HOWARD GARDNER

INTO YOUR CLASSROOM








MI

INSTRUCTOR'S PACKAGE

INTO THE CLASSROOM MEDIA

Teaching Guide

This guide is intended to provide an outline, as well as suggested uses and discussion/ writing questions, for **MI: Intelligence, Understanding, and the Mind**.

The following pages provide general notes for each section, with key quotes from the video, as well as suggested discussion questions relevant to the section.

The program is divided into seven parts, each clearly distinguished by a section title during the program (with the exception of the first section).

Structure:

Part 1. The Cognitive Revolution
Part 2. Intelligence
Part 3. The Eight Intelligences
Part 4. MI: Applications and Myths
Part 5. Understanding
Part 6. The Unschooled Mind—Across the Disciplines
Part 7. Teaching for Understanding

The division of the program into sections will allow you to selectively view desired portions of the presentation, to pause for discussion between appropriate sections, or to view the program in its entirety.

Total running time for this program is approximately 50 minutes.

(Note: **Howard Gardner Answers**, the optional companion presentation to **MI: Intelligence, Understanding, and the Mind**, runs approximately 40 minutes.)

PART 1. The Cognitive Revolution

Howard Gardner begins his presentation by illustrating the Cognitive Revolution of the 1950s. The revolution, which occurred primarily in the areas of psychology, linguistics, and artificial intelligence, has fundamentally altered our conceptions of the human mind. The dominant view of the mind prior to the revolution, called "behaviorism," viewed the mind as a "black box." This view recognized only that there were "stimuli" in the outside world and "responses" that the brain emitted to them. Behaviorism left completely unaddressed the areas of reasoning and problem solving.

Gardner explains how the work of four warriors in the Cognitive Revolution toppled the old view: Herbert Simon's work in artificial intelligence, or "A.I."; Noam Chomsky's work in linguistics; Jean Piaget's findings regarding the mind of the infant; and scientists' new findings about the structure of the brain itself.

The Cognitive Revolution raised the idea that there is, in fact, something inside the black box; it put forth the crucial new idea of "mental representation" and offered specific hypotheses regarding the nature of mental representations.

Gardner then hints at the profound implications of this new view of the mind for education and understanding; learning and understanding involve the very difficult talk of changing mental-representations.

> The Cognitive Revolution put forth [the idea] of mental representation. Mental representation means that there is something inside the black box. Some people call it a "language of thought," others call it "images," "pictures," or "schemas"... Our minds, from very early in life, are filled with mental representations, and what learning is about is changing mental representations in various ways...
>
> What's amazing to us in retrospect is that behaviorism, for over 50 years, could deny that there was any such thing as an idea in someone's head...However, what the nature of those mental representations is, that's the difficult question. [Everybody watching this presentation] will have mental representations about what intelligence is, what thinking is, what understanding is, maybe what Multiple Intelligences is... You might have a picture in your mind, a schema in your mind, or maybe a set of propositions; those are all mental representations.
>
> What I try to do as a lecturer is to tweak those representations...If your representations never changed, of course you'd never learn anything, and happily we all do learn things, so our representations do change...but one of the most important discoveries in cognitive science has been that representations are very hard to change.

Supplemental notes regarding the Cognitive Revolution:
FIVE SYMPTOMS OF THE COGNITIVE REVOLUTION

- **philosophical questions**
- **representational level**
- **computer as central**
- **anti-context**
- **anti-affect**

1. Cognitive science attempts to provide empirical answers to long-standing philosophical questions—for example, what is knowledge, when do we forget, what is distinctive about language.

2. Cognitive science posits that an understanding of human thought and behavior requires study at three discrete levels of analysis: 1) the biological, 2) the cultural, and 3) the representational. The latter denotes a belief that the mind/ brain creates and manipulates discrete forms of mental representation, such as images, schemas, propositions, theories, and the like. These need to be considered on their own terms, not merely in biological or cultural terms.

3. The computer is central in cognitive science in two senses: 1) much research is done with computers and 2) the computer offers the most viable model of the mind.

4. Most of cognitive science does not attempt to deal with contextual issues—for example, how different environments affect a stimulus or a proposition. This is not because the issue is unimportant, but rather because cognitive analysis are very difficult to carry out if the specific context of each episode must be taken into account.

5. Cognitivists generally do not deal with issues of emotions, affect, feelings. Some feel that this area falls outside of cognitive science; others would like to treat it but, as with context, feel that the issue is too difficult to deal with given our current state of knowledge.

Points for discussion related to this section:

- Discuss the behaviorist view of the mind.
- Discuss the view of the mind as a black box; consider how such a view might regard "learning" (for example, as the "accumulation of facts" that fills the black box).
- How did the Cognitive Revolution overthrow behaviorism?
- Discuss each challenge to the behaviorist point of view raised by each of the four warriors of the Cognitive Revolution: Herbert Simon, Noam Chomsky, Jean Piaget, and the brain itself.
- Discuss Gardner's explanation of the relationship between learning and mental representation.

PART 2. Intelligence

In this section, Gardner begins by demonstrating how, even in the wake of the Cognitive Revolution, the old view of the mind still underscores many dominant ideas about intelligence–from the recent publication of the controversial book, **The Bell Curve**, to psychometrics (Hans Eysenck), which claims that we can assess intelligence by looking at brain wave patterns. Gardner then explains the basic difference between the traditional view and his MI theory, arguing that the traditional view of intelligence, and IQ testing, tell us nothing about what a person can actually do.

> The Bell Curve captures the traditional view of intelligence: Intelligence is a single thing, we're born with it, there isn't much we can do about it, and best of all, psychologists can tell you how smart you are...
>
> My approach, called the theory of multiple intelligences, is quite different from any other theory of intelligence. It has nothing to do with tests and nothing to do with paper and pencil. In fact, it has more to do with the brain, and how the brain has evolved over millions of years, than it has to do with any kind of educational technology...
>
> The key entry point into my theory is to think about all the things that people do all over the world that are valued. [Take for example, sailors, pilots, hunters, entertainers, craftspeople], all individuals whose minds are valued, [and then realize] that the kinds of questions in IQ tests—repeating numbers backwards, giving antonyms, matching letters with a code—will never tell you whether people can do those things. In fact, they will never tell you whether a person can do anything, which is one of the frightening things about the intelligence test...
>
> So, I define intelligence not as having anything to do with tests but rather as the ability to solve problems, or to make things which are valued in at least one culture.

Closing this section, Gardner explains the two most important components of this definition. First is the idea of actually making something, and second is the idea that "intelligence" is always relative to a community (contrary to what the traditional view of intelligence would hold).

Points for discussion related to this section:

- Why does Gardner note that The Bell Curve could have been written in 1849?
- What do you think of Gardner's critique of psychometric testing?
- Explain what Gardner means by the "dip-stick" theory of intelligence.
- What does Gardner argue is the most alarming thing about the traditional view of intelligence as "measured" by IQ testing?
- Discuss the differences between MI theory and traditional views of intelligence.
- Illustrate "intelligence" within the MI perspective, as an ability to solve problems or to make things valued in at least one culture. Comment on this definition.

PART 3. The Eight Intelligences

In this section, Gardner begins by explaining the origins and underpinnings of his work toward the development of MI theory and then illustrates each of the eight intelligences identified therein: linguistic, logical-mathematical, spatial, bodily kinesthetic, interpersonal, intrapersonal, and naturalist.

> "In **Frames of Mind**, published in the early 1980s, I reviewed many bodies of literature: about the brain; about development; about special populations like prodigies, idiot savants, and autistic individuals. I came up with, at the time, seven (now eight) different kinds of intelligence. Each of these intelligences is perhaps best understood with reference to a kind of role or "end-state" which is valued in at least one culture or community...
>
> The basic claim is that as a species all of us have evolved so we can analyze a number of different kinds of information in the world, like language, music, space, and so on. So we all have the different intelligences...however [no two people have exactly the same combination of intelligences] and this has incredible educational implications."

Points for discussion related to this section:

- Discuss the eight intelligences of MI theory. Do you agree with the identification of eight intelligences? Is eight too many? Too few?
- Which of the intelligences identified by MI theory is analogous to the traditional conception of intelligence?
- Do you believe the intelligences should be viewed as equally important? What might Gardner say about the difference between an intelligence and a talent or ability?
- Explain what Gardner means when he says the definition of intelligence is relative to a community. Is it the case that certain intelligences might be highly valued at one point in history, or in one society, and not in another? If so, why?
- Gardner claims that contemporary schools reward linguistic and logical-mathematical intelligence almost exclusively. In what other cultures or times might this be otherwise? Refer to Gardner's earlier example of ocean navigators in the Puluwat Islands: Would a culture heavily dependent on oceanic navigation be as likely as our own to value linguistic intelligence? Other intelligences? Given your answer, discuss why you think the intelligences can, or can not, be hierarchized.

PART 4. MI: Applications and Myths

Gardner uses this section to address a key area of misconception surrounding MI theory: that there is a singular or "correct" MI approach. Illustrating several "myths and realities," Gardner demonstrates that MI is a tool, which can be applied in many different ways toward a variety of educational ends; MI is not, however, an end in itself.

Gardner notes that currently most schools are "uniform schools"; most people are taught the same things, in the same ways. While our first instinct might be to consider this fair, Gardner argues that it is completely unfair. In contemporary schools, linguistic and logical-mathematical intelligences are rewarded to the virtual exclusion of all others.

Gardner suggests that "individual-centered schools" can better match students with technologies and methods appropriate to their particular needs and intelligences. Central to this notion is the role of the "student-curriculum broker" in helping to identify the differing intelligences of children and attempting to match them accordingly, with different technologies and methodologies.

Next, he explains the role of the "school-curriculum broker":

> For the first 20 years of life, school is the only show in town, and if you don't have intelligences which are scholastically oriented, and you don't go to multiple-intelligences school, chances are you're going to be a very unhappy person and have a very low image of yourself. But if school opens up to the community, and pays attention to all of the different roles which exits there, many more children will be crystallized; they will find something which matches their own kinds of intelligence, something they can pursue.

Gardner then directly rebukes a key myth surrounding MI theory: that there is a singular, "correct" translation of MI theory into pedagogical practice. There are many different ways in which MI theory can be used as a pedagogical tool, and none, Gardner notes, is necessarily correct or better than any other.

> Some people say, "seven intelligences, let's have seven tests." Some people say, "seven intelligences, let's have seven subjects." Some people say, "let's find people's strengths and let's teach everything via the strengths; we'll put all the people who are good at spatial in the same class or the same school." Some people say, "let's find the weaknesses (and teach to the weaknesses)." So, I've found that whether it's curriculum, pedagogy, assessment, or what kinds of students you are serving, people drew very different conclusions about the educational implications of multiple intelligences.

The next myth Gardner rebukes is that it is inherently good to exercise each of the intelligences. Instead, Gardner argues that activities that involve the intelligences need to be well motivated. MI can be helpful in two ways: by helping us understand the relationship between what kinds of adults we want to foster and the intelligences we foster in children and by acting as a tool for achieving the various educational ends we might choose.

> Decide what curricula you value, what ideas and concepts are most important, and use the intelligences in different ways to achieve the educational end—and I am about to argue that the most important educational end is better understanding.

Points for discussion related to this section:

- Do you agree with Gardner that "uniform-schools" are inherently unfair?
- Elaborate Gardner's idea of the "student-curriculum broker"; the "school-community broker."
- Discuss how you might apply what you know about MI theory to the classroom.
- How is Gardner's statement that "activities which involve the intelligences must be well motivated" related to the earlier idea that the definition of intelligence is always relative to a particular community's valuation?
- How does Gardner's insistence that MI is a tool, not an "end" in itself, relate to his earlier definition of intelligence?

PART 5. Understanding

In this section, Gardner defines understanding and demonstrates how difficult it is to achieve. He also identifies the primary enemies of understanding in educational settings.

> What do I think understanding is? A person understands to the extent that he or she can take something learned—knowledge, concepts, theories, and the like—and apply them appropriately in new situations; that's all it is...[However], the major finding of cognitive science for education over the last 30-40 years is how difficult it is to get students to understand.

Gardner then illustrates examples of advanced degree students who, when asked basic questions about the nature of the physical world, give the same answers that children give; what Gardner calls "unschooled answers." He explains that when advanced students are asked about what is going on when one flips a coin, many answer that the coin is invested with a certain amount of force and that the coin continues to rise until the force is "spent," at which point it begins to fall; "when in fact, the only force operating on the coin from the moment it leaves my hand is gravity." He illustrates, in the same vein, faulty representations of mass and gravity, and of human evolution. Gardner points out that no amount of "book learning" will necessarily change these underlying, and faulty, mental representations.

Gardner accounts for this phenomenon as a kind of "Cognitive Freudianism." In childhood, he explains, all of us form very basic theories about the world; theories of matter, theories of mind, and theories of life. He demonstrates how, no matter how many thousands of facts we coat these representations with, the basic frameworks persist; when we leave school, and forget most of the facts, we are left with the same initial mental representation.

In this context, Gardner presents four "enemies" of understanding. Short-answer assessment, the text-test context, the correct-answer compromise, and pressures for coverage. He demonstrates how each of these prioritizes memorization and factual accumulation while sacrificing understanding.

Points for discussion related to this section:

- How does Gardner define "understanding"?
- How is it implied that traditional models of intelligence would define "understanding"?
- Discuss the example of the flipped coin. What is Gardner arguing is most important about the fact that so many people give the incorrect answer regarding force and the coin?
- Discuss the idea of Cognitive Freudianism. Relate this to the danger of confusing "facts" for "understanding."
- Discuss the four "enemies of understanding" that Gardner presents. How does each prioritize memorization or factual accumulation over genuine understanding?

PART 6. The Unschooled Mind—Across the Disciplines

> In my book, **The Unschooled Mind**, I take a look at the curriculum in the schools, and I talk about how, for each of the curricular areas, there is real obstacle to having a good mental representation...In science, you have "misconceptions"...they are very powerful and hard to shake...In math, you have "rigidly applied algorithms," [and] in the areas of the curriculum which involve humanistic thinking, social-scientific thinking, and the arts, what we have are scripts or stereotypes—these are familiar patterns of events which we learn to expect...So in the **The Unschooled Mind**, I go through all the disciplines and show that no matter which discipline we are looking at, students are filled with misconceptions, scripts and stereotypes, formulas which they've memorized but can't use, and its very, very discouraging...
>
> I even have to say, I took my Harvard graduate students, who are supposed to be the best and the brightest, and I studied their learning in my course. I looked at their mastery of factual material, and it zoomed up. After all, they are Harvard students—very good at doing E.D. Hirsch kinds of information mastery. I then looked at their understanding when I brought new things in—from newspapers which they had never seen before—and do you know what happened? Absolutely flat; didn't do well in the beginning, didn't do well in the middle, and didn't do well in the end. "Physician heal thyself," I try to cover fewer things now, with a lot more attention, and I think the student understanding is improving.

Facing the very difficult task of changing the mental representations of the unschooled mind, and countering the "enemies of understanding," Gardner proposes several contexts and techniques to achieve understanding.

He illustrates the idea of apprenticeship, and how such a context aids in promoting multiple representations of some topic or discipline, and, in turn, how this underlies the definition of an "expert." Furthermore, he explains how such a context, by giving students a sense of "multiple entry points" into the same concept, fosters their own sense of what it means to mobilize their knowledge in different ways. We do this in the areas of law, medicine, and other graduate study, and Gardner argues that children need this no less.

Next Gardner illustrates what is important about the learning environment of a children's museum; he explains that children's museums are places where students have the opportunity to perform their understandings without fear of punishment or failure. Gardner adds that we learn much more by failure and correction than by simply "getting it right the first time."

For each of the disciplinary areas—science, math, social sciences—Gardner proposes an appropriate counter to each of the obstacles he outlined earlier. Thus misconceptions in the sciences might be attacked head on, with what he calls "Christopherian-counters"; the rigidly applied algorithm problem can be addressed by helping children understand the "relevant semantic domain" of a formula

such that they would be able to mobilize it, or even derive it again if it was forgotten; the "scripts and stereotypes" problem can be attacked by habitually adopting multiple perspectives.

Finally, Gardner explains that, in practice, we should choose the big questions or "generative ideas"; in turn, we can organize learning around such ideas (e.g., "democracy" or "evolution") and approach them from a number of different perspectives, and through multiple entry points. If we do this, students get a sense of what it is like to be an expert (having multiple perspectives) and a sense of what it is like to use and apply their knowledge flexibly.

Points for discussion related to this section:

- Explain Gardner's conception of the "unschooled mind."
- Identify and explain the obstacles to understanding that Gardner identifies in each curricular area.
- What is the significance of Gardner's anecdote regarding his own students?
- Why does Gardner discuss apprenticeships and children's museums? How is each a context that might serve to foster better understanding?
- Identify each of the counters Gardner identifies for misconceptions, the algorithm problem, and the scripts and stereotypes problem. Discuss how each of these counters plays a role in promoting better mental representations.
- Link the idea of "multiple entry points" to the idea of organizing learning around "generative ideas."

PART 7. Teaching for Understanding
(Conclusion)

In this concluding section, Howard Gardner summarizes his discussion. He calls for educators and others to mobilize what he hopes will be their new mental representations of intelligence and understanding.

> Revolution. We've covered a lot of ground. Revolutionary ideas about intelligence: Not one thing; not inborn; not a single way to select human beings. Rather, a number of potentials which can and should be developed—and a way of thinking about what we want to achieve in school, how to reach more students, how to present things to students, either technologically or directly, in ways which make sense to them.
>
> Understanding. Sounds like a wonderful banner under which to march. But are you willing to sacrifice 5000 facts? Are you willing to sacrifice coverage? Are you willing to take those misconceptions and meet them head-on, and to dissolve them, and create better representations? Are you willing to take a look at a work of art or a historical event from a number of different perspectives? Can you learn from a children's museum, or an apprenticeship, or some other situation where understanding performances are the name of the game? Those are the tests of how seriously you take understanding.

Myths & Messages

by Howard Gardner
Project Zero,
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May 1995

I. Breaking A Decade of Silence

A silence of a decade's length is sometimes a good idea. I published **Frames of Mind**, an introduction to the theory of multiple intelligences (MI theory), in 1983.[1] Because I was critical of current views of intelligences within the discipline of psychology, I expected to stir controversy among my fellow psychologists. This expectation was not disappointed.

I was unprepared for the large and mostly positive reaction to the theory among educators. Naturally I was gratified by this response and was stimulated to undertake some projects exploring the implications of MI theory. I also took pleasure from—and was occasionally moved by—the many attempts to institute an MI approach to education in schools and classrooms. By and large, however, except for a few direct responses to criticisms,[2] I did not speak up about new thoughts concerning the theory itself.

In 1993, my self-imposed silence was broken in two ways. My publisher issued a tenth anniversary edition of **Frames of Mind,** to which I contributed a short, reflective introductory essay. In tandem with that release, the publisher issued **Multiple Intelligences: The Theory in Practice,**[3] a set of articles chronicling some of the experiments undertaken in the wake of MI theory— mostly projects pursued by colleagues at Harvard Project Zero, but also other MI initiatives. This collection gave me the opportunity to answer some other criticisms levelled against MI theory and to respond publicly to some of the most frequently asked questions.

In the twelve years since **Frames of Mind** was published, I have heard, read, and seen several hundred different interpretations of what MI theory is and how it can be applied in the schools[4]. Until now, I have been content to let MI theory take on a life of its own. As I saw it, I had issued an "ensemble of ideas" (or "memes") to the outer world, and I was inclined to let those "memes" fend for themselves.[5] Yet, in light of my own readings and observations, I believe that the time has come for me to issue a set of new "memes" of my own.

In the next part of this article, I will discuss seven myths that have grown up about multiple intelligences and, by putting forth seven complementary "realities," I attempt to set the record straight. Then, in the third part of the article, reflecting on my observations of MI experiments in the schools, I will describe three primary ways in which education can be enhanced by a multiple intelligences perspective.

In what follows, I make no attempt to isolate MI theory from MI practice. "Multiple intelligences" began as a theory but was almost immediately put to practical use. The commerce between theory and practice has been ready, continuous, and, for the most part, productive.

II. Myths of Multiple Intelligences

Myth #1 Now that seven intelligences have been identified, one can—and perhaps should— create seven tests and secure seven scores.

Reality #1 MI theory represents a critique of "psychometrics-as-usual." A battery of MI tests is inconsistent with the major tenets of the theory.

Comment: My concept of intelligences is an outgrowth of accumulating knowledge about the human brain and about human cultures, not the result of a prior definitions or of factor analysis of test scores. As such, it becomes crucial that intelligences be assessed in ways that are "intelligent-fair," that is, in ways that examine the intelligence directly rather than through the lens of linguistic or logical intelligence (as ordinary paper-and-pencil tests do).

Thus, if one wants to look at spatial intelligence, one should allow an individual to explore a terrain for a while and see whether she can find her way around it reliably. Or if one wants to examine musical intelligence, one should expose an individual to a new melody in a reasonably familiar idiom and see how readily the person can learn to sing it, recognize it, transform it, and the like.

Assessing multiple intelligences is not a high priority in every setting. But when it is necessary or advisable to assess an individual's intelligences, it is best to do so in a comfortable setting with materials (and with cultural roles) that are familiar to that individual. These conditions are at variance with our general conception of testing, as a decontextualized exercise using materials that are unfamiliar by design; but there is no reason in principle why an "intelligence-fair" set of measures cannot be devised. The production of such useful tools has been our goal in such projects as Spectrum, ARTS PROPEL, and Practical Intelligence for School.[6]

Myth #2 An intelligence is the same as a domain or a discipline.

Reality #2 An intelligence is a new kind of construct, and it should not be confused with a domain or a discipline.

Comment: I must shoulder a fair part of the blame for the propagation of The second myth. In writing **Frames of Mind**, I was not as careful as I should have been in distinguishing intelligences from other related concepts. As I have now come to understand, largely through my interactions with Mihaly Csikszentmihalyi and David Feldman,[7] an *intelligence* is a biological and psychological potential; that potential is capable of being realized to a greater or lesser extent as a consequence of the experiential, cultural, and motivational factors that affect a person.

In contrast, a *domain* is an organized set of activities within a culture, one typically characterized by a specific symbol system and its attendant operations. Any cultural activity in which individuals participate on more than a casual basis, and in which degrees of expertise can be identified and nurtured, should be considered as a domain. Thus, physics, chess, gardening, and rap music are all domains in Western culture. Any domain can be realized through the use of several intelligences: thus the domain of musical performance involves bodily-kinesthetic and personal as well as musical intelligences. By the same token, a particular intelligence, like spatial intelligence, can be put to work in a myriad of domains, ranging from sculpture to sailing to neuroanatomical investigations.

Finally, the *field* is the set of individuals and institutions that judge the acceptability and creativity of products, fashioned by individuals (with their characteristic intelligences) within established or new domains. Judgments of quality cannot be made apart from the operation of members of a field, though it is worth noting that both the

members of a field, and the criteria that they employ, can and do change over time.

Myth #3 An intelligence is the same as a "learning style," a "cognitive style," or a "working style."

Reality #3 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).

Comment: To see the difference between an intelligence and a style, consider this contrast. If a person is said to have a "reflective" or an "intuitive style," this designation assumes that the individual will be reflective or intuitive with all matter of content, ranging from language, to music, to social analysis. However, such an assertion reflects an empirical assumption that actually needs to be investigated. It might well be the case that an individual is reflective with music but fails to be reflective in a domain that requires mathematical thinking or that a person is highly intuitive in the social domain but not in the least intuitive when it comes to mathematics or mechanics.

In my view, the relation between my concept of intelligence and the various conceptions of style needs to be worked out empirically, on a style-by-style basis. We cannot assume that style means the same thing to Carl Jung, Jerome Kagan, Tony Gregoric, Bernice McCarthy, and other inventors of stylistic terminology.[8] There is little authority for assuming that an individual who evinces a style in one milieu or with one content will necessarily do so with other diverse contents—even less authority for equating styles with intelligences.

Myth #4 MI theory is not empirical. (A variant of Myth 4 alleges that MI theory is empirical but has been disproved.)

Reality #4 MI theory is based wholly on empirical evidence and can be revised on the basis of new empirical findings.

Comment: Anyone who puts forth Myth #4 cannot have read **Frames of Mind**. Literally hundreds of empirical studies were reviewed in that book, and the actual intelligences were identified and delineated on the basis of empirical findings. The seven intelligences described in **Frames of Mind** represented my best-faith effort to identify mental abilities of a scale that could be readily discussed and critiqued.

No empirically based theory is ever established permanently. All claims are at risk in the light of new findings. In the last decade, I have collected and reflected upon empirical evidence that is relevant to the claims of MI theory, 1983 version. Thus, work on the development in children of a "theory of mind," as well as the study of pathologies in which an individual loses a sense of social judgment, has provided fresh evidence for the importance and independence of interpersonal intelligence.[9] In contrast, the findings of a possible link between musical and spatial thinking has caused me to reflect on the possible relations between faculties that have previously been thought to be independent.[10] Many other lines of evidence could be mentioned here; the important point is that MI theory is constantly being reconceptualized in terms of new findings from the laboratory and from the field (see also Myth #7).

Myth #5 MI theory is incompatible with "g" (general intelligence),11 with hereditarian accounts, or with environmental accounts of the nature and causes of intelligence.

Reality #5: MI theory questions not the existence but the province and explanatory power of "g." By the same token, MI theory is neutral on the question of heritability of specific intelligences, instead

underscoring the centrality of genetic/environmental interactions.

Comment: Interest in "g" comes chiefly from those who are probing scholastic intelligence and those who traffic in the correlations among test scores. (Recently people have become interested in the possible neurophysiological underpinnings of "g"[12] and, sparked by the publication of **The Bell Curve**,[13] interest in the possible social consequences of "low g.") While I have been critical of much of the research in the "g" tradition, I do not consider the study of "g" to be scientifically improper, and I am willing to accept the utility of "g" for certain theoretical purposes. My interest, obviously, centers on those intelligences and intellectual processes that are not covered by "g."[14]

While a major animating force in psychology has been the study of the heritability of intelligence(s), my inquiries have not been oriented in this direction. I do not doubt that human abilities, and human differences, have a genetic base; can any serious scientist question this at the end of the twentieth century? And I believe that behavioral genetic studies, particularly of twins reared apart, can illuminate certain issues.[15] However, along with most biologically informed scientists, I reject the "inherited vs. learned" dichotomy and instead stress the interaction, from the moment of conception, between genetic and environmental factors.

Myth #6 MI theory so broadens the notion of intelligence that it includes all psychological constructs and thus vitiates the usefulness, as well as the usual connotation, of the term.

Reality #6 This statement is simply wrong. I believe that, it is the standard definition of intelligence that narrowly constricts our view, treating a certain form of scholastic performance as if it encompassed the range of human capacities and leading to disdain for those who happen not to be psychometrically bright. Moreover, I reject the distinction between talent and intelligence; in my view, what we call "intelligence" in the vernacular is simply a certain set of "talents" in the linguistic and/or logical-mathematical spheres.

Comment: MI theory is about the intellect, the human mind in its cognitive aspects. I believe that a treatment in terms of a number of semi-independent intelligences presents a more sustainable conception of human thought than one that posits a single "bell curve" of intellect.

Note, however, that MI theory makes no claims whatsoever to deal with issues beyond the intellect. MI theory is not, and does not pretend to be, about personality, will, morality, attention, motivation, and other psychological constructs. Note, as well, that multiple intelligences theory is not connected to any set of morals or values. An intelligence can be put to an ethical or an anti-social use. Poet and playwright Johann Wolfgang von Goethe and Nazi propagandist Joseph Goebbels were both masters of the German language; but how different were the uses to which they put their talents!

Myth #7 There is an eighth (or ninth or tenth) intelligence.

Reality #7 Not in my writings so far. But I am working on it.

Comment: For the reasons suggested above, I thought it wise not to attempt to revise the principal claims of multiple intelligences theory before the 1983 version of the theory had been debated. But recently, I have turned my attention to possible additions to the list. If I were to rewrite **Frames of Mind** today, I would probably add an eighth intelligence—the intelligence of the naturalist. It seems to me that the individual who is able readily to recognize flora and fauna, to make other consequential distinctions in the natural world, and to use this ability productively (in hunting, in farming, in biological science) is exercising

an important intelligence, and one that is not adequately encompassed in the current list. Individuals like Charles Darwin or E. O. Wilson embody the naturalist's intelligence; and in our consuming culture, youngsters exploit their naturalist's intelligence as they make acute discriminations among cars, sneakers, or hairstyles.

I have read in several secondary sources that there is a spiritual intelligence and, indeed, that I have endorsed a spiritual intelligence. That statement is not true. It is true that I have become interested in understanding better what is meant by "spirituality" and by "spiritual individuals"; as my understanding improves, I expect to write about this topic. Whether or not it proves appropriate to add "spirituality" to the list of intelligences, this human capacity certainly deserves discussion and study in non-fringe psychological circles.

Messages about MI in the Classroom

If one were to continue adding myths to the list, a promising candidate would read:

There is a single educational approach based on MI theory.

I trust that I have made it clear over the years that I do not subscribe to this myth.[16] On the contrary: MI theory is in no way an educational prescription. There is always a gulf between psychological claims about how the mind works and educational practices, and such a gulf is especially apparent in a theory that was developed without specific educational goals in mind. Thus, in educational discussions, I have always taken the position that educators are in the best position to determine the uses to which MI theory can and should be put.

Indeed, contrary to much that has been written, MI theory does **not** incorporate a "position" on tracking, gifted education, interdisciplinary curricula, the layout of the school day, length of the school year, or many other "hot button" educational issues. I have tried to encourage certain "applied MI efforts" but in general my advice has echoed the traditional Chinese adage "Let a hundred flowers bloom." And I have often been surprised and delighted by the fragrance of some of these fledgling plants— for example, the use of a "multiple intelligences curriculum" in order to facilitate communication among youngsters drawn from different cultures or the conveying of pivotal principles in biology or social studies through a dramatic performance designed and staged by students.

I have become convinced, however, that while there is no "right way" to conduct a multiple intelligences education, some current efforts go against the spirit of my formulation and embody one or more of the myths sketched above. Let me mention a few applications that have jarred me:

*The attempt to teach all concepts or subjects using all the intelligences. As I indicate below, most topics can be powerfully approached in a number of ways. But there is no point in assuming that every topic can be effectively approached in at least seven ways, and it is a waste of effort and time to attempt to do this.

*The belief that it suffices, in and of itself, just to go through the motions of exercising a certain intelligence. I have seen classes in which children are encouraged simply to move their arms or to run around, on the assumption that exercising one's body represents in itself some kind of MI statement. Don't read me as saying that exercise is a bad thing; it is not. But random muscular movements have nothing to do with the cultivation of the mind...or even of the body!

* The use of materials associated with an intelligence as background. In some classes, children are encouraged to read or to carry out math exercises while music is playing in the background. Now I myself like

to work with music in the background. But unless I focus on the performance (in which case the composition is no longer serving as background), the music's function is unlikely to be different from that of a dripping faucet or a humming fan.

*The use of intelligences primarily as mnemonic devices. It may well be the case that it is easier to remember a list if one sings it, or even if one dances while reciting it. I have nothing against such aids to memory. However, these uses of the materials of an intelligence are essentially trivial. What is not trivial— as I argue below— is to think musically, or to draw on some of the structural aspects of music in order to illuminate concepts like biological evolution or historical cycles.

*The conflating of intelligences with other desiderata. This practice is particularly notorious when it comes to the personal intelligences. Interpersonal intelligence has to do with understanding other people— but it is often distorted as a license for cooperative learning or applied to individuals who are extroverted. Intrapersonal intelligence has to do with understanding oneself— but it is often distorted as a rationale for self-esteem programs or applied to individuals who are loners or introverted. One receives the strong impression that individuals who use the terms in this promiscuous way have never read my own writings on intelligence.

*The direct evaluation (or even grading) of intelligences, without regard to context or content. Intelligences ought to be seen at work when individuals are carrying out productive activities that are valued in a culture. And that is how reporting of learning and mastery in general should take place. I see little point in grading individuals in terms of how "linguistic" or how "bodily-kinesthetic" they are; such a practice is likely to introduce a new and unnecessary form of tracking and labeling. As a parent (or as a supporter of education living in the community), I am interested in the ***uses*** to which children's intelligences are put; reporting should have this focus.

Note that it is reasonable, for certain purposes, to indicate that a child seems to have a relative strength in one intelligence and a relative weakness in another. However, these descriptions should be mobilized in order to help students perform better in meaningful activities and perhaps even to show that a label was premature or erroneous.

Having illustrated some problematic applications of MI theory, let me now indicate three more positive ways in which MI can be—and has been— used in the schools:

1. The cultivation of desired capacities. Schools should cultivate those skills and capacities that are valued in the community and in the broader society. Some of these desired roles are likely to highlight specific intelligences, including ones that have usually been given short shrift in the schools. If, say, the community believes that children should be able to perform on a musical instrument, then the cultivation of musical intelligence toward that end becomes a value of the school. Similarly, emphasis on such capacities as taking into account the feelings of others, being able to plan one's own life in a reflective manner, or being able to find one's way around an unfamiliar terrain are likely to result in an emphasis on the cultivation of interpersonal, intrapersonal, and spatial intelligences, respectively.

2. Approaching a concept, subject matter, or discipline in a variety of ways. Along with many other school reformers, I am convinced that schools attempt to cover far too much material, and that superficial understandings (or non-understandings) are the inevitable result. It makes far more sense to spend a significant amount of time on key concepts, generative ideas, and essential questions and to allow students to become thoroughly familiar with these notions and their implications.

Once the decision has been made to dedicate time to particular items, it then becomes possible to approach those topics or notions in a variety of ways. Not necessarily seven ways, but in a number of ways that prove pedagogically appropriate for the topic at hand. Here is where multiple intelligences comes in. As I argue in **The Unschooled Mind**,[17] nearly every topic can be approached in a variety of ways, ranging from the telling of a story, through a formal argument, to an artistic exploration, to some kind of "hands-on" experiment or simulation. Such pluralistic approaches should be encouraged.

When a topic has been approached from a number of perspectives, three desirable outcomes ensue. First, because children do not all learn in the same way, more children will be reached—I term this desirable state-of-affairs "multiple windows leading into the same room." Second, students secure a sense of what it is like to be an expert when they behold that a teacher can represent knowledge in a number of different ways and discover that they themselves are also capable of more than a single representation of a specified content. Finally, since understanding can also be demonstrated in more than one way, a pluralistic approach opens up the possibility that students can display **their** new understandings—as well as their continuing difficulties—in ways that are comfortable for them and accessible to others. Performance-based examinations and exhibitions are tailor-made for the foregrounding of a student's multiple intelligences.

3. The personalization of education. Without a doubt, one of the reasons that MI theory has attracted attention in the educational community is because of its ringing endorsement of an ensemble of propositions: we are not all the same; we do not all have the same kinds of minds; education works most effectively for most individuals, if these differences in mentation and strengths are taken into account rather than denied or ignored. I have always believed that the heart of the MI perspective—in theory and in practice–inheres in taking human differences seriously. At the theoretical level, one acknowledges that all individuals cannot be profitably arrayed on a single intellectual dimension. At the practical level, one acknowledges that any uniform educational approach is likely to serve only a minority of children.

When I visit an "MI school," I look for signs of personalization: evidence that all involved in the educational encounter take such differences among human beings extremely seriously; evidence that they construct curricula, pedagogy, and assessment insofar as possible in the light of these differences. All the MI posters, indeed all the references to me personally, prove to be of little avail if the youngsters continue to be treated in homogenized fashion. By the same token, whether or not members of the staff have even heard of MI theory, I would be happy to send my children to a school with the following characteristics: differences among youngsters are taken seriously; knowledge about differences is shared with children and parents; children gradually assume responsibility for their own learning; and materials that are worth knowing are presented in ways that afford each child the maximum opportunity to master those materials and to show others (and themselves) what they have learned and understood.

Closing Comments

I am often asked for my views about schools that are engaged in MI efforts. The implicit question may well be: "Aren't you upset by some of the applications that are carried out in your name?"

In truth, I do not expect that initial efforts to apply any new ideas are going to be stunning. Human experimentation is slow, difficult, and filled with zigs and zags. Attempts to apply any set of innovative ideas will sometimes be half-hearted, superficial, even wrong-headed.

For me the crucial question concerns what has happened in a school (or class), two, three, or four years after it has made a commitment to an MI approach. Often, the initiative will be long since forgotten— the fate, for better or worse, of most educational experimentation. Sometimes, the school has gotten stuck in a rut, repeating the same procedures of the first days, without having drawn any positive or negative lessons from this exercise. Needless to say, I am not happy with either of these outcomes.

I cherish an educational setting where discussions and applications of MI have catalyzed a more fundamental consideration of schooling–its overarching purposes, its conceptions of what a productive life will be like in the future, its pedagogical methods, and its educational outcomes, particularly in the context of the values of that specific community. Such examination generally leads to more thoughtful schooling. Visits with other schools and more extended forms of networking among MI enthusiasts (and critics) constitute important parts of this building process. If, as a result of these discussions and experiments, a more personalized education is the outcome, I feel that the heart of MI theory has been embodied. And if this personalization is fused with a commitment to the achievement of worthwhile (and attainable) educational understandings for all children, then the basis for a powerful education has indeed been laid.

The MI endeavor is a continuing and changing one. There have emerged over the years new thoughts about the theory, new understandings and misunderstandings, and new applications, some very inspired, some less so. Especially gratifying to me has been the demonstration that this process is dynamic and interactive: no one, not even its creator, has a monopoly on MI wisdom or foolishness. Practice is enriched by theory, even as theory is transformed in the light of the fruits and frustrations of practice. The burgeoning of a community that takes MI issues seriously is not only a source of pride to me but also the best guarantor that the theory will continue to live in the years ahead.

Acknowledgements:

For their comments on an earlier draft of this paper, I am grateful to Melissa Brand, Pat Bolanos, Tom Hatch, Tom Hoerr, Mara Krechevsky, Mindy Kornhaber, Jerome Murphy, Bruce Torff, Julie Viens, and Ellen Winner. Preparation of this paper was supported by the MacArthur Foundation and the Spencer Foundation.

Footnotes

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3. Gardner, Howard **Multiple intelligences: The theory in practice.** New York : Basic Books, 1993.

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5. The term "memes" is taken from Richard Dawkins, **The selfish gene**, Oxford: Oxford University Press, 1976.

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ll. The most thorough exposition of "g" can be found in the writings of Arthur Jensen. See for example **Bias in mental testing**. New York: Free Press, 1980. For a critique see Stephen J. Gould, **The mismeasure of man**, New York: Norton 1981.

12. Interest in the neurophysiological bases of "g" is found in the writings of Arthur Jensen, Why is reaction time correlated with psychometric "g"? **Current Directions of Psychological Science**, 1993, 2 (2), 53-6.

13. Richard Herrnstein and Charles Murray, **The bell curve**. New York: Free Press, 1994.

14. For my view on intelligences not covered by "g", see Howard Gardner, Review of Richard Herrnstein and Charles Murray, **The Bell Curve**. **The American Prospect,** Winter, 1995, 20, 71-80.

15. On behavioral genetics and psychological research, see
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16. On the many approaches that can be taken in implementing MI theory, see Krechevsky, Mara, Hoerr, Thomas, and Gardner, Howard Complementary energies: Implementing MI theory from the lab and from the field. In Jeannie Oakes and Karen H. Quartz (Eds) **Creating new educational communities: Schools and classrooms where all children can be smart.** Chicago: National Society for the Study of Education, 1995..

17. Gardner, Howard **The unschooled mind: How children think and how school should teach.** New York; Basic Books, 1991.

Amid the enormous amount of attention directed toward educational reform in America and abroad over the past decade or so, surprisingly little discussion has taken place with respect to the *reasons* that we should educate our children or ourselves. This "silence with respect to goals" is a largely accurate characterization of earlier parts of this volume, where my focus has fallen on human intellectual potentials, and, equally of the opening chapter of this section, which concentrated on a fresh approach to assessment. In this chapter, I attempt to repair this imbalance, by focusing specifically on the reasons that we should educate and on some of the most promising means for bringing about an effective educational system.

Understanding:

A Straightforward Goal for Education

Few would challenge the claim that education should seek to inculcate understanding. However, once one asks What is understanding, and How do we know that it has been achieved?, the difficulties attendant on the concept of understanding readily emerge. Indeed, I would claim that most individuals involved in education do not have a clear sense of the nature of understanding, nor do they know how to document that it has (or has not) been achieved.

In *The unschooled mind,* published in 1991, I argue that an individual understands whenever he or she is able to apply knowledge, concepts, or skills (abbreviated, hereafter, as knowledge) acquired in some kind of an educational setting to a new instance or situation, where that knowledge is in fact relevant. By inference, then, an individual fails to understand if he or she cannot apply that knowledge, or if he or she brings inappropriate knowledge to bear on the novel situation.

As a convenient example, let me refer to the short-lived Gulf War of 1991, in which the United States led a consortium of nations in an effort to wrest Kuwait from Iraqi hands, and, in the process, impose a new kind of balance on that region of the world. An individual with political or historical understanding of the region would be able to predict which kinds of outcomes were likely or unlikely to occur following the completion of the battle, including the unlikelihood of a permanent alteration of the *ante belltim* state of affairs. An individual with understanding of the principles of physics could indicate how to aim a Patriot missile so that it would intercept a Scud missile in flight and also could make some kind of a prediction about how the resulting debris was likely to distribute itself upon the earth. Finally, an individual who understood the principles of economics could anticipate the effect on the United States economy (and on other economies) of an unanticipated large expenditure of money. It is probably fair to say that the highest degree of understanding was evinced with respect to the interception of Scud missiles; and it may not be coincidental that the necessary calculations were carried out by computers.

By virtue of a considerable amount of research conducted by cognitive researchers in the past few decades, we now know a very dissettling fact: most students in the United States, and, so far as we can tell, most students in other industrialized countries, do not understand the materials that they have been presented in school. That is, when confronted with an

unfamiliar situation, they are generally unable to mobilize the appropriate concepts from school, even if they have been good students. The "smoking gun" occurs in physics: students who have received high grades in physics at redoubtable institutions like MIT and Johns Hopkins are not able to apply their classroom knowledge to games or demonstrations encountered outside of school. (They often answer in the same way as do "unschooled" five-year-olds.)

But, as documented in *The unschooled mind,* this problem is by no means restricted to the hard sciences. Indeed, whether one looks at student learning in statistics, mathematics, psychology, literature, history, or the arts, one encounters essentially the same situation. Within class, students often appear as if they understand, because they are able to furnish back to their instructors the factual and rule-governed information that they have committed to memory. But once out on their own, once expected to figure out *which* of the school-learned concepts, facts, or skills are actually applicable to a new situation, they show themselves to be incapable of understanding and, again, often are mired at the same level as the proverbial five-year-old. It may be superfluous to add that few adults in our society constitute an exception to this rule; as the above instances from the Gulf War suggest, understanding is not widely distributed in our society.

Needless to say, this is a distressing state of affairs. While our better schools certainly succeed in teaching students the basics of reading, writing, and reckoning, they fail a more stringent–and more fundamental–test. Even our better students by and large can be said not to understand the worlds of the sciences, mathematics, the humanities, and the arts. It is perhaps not too much to say that ten or even twenty years of education fail to achieve the goal that it is most reasonable to expect of "the system."

How to Achieve and Demonstrate Understanding

Unless it becomes a central goal of our entire educational enterprise, understanding is most unlikely to be achieved. For starters, educators must agree about which sorts of understandings they wish their students to have. I believe that it is advisable to have such a conversation at the national or even the international level; while each school needs to wrestle with the problem of understanding, it makes little sense to have every individual school or school system start from scratch in laying out its own preferred understandings. Let me list some plausible candidates for understanding in several disciplines:

•Student of physics should be able to explain the actions of objects and phenomena that they encounter in their everyday world, as well as ones that are staged for various purposes within the physics laboratory.

•Students of mathematics should be able to measure relevant quantities in their lives, make plausible investments, understand the principles of mortgages and insurance, and be able to fill out their tax returns.

•Students of history should be able to read the daily newspaper or weekly newsmagazine and draw on relevant historical principles both to explain what is happening and to make plausible predictions about what is likely to happen next.

•Students of literature and the arts should be able to create at least simple works in relevant genres, understand and appreciate the qualities of works from their and other cultures, and relate these works to their own lives and concerns, even as they bring those personal agendas to any work that they themselves create or appreciate.

I do not think that these aspirations are particularly controversial, nor do I think that they would be very difficult to achieve. But

it is worth noting that very few schools actually articulate such "understanding goals" as these. And even fewer posit the "performances of understanding" that their students should ultimately be asked to exhibit.

It has sometimes been convenient to contrast "performances" with "understanding." In terms of that dichotomy, which I myself used in my 1989 book *To open minds,* some educational systems highlight performances: ritualized, memorized sets of sequences and patterns that are initially exhibited by teachers and that students are expected to model with increasing fidelity. Various sites of traditional education, such as China, are often cited as examples of systems that stress "performance." In contrast, the West is thought to highlight "understanding"–the capacity to probe beneath the surface, to figure out underlying causes, to dissect a text or a work of art and illustrate the principles on which it is built. One can think of Confucius as exemplifying a focus on performance, while Socrates emerges as the exemplar incarnate of understanding.

Upon closer examination, however, it is clear that understandings can only be apprehended and appreciated if they are *performed* by a student. We cannot know whether a student understands a principle of physics unless he can issue a relevant performance; such a performance might include building or repairing an apparatus, correctly employing a formula that explains the relation between two variables, or predicting what will happen when two objects collide under certain circumstances. Each of these are "performances of understanding." By the same token, we cannot know whether a student understands a period of history unless she can issue relevant performances; these might include the capacities to explain that period to someone ignorant of American history, to relate that period to ones that came afterwards, to explain an event in today's newspaper in the light of important historical antecedents, or to illuminate works of art of the period by invoking events or personages of the period that can be thought to have animated those works. These, too, are "performances of understanding."

Work currently carried out in collaboration with David Perkins, Vito Perrone, Rebecca Simmons, and several other researchers at Harvard indicates that it is by no means an easy matter for teachers to define such performances, but that it is possible for them to do so. Following such a delineation, the next step is to share these performances with students, to allow them to become familiar with the kinds of performances that one wants them eventually to be able to carry out alone or in cooperation with fellow students. Far from requiring such performances solely at the end of a course or unit, students need to begin to "practice" these performances from the first days of class. And by the same token, students ought to become partners in the processes of assessment as soon as possible. Rather than having assessment occur at the end of the day, and at the hands of a teacher or an outsider examiner, assessment ought to be an activity of mutual engagement, in which students take regular and increasingly major responsibility for reflecting on the nature of their performances and on the means for improving them.

Implications for Curriculum

The most serious consequence of the decision to educate for understanding is a radical foreshortening of the curriculum. If one wishes to have any chance of securing understanding, it becomes essential to abandon the misguided effort to "cover everything." Broad coverage ensures superficiality; at best, heads become stuffed with facts that are forgotten almost as soon as the short-answer test has been administered. Rather, one must move toward "uncoverage," or, to cite another current slogan, one must embrace the principle that "less is more."

In my own version of education for understanding, it is important to define at the out-

set the kinds of concepts that one wishes students to understand and the kinds of performances that one wishes students to exhibit upon the completion of school. Once defined, these "end states" or "final exhibitions" become the basis on which curricula and assessments to be used en route are then devised. To the extent possible, students ought to be introduced explicitly to these concepts and performances early in their careers and have the chance to revisit them numerous times during school. And so, for example, if an understanding of democratic institutions is a major goal for history or social studies, curricula and assessments ought to be directed toward such understandings from the first years of school. By the same token, if an understanding of the processes and principles of evolution is a major goal for biological studies, then primary school children should be involved in activities that begin to acquaint them with the phenomena of evolution and give them practice in issuing the sought-after kinds of performances. In short, education for understanding entails the necessity for a "spiral curriculum" in which rich, generative ideas are revisited time and again across a student's career in school.

One can immediately see that such a process requires intimate intercourse among teachers, and considerable continuity in student learning. I have been astonished how frequently a teacher of one age group has no idea of what the students did the previous year and no idea of what they will be doing the following year, it is as if each year were sacrosanct and one were supposed to begin each fall "from scratch." Students and parents are equally culpable. Quite typically, they do not look for continuities across years, semesters, or even classes. What was done in math or English last year is not considered to be related to the tasks for this coming year; and tips about writing picked up in, say, history class are rarely thought to be relevant to the tasks of writing posed in English or science classes. Here, again, some kind of curriculum coordination, certainly across the school and possibly across the nation, seems to be indicated.

From the above discussion, it should be clear that I favor some forms of "core knowledge," some materials that all students should know. Note that this preference does not take the form of a canonical list of books or principles: I do not feel that such a mandate is appropriate or well founded. Rather I search for a consensus around certain very rich or generative concepts, like evolution or democracy, and for attention to the kinds of performances that can reveal understanding, such as the application of those concepts to newly encountered biological phenomena or political occurrences. It is reasonable to expect every graduate in our land to be able to understand the significance of a new biological discovery or to anticipate the political implications of an economic downslide or an important judicial opinion.

Balancing Specialized and Comprehensive Knowledge: An Educational Challenge

But how can one mediate between the understandable desire for common forms of knowledge within a society and the need to recognize individual interests and gifts, which is so central to the notion of multiple intelligences? I believe that part of the answer lies in a sensitivity to what makes pedagogical sense at different stages or levels of development.

It is surely no coincidence that children throughout the world begin schooling "in earnest" at around the age of seven. In my own view, most children have by this age proceeded as far as they can in coming to know the physical and social worlds and the world of symbols through the use of their natural learning processes. For some purposes, this untutored absorption of patterns may be enough. Indeed, in certain nontechnological cultures, it already makes sense to consider these children as young adults.

In literate and technologically oriented cultures, however, children are still remote

from the concerns and capacities of competent adults. They must become able to read and to master the various notational systems of the culture: mathematical ones, scientific ones, graphing techniques (like maps and charts), and perhaps other specialized notations such as those used in music, dance, or specific vocations. It is the job–and the genius–of schooling to transmit this notational knowledge in the succeeding decade or so.

Children of this age differ in other ways from their younger counterparts. Preschoolers enjoy free exploration, fantasy, and experimenting with boundaries; their speech favors metaphors, and they readily embrace synesthetic connections. By the age of eight or nine, however, most children have become quite different creatures. During this middle childhood phase, they want to master the rules of their cultures and of its specific vocations and avocations. They want to use language precisely, not allusively; they want to draw pictures that are photographically realistic, not fanciful or abstract; and they expect a strict adherence to rules in dress, behavior, games, moral situations, and other cultural activities, brooking little deviation.

These shifts in mood and focus offer pedagogical opportunities. Certainly the first years of school are a time when it is important to master the notational systems of the culture. By and large, children cannot master these notations on their own; that is why school begins the world over at around the age of seven. It is now realized that this is a more difficult task than previously thought, because notational systems are not mastered in a knowledge vacuum. Rather, they must build upon and relate to the "commonsensical" understanding of domains that has been achieved in the preschool years. Thus, written language must be related to oral language skills; musical notational skills to the child's intuitive or "figural" perception of music; scientific concepts to commonsense understanding of the physical world. Effecting this connection is a crucial challenge. Otherwise, the child may be burdened with two disembodied systems of knowledge, neither adequate on its own, rather than one integrated understanding.

Also, at this age, children are both ready and eager to master skills in specific areas. They want to be able to draw in perspective, to compose in rhyme, to perform chemical experiments, to write a computer program. It would be desirable, in the best of all possible worlds, that all children be exposed to each of these activities. Human finitude, however, guarantees that such a goal is utopian. An attempt to train children in all art forms, all athletic forms, and all scholastic activities would be certain to achieve superficial knowledge at best and a breakdown in less happy circumstances.

It is for these reasons that I recommend some degree of specialization during middle childhood–roughly from the ages of eight to fourteen. While children are mastering the crucial literacies, they should also have the opportunity to attain significant levels of skill in a small number of domains: perhaps, on the average, in one art form, one area of physical training, and one or two scholastic subjects. Thus a ten-year-old might take music or art lessons; engage in one after-school sport, gymnastic, or dance activity; and have regular cumulative lessons in a subject like history, biology, or mathematics.

I favor this early specialization for two reasons. First of all, I think it is important that youngsters early on receive some demonstrations of what it means, on a day-to-day basis, to master a subject matter or a cluster of skills–to drill, practice, monitor one's own progress, reflect upon it, compare it to that of peers at work in the same domain. Bereft of this opportunity, children may be at a severe disadvantage later on, when it becomes essential to achieve mastery in a vocational area. The need to experience mastery firsthand is nowhere more acute than in contemporary America, where so many of the cultural signals favor the quick fix rather than the lengthy apprenticeship.

The second reason relates more directly to subsequent careers. In my own view, an individual is most likely to achieve a satisfactory life to make a contribution to society and gain self-esteem if he or she finds vocational and avocational niches that complement his or her own aptitudes. If a child has had plenty of exposure to the range of domains and intelligences in early life, it seems reasonable that he or she should begin to narrow the focus to some extent in the years of middle childhood. At best, the child will then have already begun to gain needed expertise for later life. At the very least, he or she will at least have had the experience of gaining some competence and monitoring that process.

How should one go about choosing these areas? In a pluralistic and democratic society, the choice must be that of the child and the family, making use of whatever evidence and advice they care to secure from other sources. I believe that reasonable assessments of a child's strengths can already be made in middle childhood and that, therefore, the matching of child and discipline can be informed. It is possible, however, that even when these couplings are made at random, the results need not be unhappy. My observation in China, where such early matching is made in a relatively unsystematic manner, is that children become quite attached to those areas to which their attention has been directed and in which their skills have been assiduously cultivated.

Talk of the need to find some areas of specialization and the desirability of attaining clear skills through apprenticeships in these areas runs the risk of suggesting that this need be a serious and even painful experience. However, specialization need not resemble a diet of castor oil at all. An inspired teacher, a lively curriculum, a sympathetic mentor, a congenial group of peers can make the early stages of mastery a wonderful and enjoyable experience. In fact, I would urge that at the beginning of any specialization, there needs to be a period of relatively unstructured exploration, during which the possibilities of the medium or symbol system are widely sampled. More constrained training thereafter can build upon this initial survey and can be united with it as the incipient master begins to handle the medium in a more personal and more assured way.

There is never a need to suggest a single right answer or a prescribed way to do things. Indeed, just because children at this age are likely to make these erroneous assumptions, it is important for their elders to stress a plurality of approaches and responses.

In contrast to the realm of the "middle-aged" child, the world of the adolescent bursts open in at least three directions. It becomes *wider*–the youth's arena is now the larger society, even the world, and not merely the family or the local community. It becomes *higher*–the youth is capable of more abstract forms of reasoning, of speculation, and of dealing with the hypothetical and the theoretical. It also becomes *deeper*—the youth probes more insistently into his or her own life, dealing with personal feelings, fears, and aspirations in a much fuller way than a few years before.

While Piaget's characterization of "formal operational" thought is no longer accepted in its original form, it is still useful to think of the adolescent as one who can deal comfortably with whole systems of thought. The preadolescent is interested in facts, rules, and "sheer" skills, whereas the adolescent in our culture becomes more involved with values, with wide-reaching principles, with pregnant exceptions, and with the legitimacy of uses to which skills are put. The adolescent becomes newly concerned with the relations among different bodies of knowledge, different points of view, and different fields in which individuals can become productive. He or she tries to relate these issues to personal concerns–the emerging sense of identity and decisions about career, schooling, and personal relationships, including those with individuals of the other sex and of quite different backgrounds.

In our culture, adolescence is a time of "higher school"–high school and college. In many pockets of the world, developed as well as underdeveloped, this period is thought of as a time for increased specialization. In my view, this trend is ill-timed and unfortunate from a developmental perspective. Since people of this age are defining themselves with reference to a wider arena, I think it is particularly important that they remain (or become) exposed to a broad range of topics, themes, subject matter, value systems, and the like, and that they be encouraged to engage in thinking that spans these topics.

Thus, in contrast to the years of middle childhood, and also in opposition to educational practices in many places, there should be a shift of emphasis toward more comprehensive knowledge during the ages fourteen to twenty-one. In old-fashioned terms, this would be viewed as a call for the liberal arts, but defined in such a way as to include scientific and technological subjects as well as the classics and the humanities. It is also a call for the inclusion within the curriculum of a consideration of ethical issues, current events, and communal and global problems. It recommends student involvement in rich and multifaceted projects, which encourages them to sample widely and to make diverse connections.

Of course, whatever constraints applied to middle childhood do not mysteriously disappear in adolescence. If it is not possible in the years from seven to fourteen to survey the universe, it is obviously equally impossible to do so in the succeeding seven-year period. Nonetheless, I still call for a more catholic emphasis at this time, for three reasons: (1) such a broadening of curricula and concerns is consistent with the youth's own information-processing propensities at this life stage; (2) it is desirable that every growing individual in the world have at least a modicum of exposure to the principal disciplines and concerns of our planet; and (3) youths in this phase are far more willing to transcend boundaries and to risk interdisciplinary thinking.

Nearly all educators are wrestling with the problem of just how to ensure such exposure. They search for shortcuts: core curricula, major and minor subjects, courses that convey concepts or ways of thinking rather than attempting to provide all information from the ground up. Some go so far as to recommend a definite list of facts and terms that everyone who would be educated needs to know.

Even if I had arrived at one, there would be no room here to introduce the universal curriculum for adolescence. Nor do I feel that every student needs to study every subject or the same set of subjects as a matter of course. Rather, what I want to urge is that the third seven-year period of life, like the first years of life, be a time when relatively wide-ranging exploration is encouraged and narrow specialization is put aside or suspended, at least for most students, and that activities that synthesize, draw connections, or link school knowledge to extrascholastic concerns be encouraged and even mandated.

To this point, I have introduced understanding as the proper goal for education, outlined the kinds of performances of understanding for which one might strive, and indicated certain curricular options that one might adopt. It should be clear that most classrooms in the United States and abroad are not currently set up so as to encourage, let alone achieve, such an education. If anything, the insistence on having twenty to fifty students in a classroom, seated at desks while the teacher lectures, and moving arbitrarily from one subject to another at preordained timed intervals, makes the achievement of an education for understanding virtually impossible.

There is, alas, no formula for achieving understanding–though there may well be numerous formulas for thwarting it! However, important clues for a more effective education do exist in two institutions about which something is known: one the very ancient institution of the apprentice-

ship, the other the very modern one of the children's museum.

Imagine an educational environment in which youngsters at the age of seven or eight, in addition to–or perhaps instead of–attending a formal school, have the opportunity to enroll in a children's museum, a science museum, or some kind of discovery center or exploratorium. As part of this educational scene, adults are present who actually practice the disciplines or crafts represented by the various exhibitions. Computer programmers are working in the technology center, zookeepers and zoologists are tending the animals, workers from a bicycle factory assemble bicycles in front of the children's eyes, and a Japanese mother prepares a meal and carries out a tea ceremony in the Japanese house. Even the designers and the mounters of the exhibitions ply their trade directly in front of the observing students.

During the course of their schooling, youngsters enter into separate apprenticeships with a number of these adults. Each apprentice group consists of students of different ages and varying degrees of expertise in the domain or discipline. As part of the apprenticeship, the child is drawn into the use of various literacies–numerical and computer languages when enrolled with the computer programmer, the Japanese language in interacting with the Japanese family, the reading of manuals with the bicycle workers, the preparation of wall labels with the designers of the exhibition. The student's apprenticeships deliberately encompass a range of pursuits, including artistic activities, activities requiring exercise and dexterity, and activities of a more scholarly bent. In the aggregate, these activities incorporate the basic literacies required in the culture–reading and writing in the dominant language or languages, mathematical and computational operations, and skill in the notations drawn on in the various vocational or avocational pursuits.

Most of the learning and most of the assessment are done cooperatively; that is, students work together on projects that typically require a team of people having different degrees of and complementary kinds of skills. Thus, the team assembling the bicycle might consist of half a dozen youngsters, whose tasks range from locating and fitting together parts to inspecting the newly assembled systems to revising a manual or preparing advertising copy. The assessment of learning also assumes a variety of forms, ranging from the student's monitoring her own learning by keeping a journal to the "test of the street"–does the bicycle actually operate satisfactorily, and does it find any buyers? Because the older people on the team, or "coaches," are skilled professionals who see themselves as training future members of their trade, the reasons for activities are clear, the standards are high, and satisfaction flows from a job well done. And because the students are enrolled from the first in a meaningful and challenging activity, they come to feel a genuine stake in the outcome of their (and their peers') efforts.

A reader's first thought on the possibility of youngsters attending such an intensive museum program rather than or in addition to the public school may be disbelief. The connotations of the two types of institution could scarcely be more different. "Museum" means an occasional, casual, entertaining, enjoyable outing; as Frank Oppenheimer, founder of San Francisco's Exploratorium, was fond of commenting, "No one flunks museum." "School," in contrast, connotes a serious, regular, formal, deliberately decontextualized institution. Would we not be consigning students to ruination if we enrolled them in museums instead of schools?

I believe we would be doing precisely the opposite. Attendance in most schools today does risk ruining the children. Whatever significance schooling might once have held for the majority of youngsters in our society, it no longer holds significance for many of them. Most students (and, for that matter, many parents and teachers) cannot provide compelling reasons for attending school.

The reasons cannot be discerned within the school experience, nor is there faith that what is acquired in school will actually be utilized in the future. Try to justify the quadratic equation or the Napoleonic wars to an inner-city high-school student or his parents! The real world appears elsewhere: in the media, in the marketplace, and all too frequently in the demimonde of drugs, violence, and crime. Much if not most of what happens in schools happens because that is the way it was done in earlier generations, not because we have a convincing rationale for maintaining it today. The often-heard statement that school is basically custodial rather than educational harbors more than a grain of truth.

Certainly there are exemplary schools, and just as certainly there are poorly designed and poorly run museums. Yet as institutions, schools have become increasingly anachronistic, while museums have retained the potential to engage students, to teach them, to stimulate their understanding, and, most important, to help them assume responsibility for their own future learning.

Such a dramatic reversal of institutional significance has come about for two complementary sets of reasons. On the one hand, youngsters live in a time of unparalleled excitement, where even the less privileged are exposed daily to attractive media and technologies, ranging from video games to space exploration, from high-speed transportation to direct and immediate means of communication. In many cases, these media can be used to create compelling products. Activities that might once have engaged youngsters–reading in classrooms or hearing teachers lecture about remote subjects–seem hopelessly tepid and unmotivating to most of them. On the other hand, science museums and children's museums have become the loci for exhibitions, activities, and role models drawn precisely from those domains that do engage youngsters; their customary wares represent the kinds of vocations, skills, and aspirations that legitimately animate and motivate students.

I have documented some of the difficulties exhibited by youngsters in coming to understand the topics of school. It is of course possible that, even if one cannot flunk museum, one might fail to appreciate the meanings and implications of exhibitions encountered there. Indeed, I suspect such non- or miscomprehension often happens on "one-shot" visits to museums. An active and sustained participation in an apprenticeship, however, offers a far greater opportunity for understanding. In such long-term relationships, novices have the opportunity to witness on a daily basis the reasons for various skills, procedures, concepts, and symbolic and notational systems. They observe competent adults moving readily and naturally from one external or internal way of representing knowledge to another. They experience firsthand the consequences of a misguided or misconceived analysis, even as they gain pleasure when a well-thought-out procedure works properly. They undergo a transition from a situation in which much of what they do is based on adult models to one in which they are trying out their own approaches, perhaps with some support or criticism from the master. They can discuss alternatives with more accomplished peers, just as they can provide assistance to peers who have recently joined the team. All these options, it seems to me, guide the student toward that state of enablement–exhibiting the capacity to use skills and concepts in an appropriate way–that is the hallmark of an emerging understanding.

If we are to configure an education for understanding, suited for the students of today and for the world of tomorrow, we need to take the lessons of the museum and the relationship of the apprenticeship extremely seriously. Not, perhaps, to convert each school into a museum, nor each teacher into a master, but rather to think of the ways in which the strengths of a museum atmosphere, of apprenticeship learning, and of engaging projects can pervade all educational environments from home to school to workplace. The evocativeness and open-

endedness of the children's museum needs to be wedded to the structure, rigor, and discipline of an apprenticeship. The basic features I have just listed may assume a central place in educational environments that span the gamut of ages from preschool through retirement and the full range of disciplines.

Making It Happen: Teachers and Students

The setting of standards, the delineation of credible curricula, and the creation of supportive environments are all important components of an education for understanding. In the end, however, effective education depends upon the quality and commitment of the personnel who are involved on a daily basis.

To assent to an education dedicated to understanding is one thing, to be able to achieve it quite another. Such an undertaking would constitute an enormous challenge for American teachers, who for the most part have been forced to settle for "coverage" rather than for "uncoverage" and whose own teaching performances have been evaluated either on purely technical grounds (paperwork properly filled out) or on the scores attained by students on externally mandated measures of dubious quality.

Teachers must be encouraged–I almost wrote "freed"–to pursue an education that strives for depth of understanding, and to assess students in terms of relevant performances. But encouragement is not enough. Most teachers would not be able on their own to implement such curricula and assessments and, to my knowledge, only a handful of effective models are currently available. A major challenge in the United States in the years ahead is to create schools and school systems where education for understanding is in fact carried out, and where performances of understanding are sought and assessed. Only in such an altered milieu will it be possible for teachers and other members of the community to see what such a radically different education might be like.

This is not the place to list candidate sites that educate for understanding. But it is worth noting that several national organizations are currently dedicated to developing distinctly different kinds of school, resembling the model outlined here. Perhaps the foremost effort is the Coalition of Essential Schools, directed by Theodore Sizer of Brown University. Worthy of mention as well are James Comer's School Development Program, Henry Levin's Accelerated Learning Schools, and the "key schools" and "master teachers" identified by the National Education Association, the American Federation of Teachers, the Nabisco RJR model schools, and the "break-the-mold" design teams identified by the New American Schools Development Corporation.

To complement the further development of such schools, it makes sense to constitute a National Faculty of Master Teachers: individuals who have worked in such schools; who themselves embody the skills of educating for understanding and assessing student performances of understanding in an appropriate way, and who have the additional desire and ability to help teaching candidates who wish to become familiar with new approaches to education. Master teachers knowledgeable about individual differences and individual approaches to learning ought to become members of such a faculty as well.

Researchers, such as the members of our group at Project Zero, can be of distinct help in these processes of modeling. We have identified some of the steps through which schools customarily pass as they attempt to adopt a program directed at understanding; we have also monitored their progress as they seek to institute specific practices, such as the collection and evaluation of portfolios or processfolios and the design of curricula directed toward students with dif-

ferent learning approaches. Every school needs to pass through some such developmental process, but there is no need for every school to start from scratch. Familiarity with the map of change–its opportunities, its forks, its roadblocks—can be of signal help.

In a book devoted to educational implications of MI theory, it may seem odd to have paid so little heed in this chapter to the different human faculties and different intellectual strengths exhibited by students. This omission has in fact been deliberate. I believe that, in laying out educational goals and processes, we need to acknowledge the common links among students and the kinds of expectations that we may properly hold with respect to their collective accomplishments.

But it is now time to repair this omission. The preceding chapters have provided ample evidence of the fact that individuals learn in different ways and display different intellectual configurations and proclivities. Certainly, we would dismantle the entire edifice of MI theory if we were to bypass these differences and to insist on teaching all students the same contents in the same way.

At first consideration, it may seem that the fact of multiple intelligences renders the already formidable task of education even more difficult. After all, it would be highly desirable if all individuals did in fact exhibit pretty much the same faculties and learn in pretty much the same way. And, indeed, for a teacher faced with perhaps thirty students a class, and four or five classes a day, the prospect of individualizing education may appear daunting indeed. Since such individual differences do exist, however, and since a person's own particular intellectual configuration will necessarily color her trajectory and accomplishments throughout her life, it is a disservice to ignore these conditions.

So long as one tries to cover a huge amount of material in school, an education nuanced in the light of multiple intelligences becomes virtually impossible. But once one determines to teach for understanding, to probe topics in depth over a significant period of time, then the existence of individual differences can actually be an ally.

My research has suggested that any rich, nourishing topic–any concept worth teaching–can be approached in at least five different ways that, roughly speaking, map onto the multiple intelligences. We might think of the topic as a room with at least five doors or entry points into it. Students vary as to which entry point is most appropriate for them and which routes are most comfortable to follow once they have gained initial access to the room. Awareness of these entry points can help the teacher introduce new materials in ways in which they can be easily grasped by a range of students; then, as students explore other entry points, they have the chance to develop those multiple perspectives that are the best antidote to stereotypical thinking.

Let us look at these five entry points one by one, considering how each one might be used in approaching topics or concepts, one in the natural sciences (evolution) and one in the social sciences (democracy).

In using a *narrational entry point,* one presents a story or narrative about the concept in question. In the case of evolution, one might trace the course of a single branch of the evolutionary tree, or perhaps even the generations of a specific organism. In the case of democracy, one would tell the story of its beginnings in ancient Greece or, perhaps, of the origins of constitutional government in the United States.

In using a *logical-quantitative entry point,* one approaches the concept by invoking numerical considerations or deductive reasoning processes. Evolution could be approached by studying the incidence of different species in different parts of the world or in different geophysical epochs; or one might review the arguments for and against a particular claim about evolution-

ary processes. In the case of democracy, one could look at congressional voting patterns over time or the arguments used for and against democracy by the Founding Fathers.

A *foundational entry point* examines the philosophical and terminological facets of the concept. This tack proves appropriate for people who like to pose fundamental questions, of the sort that one associates with young children and with philosophers rather than with more practical (or more "middle-aged") spirits. A foundational approach to evolution might consider the difference between evolution and revolution, the reasons that we look for origins and changes, the epistemological status of teleology and finality. A foundational approach to democracy would ponder the root meaning of the word, the relationship of democracy to other forms of decision making and government, and the reasons that one might adopt a democratic rather than an oligarchic approach. The philosopher Matthew Lipman has developed engaging materials for introducing such a foundational approach to youngsters in middle childhood.

We shift gears quite sharply in considering an *esthetic approach. Here* the emphasis falls on sensory or surface features that will appeal to–or at least capture the attention of–students who favor an artistic stance to the experiences of living. In the case of evolution the examination of the structure of different evolutionary trees, or the study of the shifting morphology of organisms over time, might activate the esthetic sensitivity. With reference to democracy, one intriguing approach would be to listen to musical ensembles that are characterized either by group playing or by playing under the control of a single individual–the string quartet versus the orchestra. Another, less exotic tack might be to consider various forms of balance or imbalance as they are epitomized in different voting blocs.

The final entry point is an *experiential approach.* Some students–old as well as young–learn best with a hands-on approach, dealing directly with the materials that embody or convey the concept. Those bent on mastering concepts of evolution might breed numerous generations of Drosophila and observe the mutations that take place. Those in the social studies class might actually constitute groups that have to make decisions in accordance with various governmental processes, observing the pros and cons of democracy as compared with other, more "top-down" forms of government.

In one definition, a skilled teacher is a person who can open a number of different windows on the same concept. In our example, rather than presenting evolution and democracy only by definition, or only by example, or only in terms of quantitative considerations, such a teacher would make available several entry points over time. An effective teacher functions as a "student-curriculum broker," ever vigilant for educational prosthetics–texts, films, software that can help convey the relevant contents, in as engaging and effective a way as possible, to students who exhibit a characteristic learning mode.

It should be evident that use of multiple entry points can be a powerful means of dealing with student misconceptions, biases, and stereotypes. So long as one takes only a single perspective or tack on a concept or problem, it is virtually certain that students will understand that concept in only the most limited and rigid fashion. Conversely, the adoption of a family of stances toward a phenomenon encourages the student to come to know that phenomenon in more than one way, to develop multiple representations and seek to relate these representations to one another.

This review suggests that, even in cases where one wishes to have a core curriculum mastered by all students, it is possible to craft an educational regimen that exploits the existence of multiple intelligences. Education needs to transcend common knowledge, however. Important as it is for

all students to know about the history and literature of their land, or about the major biological and physical principles that govern the world, it is at least as important for students to identify their strengths, to pursue areas where they are comfortable and in which they can expect to achieve a great deal.

My own observations suggest that rarely in life are the fates of individuals determined by what they are unable to do. Their life trajectories are much more likely to be molded by the kinds of abilities and skills that they have developed, and these, in turn, are determined in significant measure by the profile of intelligences with which they have been endowed and/or that have been nurtured in early life. Many of the most creative individuals in human history have had significant learning problems: Thomas Edison, Winston Churchill, Pablo Picasso, even Albert Einstein come to mind. Far from being crippled by these difficulties, these individuals were able to build upon their strengths to make remarkable, and remarkably distinctive, contributions to their particular domain of achievement. Accordingly, those entrusted with education need to pay special attention to the strengths and the proclivities of youngsters under their charge.

It is probably no accident that my work came early to the attention of individuals involved with what one might call "special populations"–children who are gifted and talented, children who have learning difficulties, children who are exceptional or handicapped (or both) in one intellectual form or another. What characterizes these children is precisely the fact that they do *not* acquire the lessons of school in the ordinary way. And so those who teach these youngsters are faced with the choice of either writing them off or finding educational regimens and prosthetics that are effective. (Incidentally, this problem can be as acute with students who are highly gifted as with students who are considered disabled by current educational standards.)

MI theory can be of considerable help here. It not only supplies a categorical scheme and a set of definitions that are useful for diagnostic and training purposes, but may also actually suggest some steps that could be useful for students who exhibit one or another unusual learning pattern.

Take, for example, the case of children with dyslexia. In a significant number of cases, such children show enhanced facility with visual and/or spatial activities. These strengths can be mobilized to help students excel at vocations and avocations that exploit visual-spatial capacities; and at least sometimes, these strengths can be drawn on as ways of presenting linguistic materials. While I would scarcely recommend the imposition of a disability on any person, the experience of dealing with and overcoming a disability can itself become a great ally in dealing with subsequent challenges. Perhaps this is another reason that many individuals of singular accomplishment turn out to have been dyslexic, ranging from the inventor Thomas Edison to the politician Nelson Rockefeller.

Or take the case of an individual whose native language is not English. While it is often thought that education simply involves substituting one language for another, that view turns out to be an oversimplification. Different cultures and subcultures not only use languages in different *ways (for* example, one group stresses story-telling and fantasy; another highlights exposition in a truthful fashion; a third is terse and indirect); but language may also interact in different ways with other modes of communication, such as gesturing, singing, or demonstrating what one means. Sensitivity to multiple intelligences may help a teacher not only determine which modalities are most effective for the presentation of a new language but also how to make sure that the linguistic intelligence is interacting in optimal fashion with other intelligences that may participate in the communicative process.

Speaking more generally about students with learning problems, it is possible to use MI information in a number of ways. The most straightforward is simply to identify an area of strength–for example, through a Spectrum-style assessment instrument–and to give the child the opportunity to develop that strength. The child therefore can become skilled at endeavors that may have vocational or avocational linkages. Also, the feeling of self-esteem that accrues from a job well done may encourage the child to take up challenges that might previously have been intimidating.

Identification of strengths, however, can have a more integral effect upon educational achievement. Sometimes it is possible to use an area of strength as an "end point" to an area that has posed difficulties. For example, as suggested above, a child who is especially gifted with narratives may be introduced to difficult mathematical, musical, or scientific concepts through the comfortable vehicle of a story.

Most suggestively, structural affinities sometimes obtain between domains in which the child has talent and domains where the child appears to be impaired. For example, there are common numerical structures in mathematics and in music, and common spatial structures in geometry and in the arts. Provided that the "transfer" is attempted in a sensitive way, it may be possible for a child gifted in art or music to accomplish more in traditional subject matters by exploiting those structural analogues that exist across domains customarily thought to be disparate.

Even when executed indifferently, education is a very complicated process; and when it is done well, it turns out to be amazingly complex, intricate, and subtle. Simply to list all of the interest groups and concerns is to threaten to overwhelm our information-processing capacities: the teachers, students, parents, union leaders, school board members, administrators, opinion leaders and the general public; the texts, tests, curricula, guidelines, schedules, teaching procedures, syllabi, building, grounds, and supplies. And both lists could be extended!

In part III of this book, I have made no effort to hide this complexity. Beginning with the focus that my own work has placed on assessment, I have gradually broadened the net to include most of the above considerations and have at least hinted at some others. I have sought to provide some degree of focus by insisting on four elements: (1) the goal of an education that is geared to understanding; (2) a stress on the cultivation of performances of understanding, which can be assessed primarily in context; (3) a recognition of the existence of different individual strengths; and (4) a commitment to mobilize these productively in the education of each child. To orchestrate these different elements into a seamless educational regimen is no mean task, but there are promising signs abroad that progress can be made, and that we can secure an education that celebrates our common heritage as human beings, the particular cultural backgrounds from which we come, and the ways in which each of us stands out as an individual.

It has been clear, I hope, that the theory of multiple intelligences is not a static entity, that it has evolved and continues to evolve each year. In the final part of this book, I look more directly at the place of the theory within the history of efforts to conceptualize intelligence, and cast a glance as well at where it might be headed in the future.

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