossom. As noted earlier in this book in a discussion of Dweck's (2007) growth mindset, such assurances need to be followed up with solid academic effort leading to tangible improvements in knowledge of history, math, science, reading, and other basic subjects. The argument of MI theory is that textbooks, lectures, and standardized tests are not sufficient to produce this type of understanding, but that something more is required. Students need to investigate ideas in world history, chemistry, ecology, literature, economics, algebra, and other domains by involving their total selves (and whole brains), and this includes using their bodies, imagination, social sensibilities, emotions, and naturalistic inclinations, as well as their verbal and reasoning skills to master new material.

It is interesting to note that most of the criticisms of MI theory have come from academics and journalists—people who are usually far removed from the classroom. Few criticisms actually come from those who have applied the theory in their classrooms and seen the difference it makes in students' lives. This suggests a profound split between those academicians who build their reputations on finding logical holes in accepted ideas (or journalists who can build their journals' circulation) and practitioners who are too busy looking for ways to motivate children and methods to turn their lives around to worry about abstract logical inconsistencies or insufficiencies.

It also bears noting that MI theory was not originally designed by Howard Gardner as an educational model to be applied in the classroom. He initially wanted to convince academic psychologists that there was another,

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broader way of conceiving of intelligence. Despite arousing controversy, he seems to have failed in this effort among psychometricians. And yet, unexpectedly, he found teachers responding enthusiastically to his model because it filled a need that had not been previously met by educational approaches concerned with standardized testing and lockstep textbook approaches to learning. MI theory succeeded by revealing the positive qualities of all children and providing practical ways for them to experience success in the classroom rather than treating them as colorless denizens of a statistical bell curve. Thus, the most authentic refutation of the critics of MI can be found in the children themselves. Whenever a light goes on in a child's mind in a well-designed MI classroom, the argument supporting MI theory becomes that much stronger and clearer.

For Further Study

1. Read some of the articles critical of multiple intelligences cited in this chapter (e.g., Barnett et al., 2006; Brody, 2006; Collins, 1998; Gottfredson, 2004; Traub, 1998; Visser et al., 2006; Waterhouse, 2006; Willingham, 2004). Which aspects of their criticism do you agree with? Which ideas do you disagree with? Does your attitude toward MI theory change as a result of reading this critical literature? If so, how?
2. Howard Gardner has provided a number of responses to criticisms of MI theory, including to some of the above-mentioned authors (see, e.g., Davis, Christodoulou, Seider, & Gardner, 2011; Gardner, 2006a, 2006b, 2006c; Gardner & Moran, 2006). Read the original critics and then some of his responses, and evaluate the success or failure of his defense of MI theory.
3. In other writing (Armstrong, 2006), I have suggested that today's educational climate is characterized by an overemphasis on academic performance as measured by standardized testing and an underemphasis on the education of the whole child. To what extent has this restrictive educational climate given rise to the criticisms noted in this chapter?
4. Using some of the materials discussed above, organize a debate on MI theory, with one individual or team taking a pro-MI stance and the other individual or team taking an anti-MI stance. Afterward, discuss who did the most effective job of defending their position.

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5. Interview veteran colleagues and other school personnel about their attitudes toward MI theory and whether they have changed their opinion about it over the past 10–15 years. If they have a different attitude about it now than previously, ask them to share the reasons for their change in opinion.

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