brock
international prize in education

2015 Brock International Prize in Education Nominee

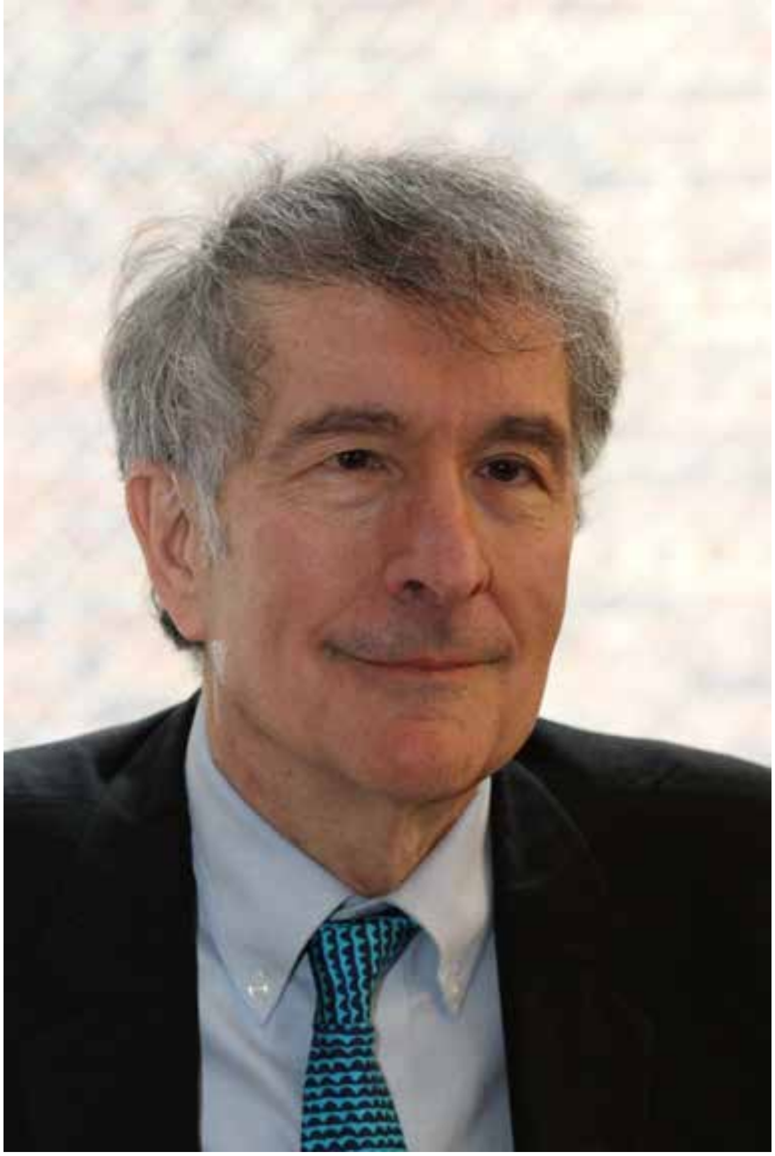
Howard Gardner

Nominated by Richard K. Miller

HOWARD E. GARDNER

John H. and Elisabeth A. Hobbs Professor of Cognition and Education

Harvard Graduate School of Education



Nominated by:

Richard K. Miller

Nomination of Professor Howard Gardner
for the
Brock International Prize in Education

September 1, 2014

by

Richard K. Miller
Juror

It is my privilege to nominate Professor Howard Gardner for the 2015 Brock International Prize in Education. I believe his research and thinking in psychology have profoundly changed the way we understand the nature of intelligence and subsequently changed the field of education in America and throughout the world.

In his 2014 book From the Ivory Tower to the Schoolhouse: How Scholarship Becomes Common Knowledge in Education, Jack Schneider presents four examples of revolutionary ideas in education that have broadly changed the field. Howard Gardner's theory of Multiple Intelligences (MI) is considered profoundly successful. In fact, Schneider reports that:

> *"Howard Gardner's theory of multiple intelligences has been a blockbuster in American education—what one set of backers called 'contemporary education's most popular idea.' A search of the federal government's Education Resource Information Center (ERIC), for instance, returns over twelve hundred articles on "multiple intelligences"—twice as many results as a search for 'Bloom's taxonomy,' and a few hundred more than a search for 'progressive education,' though not nearly as many as for 'state standards.' It is extensively, and positively, covered in textbooks for aspiring teachers…There are at least six schools in the United States named for Howard Gardner…the idea has taken hold in schools large and small, public and private, across disciplines, and at all grade levels… by 1996, there were already 50 books using multiple intelligences in the classroom. Today, there are hundreds."*

In the thirty years since he first published his research leading to the theory of Multiple Intelligences (MI), his ideas have been embraced and adopted on an enormous scale throughout the entire spectrum of education. For example, the consequences of MI theory in education have been recognized as so fundamental and pervasive that many K-12 schools have been founded based on these principles, in America, Europe, Asia, and elsewhere. In addition, several institutes devoted to the continued development and application of MI theory have been developed, including national and international conferences and widely distributed newsletters. MI theory has been embraced by theoreticians in many of the most prestigious universities in the world and business leaders have applied the theory to learning in the corporate world. For example, MI theory not only suggested the name but also provided theoretical foundations of the popular book Emotional Intelligence that was recognized by Harvard Business Review and the New York Times several years later. In addition, Professor Gardner has been recognized for this work by many other awards, including a MacArthur Fellowship, widely recognized as a "genius grant" for creativity and extraordinary potential impact.

Professor Gardner's research on MI theory has been translated into many other languages, and is strongly embraced internationally. It has influenced the most respected educational researchers and program developers in Europe, Asia, and many other locations.

On a personal level, Gardner's MI theory was deeply influential in the design and implementation of the Franklin W. Olin College of Engineering in Massachusetts, where I serve as the President (and first employee). Our challenge is to create exemplary engineering innovators, and MI theory provides the framework that we have used from the beginning in approaching the question of whether the profession has been attracting the right people into engineering schools in the first place. At most colleges of engineering, admission is based almost exclusively on standardized test scores and grades in math and science courses, rather than on creativity and the ability to design and create new things. MI theory provides the foundation for our unique "Candidates' Weekend" admission interview program that assesses candidates' abilities to work together in teams, create new solutions to complex problems under pressure, and to express passion, empathy and personal vision in a compelling way.

In addition, my younger daughter recently taught 5th and 6th grade in a public school in the Boston area that has based its entire curriculum on MI theory. This is one of many such schools around the world now.

Gardner's original research on intelligence was published in 1983 in a book called Frames of Mind. As I understand it, he was interested at the time in exploring the validity of the widely held belief in the concept of intelligence as measured by IQ tests. However, as his research unfolded, he uncovered evidence that undermined this belief. Through examination of evidence based on studies available at the time (including his own pioneering work in neuropsychology) of the mental abilities of people under widely varying conditions ranging from brain damage arising in unfortunate accidents, to savants with extraordinary abilities, to talented and gifted students at various stages of cognitive development, he concluded that the brain has multiple intelligences that form a complementary array of abilities in most people. He speculated, and subsequently others have confirmed, that an IQ score does not have significant predictive ability when considering an individual's future career success and even less value in indicating the individual's ability to effect personal relationships. Instead, the abilities that we associate with the IQ test are aligned best with his description of "mathematical intelligence" and with "linguistic intelligence." These forms of intelligence depend on a high level of skill in manipulating symbolic representations of the world using words and numbers by following the rules of formal logic in the prefrontal cortex. In fact, the deliberate focus of most formal educational programs around the world since the industrial revolution—at all levels from K-12 through advanced university research—has been based on efforts to enhance these forms of intelligence.

By omission, this focus has—for centuries—ignored the existence and critical importance of other forms of intelligence, such as those most associated with creativity and personal expression (musical intelligence, spatial intelligence, and bodily kinesthetic intelligence) and of those associated with leadership, persuasion, and empathy in working with others (interpersonal and intrapersonal intelligence). Gardner not only showed that these other forms of intelligence exist, and that they are important in future success in both careers and in personal relationships, but also that they often involve other portions of the brain in doing so. Furthermore, in most people, these different forms of intelligence are largely independent from one another, so the correlation between, for example, high mathematical intelligence and high interpersonal intelligence is not usually high. Therefore, college graduates with high GPAs in analytical subjects should not be expected to have more than average ability in activities that do not depend fundamentally on symbolic reasoning.

Since the publication of his pioneering work, these findings have been confirmed by other researchers, particularly those working in the field of education. Within the field of psychology, the findings were so disruptive that there remains a sizeable percentage of respected psychologists who have been hesitant to embrace MI theory, but this is to be expected when a revolution is underway. (For example, when the theory of continental drift was first introduced in geology, many of the key researchers in the field were slow to embrace it, too.)

Gardner's findings clearly change our basic understanding of how the brain works and what intelligence and education mean. This broadened new understanding provides an explanation for many important dilemmas in education—and hope for many students that struggle with symbolic reasoning but excel in many other ways. (For example, a disproportionate number of corporate CEOs are handicapped with dyslexia, yet they have been extraordinarily successful leaders.)

Gardner has been nominated for the Brock Prize before, but was not selected. He was among the many that were considered "second place". A copy of his prior nomination is attached as an appendix to this year's nomination. It contains examples of his written work about MI theory and his more recent research on

Good Work and on ethics. He is a prolific author and many of his more recent contributions may also one day have a profound effect on other fields. However, the evidence for the global impact on education of MI theory is extensive and compelling. Now is the time to recognize this singular contribution.

In my opinion, the Brock Prize should be reserved for contributions like Gardner's that are proven to have a profound effect on the entire field of education. The influence of MI theory has spread and grown over thirty years, influencing educators at all levels, from individual classroom teachers to university researchers to educational innovators who design and build new schools and centers. There are many, many creative and influential educators who deserve to be recognized and rewarded but Gardner's discovery of Multiple Intelligences stands out for its widespread and profound influence throughout the entire field of education and for the unmistakable evidence of its international impact at this point in time. It has had as much influence abroad as it has within the U.S., clearly demonstrating the international significance of the contribution. To me, this nomination is a near perfect fit for the Brock Prize. Furthermore, inclusion of Professor Gardner on the list of Brock Prize recipients would add as much credibility and respect for the prize among those familiar with the international field of education as it would for Gardner. I think it is time to recognize Gardner with this high honor.

To support the claims in this nomination, I provide here 19 letters from 19 very different truly exceptional experts throughout the world. Some of these referees have received the Brock Prize already, and all of them are extraordinary and highly visible and respected in the field. I strongly encourage you to read the biography of each of the referees before your read their letters. The mere fact these many extraordinary leaders were willing to respond to my request for support for this nomination is in itself a strong indication of the respect he has gained and the impact his MI theory has had. They come from the ranks of teachers in K-12, school administrators, university researchers and leaders, internationally known authors and consultants, museum directors, educational innovators who have established new schools and educational centers, and physicians, psychologists, educators, journalists and business consultants. While many potential Brock Prize nominees have developed important new ideas that have the potential to change the field one day, few can provide such comprehensive and strong evidence of certain impact throughout the world and throughout the broad spectrum of education.

Regarding these letters, I would like to describe the process that is used for selection of members of the National Academy of Science, National Academy of Engineering, and the Institute of Medicine. These are among the highest professional honors available to those working in these professional fields. To become a member of these prestigious academies, a candidate must be nominated by a current member for a specific contribution that has changed the field in profound and respected ways. The nature of the contribution is described in a short letter, not unlike this one. Supporting evidence is provided in the form of strong letters of endorsement from members of the Academy that are familiar with the work. Successful nominations normally include no more than 5 such letters. However, this nomination of Professor Gardner for the Brock Prize contains 19 letters from experts with truly exceptional qualifications that are not only familiar with the field but also with Gardner's specific contributions. This is the strongest form of nomination I know of in making such a nomination.

I look forward to our meeting in a few weeks to answer questions and consider alternatives among the candidates.

Respectfully,

Richard K. Miller, Ph.D.
President (and first employee)
Franklin W. Olin College of Engineering
Olin Way
Needham, MA 02492

Howard E. Gardner Nomination

Alphabetized List of Referees

Jerome Bruner
New York University

Jie-Qi Chen
Erikson Institute

Guy Claxton
University of Winchester

James Comer
Yale University School of Medicine

Elliot Eisner
Stanford University

David Henry Feldman
Tufts University

Daniel Goleman
Author, Rutgers university

Patricia Graham
Harvard University

Thomas Hoerr
New City School

Masao Kamijo
Japan MI Society

Hans Henrik Knoop
University of Aarhus

Mindy Kornhaber
Pennsylvania State University

Chris Kunkel
Rhode Island College

Ann Lewin-Benham
Capital Children's Museum

Kathleen McCartney
Harvard university

Michael S. McPherson
Spencer Foundation

Carlina Rinaldi
Fondazione Reggio Children
Centro Loris Malaguzzi

Zhilong Shen
Multiple intelligences Institute

Margot Strom
Facing History and Ourselves

Jerome Bruner

Jerome Bruner was a leader of the Cognitive Revolution that ended the reign of behaviorism in American psychological research and put cognition at the center of the field. He received his Ph.D. from Harvard in 1941, and returned to lecture at Harvard in 1945, after serving in the U.S. Army's Intelligence Corps. By 1952 Bruner was a full Professor the Department of Social Relations. In 1960 he co-founded the interdisciplinary, iconoclastic Center for Cognitive Studies at Harvard, serving with George Miller as co-director, until he departed the university in 1972 to take a position at Oxford University.

In the course of his three decades at Harvard, Bruner published works on perceptual organization, cognition, and learning theory, all of which departed dramatically from the deliberate mind-blindness of behaviorism, by emphasizing the importance of strategies and mental representations in the processing of real-world phenomena. His seminal 1956 book, A Study of Thinking (co-written with Jacqueline Goodnow and George Austin), reported results from a series of studies investigating concept formation. Bruner et al.'s concept formation tasks have been used in countless studies by subsequent researchers. Equally influential were Bruner's investigations of children's cognitive development. He proposed a 3-tiered system of internal representations: enactive (action-based), iconic (image-based), and symbolic (language-based).

Bruner also postulated that internal representations could be combined to produce different types of thought. His theory differentiated between "narrative thought" (temporally/causally sequential, focused on details and action) and "paradigmatic thought"(mental categorization by recognizing abstract, systematic similarities of unrelated phenomena). Bruner's theory of cognitive development was distinct from other stage-based theories of cognition, as it held that even young children can learn difficult concepts with appropriate instructional support, and it readily lent itself to practical educational applications, which Bruner himself helped to design and implement.

Bruner's explorations of learning and cognitive development have changed the field, and his enthusiastic support of cross-disciplinary research fostered the work of many colleagues and students. According to his colleague Roger Brown, "Bruner had the gift of providing rare intellectual stimulus, but also the rarer gift of giving colleagues the sense that problems of great antiquity were on the verge of solution by the group there assembled that very afternoon."

Jerome Bruner is listed at number 28 on the American Psychological Association's list of the 100 most eminent psychologists of the 20th century.

From: Jerome S Bruner [jsb3@nyu.edu]

Sent: Sunday, July 15, 2012 5:18 PM

To: Richard K. Miller

Subject: Howard Gardner

Dear Richard Miller:

It gives me especial delight to nominate Howard Gardner for the 2013 Brook International Prize in Education. As you know, I have followed his work closely over the years, observed its impact, and been in close touch with him. Indeed, as you may know, he was a student of mine during his years of study at Harvard, and we have remained in touch over the years since.

I think Howard's pioneering work on "multiple intelligence" has transformed the study of education (and its practice as well) from a test-dominated and unidimensioal approach to "school performance" to a much broader view. We now take into account the various means by which intelligence expresses itself, and how these means interact with each other. He has given the educational world a much broader and more varied way way of looking at its mission.

And in more recent years, he has aided us all mightily by exploring how different cultures manage the multiple expression of multi--dimensional intelligence, their varied expression and interaction. I have been in close touch with him on this work and admire greatly what he has been doing.

It would be no exaggeration at all to characterize Howard Gardner's work as being at the leading edge of world efforts to undestand the process of education and its social-cultural setting. I strongly recommend him for the Brook Prize!

With best wishes.

Jerome Bruner

Jie-Qi Chen

Professor Jie-Qi Chen is principal investigator for Erikson's Early Mathematics Education Project. She is a Fulbright Senior Specialist and an applied child development specialist whose work focuses on cognitive development, multiple intelligences theory, classroom assessment, early mathematics education, and school-based intervention. Dr. Chen contributed the multiple intelligences entries for *The Encyclopedia of Education* (2nd ed., 2002) and for *The International Encyclopedia of Early Childhood Education* (2007).

Dr. Chen started her career teaching young children in early childhood classrooms in China and the United States. For more than 20 years she has contributed to teacher professional development efforts in Boston and Chicago Public Schools. She has also enriched assessment and curriculum development in Head Start programs.

Honors

Visiting Professor—Shanxi Teachers' University, Xian, China, 2010
Outstanding Teacher Educator Award—National Association of Early Childhood Teacher Educators, 2009
Zijiang Scholar—East China Normal University, China, 2009-2010
The Winner of the Taylor and Francis Most Distinguished Journal of Early Childhood Teacher Education Article of 2006 Award, 2007
Senior Scholar Peer Reviewer—Fulbright Senior Specialist Program, 2006-2009
Senior Scholar—Fulbright Senior Specialist Program, 2002-2008
Excellent Teacher Award— Oversea Chinese Teaching Academy, 1999, 2001
Oversea Chinese Scholar Travel Award—Chun Hui Plan, Foreign Affairs of PRC, 1997, 2001
Dissertation Award—National Association of Early Childhood Teacher Educators, 1992
Fellowship—Jesse Smith Noyes Foundation, 1986-89

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Founded by Irving B. Harris

August 3, 2012

Board of the Brock International Prize in Education

Dear Esteemed Board Members:

It is my great honor to write a letter in support of Professor Howard Gardner's nomination for the Brock International Prize in Education. I have known Dr. Gardner since the late 1980'. I was his student at the Project Zero of Harvard Graduate School of Education. Over the last 20 years, I have worked with him on many projects, focusing particularly on his theory of multiple intelligences (MI) and its educational applications around the world.

Since its introduction in 1983, Gardner's MI theory has become a touchstone of education. Embracing a wide array of human talents that significantly contribute to our intellectual and cultural life, MI theory offers a broader definition of intelligence than is traditionally conceived in the notion of IQ. MI theory is not only an intelligence theory however; it is also a perspective on human development. Individual differences are a universal quality of humans. Responding to these differences is a prerequisite to fulfilling human potentials.

In the three decades since its inception, MI theory has been applied in diverse educational settings with a wide range of student populations. As a MI researcher and a Fulbright Senior Specialist in Education, I have experienced the power of MI theory when used to reform curriculum, lead to new definition of giftedness, encourage a different understanding of at-risk students, and promote alternative assessments of student learning. I have observed these innovations in many educational settings: American inner city schools, a shanty town school in Peru, a prestigious private school in Saudi Arabia, a program for indigenous residents in Taiwan, and an orphanage in Russia, to name a few. MI-inspired educational practices have made education meaningful and success-oriented. Gardner's work has changed the lives of many, many children and teachers in the United States and around the world.

MI theory speaks to the hearts of educators. It orients educators to the future by offering a new framework, stimulating new ideas, providing new perspectives, and leads to new ways of understanding children, teaching, and education. In 2012, with education constrained by a limited vision of success and by accountability that relies primarily on test scores, MI has a renewed significance. It calls our attention back to Gardner's basics: diversity, individuality, and multiple potentials for growth.

Many people aspire to achieve greatness in their work. Few actually do. Greatness is not a destination. Instead, it emerges as an individual's contributions prove transformative to a field. It is based not on one or two achievements, but on work that develops over the course of a lifetime. Howard Gardner is one of those rare individuals whose work has achieved greatness. MI theory is only one such example; equally applicable are his scholarly pursuits in the study of creativity and his commitment to further engagement, excellence, and social responsibility in the workplace. Dr. Gardner is a living legend, one of the most influential psychologists of our time. His greatness is the sustained expression of his creative vision, innovative power, enormous impact, and enduring contributions to the field.

Please let me know if I can provide further assistance in support of Professor Gardner’s nomination for this well-deserved Brock International Prize in Education.

Sincerely,

Jie-Qi Chen

Jie-Qi Chen, Ph.D.
Professor

Guy Claxton

After appointments at Oxford, the University of London Institute of Education, King's College London and Bristol, Guy Claxton is currently Research Director of the Centre for Real-World Learning, and Professor of the Learning Sciences, at the University of Winchester. He is a Fellow of the British Psychological Society and of the Royal Society of Arts, and an Academician of the Academy of Social Sciences. Guy holds degrees from Cambridge and Oxford in experimental psychology.

His contributions to psychology fall into three main areas: the learnability of practical intelligence, especially in educational contexts; historical and contemporary approaches to the unconscious; and the development of East-West psychology, bringing together scientific and Buddhist approaches to mind and self. A prolific author, Guy's most important books on the unconscious include *Hare Brain, Tortoise mind: Why Intelligence Increases When You Think Less* and *The Wayward Mind: An Intimate History of the Unconscious*. On East-West psychology, he has written *Noises from the Darkroom* and co-edited *Beyond Therapy* and *The Psychology of Awakening*. In education, Guy's books include *Wise Up: The Challenge of Lifelong Learning* (1999), *Building Learning Power* (2002), *What's The Point of School?* (2008) and (with Bill Lucas and others) *New Kinds of Smart: How the Science of Learnable Intelligence Is Changing Education* (2010) and *The Learning Powered School* (2011). His new book, *Intelligence in the Flesh: Why Bodies Are Smarter than Thought*, will be published in 2013.

Guy's educational program Building Learning Power (BLP) has evolved over 15 years into a provenly effective approach to teacher habit development and school culture change with a very specific intention: that of systematically developing students' confidence, capacity and appetite for learning within education and beyond. The approach has been widely influential across the UK, for example in Milton Keynes, the Isle of Man and the London Boroughs of Ealing, Barnet and Newham, and in countries as far afield as Poland, Switzerland, Dubai, Chile, Singapore, Australia and New Zealand.

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at the University of Winchester

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Prof Richard K Miller
Olin College
Olin Way
Needham
MA 02492-1200

August 6 2012

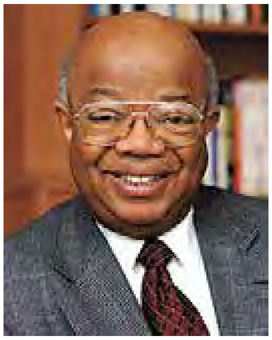
Dear Professor Miller

I write with reference to the nomination of Professor Howard Gardner for the Brock International Prize in Education, 2013.

Professor Gardner is without doubt the most influential educationalist of his generation. His theory of Multiple Intelligences has had a dramatic global influence on teachers' understanding of both the purposes and methods of education. The work of Project Zero at Harvard, of which Professor Gardner was co-founder and for many years co-director, has been a major source of rigorously researched, practical guidance for teachers at all levels of the educational system. And in a series of ground-breaking books – *The Unschooled Mind*, *Five Minds for the Future*, and most recently *Truth, Beauty and Goodness Reframed* – Gardner has continued to develop a blend of moral philosophy and cognitive science that has challenged and advanced thinking at the deepest level about the nature of intelligence, learning, creativity and their relevance to 21st century society. Gardner's Good Work project, pursued jointly with Csikszentmihalyi and Damon, has flushed our vital important if somewhat uncomfortable truths about attitudes to work in the contemporary world. And in an edited collection on *Creativity, Wisdom and Trusteeship* (which Gardner and I co-edited and authored), he has profound things to say about the confluence of cognition and ethics. Any one of these strands of scholarship would have merited international distinction. To find them all in the work of one man is utterly extraordinary. If anyone deserves the recognition that the Brock Prize so eminently confers, it is Professor Howard Gardner.

Yours sincerely

Guy Claxton MA(Cantab), DPhil(Oxon), AcSS, FBPsS, FRSA.
Professor of the Learning Sciences
University of Winchester, UK



James Comer

Dr. James P. Comer is the founder and chairman of the School Development Program at the Yale University School of Medicine's Child Study Center. Since 1976, he has been the Maurice Falk Professor of Child Psychiatry at the Yale School of Medicine. He developed the Comer Process – a system of education focused on child development in inner-city schools. His School Development Program has been utilized in more than 600 schools in eighty-two school districts across twenty-six states. Founded in 1968, the Comer School Development Program promotes the collaboration of parents, educators and community resources to improve social, emotional and academic outcomes for children, which in turn, helps them to achieve success in school.

Dr. Comer was born on September 25, 1934 in East Chicago, Indiana. After earning his A.B. degree from Indiana University, he went on to earn his M.D. from Howard University College of Medicine in 1960 and a M.P.H. from the University of Michigan School of Public Health in 1964. After completing his M.P.H., Comer completed his training at the Yale School of Medicine, the Yale Child Study Center and the Hillcrest Children's Center in Washington, D.C. He also participated in the military, completing his service in 1968 with the rank of Surgeon (Lt. Colonel) in the U.S. Public Health Service.

In addition to lecturing and consulting widely across the United States at colleges and universities, medical schools, scientific associations and public school districts, Dr. Comer has lectured, observed and discussed child care and school conditions and reform around the world, in places such as London, Paris, Tokyo, Dakar, Senegal and Sydney, Australia. A prolific writer, Comer has authored ten books including *Beyond Black and White* (1972); *Black Child Care* (with Dr. Alvin Poussaint, 1975); *Raising Black Children* (1992); *School Power: Implications of an Intervention Project* (1980); and most recently, *Leave No Child Behind: Preparing Today's Youth for Tomorrow's World* (2004). Between 1978 and 1994, Comer also wrote more than 150 articles for Parent's Magazine and more than 300 syndicated articles on children's health and development and race relations.

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August 13, 2012

Brock International Prize in Education
2120 S. Lewis, Suite 415
Tulsa, OK 74104

To Whom It May Concern:

I am writing in support of the nomination of Howard Gardner for the Brock International Prize in Education. I have been a colleague and friend of Howard's over the last thirty years. Over a five year period Howard and I met periodically and collaborated with the late Ted Sizer, then at Brown, and Janet Whitla of Education Development Center in a school improvement project entitled ATLAS in which our respective projects were combined and field tested in several school communities in different parts of the nation. Thus, I am very familiar with his work and thinking.

While his lifetime achievement in psychology, and to his own surprise, in education, has been remarkable, his best known work, expressed in his book, Frames of Mind, presents his *discovery of intelligences and learning processes* that broadened, probably forever, the concept of intelligence and challenged long standing understanding of how children learn. His original intent was to study the different ways that children and adults think and express themselves. But his findings provided many in the education and psychology communities who were skeptical about the limits of the traditional definition of intelligence with a framework that continues to greatly facilitate research, training and practice in education.

The importance of this work will not be fully appreciated until the neuroscience findings about brain functioning are fully applied to everyday education practice. I believe that this will lead to a greater focus on how the different intelligences he has described are simultaneously and inextricably linked to problem solving and multiple forms of self expression and to the centrality of child development. His work, while still challenged by the traditional focus on analytical thinking, has moved many in education to look at, think about, and promote the many ways of "being smart," and how they are interrelated.

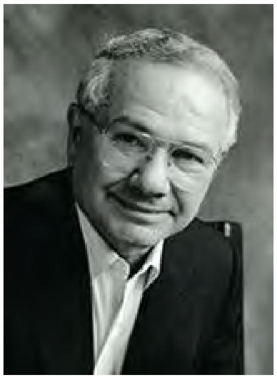
This work represents an extraordinary contribution to our understanding of learning processes and is worthy of the Brock International Prize in Education.

Thank you for this opportunity.

Sincerely yours,

James P. Comer, MD

James P. Comer, M.D.
Maurice Falk Professor
of Child Psychiatry
Yale Child Study Center
Associate Dean
Yale School of Medicine



Elliot Eisner

Elliot W. Eisner is the Lee L. Jacks Professor of Education and professor of art at Stanford University. He works in three fields: arts education, curriculum studies and qualitative research methods. He has been especially interested in advancing the role of the arts in American education and in using the arts as models for improving educational practice in other fields. Elliot is a fellow of the Royal Society of Art in the United Kingdom, the Royal Norwegian Society of Arts and Sciences, and in the United States, the National Academy of Education. He has served as president of the NAEA, the International Society for Education Through Art, the American Educational Research Association and the John Dewey Society.

He is the author or editor of 16 books addressing arts education topics, among them *Educating Artistic Vision*, *The Educational Imagination*, *The Enlightened Eye*, *Cognition and Curriculum*, *The Kind of Schools We Need* and, most recently, *The Arts and the Creation of Mind*. He has lectured on education throughout the world.

Elliot has received many prestigious awards for his work, among them a John Simon Guggenheim Fellowship, a Senior Fulbright Fellowship, the Jose Vasconcelos Award from the World Cultural Council, the Harold McGraw Prize in Education, the Brock International prize in Education and the Grawemeyer Award in Education from the University of Louisville. In addition, he has received six honorary doctorates from institutions around the world.

Elliot received his doctorate from the University of Chicago. He was trained as a painter at the School of the Art Institute of Chicago and studied design and art education at the Institute of Design at the Illinois Institute of Technology.

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August 10, 2012

Richard K. Miller, Ph.D.
President
Franklin W. Olin College of Engineering
Olin Way
Needham, MA 02492-1200

Dear President Miller,

I very much regret the confusion surrounding the application process for which Howard Gardner is to be a candidate. I hope that you will find this letter useful and consistent with your values for the Brock International Prize In Education. My thanks go to you and your colleagues for help in improving the quality of education in this country. If there is any assistance or information you need, I will try to provide it.

Howard Gardner has been a seminal figure in the field of education for the past 40 years. His contributions are numerous and have had powerful ramifications for the field. The concept of "Multiple Intelligences" is an innovation that opened the doors to much greater diversity in the practice of evaluation than existed prior to its arrival. When one thinks about intelligence as being uniform, one that has a very large "G factor," one tends to exclude the study of variables that do not fall under a highly differentiated cognitive model. Students whose form of intelligence is different than the mainstream tend to fall by the wayside in educational practice. Happily, Howard's work ameliorates such views. As Howard Gardner once said, "The question to ask about intelligence is not whether children are smart, but rather in what ways are children smart." Since it's introduction in the 1960's, the concept of "Multiple Intelligences" has been changing the way practitioners view students, as well as changing their teaching practices. This idea has made it possible for teachers to see possibilities for children that they could not see prior to the introduction of "Multiple Intelligences." More importantly, it has made a difference to the lives of children, who can now be recognized for their unique intelligence.

Another contribution of signal importance is the recognition that expressiveness in children's work is not a trivial accomplishment, but something that gets at the heart of the marriage between feeling and knowing. His research looks at how children shape form to achieve an evocative rendition of the work itself.

Expressiveness is important because it allows the child to leave his or her thumbprint on the work. Howard taught us how expressive form works and what might be done to promote it even further. Promoting expressiveness acknowledges what is distinctive in an educational environment, an environment that often pushes toward uniformity. Democratic societies must achieve a balance between the press toward formalized expectations that are uniform and aims and objectives that promote innovation, discovery and surprise. That is a mighty powerful set of aspirations. I believe that the aspirations that Howard has offered us are ones we are in the process of reaching. The field of education is indebted to him for setting forth this path of inquiry and exploration.

Seldom does one encounter scholars with such breadth and scope and sensitivity to nuance. We are fortunate to have had Howard Gardner share his views of what education entails as it has helped us set a common agenda for the future.

Sincerely,

Elliot Eisner

Elliot W. Eisner
Professor of Education, Emeritus
Stanford University

David Henry Feldman

David Henry Feldman has been intrigued with understanding creativity and giftedness and cognitive development throughout his entire professional career. He has spent a great deal of time exploring child prodigies, has directed a project looking at these prodigies; and, has published extensively on these subjects, including the publication of his book entitled: *Nature's Gambit.*

Feldman has been a contributing author in many edited volumes on the subject, including the book on *Creativity and Development*, co-authored with Keith Sawyer, Sternberg, Csikszentmihalyi, and others. He has pondered over the nature of creativity, average intelligence, giftedness, extreme giftedness and more. He has advised parents and teachers on how to teach talented children; and, written extensively on the topic. An interesting observation made by Dr. Feldman is that giftedness is not necessarily solely synonymous with traditional measures of IQ.

David Henry received his graduate degrees from, Stanford and Harvard University and his undergraduate degree from the University of Rochester. (In Child Development, Psychological Studies in Education, Psychology, Human Development, Social Studies Education and History).

Among his honors include: recipient of the Fulbright Fellowship, award for the Distinguished Scholar of the Year, and, award from the National Association of Gifted Children. Feldman has also participated in media events, such as appearances on NOVA, the Today Show, 48 Hours, PBS In Search of Mind, TV and Video series, and CNN's Future Watch. Feldman served as a member of the U.S. Department of Education's Panel on National Policy for Gifted Education.

Feldman currently serves on the national advisory board of the Institute for the Mind of the Child, Society for Research in Child Development, and the Cognitive Development Society. Past Board affiliations include: the Jean Piaget Society, Smithsonian Institution's National Committee for the Mozart Bicentennial, Social Science Research Council's Committee on Development, Giftedness and the Learning Process; The Advisory Board of "Arthur" at WGBH TV in Boston; the Study Group on School Reform for the Javits Program at the U.S, Department of Education, and more.

Feldman has served on a variety of editorial boards including: Behavioral and Brain Science, Child Development, Creativity Research Journal, the International Journal of Thinking Skills and Creativity, and more. Feldman has produced many books, journal articles and publications in the field of cognitive and developmental science, creativity and extreme giftedness.

Tufts
UNIVERSITY

SCHOOL OF ARTS AND SCIENCES

Eliot-Pearson Department of Child Development

August 6, 2012

Richard K. Miller, Ph.D.
President and Professor
Franklin W. Olin College of Engineering
Olin Way
Needham, MA 02492-1200

Dear Professor Miller:

It is an honor as well as a personal and professional pleasure to write this letter in support of the nomination of Professor Howard Gardner for **The Brock International Prize in Education**. Professor Gardner is one of my oldest and best friends and colleagues; we have known each other for nearly forty years, have collaborated on research and development projects, worked together on committees, and shared authorship on a number of articles, books, and reports. To say I know him well is an understatement.

Of perhaps more direct relevance to the award for which he is being nominated, I worked on the Van Leer Project at Harvard with Howard and his team in 1980 when he was gathering materials for what would become his landmark book Frames of Mind: The Theory of Multiple Intelligences. A year later Howard asked me to read the manuscript he had prepared for the book and I was astonished by it. I had worked on his research team and yet found myself stunned at the striking originality, innovative methodology and powerful theoretical framework that Howard was proposing. Even more surprising were the sections at the end of the book that drew clear and compelling policy implications for the field of education.

It would take a much longer letter than I should write to explain why Frames of Mind seemed to come out of the blue, but suffice it to say that I did not at the time think of Howard as someone interested in education; his training and background were (like my own) in basic cognitive development research and theory, and his sensibilities seemed very much those of the scholar, not someone who would boldly challenge decades of conventional wisdom about intelligence and how it has impacted educational beliefs and practices.

Although neither of us knew it at the time, Howard's work was to have profound and enduring influence on education. If anything, Howard is more surprised than his colleagues that the theory of multiple intelligences would catalyze some of the most significant changes in educational policy and practice that have ever occurred. In my own estimation, Howard' work on multiple intelligences has been the most important contribution to the "science and art of education" in a century, with ever growing impact and "long term benefit" for the field, as **The Brock International Prize in Education** states its purpose.

That Howard Gardner has done work of the quality and scope that the award seeks to honor seems to me beyond argument. What is perhaps not so obvious, but would make the award that much more meaningful, is that Howard has not changed since those days when he was a contract researcher without a secure position. He was modest and self-effacing then and he is now. Howard recently invited another old friend and colleague and I to share a meal and asked us, in all seriousness, if we thought any of our work would endure. My colleague and I almost simultaneously said that it was obvious that multiple intelligences would endure, but we were not at all sure of our own contributions. Howard was hardly more certain now than when he shared the unpublished manuscript that would become his most famous work.

I am sure that Howard, if he were to be honored with this prize, would be deeply pleased, not a little surprised, and humble in what it might mean about him. I'm sure he will see it as a wonderful affirmation of a joint effort that he was fortunate enough to lead, the result of timing and readiness in the educational community to embrace a more diverse, varied, and humane conception of human potential, and probably a bit of luck.

The Brock International Prize in Education expresses the highest aspirations for the field of education and recognizes those rare instances in which those aspirations have been met. Conferring the prize on Howard Gardner and his work on multiple intelligences would help further these aspirations as well as the generous spirit which inspired the creation of the prize itself.

Sincerely yours,

David Henry Feldman

David Henry Feldman, Ph.D., Professor

Daniel Goleman

Daniel Goleman is an internationally known psychologist who lectures frequently to professional groups, business audiences, and on college campuses. As a science journalist Goleman reported on the brain and behavioral sciences for *The New York Times* for many years. His 1995 book, *Emotional Intelligence* was on *The New York Times* bestseller list for a year-and-a-half, with more than 5,000,000 copies in print worldwide in 40 languages, and has been a best seller in many countries. Apart from his books on emotional intelligence, Goleman has written books on topics including self-deception, creativity, transparency, meditation, social and emotional learning, ecoliteracy and the ecological crisis.

The Harvard Business Review called emotional intelligence — which discounts IQ as the sole measure of one's abilities — "a revolutionary, paradigm-shattering idea" and chose his article "What Makes a Leader" as one of ten "must-read" articles from its pages. *Emotional Intelligence* was named one of the 25 "Most Influential Business Management Books" by *TIME Magazine.* The Financial Times, Wall Street Journal and Accenture Institute for Strategic Change have listed Goleman among the most influential business thinkers.

Goleman is a co-founder of the Collaborative for Academic, Social, and Emotional Learning (www.casel.org), originally at the Yale Child Studies Center and now at the University of Illinois at Chicago. CASEL's mission centers on bringing evidence-based programs in emotional literacy to schools worldwide. He currently co-directs the Consortium for Research on Emotional Intelligence in Organizations (www.eiconsortium.org) at Rutgers University. The consortium fosters research partnerships between academic scholars and practitioners on the role emotional intelligence plays in excellence.

Goleman is a board member of the Mind & Life Institute, which fosters dialogues and research collaborations among contemplative practitioners and scientists. Goleman has organized a series of intensive conversations between the Dalai Lama and scientists, which resulted in the books *Healthy Emotions,* and *Destructive Emotions.* He is currently editing a book from the most recent dialogue on ecology, interdependence, and ethics.

Goleman's work as a science journalist has been recognized with many awards, including the Washburn Award for science journalism, a Lifetime Career Award from the American Psychological Association, and he was made a Fellow of the American Association for the Advancement of Science in recognition of his communicating science to the general public.

Daniel Goleman, Ph.D.
30 South St.
Williamsburg, MA 01096

TO: Richard Miller

It is with great pleasure that I write to nominate Howard Gardner, Professor of Cognition and Education at the Harvard Graduate School of Education, for the Brock International Prize in Education. Howard Gardner is not only an unusually original thinker and world-class scientist, but perhaps more than any other living psychologist he has left a unique and innovative imprint on education.

His seminal work in this area, the 1983 book *Frames of Mind: The Theory of Multiple Intelligences,* has been immensely influential, both in the scholarly world and in the classroom. The book has been cited in more than 15,000 scholarly publications, marking it as one of the most important works in psychology of our times

Gardner argues convincingly, based on research in cognitive science, that children possess different kinds of minds, and so learn and understand best in unique ways rather than in a set format that caters to those with linguistic intelligence alone. By recognizing other domains of challenges and skills – such as musical, bodily, spatial, and interpersonal intelligences – we can better serve the broad spectrum of students and society as a whole.

My own book, *Emotional Intelligence,* could not have been written without Howard Gardner's foundational thinking and research. His profound insights into the range of ways different children learn, and the spectrum of abilities learning entails, opened the way for social/emotional learning, or SEL, which focuses on what he calls the "personal intelligences." A recent meta-analysis of SEL, based on data from 270,000 school children, shows this educational approach lowers anti-social behavior and raises prosocial actions by ten percent, and imporves academic achievement scores by 11 percent.

By expanding our notion of intelligence beyond linguistic and logical-mathematical to include spatial, bodily and musical, Gardner has also provided an intellectual foundation for defending the place of arts education in schools.

The world of education has been deeply enriched by Howard Gardner's thinking. We can consider lucky those children worldwide who have found themselves in schools built around Howard Gardner's theory of multiple intelligences.

Patricia Graham

Patricia Albjerg Graham became dean of the Harvard Graduate School of Education on July 1, 1982. She had previously directed Barnard College's Education Program and held faculty appointments at Indiana University, Northern Michigan University, and Columbia University's Teachers College. Graham joined the HGSE faculty and concurrently served as dean of the Radcliffe Institute for Independent Study, vice president for Institutional Planning for Radcliffe College, and vice president of Radcliffe College. She left these positions to become president of the National Institute of Education. She returned to Harvard in 1979, becoming the Charles Warren Professor of the History of American Education. In addition to her many accomplishments as dean, Graham's place in the historical annals of Harvard University will be secured by the fact that she was the first woman to be appointed dean of a Harvard faculty.

While research programs were always an integral part of HGSE during Graham's tenure, she re-established strong ties to public schools and brought a strong focus on education practice back to the curriculum. Graham attracted future practitioners to the School with programs such as the Undergraduate Teacher Education Program (UTEP), Urban Superintendents Program, and the MidCareer Math and Sciences Program.

UTEP offers the Harvard undergraduate the opportunity to simultaneously earn their bachelor's degree and educator licensure. The Urban Superintendents Program is a course of study for doctoral students interested in leading city public school systems. The MidCareer Math and Science Program is designed to draw professionals from technically oriented fields into careers as secondary science and mathematics teachers. With the renewed interest in teacher training, new partnerships were forged between HGSE and local school districts, thereby securing "fieldwork" sites for students in those programs.

During her tenure, new outreach programs were established and strengthened. Programs in Professional Education and the Principals' Center continued curriculum support to current practitioners. The *Harvard Education Letter* was established in 1985 as a means to reach K–12 educators. This newsletter became a concise source of information for new research and innovative practices. The years of Graham's administration also brought stability to the senior faculty as a ten year moratorium on granting tenure was lifted with nine new tenured appointments.

Graham resigned from the deanship in 1991, after which she served as president of the Spencer Foundation. Graham continued to teach at HGSE until 2006 when she retired as the Charles Warren Research Professor of the History of American Education, Emerita.

HARVARD
GRADUATE SCHOOL OF EDUCATION

August 8, 2012

Mr. Richard K. Miller

President and Professor

Olin College of Engineering

Olin Way

Needham, MA 02492-1200

Dear Rick:

I am writing to nominate Howard Gardner for the Brock International Prize in Education. Among living persons I know of no one whose work has had greater or more beneficial consequences for education than Gardner.

If I must select a single work of Gardner's, my choice would be Frames of Mind, initially published in 1983 and republished and excerpted many times after that. This book lays out what has subsequently been termed Gardner's Theory of Multiple Intelligences. Its essential argument is that intelligence is a much broader competence than usually recognized. It exists in several different areas, initially seven and now a few more. Gardner argues that we have not recognized several of these "intelligences" and have thus misunderstood and failed to understand talents that humans possess but often are neither cultivated nor developed nor appreciated. Gardner's most recent discussion of these ideas was in 2011 when as recipient of the Prince of Asturias Award, he lectured on "The Theory of Multiple Intelligences: As Psychology, As Education, As Social Science." Thus, for nearly thirty years Gardner has expanded, clarified, modified the basic ideas incorporated in Frames of Mind and has received widespread acceptance and recognition of these ideas.

This book, which built upon and extended earlier psychological research, transformed the way that teachers, eventually parents and now nearly everybody considers children and adults whose language facility might not be superb but whose inter-personal acuity or kinesthetic talent was extraordinary. These were all expressions of different "intelligences." Thus the options for one to excel were no longer limited to a narrow definition of IQ but embraced other realms of excellence. This was a transforming idea, particularly for educators, in the late twentieth century.

What is more remarkable about Howard Gardner than a single book, however, is how he has managed to find the insight and creative energy to build on the notion of "multiple intelligences" in his extensive publications since Frames of Mind. His subsequent research has explored "good works" and the varying

APPIAN WAY, CAMBRIDGE, MA 02138

settings in which they can occur and the talents that are necessary to facilitate them. The underlying argument, of course, is that intelligence alone does not guarantee "good works" but that many forms of intelligence can produce "good works." Another important by-product of his work on intelligence is his persistent and multi-faceted pursuit of the essence and diversity of creativity, again recognizing the many forms in which it may occur whether in Chinese art or in US business or as exemplified in the lives of such diverse figures as Mahatma Gandhi or Igor Stravinsky.

Finally, perhaps most impressive of all is Gardner's willingness to engage with individuals and institutions who attempt to apply his ideas in educational settings. Unlike many theorists, he has been willing to meet, visit, applaud, and – most importantly - argue with those who claim to be his followers. That is not easy work and most theorists resist it, but Gardner has not. In many ways clarifying his ideas when misunderstood by persons who want to use his name is one of Gardner's own examples of his "good works."

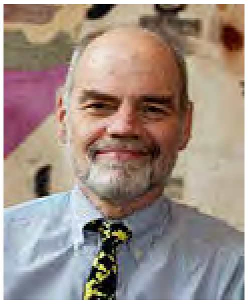
Should you need additional information about Howard Gardner, do not hesitate to be in touch with me.

Sincerely,

Pat Graham

Patricia Albjerg Graham

Charles Warren Professor of the History of Education Emerita



Thomas Hoerr

Thomas R. Hoerr, PhD, has been the Head of School at New City since 1981. Prior to coming to New City, Tom was the principal of Pershing Elementary School in the School District of University City. He also taught in two school districts, and worked as an intern in the St. Louis Public School's Division of Evaluation and Research. Tom founded and directed the Washington University Non-Profit Management Program and co-facilitated the ASCD Scholars Program.

Following the words of playwright Edward Albee, who said, “I write to find out what I am thinking,” Tom has written more than 90 articles and three books: *Becoming A Multiple Intelligences School* (ASCD Press, 2000), *The Art of School Leadership* (ASCD Press, 2005), and *School Leadership for the Future* (NAIS Press, 2009). He writes a monthly column, “The Principal Connection,” for *Educational Leadership*, one of the country’s premier educational publications.

Currently, Tom is facilitating the ISACS (Independent Schools Association of the Central States) New Heads Network. This program provides content, skills, and perspectives on school leadership and governance for new heads of ISACS Schools. He also facilitates the ASCD Multiple Intelligences Professional Interest Community, and publishes *Intelligence Connections*, an MI newsletter that is distributed ten times each year. *Intelligence Connections* features articles from educators around the world who share how MI can be used to help students learn.

NEW C!TY SCHOOL

July 9, 2012

Dr. Richard K. Miller
Franklin W. Olin College of Engineering
Olin Way
Needham, MA 02492-1200

Dear Dr. Miller:

I am delighted to endorse Howard Gardner's candidacy as a recipient of the Brock International Prize in Education. Few individuals have had more of an impact on how educators think and how children learn than Dr. Gardner.

Gardner is most known for his ground-breaking theory of multiple intelligences (MI), set out in his book, *Frames of Mind* (1983). Simply put, Gardner recognized the potential in each human being to learn and to achieve. He did this by observing how people learn, and using that information to think differently about intelligence. Viewing students as more than percentiles has powerful implications for curriculum design and instruction, and educators embraced a more pragmatic view of student growth. I know this, personally. My school has been using MI since 1988, and I have seen first-hand the positive impact that it has on our students and their teachers. In addition, my work as the facilitator of the ASCD Multiple Intelligences Professional Interest Community brings me in contact with educators around the world who use MI as a tool to help students learn.

Yet Gardner's impact in education goes beyond his conceptualization of MI. Gardner has been a leader n helping educators think about assessment in ways which focus on students' genuine understanding, not just recall of information. He popularized the term "processfolio" to capture that a portfolio should convey both what and *how* students learn. He has been active in researching the conditions under which students learn best and is also looking ahead to see how we need to prepare students for tomorrow's world.

Howard Gardner is a researcher, a writer, and a visionary, but he is more than that. He is an educator who reminds us all of the enormous potential within our students and the opportunity that each of us has to make the world a better place.

Sincerely,

Thomas R. Hoerr, PhD
Head of School
trhoerr@newcityschool.org

p 314.361.6411 • f 314.361.1499 • 5209 Waterman Boulevard • St. Louis, MO • 63108 • www.newcityschool.org

Masao Kamijo

Masao Kamijo is the president of the Japan MI Society (JMIS), emeritus adjunct lecturer at the graduate school of Nagoya University, and a representative of Office Kannonzaki Consulting. He began his study and application of MI outside the academic world while in his position at the Sony Corporation as chief manager in market research.

Japan MI Society

c/o Tomoe Soroban Co., LTD 1-10 Wakaba, Shinjuku-ku, Tokyo 160-0011 JAPAN

TEL : 813-5269-8801 FAX : 813-5269-8182

http://www.japanmi.com japanmi@gmail.com

August 6, 2012

To: **Richard K. Miller, Ph.D. President and Professor, Franklin W. Olin College of Engineering**
From: **Masao Kamijo, President Japan MI Society**
Re: **Letter of Nomination for Dr. Howard GARDNER**

Dear Dr. Richard MILLER,

I am nominating Psychologist, Professor Dr. Howard GARDNER for The Brock International Prize in Education in 2013.

After having worked for Sony Corporation as an engineer and chief manager marketing in audio and video products, I knocked on Howard Gardner's door in 1999. Since then I had been struck by a number of features of Gardner's Multiple Intelligences (MI) Theory that offers a basic fair assessment of an individual's potential, and it makes inventory, or profile of intelligence, possible; it allows the development of intelligences; it provides a way of monitoring this development; and it provides various entry points to concepts or topics. All these elements, if they are in place, can be introduced to the network society.

I can't forget Dr. Gardner's strong message: "The development of the intelligence of all people has to be the fundamental aim of our times. To guarantee peace, democracy, and freedom throughout the world, the development of the intelligence of each and every citizen has to become a national goal in all countries of the world, a universal goal." (Choice Points. 1993)

Dr. Gardner willingly accepted our invitations to "Prof Howard Gardner Japan Lectures" in 2003 & 2006, planned by Japan MI Society and cosponsored by Tokyo University, Sony Education Foundation and Sony Corporation. Prof Manabu SATO Graduate School, Tokyo University happily welcomed him and moderated the events. The subject of address in 2006 was "Why Deep Understanding Should Be Central in All Education?" These successful events prove that Dr. Gardner's ideas are just innovative, stimulating and universal. The impacts of these events and decade long related activities have echoed throughout nationwide educational institutions such as Aoyama Gakuin, Japan Professional School of Education, Keio, Kobe, Meiji, Nagoya, Yokohama National, Tohoku University of Art & Design, Tokyo, Waseda University or various Primary /Junior High/High Schools and Tomoe MI Academy in tutoring abacus.

Not only in the educational field but, but also his ideas are well accepted in the business leaders here in Japan through his recent books such as "Changing Minds" and "Five Minds For The future". He is now describing about "Good Work": two new factors of *Ethics* and *Engagement* in addition to *Excellence (MI)*. His ideas are just coming to maturity. He is continuously providing us with these precious universal keys or standards for problem solving and also bettering the current world so that one can challenge in life. Besides he is always just generous and an amazingly rapid networker to offer hands to us when needed.

We hope you agree and honor him for The Brock International Prize in Education in 2013.

Sincerely,

Masao Ka

Masao Kamijo Co-contributor of *Multiple Intelligences Around the World* (2009), President Japan MI Society, Emeritus adjunct lecturer Graduate School of Nagoya University, Representative Office Kannonzaki Cosulting.
(Home) 3-76-7 Kamoi, Kanagawa 239-0813 Japan Kamijo@df6.so-net.ne.jp

Hans Henrik Knoop

Hans Henrik Knoop is Associate Professor of educational psychology and Director of the Positive Psychology Research Unit at the Danish School of Education, University of Aarhus, Denmark. His work is focused on learning and creativity in education and professional work, currently collaborating with more than 12,000 pupils and 2,000 teachers.

For more than a decade Hans Henrik Knoop has been involved in research cooperation with colleagues at Harvard University, Stanford University and at Claremont Graduate University in the GoodWork Project and as researcher he has participated in development projects for LEGO, Danfoss Universe, SIS Akademi and Royal Greenland Academy, among others. Knoop contributed to the Danish DR2's programs on talent development in schools, and he was the scholarly anchor of the Danish TV2's reality documentary series "Plan B" and "SKOLEN – verdensklasse på 100 dage" [The school – world class in 100 days] concerning efficient education. "Plan B" received international attention in being nominated for the prestigious television award Golden Rose of Montreux. From 2007-2010, he was Research Director at the Universe Research Lab in Denmark.

As academic expert he has contributed to Danish ministerial committees on cross-curricular competencies, pedagogical appliance of IT, pedagogical planning, talent development, the Government's Committee on School Initiation and the Danish Evaluation Institute's project concerning teaching environment in primary and secondary school.

He is a member of the Board of Directors of the International Positive Psychology Association (IPPA) and current President of the European Network for Positive Psychology. In collaboration with colleagues at the University of Aarhus he was responsible for hosting the 5th European Conference on Positive Psychology in Copenhagen.

Hans Henrik Knoop has carried out research based consultancy for a large number of institutions and municipalities in Denmark and internationally he has been involved in major EU-financed development projects in Latvia and Lithuania as well as contributing to evaluation of development projects for EU.

AARHUS UNIVERSITY

August 20th, 2012

To whom it may concern,

Howard Gardner is recognized around the world as one of the most important and influential educational thinkers alive. His original work integrates, indeed in important new ways synthesizes brain research, psychology, moral philosophy and social studies, reaching a very broad readership of practitioners, scholars and decision makers. Over four decades Dr. Gardner's work has informed, provoked and energized both theoretical and practical discourse in many domains, and today, within the field of education, it is rare to meet someone who has not heard of Gardner's theory of Multiple Intelligences, or who does not know of his pioneering work on improving education. While not everyone agrees with his theories or ideas, the enormous importance his contributions have had on education around the world is undeniable. And while his harsh critique of standardized testing and simplified rankings of individuals and institutions have not been enough to change this globally dominating paradigm yet, it does continue to stimulate debate, worldwide.

The author of twenty-five books and several hundred articles, Gardner has received numerous awards for his work, including the MacArthur Prize Fellowship in 1981, the University of Louisville Grawemeyer Award in 1990, a fellowship from the John S. Guggenheim Memorial Foundation in 2000, and honorary degrees from twenty-six colleges and universities, including institutions in Bulgaria, Canada, Chile, China, Greece, Ireland, Israel, Italy, and South Korea. He was selected by Foreign Policy and Prospect magazines as one of the top 100 most influential public intellectuals in the world in the years 2005 and 2008, and in 2011 he won the Prince of Asturias Award in Social Sciences.

Thus, having often stressed the importance of personal role models in education, as in life more generally, Gardner himself has become a role model for thousands of educators around the world. And like he himself was crucially inspired by John Dewey, Jean Piaget, Erik Erikson, Jerome Bruner, Norman Geschwind and many others Howard Gardner now stands as a beacon of hope for many who work hard towards the day when education finally comes of age, finally emerges as truly fair, truly working to bring out the best in all, truly allowing each child, each student a fair chance of a good life, by means of enabling educators to do truly good work .

With these words I wish to support the nomination of Professor Howard Gardner for the Brock International Prize in Education

Sincerely,

Hans Henrik Knoop
Associate Professor, Department of Education, Aarhus University
President of European Network for Positive Psychology

DEPARTMENT OF EDUCATION
Niels Juels Gade 84, Building 2110, 8200 Aarhus N, Denmark

Mindy Kornhaber

Mindy L. Kornhaber is an assistant professor at The Pennsylvania State University at University Park. She has a dual appointment in the Education Policy Studies Department's program in Education Theory and Policy and in the University-wide consortium for Children, Youth, and Families.

Dr. Kornhaber's research interests are driven by one question: How can institutions and the policies surrounding them enhance human potential both to a high degree and on an equitable basis? Her experience investigating this question has included studies of assessment and school reform at Harvard University's Project Zero and research into high stakes testing policies, initially undertaken at the Civil Rights Project, also at Harvard University. At Penn State, she is investigating the effects of high stakes testing on the mission of diverse public schools. She is working in collaboration with other professors at Penn State to explore how service learning might advance the service mission of large public universities. She is also working in collaboration with Prof. Dorothy Evensen to understand student preparation for law school and careers in law.

Alongside her research, Dr. Kornhaber is teaching courses relating to intellectual development and social policy. An undergraduate course entitled "Intelligence and Education Policy" and a graduate course, "Testing and Educational Equity".

PENNSTATE

Department of Education
Policy Studies

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Fax: (814) 865-1480
http://www.ed.psu.edu/eps/

August 14, 2012

Richard K. Miller, Ph.D.
President
Franklin W. Olin College of Engineering
Olin Way
Needham, MA 02492-1200

Dear President Miller:

It is an honor to support the nomination of Professor Howard Gardner for the Brock International Prize in Education. I have known Professor Gardner since 1987, first as a student, then as a principal investigator at Harvard Project Zero, the research group he co-directed for a quarter century, and now as a faculty member who benefits from his continuing mentorship. At this time, I also have a unique vantage point on Professor Gardner's contributions to education, because I am co-editing a festschrift in honor of his 70th birthday in 2013. The festschrift will include 100 contributions, many from eminent leaders in education who speak to Howard Gardner's unparalleled influence in the field.

Even as the Brock International Prize provides pubic recognition for an honoree's specific innovation that may provide long-term benefit to all humanity, it is important to emphasize that Professor Gardner has contributed at least two such innovations. He is widely and justly recognized for proposing the theory of multiple intelligences ("MI") in 1983. This theory challenged the prevailing view that all individuals' intelligence was dependent on a single, underlying factor, general intelligence, or 'g.' Instead, drawing on support from a range of disciplines, including developmental psychology and evolutionary biology, Professor Gardner has now identified eight relatively autonomous "intelligences," that all cognitively unimpaired individuals draw on to solve problems or create products across cultures.

The theory of multiple intelligences has been widely debated within and beyond psychological circles. Recently, at least two serious former critics (Daniel Willingham and Charles Murray) have voiced support for the theory. Even as debates continued, the theory proved to have widespread positive interest among a wide range of classroom educators and school leaders. Some of my own research explored why this is the case. One of the key findings from this research is that educators use the theory as a tool for organizing and reflecting on their own practice, both individually and on a school-wide basis. This, in turn, enables them to develop practices to serve a wider range of students.

The utility of MI for educators spans far beyond the reaches of the United States. In 2009, a volume entitled MI Around the World, included contributions from practitioners across

Asia, Europe, Latin America. Gardner's theory has made its way from the United States to madrassahs in southeast Asia to North Korea to Chile and Australia. The power and global reach of Professor Gardner's theory was made plain by one of the contributors to the festschrift who visited a school in a very poor and remote region of China. There she found a poster celebrating the work of just three great thinkers in education: Jean Piaget, Lev Vygotsky, and Howard Gardner.

The second major contribution made by Howard Gardner to the science and art of education stems from the GoodWork Project, an ongoing endeavor he began in the mid-1990s in collaboration with Professors William Damon and Mihaly Csikszentmihalyi. The project was borne in part from the realization that research aimed at understanding and fostering, human intelligence tends to leave out equally salient dimensions of exceptional work. Drawing on an initial data base of some 1200 indepth interviews with practitioners in varied disciplines, Professor Gardner and his colleagues have produced at least eight books and scores of scholarly articles that explore human achievements that are excellent from an intellectual vantage point, that engage the worker in a deep way and that is conducted in an ethical manner.

The GoodWork Project is a vital corrective to test-based accountability policies, which too often undermine excellence, engagement, and ethics. Professor Gardner and his collaborators have now developed case studies to foster deep consideration of the ethical dimensions of work. The GoodWork Project's framework and case studies have been used to in professional education in various disciplines, including education, law and business in both the U.S. and Europe. GoodWork's emphasis on excellence, engagement and ethics provides a crucial foundation for education that serves not only individuals, but the professions, and the wider society.

Professor Gardner's contributions to education are grounded in research and theory, but they have not rested in only those important spheres. GoodWork and the theory of multiple intelligences have leaped from the pages of books and journals into the hands of educators, because they are powerful educational tools that have utility across the globe. These two contributions make Professor Gardner a most compelling nominee for the Brock International Prize.

Sincerely,

Mindy L Kornhaber

Mindy L. Kornhaber, Ed.D.
Associate Professor
Department of Education Policy Studies
The Pennsylvania State University

Chris Kunkel

Dr. Christine Kunkel began her career in education as a basketball coach and middle school science teacher. Eventually, her love for teaching and coaching led her to the Key School in Indianapolis, Indiana.

The Key School (now the Key Learning Community) was the first school in the world to adapt Howard Gardner's Theory of Multiple Intelligences to a school curriculum. While teaching at Key, Chris was asked by founding principal, Pat Bolaños, to accept the position of assistant principal and focus on implementing progressive school ideals within a public school setting. After Mrs. Bolaños' untimely death in 2003, Dr. Kunkel became principal of the innovative Key Program and continued to focus on bringing authentic education to urban students.

In 2010, Dr. Kunkel accepted a position as Assistant Professor in Educational Leadership at Rhode Island College where she brings her voice to the field as an academic. She now teaches Educational Leadership courses and studies authentic ways to measure school success, beyond standardized testing.
Dr. Kunkel has been invited to share her expertise in implementing the Multiple Intelligences in K-12 schools in Barcelona, Spain; Bangalore, India; and Mexico City, as well across the US. This past summer she was delighted to join the Project Zero Classroom Faculty at Harvard as a Fellow and Mini-Course Instructor.

RHODE ISLAND
COLLEGE

Department of Counseling, Educational
Leadership, and School Psychology

August 15, 2012

I write today to support the nomination of Dr. Howard Gardner for the Brock International Prize in Education. Few would argue that Dr. Gardner's theory of Multiple Intelligences is an idea that challenges the previous predominant notion of human intelligence. With his ideas, Gardner has provided the world with a more inclusive notion of human potential. It is no surprise, then, that in a short time after his groundbreaking book, *Frames of Mind*, was published in 1983, a group of educators developed a way to use the theory, and the world's first MI School opened in Indianapolis, IN. This set off a firestorm of media attention and a wave of interest in bringing MI Theory to educative practice not only in the US, but worldwide.

How has the theory of MI changed the face of education? I say in ways wonderful and profound. You see, previously school children could only officially show aptitude and academic achievement in primarily two ways: in the areas of language and mathematics. After Howard Gardner's Theory of Multiple Intelligences became widely implemented in schools, children could show aptitude in 6 additional ways. Children now had interpersonal and intrapersonal, naturalist, spatial, musical and bodily-kinesthetic intelligence as well. This was earth shattering in that every child—even "Special Ed" children—could now have a strength, and in practice, every child could now find a way to use their strength(s) not only to demonstrate their knowledge and understanding, but to confidently work on areas that challenged them as well. In addition, by recognizing their strengths, children become more reflective learners, which makes them better learners. As they transition from their K-12 educational career to college and beyond, they could use their strengths to help determine their career. With the confidence developed through this process, students are much more motivated to use their strengths for personal success as well as to "make a difference" in both the local and global community.

The wonderful thing about Howard Gardner's theory of Multiple Intelligences is that there is no one way to use it in educational practice. In fact, the use of MI in a school could and probably should be used differently by each set of educators in each individual school, and Dr. Gardner has wisely refrained from suggesting any standard way to use MI in a school. He simply observes, and graciously responds to questions from anyone who writes him to inquire about MI Practice in school. This is perhaps the final reason I advocate for Dr. Gardner to receive this honor...he worked hard to create a solid and well-supported scientific theory, his theory has found profound utility in the field of education, he is happy to share his thoughts, advice and ideas about implementation when asked – and he does so frequently. This all makes him not only brilliant as well as clever, it makes him caring and magnanimous. He is a person who never sought the limelight that has been cast upon him, but one who takes the responsibility that comes with great fame to help all who seek to use MI Theory to not only better education, but to better the world.

Sincerely,
Christine D. Kunkel, Ph.D.
Christine D. Kunkel
Assistant Professor, Educational Leadership
Principal, Key Learning Community (World's First MI School), 2003-2010

Providence, RI 02908-1991
(401) 456-8023
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Ann Lewin-Benham

As an educator in the 1960s, Ann Lewin-Benham helped to grow a Montessori school for 3-to-6-year-olds into an elementary school. As the children approached 7th grade, she founded Parkmont Junior High, an alternative school where students engaged in projects as a significant part of the curriculum. In the 1970s she launched 8 public-school Montessori classes in the poverty pockets of Arlington County, and in inner-city Washington, DC ran one of the early corporate-sponsored day care centers established as a benefit to try to cut employee turnover. In the 1980s she founded a computer-based center to prepare out-of-school, out-of-work youth for the GED, and structured numerous government-funded teacher-education programs in the arts, humanities, and sciences. In January 1990, she opened Options School under contract to the DC Public Schools. The school was a one-year drop-out prevention program for 100 14- to 17-year-olds, nominally 7th graders. Options became a safety-net for the public schools and was a harbinger of the charter school movement soon to begin, as was the Model Early Learning Center.

In the mid-1970s Ann led an effort to establish the Capital Children's Museum in a former riot corridor in the shadow of the US Capitol. Its Washington, DC location catapulted the museum to international prominence. For 20 years Ann built the institution creating major exhibitions that brought to life foreign cultures, traced the history of human communication from Ice Age cave to computers, and explored the world of the hearing impaired in an exhibit called 'Sound and Silence.' The exhibit 'Remember the Children,' prototype for the permanent children's exhibit at the U. S. Holocaust Memorial Museum in Washington, DC, probed the concept of prejudice.

Capital Children's Museum was site of many firsts: first public-access computer center in the nation's capital, first meeting place for First Ladies Mrs. Menachim Begin and Mrs. Anwar Sadat following the 1979 Camp David Peace Accord, first effort to reclaim a Washington, DC riot corridor following Martin Luther King, Jr.'s assassination. Ann led a large innovative team in bringing to life the museum's full city block – 3 acres and 150,000 square feet of buildings – with exhibits, performance, and programs for teachers and youth.

The Model Early Learning Center (MELC), the subject of Ann's first 2 books, served Head Start-eligible 3- to 6-year-olds. There Ann adapted the practices of the renowned preschools of Reggio Emilia, Italy as described in her books *Possible Schools* and *Powerful Children*. In Howard Gardner's words from the Foreword to *Possible Schools:* "The Model Early Learning Center is ... proof that schools in the Reggio tradition can be created even in the most challenging urban disadvantaged areas." The MELC was the only school outside Reggio Emilia ever accredited by the Italian educators.

Ann Lewin-Benham
1850 Overton Park
Memphis, TN 38112

I write in support of Professor Howard Gardner's nomination for the Brock International Prize in Education. Prof. Gardner's Multiple Intelligence Theory ("MI") (1983) is an entirely original way to think about the elusive human capacity called "intelligence." Throughout history, intelligence has been seen as an "it," one capacity that a person has limited or greater amounts. By recasting intelligence as "them"—multiple capacities, all manifest differently and embodying their own neurological profiles – Prof. Gardner has provided a new lens for teachers and parents to observe, nurture, and hone the next generation's abilities.

In 1983, having just heard Prof. Gardner explain MI theory, I shared my excitement with two members of a jazz band called the Foot Warmers. Their faces paled as one recounted his story: He was considered the "dumb" kid in school, ridiculed and ostracized by peers and adults. But, in music class, his escape, he was certain he knew something others did not. His fellow band member had had the same experience. As I described the theory, their relief was palpable to think that a credentialed psychologist/education professor recognized their musical skill as a form of intelligence.

In addition to being a paradigm with the power to change one's self-image, MI theory provides these long-term benefits:

- gives teachers a sound scientific basis for understanding why intelligence is manifest so differently in different people;
- elevates the importance of the arts in education from add-ons to must-do's;
- gives students who might be written off a chance to be viewed positively;
- inspires teachers to innovate and think.

Howard Gardner makes himself amazingly accessible to teachers and schools. He has been involved deeply in school change efforts and, as the decades have passed, has expanded his work stunningly to encompass what he calls Good Work – the kind of ethical, synergistic, collaborative endeavor that he has instilled in his school change work.

Prof. Gardner has become world-renowned for Multiple Intelligence Theory. It could be said that his theory is a "household" world, seeding the imagination of people far removed from the fields of education and psychology. Hopefully as time passes, the idea that there are multiple intelligences which must be cultivated will become instantiated widely in educational practice. As that time approaches the world can thank Prof. Gardner for his insights, his voluminous and clear writing, and his willingness to make himself available to share his wisdom.

Ann Lewin-Benham

Kathleen McCartney

Kathleen McCartney, the Gerald S. Lesser Professor in Early Childhood Development, was named Dean of the Harvard Graduate School of Education in 2006. In collaboration with a dedicated faculty and administrative team, she has implemented a strategic plan that has resulted in the creation of two new degree programs, the doctorate in education leadership (Ed.L.D.), and a new interfaculty Ph.D. in education; a 25 percent growth in core faculty; a doubling of financial aid for Ed.M. students; a dramatic increase in fellowship support for doctoral students; and the establishment of a partner network with over 30 districts and non-profit organizations.

McCartney's research program concerns early experience and development, and she has published more than 150 articles and chapters on child care, early childhood education, and poverty. She is a member of the NICHD Early Child Care Research Network, which summarized the results of their longitudinal study in *Child Care and Child Development.* She also co-edited *Experience and Development*, *The Blackwell Handbook of Early Childhood Development,* and *Best Practices in Developmental Research Methods*.

McCartney received her B.S. in psychology *summa cum laude* from Tufts University, where she now serves as a trustee, and her M.S. and Ph.D. in developmental psychology from Yale University. In 2012 she was inducted as a member of the American Academy of Arts & Sciences, and in 2009 she received the Distinguished Contribution Award from the Society for Research in Child Development. McCartney is also a Fellow of the American Education Research Association, the American Psychological Association, and the American Psychological Society.

HARVARD
GRADUATE SCHOOL OF EDUCATION

OFFICE OF THE DEAN

July 19, 2012

Brock Prize Jurors
Brock International Prize in Education
2120 S. Lewis, Suite 415
Tulsa, OK 74104

To the Jurors of the Brock International Prize in Education:

It is with great pleasure that I nominate my colleague, Howard Gardner, the John H. and Elisabeth A. Hobbs Professor of Cognition and Education, for the 2013 Brock International Prize in Education. Howard Gardner is a research psychologist and public intellectual, who for over forty years has sought to understand the human mind in its full richness and complexity. He is best known for his multiple intelligences (MI) theory—a critique of the notion that there exists but a single human intelligence that can be adequately assessed by standard psychometric instruments. Gardner initially conceived of MI as a psychological theory, but his pluralistic view of the mind has arguably had a greater influence on the field of education. In the wake of the publication of *Frames of Mind: The Theory of Multiple Intelligences* (1983), educators around the world have undertaken great experiments grounded in his ideas—some schools have launched seven distinct learning centers, each catering to a particular intelligence; other schools have been founded with the aim of teaching a range of content through the lens of a single intelligence; and still other schools carefully place students representing different intellectual profiles in the same classroom—believing the complementary nature of these intelligences produces the most effective learning environment. Gardner's theory has driven the development of new forms of assessment, stoked ongoing scholarly debate, and helped usher in a new era of individualized instruction.

Far from resting on his laurels, Gardner has authored more than 20 books—many of which expand upon and refine his theory of multiple intelligences. From 1972-1990, he served as the Director of Project Zero, a Harvard-based initiative that deepens our understanding of human cognitive development and the processes of learning in the arts and other disciplines. The Project has conducted a number of studies examining the dissemination and application of MI. Gardner continues to serve on its steering committee and as the faculty chair for the Project Zero Classroom—one of our most popular professional education programs at HGSE which draws heavily on Gardner's ideas of intelligence to inform the approaches of the hundreds of administrators and teachers who participate each year.

Gardner has been awarded a MacArthur "Genius" Grant, the Grawemeyer Award in Education, and more than 20 honorary degrees from universities around the globe. I cannot think of another individual whose work has had more heuristic value, and I enthusiastically endorse him for the 2013 Brock International Prize in Education.

Sincerely,

Kathleen McCartney

Kathleen McCartney
Dean
Gerald S. Lesser Professor in Early Childhood Development

LONGFELLOW HALL 101, 13 APPIAN WAY, CAMBRIDGE, MA 02138, 617-495-3401, WWW.GSE.HARVARD.EDU

Michael S. McPherson

Michael S. McPherson is the fifth President of the Spencer Foundation. Prior to joining the Foundation in 2003 he served as President of Macalester College in St. Paul, Minnesota for seven years. A nationally known economist whose expertise focuses on the interplay between education and economics, McPherson spent the 22 years prior to his Macalester presidency as professor of economics, chairman of the Economics Department, and dean of faculty at Williams College in Williamstown, Massachusetts. He holds a B.A. in Mathematics, an M.A. in Economics, and a Ph.D. in Economics, all from the University of Chicago.

McPherson, who is co-author and editor of several books, including *College Access: Opportunity or Privilege?*, *Keeping College Affordable* and *Economic Analysis, Moral Philosophy, and Public Policy;* was founding co-editor of the journal *Economics and Philosophy*. He has served as a trustee of the College Board, the American Council on Education, and the Minneapolis Institute of Arts. McPherson has been a Fellow of the Institute for Advanced Study and a Senior Fellow at the Brookings Institution.

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chicago illinois 60611
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August 13, 2012

Richard K. Miller
President, Olin College

Dear Rick:

Howard Gardner's pioneering work on the concept of multiple intelligences has had a profound impact in psychology and allied fields and unparalleled influence on educational theory and policy throughout the world. Gardner's seminal work, "Frames of Mind: The Theory of Multiple Intelligences", appeared in 1983, a time when the field of psychology remained largely in the grip of a reductionist behaviorism. Gardner's important work contributed to an emerging stream of work in cognitive psychology that recognized the complexity of mental life and cognitive development.

Gardner's work also helped to open the minds of educators and education researchers to broader notions of cognitive competence and cognitive development than could be captured in the one-dimensional notion of IQ (or "g" in the lingo of psychometricians). It is of interest that Gardner did not think of his work in the first instance as a contribution to educational research, but as a fundamental contribution to psychological research. Perhaps as a result, Gardner's original catalog of seven intelligences is defined in a disciplined way, and he has sanctioned only very limited extensions of the list since its inception. Gardner's offering is not any sort of permissive suggestion that "everybody's good at something", but a disciplined argument that mental capacities and achievements fall into a defined list of domains.

The implications of this analytical engine for educational thinking and policy have been extensive throughout the world – indeed probably even greater in Asia and Europe than in Gardner's home country. Gardner's work suggests that schools should aim to develop students' capabilities across the spectrum of intelligences, while at the same time helping them build their personal and career goals around their areas of strength. Because students show strength in differing places along the spectrum of intelligences, they have greater opportunity to sustain their sense of competence without neglecting their development in areas of lesser strength.

While his best-known contribution has been in the field of multiple intelligences, Gardner has made significant contributions across an extraordinary range. In this age of specialization, Howard Gardner's engagement in work in the arts, in ethics, in business and community leadership, and in other areas marks him as one of the nation's, and perhaps the Western world's, leading intellectuals. He is unfailingly constructive, and brings extraordinary good will and optimism to all his engagements.

I am honored to support Howard Gardner's candidacy for the Brock Prize.

Sincerely,

Michael S. McPherson
President

Carlina Rinaldi

In 1970, Carlina Rinaldi graduated from the University of Bologna with a degree in Pedagogy. Starting in 1971, she worked as a pedagogista with the Municipal Infant-toddler Centers and Preschools of Reggio Emilia. Carlina was then appointed pedagogical director and, subsequently, as director of the Municipal Infant-toddler Centers and Preschools.

Ms. Rinaldi has been working as pedagogical consultant for Reggio Children since 1994, following the supervision of all Reggio Children initiatives; she is responsible for research projects being carried out in conjunction with Harvard University, the University of New Hampshire, and the University of Milan.

She was vice-president of the Gruppo Nazionale Nidi-Infanzia (National Early Childhood Association). Carlina has spoken at numerous seminars and conferences in Italy, as well as across Europe, the United States, Latin America, Australia and Asia.

She is co-author of various books on the Reggio Emilia municipal infant-toddler centers and preschools, such as *The Hundred Languages of Children*, *The Fountains*, and *Children, Spaces and Relations*—a Meta-project for an environment for young children and many others. She has coordinated the publication of the book *Making Learning Visible*, published by Reggio Children and Harvard University's Project Zero. Her most recent book is *In dialogue with Reggio Emilia*.

Carlina has also written a number of articles published both in Italy and abroad for books, education magazines.

FONDAZIONE
REGGIO CHILDREN
CENTRO LORIS MALAGUZZI

July 23, 2012

Dr. Richard K. Miller, President
Franklin W. Olin College of Engineering
Olin Way
Needham, MA 02492
USA

RE: Nomination of Professor Howard Gardner for the Brock International Prize in Education

The beginning of the relationship and friendship between Professor Gardner and the city of Reggio Emilia dates back to the ’80.
At that time Professor Loris Malaguzzi invited Professor Howard Gardner to present his book “Frames of Mind”.
There was an immediate and sincere empathy and reciprocal appreciation between these two researchers passionate about learning and education in general.
Since then the interesting and fruitful collaboration and exchange develop and almost once a year Professor Gardner comes to Reggio Emilia to visit the Municipal infant-toddler centres and preschools and to be part of meetings and reflections about the ongoing research projects.
A very meaningful research took place between Harvard Project Zero and the schools and infant-toddler centres of Reggio Emilia with the title of “Making Learning Visible: children as individual and group learners”. This research project represented not only an advancement in the dialogue between these two entities but it has become a reference point for teachers and researchers all over the world.
The generosity of Professor Gardner towards the experience of Reggio Emilia gave the possibility to realize several meetings and seminars at National and International level on the studies and researches of Prof.Gardner as well as on other topics of common interest (such as on Multicultural Education, Learning Communities, etc.).
His link with the city of Reggio Emilia has become stronger and deeper also through a wider knowledge and under standing of the local policies and of the challenges and projects the city and its present Mayor Graziano Delrio have been facing and developing.
Recently Professor Gardner consulted the Mayor of Reggio Emilia on a project for the cultural and economical development of the city.

The gratitude and recognition of the educators, administrators and citizens of Reggio Emilia to Professor Gardner is very strong.
Professor Gardner has, among many others, merits and competences about the political dimension and ethical dimension, which make him particularly precious and unique in a worldwide reality where issues in education are more than ever fundamental and determing factors for the future of humanity.

For these considerations, we all in Reggio Emilia strongly support the nomination of Professor Howard Gardner for the Brock International Prize in Education in 2013.

Carla Rinaldi

Carla Rinaldi
President of Reggio Children
President of the Foundation “Reggio Children-Loris Malaguzzi Centre”

Zhilong Shen

Professor Zhilong Shen: “Multiple Intelligences Theory and Opening Students’ Potentials” Special Consultant at MII, Chemistry professor, Arts educator. Professor Shen graduated from Peking University in 1967. From 1984-1986, he was a Chinese government-sponsored chemistry scholar sent to Liverpool University. Upon returning, he became Head of the Chemistry Department of the School of Environmental Engineering at Beijing Technology and Business University. In 1999, he translated and published Howard Gardner’s “Multiple Intelligences”, having a great impact on education reform in China. Since 1994, he has also given more than 300 lectures, at universities in 24 provinces and abroad in the US, to a combined audience of more than 150 thousand listeners.

Since 2002, Professor Shen has published more than ten books including “Experiences at Harvard”, “Music in Life”, “Gardner, Talent, Multiple Intelligences”, “Rethinking Multiple Intelligences” and “Changing Perspectives”.

北京工商大學
BEIJING TECHNOLOGY AND BUSINESS UNIVERSITY

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To Richard K. Miller, Ph.D.
President and Professor
Olin Way
Needham, MA 02492-1200
USA
July 18, 2012

From Shen Zhilong
A2-210
11 Fucheng Road
Beijing 100048
CHINA

Dear Dr. Richard K. Miller:

Thank you for your email of July 4th in 2012 and your introduction to The Brock International Prize in Education. I am very happy to nominate Professor Howard Gardner for the Brock International Prize in Education in 2013.

The Theory of Multiple Intelligences (MI Theory) created by Howard Gardner in 1983 has been giving tremendous influences on the educational reform and development in the whole China. I am one of most important witness in the mainland of China

The Chinese copy of Gardner's book, *Multiple Intelligences: Theory in Practice,* translated by myself was published in 1999. Since then, millions of educators, teachers from variety of schools, the administrators, supervisors, policymaker and legislators of education, students and parents of China, even top leaders of the Central Government of PRC have learned MI theory, been attracted and accepted it. In the beginning of 2004, an article in *China Educational Daily* declared that book had occupied the first place among one hundred best-selling books on education in 2003.

As the ideas became better known, *the China Education Association* set up a key project named "*Applied Research of Multiple Intelligences Theory on Developing Students Potential*" in February of 2002, and 151 various schools from kindergartens to universities of thirteen provinces in the mainland of China had been involved in the research and practice of MI Theory. By my calculation, 3145 paper relative to the study and practice of MI Theory have published. About seven hundred books referring to MI Theory were translated into or written in simplified characters of Chinese since 2000 in Mainland of China.

Above all, I absolutely consider that Howard Gardner is the best candidate for the Brock International Prize in Education in 2013. Thank you.

Sincerely Yours

Shen Zhilong
Professor of Physical Chemistry and Art Education
Beijing Technology and Business University

Margot Strom

Margot Stern Strom is an international leader in education for justice and the preservation of democracy. Through her commitment to honoring the voices of teachers and students and her deep belief that history matters, she has enabled millions of students to study the Holocaust, to investigate root causes of racism, anti-Semitism and violence, and to realize their obligations and capabilities as citizens in a democracy.

In 1980, Margot became the Executive Director of Facing History and Ourselves. Through pilot workshops and in consultation with scholars and teachers, she created the Facing History scope and sequence: the journey that students undertake to learn about the impact of history on their own lives and their futures. Beginning with the concept of individual and group identity, the study then examines the failure of democracy and the steps leading to the Holocaust. The program further explores difficult questions of judgment, memory, and legacy. It concludes with the necessity for responsible participation in protecting and promoting democracy, justice, and human dignity today and for generations to come. Later, she brought exhibitions, community conversations, and online dialogues to wider audiences in the community, including a vibrant, engaged adult learning community.

As the Executive Director of Facing History and Ourselves since its inception, Margot has recognized that young people are moral philosophers and that it is critical to listen to their voices to understand how to make education relevant to them and to the world they will enter. With her leadership, Facing History and Ourselves has become known worldwide for the high quality of its materials and programs for both students and teachers. Facing History teachers are empowered to engage their students in the urgent task of developing individual responsibility, tolerance for difference, and civic participation through the rigorous study of history. Facing History is based on the belief that students must be trusted to examine history in all of its complexities, including its legacies of prejudice and discrimination as well as resilience and courage. This trust encourages young people to develop their own ideas and to contribute their voices to critical discussions and debates among their peers and in the larger community.

Margot credits her "virtual teachers" with inspiration. From the philosopher Hannah Arendt, she learned the importance of thinking about one's thinking in a silent dialogue with oneself and the value of examining those thoughts in a public space. Facing History is built on the belief that individuals have the capacity to make a difference and that history is not the result of immutable forces or a collection of inevitable outcomes. Margot's understanding of the critical concept of "choice" was enhanced by scholar Jacob Bronowski's emphasis on choice as a uniquely human possibility.

Margot learned too from the stories of Holocaust survivors and their generosity in sharing their experiences with students in classrooms. And she learned from the grace with which they embrace other survivors - those who tell their stories of the legacies of hatred and discrimination in Rwanda, Cambodia and places where humans behaved in the cruelest-and sometimes the bravest-of ways.

FACING
HISTORY
AND
OURSELVES

Margot Stern Strom
President and
Executive Director

Tracy P. Palandjian
Chair, Board of Directors

Seth A. Klarman
Dana W. Smith
Co-Chairs, Board of Trustees

Kwame Anthony Appiah
Chair, Board of Scholars

August 23, 2012

Dr. Richard Miller
President and Professor
Franklin W. Olin College of Engineering
Olin Way
Needham, MA 02492-1200

Dear Dr. Miller,

When Professor Howard Gardner turned his multiple intelligences to education in the 1980s, I began virtual conversations with him. Facing History and Ourselves was in its infancy and his attention to how children think and how schools should teach elevated our profession and resonated with our experiences with teachers and students about history and ethics. His attention to interdisciplinary education in the humanities and his respect for the multiple capacities of students to create exceptional ways to express and question their knowledge and understanding of complex history and human behavior has been inspirational.

His interests and his remarkable ability to act as a public intellectual on critical issues related to civic and moral education brought us together. Now that our conversations are no longer just virtual, I have learned about his personal history, his virtues and his ongoing admiration for his colleagues and his mentors, many of whom he both respects and critiques simultaneously. His resume reads like an adult development journey that marries the pursuit of science and human values to strengthening democratic citizenship education.

For decades, Professor Gardner, through his classroom seminars, institutes, books, global relationships to scholars, friends, educational researchers, artists, and family, has built a following of citizens dedicated to examining and advocating for a "good society." His recent focus on the future of learning, and the changes and challenges in our society that demand transformational professional education for educators, once again aligns his interests and insights and my ongoing work. His insistence on bringing globalization, the digital revolution and biology into public dialogue will help those of us educating about global citizenship gain traction for models of schooling that can engage students in ethical, reflective and meaningful lives beneficial and necessary to strengthening and thriving in a democracy.

Dr. Gardner serves on the Facing History and Ourselves Scholars Board, where his critical insights about the inadequacies of single solutions to measuring intellect is a commanding achievement in the current heated political environment that pits education about head, heart, cognition and socio-emotional development against one another and blurs the public's ability to advance educational changes that would lead to solutions to the problems plaguing global education for our children.

I wholeheartedly support the nomination of Howard Gardner for the Brock International Prize in Education.

Sincerely,

Margot Stern Strom

Margot Stern Strom
Executive Director

16 Hurd Road
Brookline, MA 02445
617 232 1595
facinghistory.org

June 2014

CURRICULUM VITAE

Howard E. Gardner

Date of Birth: July 11, 1943

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Longfellow Hall, Room 224A
Harvard Graduate School of Education
Cambridge, MA 02138
hgasst@gse.harvard.edu
1–617–496–4929 (tel)
1–617–496–4855 (fax)

Websites:
thegoodproject.org
howardgardner.com
pz.harvard.edu
multipleintelligencesoasis.org

EDUCATION

Harvard College, 1961–1965; A.B. in Social Relations
London School of Economics, 1965–1966; Reading in Philosophy and Sociology
Harvard University, 1966–1971; Ph.D. in Social Psychology (Developmental Psychology)
Harvard Medical School and Boston University Aphasia Research Center, 1971–1972; Postdoctoral Fellow

CURRENT POSITIONS

John H. and Elisabeth A. Hobbs Professor of Cognition and Education, Harvard Graduate School of Education (1998–present)
Professor of Education, Harvard Graduate School of Education (1986–1998)
Adjunct Professor of Psychology, Harvard University (1991–present)
Chair, Project Zero Steering Committee (1995–present); Co-Director, Project Zero (1972–2000); Senior Director (2000–present).

ACADEMIC HONORS AND FELLOWSHIPS

Phi Beta Kappa, Junior Year (1964)
A.B. summa cum laude (1965)
Frank Knox Fellowship, London School of Economics (1965–1966)
NIMH Pre-doctoral Fellowship (1966–1971)
Ph.D. Examination passed with Distinction (1968)
Social Science Research Council Fellow (1971–1972)
Livingston Fund Fellowship (1972–1974)
Claude Bernard Science Journalism Award (1975)
MacArthur Prize Fellowship (1981–1986)
National Psychology Award for Excellence in the Media of the American Psychological Association, for the book, Frames of Mind (1984)
William James Award, American Psychological Association (1987)
Educational Press of America, Distinguished Achievement Award (1989)
Who's Who in America (1989–present)
University of Louisville Grawemeyer Award in Education (1990)

Wyoming Seminary Distinguished Alumnus Award (1990)
Laureate Member, Kappa Delta Pi, International Honor Society in Education
Doctor of Education, *honoris causa*, Curry College (1992)
Patron of the Arts Award, Community School District 3, New York City (1992)
Best Friend of Children's Museums, American Association of Youth Museums (1992)
Doctor of Music, *honoris causa*, New England Conservatory of Music (1993)
Children's Theatre Foundation of America, Medallion Award (1993)
Villa Serbelloni, Bellagio, Rockefeller Foundation Study Center, Resident (Aug–Sept, 1993)
Excellence in Family Issues Award for *The Unschooled Mind*, Child Magazine (1993)
Educational Press Association of America Distinguished Achievement Award (1994)
Governor's Award for Excellence in the Humanities, Pennsylvania (1994)
Teachers College Medal for Distinguished Service to Education, Teachers College, Columbia University (1994)
Center for Advanced Study in the Behavioral Sciences, Fellow, Stanford, CA (1994–1995)
Salute to Science Award, Mind Science Foundation, San Antonio, TX (1994)
Outstanding Educator Award, Exploratorium, San Francisco, CA (1995)
Doctor of Humane Letters, *honoris causa*, Indiana University, IN (1995)
Outstanding Service to the Field of Education Award, Lehigh University, PA (1995)
Presidential Citation, American Educational Research Association (1996)
Doctor of Humanities, *honoris causa*, Moravian College, PA (1996)
Doctor of Humane Letters, *honoris causa*, Salem State College, MA (1996)
Doctor of Music, *honoris causa*, Cleveland Institute of Music, OH (1996)
Distinguished Achievement Award for Excellence in Educational Journalism, Educational Press Association of America (1996)
Literary Light, Associates of the Boston Public Library, MA (1997)
Doctor of Humane Letters, *honoris causa*, Long Island University, NY (1997)
Doctor of Humane Letters, *honoris causa*, Macalester College, St. Paul, MN (1997)
Subject of exhibit, *Contemporary Educational Leaders*, Museum of Education, Columbia, SC (1998)
Doctor of Humane Letters, *honoris causa*, Princeton University, NJ (1998)
Doctor of Philosophy, *honoris causa*, Tel Aviv University, Israel (1998)
Laureate Member, Omicron Delta Kappa National Leadership Honor Society (1998)
Outstanding Creative Achievement Award, Creative Education Foundation (1998)
Doctor of Humane Letters, *honoris causa*, Pennsylvania State University, PA (1998)
Presidential Citation, American Psychological Association (1998)
John McGovern Award in Behavioral Sciences, Smithsonian Associates (1998)
The Walker Prize, Museum of Science, Boston, MA (1999)
Doctor of Music, *honoris causa*, Ithaca College, Ithaca, NY (1999)
Doctor of Science, *honoris causa*, Connecticut College (1999)
Doctor of Science, *honoris causa*, McGill University (1999)
Artsgenesis Creative Achiever Award, Artsgenesis, New York, NY (1999)
Golden Plate Award, American Academy of Achievement, Washington, DC (1999)
Honored Author, Newton Free Library, Newton, MA (1999)
Samuel Torrey Orton Award, International Dyslexia Association (1999)
Doctor of Humane Letters, *honoris causa*, University of Hartford (2000)
Doctor of Humane Letters, *honoris causa*, Massachusetts School of Professional Psychology (2000)
Fellow, John S. Guggenheim Memorial Foundation (2000–2001)

George Ledlie Prize, President and Fellows of Harvard College (2000)
Children's Arts Medal, Young Audiences, New York (2001)
Doctor of Laws, *honoris causa*, University of Toronto (2001)
Doctor of Literature, *honoris causa*, National University of Ireland/Univ. College Cork (2001)
Medal of the Presidency of the Italian Republic, Pio Manzù, October (2001)
Doctor of Letters, *honoris causa*, Wheaton College (2002), Norton, Massachusetts.
Klingenstein Leadership Award, Teachers College, Columbia University, February (2003)
Benchmark School Award for Excellence in the Fields of Learning and Literacy, Benchmark School, Media, PA (2003)
Doctor, *honoris causa*, University of Urbino, Italy (2003)
Howard Gardner Multiple Intelligence Scholarship (2003 onwards), Aspen University
Mahatma Gandhi Fellow, American Academy of Political and Social Science (2004)
Presidents Medal, Teachers of English as a Second Language (2004)
George W. Gay Lecture in Medical Ethics (oldest endowed lectureship at Harvard and oldest medical ethics lectureship in the United States) (2004)
Honorary Professor, East China Normal University, Shanghai, China (2004)
Colonel Samuel Rosenbaum Memorial Award from the National Guild of Community Schools of the Arts (2004)
Lifetime Achievement Award in Workplace Learning and Performance from the American Society for Training and Development (2005).
Selected by Foreign Policy and Prospect magazines as one of 100 most influential public intellectuals in the world (2005) (2008).
Doctor, *honoris causa,* University of Valparaiso (2006)
Doctor of Education, Hanyang University in South Korea (2007)
Fellow, American Educational Research Association (2008)
Selected by Ethisphere Magazine as one of the 100 most influential people in business ethics.
Selected by Thinkers 50 as one of the 50 most important and influential business thinkers.
Selected by the Wall Street Journal as one of the five most sought after thinkers in business.
Doctor, *honoris causa*, Wheelock College (2009)
Doctor, *honoris causa*, University of the Agean in Rhodes (2009)
Doctor, *honoris causa*, National University of Athens (2009)
Doctor, *honoris causa*, University of Sofia, Bulgaria (2009)
Common Sense Media Award for Outstanding Leadership in Education and Digital Ethics (2010)
Doctor, *honoris causa*, University of Ploiesti, Romania (2011)
Prince of Asturias Award for Social Sciences (2011)
Doctor, *honoris causa*, Camilo José Cela University, Spain (2011)
Honoree, FABBS Foundation "In Honor of…" program (2012)
Namesake of Howard Gardner Award in Social Sciences (awarded annually), Adams House, Harvard University
Honoree, Exceptional Research & Teaching Performance Award, The Annual International Weekend Book Festival Corporation (2013)

RESEARCH GRANTS

John Abele and the Argosy Foundation

Collaboration among Non Profit Organizations in Education (2009–Present)
The Atlantic Philanthropies
Harvard Project Zero (1994–2003)
Good Work in Philanthropy (2002–2005)
Good Work in Higher Education (2003–2005)
Interdisciplinary Studies (2000–2006)
Making Learning Visible (1995–2005)
The Bauman Foundation
Art Education in the Schools: A collaboration between The Isabella Stewart Gardner Museum and Harvard Project Zero (1992–1995).
GoodWork general support (1994–1995; 2002–2003).
Bank Street College of Education's Consortium of the Center for Technology in Education: The Use of Technology to Assess Student Learning (1988–1993)
The Carnegie Corporation:
The Development of Symbolization in Diverse Media (1979–1984)
The Development of Notational Symbolization (1982–1985)
Humane Creativity (1997–1998)
The Project on Good Work (1999–2001)
Trust and Trustworthiness in a Democratic Society (2006–2008)
Civic Trust and Engagement among Latino Immigrant Young Adults (2011-2012)
C.O.U.Q. Foundation: GoodWork Project on Trust (2005)
Count Anton von Faber-Castell, A Study of Quality in Our Time (2007–present)
Nathan Cummings Foundation:
Educational Effectiveness in Community Arts Organizations (1991–1995)
Humane Creativity and the Contemplative Mind (1996–1999)
Good Work and the Contemplative Mind (2001–2004)
Judy Dimon, Developing Minds in the Digital Media (2007–present)
J. Epstein Foundation:
A Study of Creativity Across Domains (1999)
Disciplinary and Interdisciplinary Studies in Good Work (2000–2001)
GoodWork Project general support (2001–2003)
Compromised Work (2003–2004)
Jeffrey Epstein: General Support (2001–2003; 2005–2006)
Fetzer Institute:
Humane Creativity and the Contemplative Mind (1997–2000)
Good Work and the Contemplative Mind (2001–2004)
The Ford Foundation:
Humane Creativity (1997–1998)
The Project on Good Work (1999–2005)
The J. Paul Getty Trust: A Study of Art Education and Human Development (1988–1989)
The William T. Grant Foundation:
The Early Detection of Children "At Risk" for School Problems (1988–1989)
Building on Children's Strengths: A Project Spectrum Intervention for Children At Risk for School Failure (1990–1991)
Project Spectrum: A Synthesis of Recent Work (1991–1993)
The William and Flora Hewlett Foundation:
Humane Creativity: Its Nature, Its Nurturance (1996–1999)
The Project on Good Work (1999–2005)

Christian A. Johnson Endeavor Foundation:
  Humane Creativity in the Young Professional (1998–2007)
Alexander Julian Foundation:
  Educational Effectiveness in Community Arts Organizations (1991–1993)
Thomas H. Lee Company: Support of Project Zero (1996–2004)
The Lilly Endowment:
  Portfolios of Student Projects: A New Approach to the Assessment of Student Growth and Learning (1989–1994)
The John D. and Catherine T. MacArthur Foundation:
  An Integrated Approach to the Development of Literacies in Elementary School Children (1990–1994)
  The ATLAS Design and Development Working Party (1993–1996)
  Ethical Perspectives on Young Persons' Use of Digital Media (2006–present)
The Markle Foundation:
  Children and the Worlds of Television (1976–1982)
  The Effects of Domain Knowledge on Children's Interactions with Computers (1985–1991)
The James S. McDonnell Foundation:
  The Development of Practical-Intelligence-for-Schooling (1988–1994)
Milton Fund Research Grant (1972–1973)
National Institute of Education:
  Harvard Project Zero: Processes and Component Skills in the Arts (1973–1978)
National Institute of Neurological Diseases and Stroke:
  Communication in Aphasia: Mechanisms and Rehabilitation (Principal Investigator 1973–1990)
National Science Foundation:
  Dissertation Grant (1970–1971)
  The Development of Metaphoric Operations (1977–1982)
New American School Development Corporation:
  ATLAS Communities: Authentic Teaching, Learning, and Assessment for all Students (1992–1997)
The Noyes Family Collaboration among Non Profit Organizations in Education (2009–2011)
The Pew Charitable Trusts:
  An Integrated Approach to the Development of Literacies in Elementary School Children (1990–1994)
Jesse Phillips Foundation: Studies of Humane Creativity in the Professions (1998)
The Rockefeller Brothers Fund:
  A Study of Chinese and American Arts Education (1984–1987)
  Project Spectrum: Quality Pre-School Education for "At Risk" Children (1989–1990)
  Project Spectrum: Connecting Children to Their Community (1991–1993)
  A Study of Trust and Trustworthiness in a Democratic Society (2006–present)
The Rockefeller Foundation:
  The Assessment of Learning in the Arts and Humanities (in collaboration with the Educational Testing Service) (1986–1991)
  National Dissemination of Arts PROPEL (1991–1993)
  The ATLAS Design and Development Working Party (1993–1996)
The Louise and Claude Rosenberg, Jr. Family Foundation
  The Origins of Humane Creativity (1996–2004)
The Ross Family Charitable Foundation: Humane Creativity (1995–1997)

The Sloan Foundation: A Study of the Cognitive Sciences (1981–1985)
The Spencer Foundation:
  Research Grant (1972–1973)
  The Development of Symbolization in Diverse Media (1974–1982)
  The Monitoring of Intellectual Propensities in Early Childhood (1984–1988)
  Enhancing Disciplinary Understanding in Teachers and Students (1989–1990)
  Enhancing Disciplinary Understanding in Teachers and Students: Second Phase (1990–1994)
  Project-centered Instruction for the Literacies in an After-school program for High-risk Children. (1992–1994)
  The ATLAS Design and Development Working Party (1993–1996)
  The Transmission of Excellence: A Study of Mentoring in Creative Work (1998–2001)
John Templeton Foundation:
  The Moral Underpinnings of Enduring Success (1998–2000)
Van Leer Foundation: The Realization of Human Potential (1979–1985)
Veterans Administration:
  Research and Education Grant (1972–1974)
  Symbolization in Aphasia and Related Disturbances (1978–1981)
  The Role of the Right Hemisphere in the Processing of Symbol Systems (1981–1986)
  Processes of Integration in Right-Hemisphere Damaged Patients (1986–1989)
  Language Problems in Right-Hemisphere Patients (1989–1993)
Andy Warhol Foundation:
  Educational Effectiveness in Community Arts Organizations (1991–1993)

PROFESSIONAL MEMBERSHIPS AND HONORARY SOCIETIES

Academy of Aphasia (Member, Governing Board, 1983–1988; Chair, 1986–1988)
International Neuropsychology Symposium (1976–1992)
Authors' Guild
American Association for the Advancement of Science (Fellow)
National Academy of Education (Vice President, 1993–1997)
American Academy of Arts and Sciences
Society for Research in Child Development
American Educational Research Association
American Academy of Political and Social Sciences
American Psychology Society
American Philosophical Society (and Council member, 2013-2016)
Royal Society for the Encouragement of Arts, Manufactures, and Commerce (England) (2007)

ADVISORY POSITIONS

Committee on Scholarly Communications with the People's Republic of China, (Member, 1989–1992)
Social Science Research Council, Committee on Development, Giftedness, and the Learning Process (Member, 1980–1989)
Social Science Research Council (Board of Directors, 1982–1988; Treasurer, 1985–1988)
Action for Children's Television, Resource Handbook on Children's Programming and the Arts (Editorial Board, 1975–1976)
Editorial Associate, The Behavioral and Brain Sciences, Journal of Speech and Hearing Disorders, Scientific Aesthetics, Review of Research in Visual Arts, Education, Language and

Communication, Studies in Visual Communication, Empirical Studies of the Arts, Brain and Cognition, Metaphor and Symbolic Behavior, New Ideas in Psychology

Research Center for Language and Semiotic Studies, Indiana University, (Advisory Board Member, 1982–1985; Chairman, 1983)

Psychology Today, (Consulting Editor, 1978–1985)

Prime Time Television—Film on Infancy, "Right from the Start" (1980)

Rockefeller Brothers Fund Awards in Art Education (Committee Member, 1980–1985)

Weston Woods Institute, (Member, Board of Directors, 1985–2000)

Institute for the Arts (Massachusetts) (Advisory Board, 1984–1986)

Developmental Review (Editorial Board, 1985–1996)

Academy of Aphasia (Member, Board of Governors, 1983–1988; Chairman, Board of Governors, 1986–1988)

National Aphasia Association (Executive Board, 1987–1991)

The Museum of Modern Art (Member Trustees Committee on Education, 1987–present)

The Harvard Education Letter (Editorial Board, 1988–1992)

Handbook of Neuropsychology (Editorial Board, 1982–1995)

A Study of the Lincoln Center Institute, funded by the Lila Wallace-Reader's Digest Fund (Senior Advisor, 1990–1996)

Creativity Research Journal (Editorial Board, 1990–present)

Boston Museum of Science (Overseer, 1992–2005)

Australian Children's Television Foundation, Lift-Off (Adviser, 1991–1993)

National Endowment for the Arts (Member, Advisory Council on Arts Education, 1991–1993)

National Advisory Committee of the Pew Charitable Trust Children's Initiative (Member, 1993–1994)

Gifted Education Newsletter (1995–2001)

Journal of Creative Behavior (Editorial Board, 1997–2001)

WGBH, A Science Odyssey (Advisory Board, 1996–2000)

Youth Venture (Advisory Board, 1997–2009)

Member, Distinguished Contributions to Educational Research, Award Committee of the American Educational Research Association (1998–2000)

Conservatory Lab Charter School, Boston, MA (Advisory Board, 1998–2002)

Member, Board of Directors, Spencer Foundation (2001–2011)

Member, Advisory Board, Commonweal (2000–2010)

Member, Advisory Board, City at Peace (2001–2010)

Member, Advisory Board, American Hebrew Academy (2002–2008)

Member, Editorial Advisory Board, Daedalus (2002–2008)

Member, Advisory Board, Facing History and Ourselves (2002–present)

Member, Advisory Board, Albert Schweitzer Fellowship (2003–2010)

Member, Advisory Board, Hong Kong Institute of Educational Research, The Chinese University of Hong Kong (2004–2009)

Member, Editorial Board, The International Journal of Thinking Skills and Creativity (2004–Present)

Advisor, International Mind, Brain, and Education Society (2004–Present)

Member, Advisory Board, Joan Shorenstein Center on the Press, Politics, and Public Policy, Kennedy School of Government (2004–Present)

Member, Artistic Advisory Committee, Asian Cultural Council (2004–2010)

Committee on Drawings, Museum of Modern Art (2005–Present)

Member, Board of Trustees, The Museum of Modern Art (New York) (April 2005–Present)

Educational Advisory Board, The John Simon Guggenheim Memorial Foundation (May 2005–Present)
Member, Board, Universe Foundation, Danfoss Universe, Denmark (2006–2010)
Member, Editorial Board, Thinking Skills and Creativity Journal (2006–2010)
NetAid Global Leadership Council (2006–2011)
Editorial Board, The International Journal of Learning and Media (2008–2011)
Faculty Associate, Edmond J. Safra Foundation Center for Ethics (2005–Present)
Member, Amherst College Board (2009–Present)
Member, Board of Overseers, Boston Landmarks Symphony Orchestra (2009–Present)
Member, Harvard University Committee on the Arts (HUCA) (2011–2013)
Member, Boston Children's Museum Advisory Board (2012–Present)
Member, Scientific Committee of the Reggio Children – Loris Malaguzzi Centre Foundation (2012-Present)
Member, Steering Committee, Center for Bioethics (2014-Present)

PREVIOUS EMPLOYMENT AND ACADEMIC POSITIONS

Piano teacher (1958–1969)
Elementary school teacher in Newton, Massachusetts, taught in "open classroom" of fifty 5–7 year-olds (1969)
Research Associate, Harvard Project Zero (1971–1973)
Consultant, Ford Foundation Program for Television and the Arts (1972)
Research Associate in Neurology, Boston University School of Medicine (1972–1975)
Research Associate, Boston Veterans Administration Medical Center (1972–1974)
Visiting Lecturer in Psychology, Clark University (1973)
Consultant, Council on Museum Education (1973)
Consultant on Evaluation, Rockefeller Fellowship Program in Education, Museums, and Community Studies (1974)
Visiting Specialist, Minneapolis Institute of Arts (1974–1975)
Consultant, Cemrel, Inc. (1975–1978)
Lecturer in Education, Harvard Graduate School of Education (1974–1986)
Member, Advisory Committee, Television Arts Project, Ford Foundation (1974–1975)
Co-Director, Intensive Summer Course in Developmental Psychology, Harvard Summer School (1975)
Member, Advisory Committee, Television Humanities Project (1975–1977)
Assistant Professor of Neurology, Boston University School of Medicine (1975–1979)
Clinical Investigator, Boston Veterans Administration Medical Center (1975–1978)
Consultant, National Geographic World Magazine (1976)
Senior Research Associate, Harvard Graduate School of Education (1977–1986)
Associate Professor of Neurology, Boston University School of Medicine (1979–1984)
Professor of Neurology, Boston University School of Medicine (1984–2005)
Faculty, International Summer Seminar for Structural and Semiotic Studies, University of Toronto (June, 1984)
Research Affiliate, Massachusetts Institute of Technology (1982–1986)
Research Psychologist, Boston Veterans Administration Medical Center (1978–1991)
Consulting Psychologist, Boston Veterans Administration Medical Center (1991–1993)
Co-Director, Harvard Project Zero (1972–2000)
Adjunct Research Professor of Neurology, Boston University School of Medicine (1987–2005)

Books and Monographs

1. Gardner, H. (1973). *The quest for mind: Jean Piaget, Claude Levi-Strauss, and the structuralist movement.* New York, NY: Knopf. Vintage paperback, 1974; coventure publication in England, 1975. Second Edition, 1981, University of Chicago Press. Translated into Italian and Japanese.

2. Gardner, H. (1973). *The arts and human development*. New York, NY: Wiley. Translated into Chinese and Portuguese. Second Edition, 1994, New York: Basic Books.

3. Gardner, H. (1975). *The shattered mind.* New York, NY: Knopf. Main Selection, *Psychology Today* Book Club, Jan. 1974; Vintage Paperback, 1976. Quality Paperback Book Club Selection. Routledge and Kegan Paul, British Edition. Translated into Japanese.

4. Gardner, H. (1979). *Developmental Psychology: An introduction*. Boston, MA: Little Brown, International Edition. Second Edition, 1982.

5. Gardner, H. (1980). *Artful scribbles: The significance of children's drawings.* New York, NY: Basic Books. *Behavioral Sciences* book service selection. English Edition: Jill Norman. Basic Books Paperback, 1982. Translated into Japanese, French, Spanish, and Chinese.

6. Gardner, H. (1982). *Art, mind, and brain: A cognitive approach to creativity.* New York, NY: Basic Books. Basic Books Paperback, 1984. Translated into Spanish, Hebrew, Japanese, Italian, Chinese, and Portuguese.

7. Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences.* New York, NY: Basic Books. Selected by five book clubs. British Edition, W. Heinemann. Basic Books Paperback, 1985. Tenth Anniversary Edition with new introduction, New York: Basic Books, 1993. Twentieth Anniversary Edition with new introduction. New York: Basic Books, 2004. Twenty-Fifth Anniversary Edition with new introduction. New York: Basic Books, 2011. Translated into Arabic, Chinese (Taiwan), Czech, French, German, Georgian, Hebrew, Italian, Korean, Norwegian, Portuguese, Slovenian, Spanish, Swedish, and Vietnamese. Selected by three book clubs. Selected by the Museum of Education for *Books of the Century* exhibit, Columbia, SC, 1999. Tenth Anniversary British Edition, London: HarperCollins (Fontana Press), 1993. Second Edition, Mexico: Fondo de Cultura Economica, 2005. Translated into Chinese, French, German, Hebrew, Italian, Japanese, Russian, and Spanish.

8. Gardner, H. (1985). *The mind's new science A history of the cognitive revolution.* New York, NY: Basic Books. Adopted by six book clubs. Basic Books Paperback with new Epilogue, 1987. Translated into Spanish, Japanese, French, German, Italian, Chinese, and Portuguese.

9. Gardner, H. (1989). *To open minds: Chinese clues to the dilemma of contemporary education.* New York, NY: Basic Books. Basic Books Paperback with new introduction, 1991. Translated into Italian and Korean.

10. Gardner, H. (1990). *Art education and human development.* Los Angeles, CA: The Getty Center for Education in the Arts. Translated into Italian and Spanish.

11. Gardner, H. (1991). *The unschooled mind: How children think and how schools should teach.* New York, NY: Basic Books. Tenth Anniversary Edition. New York: Basic Books, 2004. Twentieth Anniversary Edition with new introduction. New York: Basic Books, 2011. Adopted by the Reader's Subscription Book Club. British Edition, London: HarperCollins (Fontana Press), 1993. Translated into Spanish, Italian, German, Swedish, Norwegian, Chinese (R.C.), Chinese (Taiwan), Portuguese, Croatian, French, Danish, Korean, Greek and Russian.

12. Gardner, H. (1993). *Multiple intelligences: The theory in practice.* New York, NY: Basic Books. Selected by three book clubs. Excerpted in the magazine *Behinderte in Familie, Schule und Gesellschaft, vol. 2*, 1997. Abridged, Danish translation, 1997, Copenhagen: Glydendal Undervisning. Translated into Spanish, Portuguese, Italian, French, Chinese (Taiwan), Hebrew, Korean, Polish, Chinese (R.C.), Danish, Ukrainian, Japanese, Norwegian, Indonesian, Arabic, and Turkish.

13. Gardner, H. (1993). *Creating minds: An anatomy of creativity seen through the lives of Freud, Einstein, Picasso, Stravinsky, Eliot, Graham, and Gandhi.* New York, NY: Basic Books. Quality Paperback Book Club. Translated into Swedish, German, Spanish, Chinese (Taiwan), Chinese, Chinese (simplified), Portuguese, Italian, Slovenian, Korean, Polish, and French. 2011 Edition with updated preface and bibliography: New York, NY, Basic Books.

14. Gardner, H., with the collaboration of Laskin, E. (1995). *Leading minds: An anatomy of leadership.* New York, NY: Basic Books. British Edition: HarperCollins, 1996. Basic Books Paperback. Translated into German, Italian, Swedish, Portuguese, Chinese (Taiwan), Greek, Korean, Spanish, Japanese, and Romanian. 2011 Edition with updated preface and bibliography: New York, NY, Basic Books.

15. Gardner, H. (1997). *Extraordinary minds: Portraits of exceptional individuals and an examination of our extraordinariness.* New York, NY: Basic Books. British edition, London: Weidenfeld & Nicolson, 1997. Translated into French, Portuguese, Chinese (Taiwan), Chinese (PRC), Polish, Hungarian, Czech, Spanish, Korean, German, and Indonesian.

16. Gardner, H. (1997). *De Mange Intelligensers Paedagogik*. Copenhagen: Gyldendal Undervisning.

17. Gardner, H. (1999). *The disciplined mind: What all students should understand*. New York, NY: Simon and Schuster. Excerpted in *The Futurist, 34,* (2), 30–32, (Mar/Apr 2000). Paperback edition with new afterword "A Tale of Two Barns": New York, NY.

Penguin Putnam. Translated into Portuguese, German, Spanish, Chinese (Taiwan), Italian, Swedish, Korean, Hebrew, Danish, Turkish, Romanian and Croatian

18. Gardner, H. (1999). *Intelligence reframed: Multiple intelligences for the 21st Century.* New York, NY: Basic Books. Translated into German, Spanish, Korean, Hebrew, Chinese (SC), Swedish, Portuguese, Japanese, Italian, Bulgarian, Polish, Turkish, Dutch and Croatian.

19. Gardner, H. (1999). *Çoklu Zekâ: Görüşmeler ve Makaleler* (Multiple Intelligences: Interviews and Essays). C. Vickers (Ed.). Istanbul: Enka Okullari.

20. Gardner, H. (2002). *Howard Gardner in Hong Kong*. L. Lo (Ed.). Hong Kong: Hong Kong Institute of Educational Research.

21. Gardner, H. (2004) *Changing minds: The art and science of changing our own and other people's minds.* Boston, MA: Harvard Business School Press. Paperback edition (2006). Awarded Strategy + Business's Best Business Books of the Year (2004). Translated into French, Spanish, Japanese, Danish, Dutch, Indonesian, Italian, Korean, Portuguese, Greek, Polish, Russian, Turkish, Chinese (CC), Chinese (SC), Chinese (short version), Romanian, Norwegian, and Croatian. 2011 Edition with updated preface and bibliography: New York, NY, Basic Books.

22. Gardner, H. (2005). *Las cincos mentes del futuro: Un ensayo educativo.* Barcelona: Paidos Asterico. Reviewed by Angel de Juanas in Revista de Psicología y Educación (2005), Vol. 1, No. 1., Universidad Complutense Madrid.

23. Gardner, H. (2006). *The development and education of the mind: The collected works of Howard Gardner.* London, UK: Routledge. Translated into Italian, Spanish.

24. Gardner, H. (2006). *Multiple intelligences: New horizons.* New York, NY: Basic Books. Translated into: Romanian, Chinese (SC), Vietnamese, Indonesian, Korean, and Bulgarian.

25. Gardner, H. (2006) *Howard Gardner under fire.* In Jeffrey Schaler, (Ed.). Chicago, Illinois: Open Court Publishing.

26. Gardner, H. (2007). *Five Minds for the future*. Boston, MA: Harvard Business School Press. Translated into Arabic, Korean, Italian, Japanese, Danish, Chinese (CC), Chinese (SC), Norwegian, Portuguese, Polish, Russian, Spanish, Swedish, Turkish, Romanian, French, Indonesian, Thai, Vietnamese, Georgian, and Persian.

27. Gardner, H. (2010). *Uluslararasi Yasayan Kuramcilar Konferani*. Burdur, Turkey: Mehmet Akif Ersoy Universitesi.

28. Gardner, H. (2011). *Truth, beauty, and goodness reframed: Educating for the virtues in the 21st century*. New York, NY: Basic Books. Translated into: Chinese (simple characters), French, Italian, Korean, Portuguese, Romanian, Spanish and Turkish.

29. Gardner, H. (2011). *Truth, beauty, and goodness reframed: Educating for the virtues in the era of truthiness and twitter*. (Paperback edition, with new preface). New York, NY: Basic Books.

30. Gardner, H. and Davis, K. (2013). *The App Generation: How today's youth navigate identity, intimacy, and imagination in a digital world*. New Haven, CT: Yale University Press. Translated into: Italian, Korean, Spanish, Romanian, and Chinese (simple characters).

Coauthored Books and Monographs

1. Grossack, M., & Gardner, H. (1970). *Man and men: Social psychology as social science.* Scranton, PA: International Textbook.

2. Gardner, H., Kornhaber, M., & Wake, W. (1996). *Intelligence: Multiple perspectives*. Fort Worth, TX: Harcourt Brace. Translated into Croatian, Korean, Portuguese, and Polish.

3. Williams, W., Blythe, T., White, N., Li, J., Sternberg, R., & Gardner, H. (1996). *Practical intelligence for school.* New York: HarperCollins.

4. Gardner, H., Csikszentmihalyi, M., & Damon, W. (2001). *Good work: When excellence and ethics meet.* New York, NY: Basic Books. Paperback edition with Afterword (2002). Chosen as a Book of Distinction by the Templeton Foundation. Translated into Korean, Spanish, German, Portuguese, Swedish, Chinese, Romanian, and Hungarian. Selected as one of ten most important books in Hong Kong (2003).

5. Fischman, W., Solomon, B., Greenspan, D., & Gardner, H. (2004). *Making good: How young people cope with moral dilemmas at work*. Cambridge, MA: Harvard University Press. Translated into Spanish, Korean, and Chinese.

6. James, C., Davis, K., Flores, A., Francis, J., Pettingill, L., Rundle, M., & Gardner, H. (2009) *Young people, ethics, and the new digital media: A synthesis from the GoodPlay Project*. Cambridge, MA: The MIT Press.

Edited Books and Journal Volumes

1. Gardner, H., & Gardner, J. (Eds.). (1973). *Classics in psychology* (Vols. 1-42). New York, NY: Arno Press.

2. Gardner, J., & Gardner, H. (Eds.). (1975). *Classics in child psychology* (Vols. 1-32). New York, NY: Arno Press.

3. Winner, E., & Gardner, H. (Eds.). (1979). Fact, fiction, and fantasy in childhood. *New Directions for Child Development (Vol. 6), 88.*

4. Kelly, H., & Gardner, H. (Eds.). (1981). Viewing children through television. *New Directions for Child Development* (Vol. 13).

5. Gardner, H., & Perkins, D.N. (1988, Spring). Art, mind, and education. *Journal of Aesthetic Education, 22* (1).

6. Wolf, C., & Gardner, H. (1989, Spring). Arts education in China. *Journal of Aesthetic Education*, 23 (1).

7. Feldman, D., Csikszentmihalyi, M., & Gardner, H. (1994). *Changing the world: A framework for the study of creativity.* Westport, CT: Praeger Publishers.

8. Chen, J-Q., Krechevsky, M., and Viens, J., & E. Isberg. (1998). Building on children's strengths: The experience of project spectrum. *Project Zero Frameworks for Early Childhood Education*, 1. H.Gardner, D. H. Feldman, & M. Krechevsky (Gen. Eds.), New York, NY: Teachers College Press. Translated into Chinese, Italian, Spanish, and Portuguese.

9. Chen, J-Q., with E. Isberg & M. Krechevsky. (1998). Project spectrum early learning activities. *Project Zero Frameworks for Early Childhood Education, 2.* H. Gardner, D. H. Feldman, & M. Krechevsky (Gen. Eds.). New York, NY: Teachers College Press. Translated into Chinese, Italian, Spanish, and Portuguese.

10. Krechevsky, M. (1998). Project Spectrum preschool assessment handbook. *Project Zero Frameworks for Early Childhood Education,* 3. H. Gardner, D. H. Feldman, & M. Krechevsky (Gen. Eds.), New York, NY: Teachers College Press. Translated into Chinese, Italian, Spanish and Portuguese.

11. Gardner, H., & Shulman, L. (Gen. Eds.). (2005). On professions and professionals. *Daedalus, 13(*43), 13-18.

12. Gardner, H. (Ed.). (2007). *Responsibility at work: How leading professionals act (or don't act) responsibly*. San Francisco, CA: Jossey-Bass. Translated into Chinese (SC), Korean, and Portuguese.

13. Craft, A., Gardner, H., & Claxton, G. (2007). *Creativity, wisdom, and trusteeship*. Thousand Oaks, CA: Corwin Press. Translated into Chinese (Taiwan) 2010.

14. Chen J., Moran, S., & Gardner, H. (2009). *Multiple intelligences around the world*. San Francisco, CA: Jossey Bass. Translated into Portuguese.

15. Gardner, H. (Ed). (2010). *GoodWork: Theory and Practice*. Cambridge, MA. http://www.thegoodproject.org/the-goods/books/goodwork-theory-and-practice/

16. Noonan, J., & Gardner, H. (2014). Creative artists and creative scientists: Where does the buck stop? In S. Moran, D. Cropley, & J.C. Kaufman (Eds.), *The Ethics of Creativity*. New York: Palgrave Macmillan.

Non-print media

1. Kagan, J., & Gardner, H. (1972). *Infancy, language, cognition: Three films on child development.* (Film). New York, NY: Harper and Row. Winner of Cine Golden Eagle, Chris Statuette, American Film Festival Screening Award. Translated for Italian National Television.
2. Gardner, H., & DiNozzi, R. (Producer). (1996). *MI: Intelligence, understanding, and the mind,* Los Angeles CA: Into the Classroom Media. Related material: Howard Gardner: Answers.
3. Gardner, H., with M. Levine. (1997). *Reaching minds.* (Audiocassette series). Chapel Hill, NC: All Kinds of Minds.
4. Gardner, H., & DiNozzi, R. (Producer). (1998). *Creativity and leadership: Making the mind extraordinary*. Los Angeles, CA: Into the Classroom Media.
5. Gardner, H. (2001). Minds and understanding, in Harvard Project Zero *Educating for understanding* (video set). Port Chester, NY: National Professional Resources (Tape 3).
6. Gardner, H., & DiNozzi, R. (Producer). (2002). *M.I. millennium: multiple intelligences for the new millennium*. Los Angeles, CA: Into the Classroom Media.
7. Csikszentmihalyi, M., & R. DiNozzi (Producer). (2003). *Flow*: Interview by Howard Gardner. Los Angeles, CA: Into the Classroom Media.
8. Foos, R., Spevak, A., Clark, J, DiNozzi, R. (Producers), & Gardner, H. (Host). (2011). *Extraordinary Minds* [5 Part DVD Series]. Los Angeles, CA: Shout Factory, LLC & Ambassador Entertainment Inc.
9. Goleman, D. (Producer). (2012). *Leadership: A Master Class*. Florence, MA: More Than Sound, LLC.
10. Gardner, H., & DiNozzi, R. (Producer). (2013). *Learning and the Mind,* Los Angeles, CA: Into the Classroom Media. Includes *Multiple Intelligences* Instructor's Package e-book.

Articles

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Kinesthetic
Spatial
Ageless
SCHOOLS
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Evolutionary
Assessment
Curriculum
Knowing
Linguistic
GoodWorks
Research
Vision
Learning
Harvard
HumanAbilities
HOWARDGARDNER
MULTIPLEINTELLIGENCES
ProjectSpectrum
Instruction
Existential
FRAMESOFMIND
Logical-Mathematical
Intrapersonal
Adults
ProjectZero
Musical
HumanCognition
Thinking
Timeless
ArtsPropel

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July 12, 2010

Dear Brock International Prize in Education Jurors:

Have you ever pondered the thought that a multitude of intelligences may exist, rather than the notion of one single intelligence? Different from the psychometric and behaviorists eras when it was generally believed that intelligence was a single inherited entity, have you explored research which suggests that individual intelligences exist, each having its own strengths and constraints? Have you questioned the notion that intelligence results from a single factor, and is simply measured by IQ tests? If you can answer yes to any of these questions, you may already be familiar with or have aligned your thinking with Multiple Intelligence Theory and the renowned work of Howard Gardner. I am proud to present the name Howard Gardner as my nomination for the 2011 Brock Prize in Education.

Howard Gardner is the Hobbs Professor of Cognition and Education at the Harvard Graduate School of Education. His work is best described as an effort to understand and explicate the broadest and highest reaches of human thought, with a particular focus on intellectual capacity. He is a synthesizer of a vast amount of research and theory. He is best known in educational circles for his Theory of Multiple Intelligences, a critique of the notion that there exists but a single human intelligence that can be assessed by standard psychometric instruments. Gardner has authored 25 books, which have been translated into 28 languages, and over 450 articles in scholarly journals in the areas of developmental psychology, neuropsychology, education, aesthetics, ethics, and the social sciences. He has received honorary degrees from twenty-two colleges and universities in addition to his PhD from Harvard. Gardner was named one of the one hundred most influential public intellectuals in the world by Foreign Policy and Prospect magazine in 2008.

During the past two decades, Gardner and colleagues at Project Zero have been involved in the design of performance based assessments, education for understanding, the use of multiple intelligences to achieve more personalized curriculum, instruction, and pedagogy, and the quality of interdisciplinary efforts in education. Project Zero carries the reputation of the oldest and most respected educational research site in the world. Currently, Dr. Gardner is investigating the nature of trust in contemporary society and ethical dimensions entailed in the use of the new digital media. Among new research undertakings is a study of effective collaboration among non-profit institutions in education and the study of conceptions of quality, nationally and internationally. The "Good Work" project focuses on the benevolent uses to which human intelligence, creativity, and leadership can be applied. The large scale, multi-site effort identifies individuals and institutions that exemplify good work - work that is quality, socially responsible, and meaningful to practitioners - to determine how to best increase the incidence of good work in our society.

Howard Gardner exemplifies the criteria used for awarding the Brock Prize. His work has made a profound impact on education although Gardner himself states that he did not initially spell out the implications of his theory for educators, claiming that psychology does not directly dictate education, it merely helps one to understand the conditions within which education takes place. Rather than providing a specific approach, formula, or template for education, Gardner's research causes anyone involved in education to consider the multiplicity of intelligence and the implications for learning, teaching, curriculum and assessment. Simply, it demands that educators check their own assumptions about intelligence. Because of Gardner's work, educators are called to develop a broader vision of education and develop flexible programs, which support what teachers experience daily: that students think and learn in many ways. The impact of Gardner's work spans pre school learning to adult education and is applicable around the globe. I cannot think of another theory or body of educational research, which has had and continues to have the impact of Gardner's Multiple Intelligence Theory. As a teacher, a building administrator and a district superintendent, I know Gardner's work has significantly impacted my thinking and my practice and I believe it will continue to impact generations of educators. In our complex global world, we must rely on the talents and abilities of all individuals and Gardner's work will remain timeless.

I urge you to look favorably on this nomination. The name Howard Gardner most definitely belongs on the Brock International Prize in Education list of Laureates. His work deserves recognition, his name deserves the honor, and the prestigious Brock list of Laureates will be greatly enhanced by the addition of Gardner's name. Thank you for your consideration of this most deserving nominee.

Sincerely,

Patricia E Neudecker

Patricia E. Neudecker, Ph.D.
Superintendent of Schools
2010-2011 President Elect, AASA

March 2010

CURRICULUM VITAE

Howard E. Gardner

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EDUCATION

Harvard College, 1961–1965; A.B. in Social Relations
London School of Economics, 1965–1966; Reading in Philosophy and Sociology
Harvard University, 1966–1971; Ph.D. in Social Psychology (Developmental Psychology)
Harvard Medical School and Boston University Aphasia Research Center, 1971–1972; Postdoctoral Fellow

CURRENT POSITIONS

John H. and Elisabeth A. Hobbs Professor of Cognition and Education, Harvard Graduate School of Education (1998–present)
Professor of Education, Harvard Graduate School of Education (1986–1998)
Adjunct Professor of Psychology, Harvard University (1991–present)
Chair, Project Zero Steering Committee (1995–present); Co-Director, Project Zero (1972–2000); Senior Director (2000–present).

ACADEMIC HONORS AND FELLOWSHIPS

Phi Beta Kappa, Junior Year (1964)
A.B. summa cum laude (1965)
Frank Knox Fellowship, London School of Economics (1965–1966)
NIMH Pre-doctoral Fellowship (1966–1971)
Ph.D. Examination passed with Distinction (1968)
Social Science Research Council Fellow (1971–1972)
Livingston Fund Fellowship (1972–1974)
Claude Bernard Science Journalism Award (1975)
MacArthur Prize Fellowship (1981–1986)
National Psychology Award for Excellence in the Media of the American Psychological Association, for the book, Frames of Mind (1984)
William James Award, American Psychological Association (1987)
Educational Press of America, Distinguished Achievement Award (1989)
Who's Who in America (1989–present)
University of Louisville Grawemeyer Award in Education (1990)
Wyoming Seminary Distinguished Alumnus Award (1990)

Common Sense Media Award for Outstanding Leadership in Education and Digital Ethics (2010)

Recipient of 26 honorary degrees, from institutions in Bulgaria, Canada, Chile, Greece, Ireland, Israel, Italy, and South Korea, and the United States.

Research Grants

Recipient of grants from many governmental agencies and foundations.

Professional Memberships and Honorary Societies

Academy of Aphasia (Member, Governing Board, 1983-1988; Chair, 1986-1988)
American Association for the Advancement of Science (Fellow)
National Academy of Education (Vice President, 1993-1997)
American Academy of Arts and Sciences
Society for Research in Child Development
American Educational Research Association
American Academy of Political and Social Sciences
American Philosophical Society
American Psychological Society
Royal Society for the Encouragement of Arts, Manufactures, and Commerce (England)

Books and Monographs

1. Gardner, H. (1973). *The quest for mind: Jean Piaget, Claude Levi-Strauss, and the structuralist movement.* New York: Knopf. Vintage paperback, 1974; coventure publication in England, 1975. Translated into Italian and Japanese. Second Edition, 1981, University of Chicago Press.

2. Gardner, H. (1973). *The arts and human development.* New York: Wiley. Translated into Chinese and Portuguese. Second Edition, 1994, New York: Basic Books.

3. Gardner, H. (1975). *The shattered mind.* New York: Knopf. Main Selection, *Psychology Today* Book Club, Jan. 1974; Vintage Paperback, 1976. Quality Paperback Book Club Selection. Routledge and Kegan Paul, British Edition. Translated into Japanese.

4. Gardner, H. (1979). *Developmental Psychology: An introduction.* Boston: Little Brown, International Edition. Second Edition, 1982.

5. Gardner, H. (1980). *Artful scribbles: The significance of children's drawings.* New York: Basic Books. *Behavioral Sciences* book service selection. English Edition: Jill Norman. Basic Books Paperback, 1982. Translated into Japanese, French, Spanish, and Chinese.

6. Gardner, H. (1982). *Art, mind, and brain: A cognitive approach to creativity.* New York: Basic Books. Basic Books Paperback, 1984. Translated into Spanish, Hebrew, Japanese, Italian, Chinese, and Portuguese.

7. Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences.* New York: Basic Books. Selected by five book clubs. British Edition, W. Heinemann. Translated into Spanish, Japanese, Italian, Hebrew, Chinese, French, German, and Russian. Basic Books Paperback, 1985. Tenth Anniversary Edition with new introduction, New York: Basic Books, 1993. Twentieth Anniversary Edition with new introduction. New York: Basic Books, 2004. Translated into Swedish, German, Portuguese, Spanish, Italian, Chinese (Taiwan), French, Norwegian, Hebrew, Slovenian, Korean, Vietnamese, and Czech. Selected by three book clubs. Selected by the Museum of Education for *Books of the Century* exhibit, Columbia, SC, 1999. Tenth Anniversary British Edition, London: HarperCollins (Fontana Press), 1993. Second Edition, Mexico: Fondo de Cultura Economica, 2005.

8. Gardner, H. (1985). *The mind's new science: A history of the cognitive revolution.* New York: Basic Books. Translated into Spanish, Japanese, French, German, Italian, Chinese, and Portuguese. Adopted by six book clubs. Basic Books Paperback with new Epilogue, 1987.

9. Gardner, H. (1989). *To open minds: Chinese clues to the dilemma of contemporary education.* New York: Basic Books. Translated into Italian. Basic Books Paperback with new introduction, 1991.

10. Gardner, H. (1990). *Art education and human development.* Los Angeles: The Getty Center for Education in the Arts. Translated into Italian and Spanish.

11. Gardner, H. (1991). *The unschooled mind: How children think and how schools should teach.* New York: Basic Books. Tenth Anniversary Edition. New York: Basic Books, 2004. Translated into Spanish, Italian, German, Swedish, Norwegian, Chinese (R.C.), Chinese (Taiwan), Portuguese, Croatian, French, Danish, and Greek. Adopted by the Reader's Subscription Book Club. British Edition, London: HarperCollins (Fontana Press), 1993.

12. Gardner, H. (1993). *Multiple intelligences: The theory in practice.* New York: Basic Books. Translated into Spanish, Portuguese, Italian, French, Chinese (Taiwan), Hebrew, Korean, Polish, Chinese (R.C.), Danish, Ukranian, Japanese and Norwegian. Selected by three book clubs. Excerpted in the magazine *Behinderte in Familie, Schule und Gesellschaft, vol. 2*, 1997. Abridged, Danish translation, 1997, Copenhagen: Glydendal Undervisning

13. Gardner, H. (1993). *Creating minds: An anatomy of creativity seen through the lives of Freud, Einstein, Picasso, Stravinsky, Eliot, Graham, and Gandhi.* New York: Basic Books. Quality Paperback Book Club. Translated into Swedish, German, Spanish, Chinese (Taiwan), Portuguese, Italian, Slovenian, Korean, Polish, and French.

14. Gardner, H., with the collaboration of Laskin, E. (1995). *Leading minds: An anatomy of leadership.* New York: Basic Books. Translated into German, Italian, Swedish,

Portuguese, Chinese (Taiwan), Greek, Korean, Spanish, and Japanese. British Edition: HarperCollins, 1996. Basic Books Paperback.

15. Gardner, H. (1997). *Extraordinary minds: Portraits of exceptional individuals and an examination of our extraordinariness.* New York: Basic Books. British edition, London: Weidenfeld & Nicolson, 1997. Translated into French, Portuguese, Chinese (Taiwan), Chinese (PRC), Polish, Hungarian, Czech, Spanish, Korean, German, and Indonesian.

16. Gardner, H. (1997). *De Mange Intelligensers Paedagogik.* Copenhagen: Gyldendal Undervisning.

17. Gardner, H. (1999). *The disciplined mind: What all students should understand.* New York: Simon and Schuster. Translated into Portuguese, German, Spanish, Chinese (Taiwan), Italian, Swedish, Korean, Hebrew, Danish, Turkish, Romanian and Croatian. Excerpted in *The Futurist, 34,* (2), 30–32, Mar/Apr 2000. Paperback edition with new afterword, "A Tale of Two Barns": Penguin Putnam, New York, 2000.

18. Gardner, H. (1999). *Intelligence reframed: Multiple intelligences for the 21st Century.* New York: Basic Books. Translated into German, Spanish, Korean, Hebrew, Chinese, Swedish, Portuguese, Japanese, Italian, Bulgarian, Polish, Turkish, Dutch and Croatian.

19. Gardner, H. (1999). *Çoklu Zekâ: Görüşmeler ve Makaleler* (Multiple Intelligences: Interviews and Essays). C. Vickers (Ed.). Istanbul: Enka Okullari.

20. Gardner, H., Csikszentmihalyi, M. and Damon, W. (2001). *Good Work: When excellence and ethics meet.* New York: Basic Books. Paperback edition with Afterword (2002). Translated into Korean, Spanish, German, Portuguese, Swedish, Chinese, Romanian, and Hungarian. Selected as one of ten most important books in Hong Kong (2003). Chosen as a Book of Distinction by the Templeton Foundation.

21. Gardner, H. (2002). *Howard Gardner in Hong Kong.* L. Lo (Ed.). Hong Kong: Hong Kong Institute of Educational Research, May 2002.

22. Gardner, H. (2004) *Changing minds: The art and science of changing our own and other people's minds.* Boston: Harvard Business School Press. Paperback edition (2006). Translated into French, Spanish, Japanese, Danish, Dutch, Indonesian, Italian, Korean, Portuguese, Greek, Polish, Russian, Turkish, Chinese (CC), Chinese (SC), Romanian, Norwegian, and Croatian. Awarded Strategy + Business's Best Business Books of the Year (2004).

23. Gardner, H. (2005). *Las cincos mentes del futuro: Un ensayo educativo.* Barcelona: Paidos Asterico. Reviewed by Angel de Juanas in Revista de Psicología y Educación (2005), Vol. 1, No. 1., Universidad Complutense Madrid.

24. Gardner, H. (2006). *The development and education of the mind: The collected works of Howard Gardner.* London: Routledge. Translated into Italian, Spanish.

25. Gardner, H. (2006). *Multiple Intelligences: New Horizons.* New York: Basic Books. Translated into: Romanian, Chinese. Gardner, H. (2006).

26. *Howard Gardner under fire.* In Jeffrey Schaler (Ed.). Illinois: Open Court Publishing.

27. Gardner, H. (2007). *Five minds for the future.* Boston: Harvard Business School Press.Translated into Arabic, Korean, Italian, Japanese, Danish, Chinese (CC), Chinese (SC), Norwegian, Portuguese, Polish, Russian, Spanish, Swedish, Turkish, Romanian, French, Indonesian, and Thai.

Recent Edited Books

1. Gardner, H. (2007). *Responsibility at work: How leading professionals act (or don't act) responsibly.* San Francisco: Jossey-Bass. Translated into Portuguese

2. Chen J., Moran, S., and Gardner, H. (2009). *Multiple intelligences around the world.* San Francisco: Jossey Bass.

Author of over 450 articles in scholarly journals in the areas of developmental psychology, neuropsychology,
education, aesthetics, ethics, and the social sciences. Author of over 300 topical articles, introductions,
and book reviews in wide-circulation publications

Chapter 1

IN A NUTSHELL

The original scene: Paris, 1900—La Belle Epoque. The city fathers approached a talented psychologist named Alfred Binet with an unusual request. Families were flocking to the capital city from the provinces, and a good many of their children were having trouble with their schoolwork. Could Binet devise some kind of a measure that would predict which youngsters would succeed and which would fail in the primary grades of Paris schools?

As almost everybody knows, Binet succeeded. In short order, his discovery came to be called the "intelligence test"; his measure, the IQ, for "intelligence quotient" (mental age divided by chronological age and multiplied by 100). Like other Parisian fashions, the IQ soon made its way to the United States, where it enjoyed a modest success until World War I, when it was used to test over one million American military recruits. With its use by the U.S. armed forces, and with America's victory in the conflict, Binet's invention had truly arrived. Ever since, the IQ test has looked like psychology's biggest success—a genuinely useful scientific tool.

What is the vision that led to the excitement about IQ? At least in the West, people had always relied on intuitive assessments of how smart other people were. Now intelligence seemed to be quantifiable. Just as you could measure someone's actual or potential height, now, it seemed, you could measure someone's actual or potential intelligence. We had one dimension of mental ability along which we could array everyone.

The search for the perfect measure of intelligence has proceeded apace. Here, for example, are some quotations from an advertisement for one such test:

> Need an individual test which quickly provides a stable and reliable estimate of intelligence in four or five minutes per form? Has three forms? Does not depend on verbal production or subjective scoring? Can be used with the severely physically handicapped (even paralyzed) if they can signal yes or no? Handles two-year-olds and superior adults with the same short series of items and the same format? Only $16.00 complete.

Now, a single test that can do all that is quite a claim. American psychologist Arthur Jensen suggests that we could look at reaction time to assess intelligence: a set of lights go on; how quickly can the subject react? British psychologist Hans Eysenck recommends that investigators of intelligence look directly at brain waves. And with the advent of the gene chip, many look forward to the day when we can glance at the proper gene locus on the proper chromosome, read off someone's IQ, and confidently predict his or her life chances.

There are also, of course, more sophisticated versions of the IQ test. One of them is the SAT. Its name originally stood for Scholastic Aptitude Test, although with the passage of time, the meaning of the acronym has been changed—it became the Scholastic Assessment Test, and, more recently, it has been reduced to the plain old SAT—just the initials. The SAT purports to be a similar kind of measure, and if you add up a person's verbal and math scores, as is often done, you can rate him or her along a single intellectual dimension. (In 2005, a writing component was added.) Programs for the gifted, for example, often use that kind of measure; if your IQ is in excess of 130, you're admitted to the program—if it's 129, "Sorry, no room at the inn."

Along with this one-dimensional view of how to assess people's minds comes a corresponding view of school, which I will call the "uniform view." A uniform school features a core curriculum—a set of facts that everyone should know—and very few electives. The better students, perhaps those with higher IQs, are allowed to take courses that call on critical reading, calculation, and thinking skills. In the uniform school, there are regular assessments, using paper and pencil instruments, of the IQ or SAT variety. These assessments yield reliable rankings of people; the best and the brightest get into the better colleges, and perhaps—but only perhaps—they will also get better rankings in life. There is no question that this approach works well for certain people—schools such as Harvard and Stanford are eloquent testimony to that. Since this measurement and selection system is clearly meritocratic in certain respects, it has something to recommend it.

The uniform school sounds fair—after all, everyone is treated in the same way. But some years ago it occurred to me that this supposed rationale was completely unfair. The uniform school picks out and is addressed to a certain kind of mind—we might call it provisionally the IQ or SAT mind. I sometimes call it the mind of the future law professor. The more your mind resembles that of the legendary law professor Dr. Charles W. Kingsfield Jr., played on-screen by John Houseman in *The Paper Chase*, the better you will do in school and the more readily you will handle IQ-SAT-type measures. But to the extent that your mind works differently—and not that many of us are cut out to be law professors—school is certainly not fair to you.

I would like to present an alternative vision—one based on a radically different view of the mind, and one that yields a very different view of school. It is a pluralistic view of mind, recognizing many different and discrete facets of cognition, acknowledging that people have different cognitive strengths and contrasting cognitive styles. I introduce the concept of an individual-centered school that takes this multifaceted view of intelligence seriously. This model for a school is based in part on findings from sciences that did not even exist in Binet's time: cognitive science (the study of the mind) and neuroscience (the study of the brain). One such approach I have called the theory of multiple intelligences. Let me tell you something about its sources and claims to lay the groundwork for the discussions on education in the chapters that follow.

I introduce this new point of view by asking you to suspend for a moment the usual judgment of what constitutes intelligence, and let your thoughts run freely over the capabilities of human beings—perhaps those that would be picked out by the proverbial visitor from Mars. Your mind may turn to the brilliant chess player, the world-class violinist, and the champion athlete; certainly, such outstanding performers deserve special consideration. Are the chess player, violinist, and athlete "intelligent" in these pursuits? If they are, then why do our tests of "intelligence" fail to identify them? If they are not intelligent, what allows them to achieve such

astounding feats? In general, why does the contemporary construct of intelligence fail to take into account large areas of human endeavor?

To approach these questions I introduced the theory of multiple intelligences (MI) in the early 1980s. As the name indicates, I believe that human cognitive competence is better described in terms of a set of abilities, talents, or mental skills, which I call *intelligences*. All normal individuals possess each of these skills to some extent; individuals differ in the degree of skill and in the nature of their combination. I believe this theory of intelligence may be more humane and more veridical than alternative views of intelligence and that it more adequately reflects the data of human "intelligent" behavior. Such a theory has important educational implications.

WHAT CONSTITUTES AN INTELLIGENCE?

The question of the optimal definition of intelligence looms large in my inquiry. And it is here that the theory of multiple intelligences begins to diverge from traditional points of view. In the classic psychometric view, intelligence is defined operationally as the ability to answer items on tests of intelligence. The inference from the test scores to some underlying ability is supported by statistical techniques. These techniques compare responses of subjects at different ages; the apparent correlation of these test scores across ages and across different tests corroborates the notion that the general faculty of intelligence, called *g* in short, does not change much with age, training, or experience. It is an inborn attribute or faculty of the individual.

Multiple intelligences theory, on the other hand, pluralizes the traditional concept. An intelligence is a computational capacity—a capacity to process a certain kind of information—that is founded on human biology and human psychology. Humans have certain kinds of intelligences, whereas rats, birds, and computers foreground other kinds of computational capacities. An intelligence entails the ability to solve problems or fashion products that are of consequence in a particular cultural setting or community. The problem-solving skill allows one to approach a situation in which a goal is to be obtained and to locate the appropriate route to that goal. The creation of a cultural product allows one to capture and transmit knowledge or to express one's conclusions, beliefs, or feelings. The problems to be solved range from creating an end for a story to anticipating a mating move in chess to repairing a quilt. Products range from scientific theories to musical compositions to successful political campaigns.

MI theory is framed in light of the biological origins of each problem-solving skill. Only those skills that are universal to the human species are considered (again, we differ from rats, birds, or computers). Even so, the biological proclivity to participate in a particular form of problem solving must also be coupled with the cultural nurturing of that domain. For example, language, a universal skill, may manifest itself particularly as writing in one culture, as oratory in another culture, and as the secret language composed of anagrams or tongue twisters in a third.

Given the desideratum of selecting intelligences that are rooted in biology and that are valued in one or more cultural settings, how does one actually identify an intelligence? In coming up with the list, I reviewed evidence from various sources: knowledge about normal development and development in gifted individuals; information about the breakdown of cognitive skills under conditions of brain damage; studies of exceptional populations, including prodigies, savants, and autistic children; data about the evolution of cognition over the millennia; cross-cultural accounts of cognition; psychometric studies, including examinations of correlations among tests; and psychological training studies, particularly measures of transfer and generalization across tasks. Only those candidate intelligences that satisfied all or a healthy majority of the criteria were selected as bona fide intelligences. A more complete discussion of each of these criteria and of the intelligences that were initially identified may be found in *Frames of Mind* (1983b), especially chapter 4. In that foundational book I also consider how the theory might be disproved and compare it with competing theories of intelligence. An update of some of these discussions is presented in *Intelligence Reframed* (1999a), and in the chapters that follow.

In addition to satisfying the aforementioned criteria, each intelligence must have an identifiable core operation or set of operations. As a neurally based computational system, each intelligence is activated or triggered by certain kinds of internal or external information. For example, one core of musical intelligence is the sensitivity to pitch relations, and one core of linguistic intelligence is the sensitivity to the phonological features of a language.

An intelligence must also be susceptible to encoding in a symbol system—a culturally contrived system of meaning that captures and conveys important forms of information. Language, picturing, and mathematics are but three nearly worldwide symbol systems that are necessary for human survival and productivity. The relationship of an intelligence to a human symbol system is no accident. In fact, the existence of a core computational capacity anticipates the actual or potential creation of a symbol system that exploits that capacity. While it may be possible for an intelligence to develop without an accompanying symbol system, a primary characteristic of human intelligence may well be its gravitation toward such an embodiment.

THE ORIGINAL SET OF INTELLIGENCES

Having sketched the characteristics and criteria for an intelligence, I turn now to a brief consideration of each of the intelligences that were proposed in the early 1980s. I begin each sketch with a thumbnail biography of a person who demonstrates an unusual facility with that intelligence. (These biographies were developed chiefly by my longtime colleague Joseph Walters.) The biographies illustrate some of the abilities that are central to the fluent operation of a given intelligence. Although each biography illustrates a particular intelligence, I do not wish to imply that in adulthood intelligences operate in isolation. Indeed, except in abnormal individuals, intelligences always work in concert, and any sophisticated adult role will involve a melding of several of them. Following each biography is a survey of the various sources of data that support each candidate as an intelligence.

Musical Intelligence

When Yehudi Menuhin was three years old, his parents smuggled him into San Francisco Orchestra concerts. The sound of Louis Persinger's violin so entranced the young child that he insisted on a violin for his birthday and Louis Persinger as his teacher. He got both. By the time he was ten years old, Menuhin was an international performer (Menuhin, 1977).

Violinist Yehudi Menuhin's musical intelligence manifested itself even before he had touched a violin or received any musical training. His powerful reaction to that particular sound and his rapid progress on the instrument suggest that he was biologically prepared in some way for a life in music. Menuhin is one example of evidence from child prodigies that support the claim that there is a biological link to a particular intelligence. Other special populations, such as autistic children who can play a musical instrument beautifully but who cannot otherwise communicate, underscore the independence of musical intelligence.

A brief consideration of the evidence suggests that musical skill passes the other tests for an intelligence. For example, certain parts of the brain play important roles in the perception and production of music. These areas are characteristically located in the right hemisphere, although musical skill is not as clearly localized in the brain as natural language. Although the particular susceptibility of musical ability to brain damage depends on the degree of training and other individual characteristics, there is clear evidence that amusia, or a selective loss of musical ability, occurs.

Music apparently played an important unifying role in Stone Age (Paleolithic) societies. Birdsong provides a link to other species. Evidence from various cultures supports the notion that music is a universal faculty. Studies of infant development suggest that there is a "raw" computational ability in early childhood. Finally, musical notation provides an accessible and versatile symbol system. In short, evidence to support the interpretation of musical ability as an intelligence comes from many different sources. Even though musical skill is not typically considered an intellectual skill like mathematics, it qualifies under our criteria. By definition it deserves consideration; and in view of the data, its inclusion is empirically justified.

Bodily-Kinesthetic Intelligence

Fifteen-year-old Babe Ruth was playing catcher one game when his team was taking a "terrific beating." Ruth "burst out laughing" and criticized the pitcher loudly. Brother Mathias, the coach, called out, "All right, George, YOU pitch!" Ruth was stunned and nervous: "I never pitched in my life . . . I can't pitch." The moment was transformative, as Ruth recalls in his autobiography: "Yet, as I took the position, I felt a strange relationship between myself and that pitcher's mound. I felt, somehow, as if I had been born out there and that this was a kind of home for me." As sports history shows, he went on to become a great major league pitcher (and, of course, attained legendary status as a hitter) (Ruth, 1948, p. 17).

Like Menuhin, Babe Ruth was a prodigy who recognized his "instrument" immediately on his first exposure to it, before receiving any formal training.

Control of bodily movement is localized in the motor cortex, with each hemisphere dominant or controlling bodily movements on the contralateral side. In right-handers, the dominance for bodily movement is ordinarily found in the left hemisphere. The ability to perform movements when directed to do so can be impaired even in individuals who can perform the same movements reflexively or on a nonvoluntary basis. The existence of specific apraxia constitutes one line of evidence for a bodily-kinesthetic intelligence.

The evolution of specialized body movements is of obvious advantage to the species, and in human beings this adaptation is extended through the use of tools. Body movement undergoes a clearly defined developmental schedule in children; there is little question of its universality across cultures. Thus it appears that bodily-kinesthetic "knowledge" satisfies many of the criteria for an intelligence.

The consideration of bodily-kinesthetic knowledge as "problem solving" may be less intuitive. Certainly carrying out a mime sequence or hitting a tennis ball is not solving a mathematical equation. And yet, the ability to use one's body to express an emotion (as in a dance), to play a game (as in a sport), or to create a new product (as in devising an invention) is evidence of the cognitive features of body usage. The specific computations required to solve a particular bodily-kinesthetic problem, hitting a tennis ball, are summarized by Tim Gallwey:

> In order to anticipate how and where to move the feet and whether to take the racket back on the forehand or backhand side, the brain must calculate within a fraction of a second the moment the ball leaves the server's racket approximately where it is going to land, and where the racket will intercept it. Into this calculation must be computed the initial velocity of the ball, combined with an input for the progressive decrease in velocity and the effect of wind and of spin, to say nothing of the complicated trajectories in-

> volved. Then, each of these factors must be recalculated after the bounce of the ball to anticipate the point where contact will be made by the racket. Simultaneously, muscle orders must be given—not just once, but constantly refined on updated information. Finally, the muscles have to respond in cooperation with one another . . . Contact is made at a precise point that depends on whether the order was given to hit down the line or cross-court, an order not given until after a split-second analysis of the movement and balance of the opponent . . . Even if you are returning the serve of an average player, you will have only about one second. Just to hit the ball is clearly a remarkable feat; to return it with consistency and accuracy is a mind-boggling achievement. Yet it is not uncommon. The truth is that everyone who inhabits a human body possesses a remarkable instrument (Gallwey, 1976, pp. 33–34).

Logical-Mathematical Intelligence

In 1983 Barbara McClintock won the Nobel Prize in Medicine or Physiology for her work in microbiology. Her intellectual powers of deduction and observation illustrate one form of logical-mathematical intelligence that is often labeled "scientific thinking." One incident is particularly illuminating. When she was a researcher at Cornell in the 1920s, McClintock was faced one day with a problem: while theory predicted 50 percent pollen sterility in corn, her research assistant (in the "field") was finding plants that were only 25 to 30 percent sterile. Disturbed by this discrepancy, McClintock left the cornfield and returned to her office where she sat for half an hour, thinking:

> Suddenly I jumped up and ran back to the (corn) field. At the top of the field (the others were still at the bottom) I shouted, "Eureka, I have it! I know what the 30% sterility is!" . . . They asked me to prove it. I sat down with a paper bag and a pencil and I started from scratch, which I had not done at all in my laboratory. It had all been done so fast; the answer came and I ran. Now I worked it out step by step—it was an intricate series of steps—and I came out with [the same result]. [They] looked at the material and it was exactly as I'd said it was; it worked out exactly as I had diagrammed it. Now, why did I know, without having done it on paper? Why was I so sure? (Keller, 1983, p. 104).

This anecdote illustrates two essential facts of the logical-mathematical intelligence. First, in the gifted individual, the process of problem solving is often remarkably rapid—the successful scientist copes with many variables at once and creates numerous hypotheses that are each evaluated and then accepted or rejected in turn. The anecdote also underscores the nonverbal nature of the intelligence. A solution to a problem can be constructed before it is articulated. In fact, the solution process may be totally invisible, even to the problem solver. This phenomenon need not imply, however, that discoveries of this sort—the familiar "aha!"—are mysterious, intuitive, or unpredictable. The fact that it happens frequently to some people (e.g. Nobel Prize winners) suggests the opposite. We interpret this phenomenon as the work of the logical-mathematical intelligence.

Along with the companion skill of language, logical-mathematical reasoning provides the principal basis for IQ tests. This form of intelligence has been thoroughly investigated by traditional psychologists, and it is the archetype of "raw intelligence" or the problem-solving faculty that purportedly cuts across domains. It is perhaps ironic, then, that the actual mechanism by which one arrives at a solution to a logical-mathematical problem is not as yet completely understood—and the processes involved in leaps like those described by McClintock remain mysterious.

Logical-mathematical intelligence is supported as well by empirical criteria. Certain areas of the brain are more prominent in mathematical calculation than others; indeed, recent evidence suggests that the linguistic areas in the frontotemporal lobes are more important for logical deduction, and the visuospatial areas in the parietofrontal lobes for numerical calculation (Houdé & Tzourio-Mazoyer, 2003). There are savants who perform great feats of calculation even though they are tragically deficient in most other areas. Child prodigies in mathematics abound. The development of this intelligence in children has been carefully documented by Jean Piaget and other psychologists.

Linguistic Intelligence

At the age of ten, T. S. Eliot created a magazine called *Fireside*, to which he was the sole contributor. In a three-day period during his winter vacation, he created eight complete issues. Each one included poems, adventure stories, a gossip column, and humor. Some of this material survives, and it displays the talent of the poet (see Soldo, 1982).

As with the logical intelligence, calling linguistic skill an intelligence is consistent with the stance of traditional psychology. Linguistic intelligence also passes our empirical tests. For instance, a specific area of the brain, called Broca's area, is responsible for the production of grammatical sentences. A person with damage to this area can understand words and sentences quite well but has difficulty putting words together in anything other than the simplest of sentences. Other thought processes may be entirely unaffected.

The gift of language is universal, and its rapid and unproblematic development in most children is strikingly constant across cultures. Even in deaf populations where a manual sign language is not explicitly taught, children will often invent their own manual language and use it surreptitiously. We thus see how an intelligence may operate independently of a specific input modality or output channel.

Spatial Intelligence

Navigation around the Caroline Islands in the South Seas is accomplished by native sailors without instruments. The position of the stars, as viewed from various islands, the weather patterns, and water color are the principal signposts. Each journey is broken into a series of segments, and the navigator learns the position of the stars within each of these segments. During the actual trip the navigator must mentally picture a reference island as it passes under a particular star. From that envisioning exercise, he computes the number of segments completed, the proportion of the trip remaining, and any corrections in heading that are required. The navigator cannot see the islands as he sails along; instead he maps their locations in his mental picture of the journey (see Gladwin, 1970).

Spatial problem solving is required for navigation and for the use of the notational system of maps. Other kinds of spatial problem solving are brought to bear in visualizing an object from different angles and in playing chess. The visual arts also employ this intelligence in the use of space.

Evidence from brain research is clear and persuasive. Just as the middle regions of the left cerebral cortex have, over the course of evolution, been selected as the site of linguistic processing in right-handed persons, the posterior regions of the right cerebral cortex prove most crucial for spatial processing. Damage to these regions causes impairment of the ability to find one's way around a site, to recognize faces or scenes, or to notice fine details.

Blind populations provide an illustration of the distinction between the spatial intelligence and visual perception. A blind person can recognize shapes by a nonvisual method: running a hand along the contours of an object translates into length of time of movement, which in turn is translated into the size and shape of the object. For the blind person, the perceptual system of the tactile modality parallels the visual modality in the seeing person. The analogy between the spatial reasoning of the blind and the linguistic reasoning of the deaf is notable.

There are few child prodigies among visual artists, but there are savants like Nadia (Selfe, 1977), a preschool child who, despite a condition of severe autism, made drawings of the most remarkable representational accuracy and finesse.

Interpersonal Intelligence

With little formal training in special education and nearly blind herself, Anne Sullivan began the formidable task of instructing a blind and deaf seven-year-old, Helen Keller. Sullivan's efforts at communication were complicated by the child's emotional struggle with the world around her. At their first meal together, this scene occurred:

> Annie did not allow Helen to put her hand into Annie's plate and take what she wanted, as she had been accustomed to do with her family. It became a test of wills—hand thrust into plate, hand firmly put aside. The family, much upset, left the dining room. Annie locked the door and proceeded to

> eat her breakfast while Helen lay on the floor kicking and screaming, pushing and pulling at Annie's chair. [After half an hour] Helen went around the table looking for her family. She discovered no one else was there and that bewildered her. Finally, she sat down and began to eat her breakfast, but with her hands. Annie gave her a spoon. Down on the floor it clattered, and the contest of wills began anew (Lash, 1980, p. 52).

Anne Sullivan sensitively responded to the child's behavior. She wrote home: "The greatest problem I shall have to solve is how to discipline and control her without breaking her spirit. I shall go rather slowly at first and try to win her love." In fact, the first "miracle" occurred two weeks later, well before the famous incident at the pump house. Annie had taken Helen to a small cottage near the family's house, where they could live alone. After seven days together, Helen's personality suddenly underwent a change—the therapy had worked: "My heart is singing with joy this morning. A miracle has happened! The wild little creature of two weeks ago has been transformed into a gentle child" (Lash, 1980, p. 54).

It was just two weeks after this that the first breakthrough in Helen's grasp of language occurred; and from that point on, she progressed with incredible speed. The key to the miracle of language was Anne Sullivan's insight into the person of Helen Keller.

Interpersonal intelligence builds on a core capacity to notice distinctions among others—in particular, contrasts in their moods, temperaments, motivations, and intentions. In more advanced forms, this intelligence permits a skilled adult to read the intentions and desires of others, even when they have been hidden. This skill appears in a highly sophisticated form in religious or political leaders, salespersons, marketers, teachers, therapists, and parents. The Helen Keller–Anne Sullivan story suggests that this interpersonal intelligence does not depend on language. All indices in brain research suggest that the frontal lobes play a prominent role in interpersonal knowledge. Damage in this area can cause profound personality changes while leaving other forms of problem solving unharmed—after such an injury, a person is often not the "same person."

Alzheimer's disease, a form of dementia, appears to attack posterior brain zones with a special ferocity, leaving spatial, logical, and linguistic computations severely impaired. Yet people with Alzheimer's often remain

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well groomed, socially proper, and continually apologetic for their errors. In contrast, Pick's disease, a variety of dementia that is localized in more frontal regions of the cortex, entails a rapid loss of social graces.

Biological evidence for interpersonal intelligence encompasses two additional factors often cited as unique to humans. One factor is the prolonged childhood of primates, including the close attachment to the mother. In cases where the mother (or a substitute figure) is not available and engaged, normal interpersonal development is in serious jeopardy. The second factor is the relative importance in humans of social interaction. Skills such as hunting, tracking, and killing in prehistoric societies required the participation and cooperation of large numbers of people. The need for group cohesion, leadership, organization, and solidarity follows naturally from this.

Intrapersonal Intelligence

In an essay called "A Sketch of the Past," written almost as a diary entry, Virginia Woolf discusses the "cotton wool of existence"—the various mundane events of life. She contrasts this cotton wool with three specific and poignant memories from her childhood: a fight with her brother, seeing a particular flower in the garden, and hearing of the suicide of a past visitor:

> These are three instances of exceptional moments. I often tell them over, or rather they come to the surface unexpectedly. But now for the first time I have written them down, and I realize something that I have never realized before. Two of these moments ended in a state of despair. The other ended, on the contrary, in a state of satisfaction. . . . The sense of horror [in hearing of the suicide] held me powerless. But in the case of the flower, I found a reason; and was thus able to deal with the sensation. I was not powerless. . . . Though I still have the peculiarity that I receive these sudden shocks, they are now always welcome; after the first surprise, I always feel instantly that they are particularly valuable. And so I go on to suppose that the shock-receiving capacity is what makes me a writer. I hazard the explanation that a shock is at once in my case followed by the desire to explain it. I feel that I have had a blow; but it is not, as I thought as a child, simply a blow from an enemy hidden behind the cotton wool of daily life;

> it is or will become a revelation of some order; it is a token of some real thing behind appearances; and I make it real by putting it into words (Woolf, 1976, pp. 69–70).

This quotation vividly illustrates the intrapersonal intelligence—knowledge of the internal aspects of a person: access to one's own feeling life, one's range of emotions, the capacity to make discriminations among these emotions and eventually to label them and to draw on them as a means of understanding and guiding one's own behavior. A person with good intrapersonal intelligence has a viable and effective model of him- or herself—one consistent with a description constructed by careful observers who know that person intimately. Since this intelligence is the most private, it requires evidence from language, music, or some other more expressive form of intelligence if the observer is to detect it at work. In the above quotation, for example, linguistic intelligence serves as a medium in which to observe intrapersonal knowledge in operation.

We see the familiar criteria at work in the intrapersonal intelligence. As with the interpersonal intelligence, the frontal lobes play a central role in personality change. Injury to the lower area of the frontal lobes is likely to produce irritability or euphoria, whereas injury to the higher regions is more likely to produce indifference, listlessness, slowness, and apathy—a kind of depressive personality. In persons with frontal lobe injury, the other cognitive functions often remain preserved. In contrast, among aphasics who have recovered sufficiently to describe their experiences, we find consistent testimony: while there may have been a diminution of general alertness and considerable depression about the condition, the individual in no way felt himself to be a different person. He recognized his own needs, wants, and desires and tried as best he could to achieve them.

The autistic child is a prototypical example of an individual with impaired intrapersonal intelligence; indeed, the child may not even be able to refer to himself. At the same time, such children may exhibit remarkable abilities in the musical, computational, spatial, mechanical, and other nonpersonal realms.

Evolutionary evidence for an intrapersonal faculty is more difficult to come by, but we might speculate that the capacity to transcend the satisfaction of instinctual drives is relevant. This potential becomes increasingly important in a species not perennially involved in the struggle for survival. The neural structures that permit consciousness probably form the basis on which self-consciousness is constructed.

In sum, then, both interpersonal and intrapersonal faculties pass the tests of an intelligence. They both feature problem-solving capacities that have significance for the individual and the species. Interpersonal intelligence allows one to understand and work with others. Intrapersonal intelligence allows one to understand and work with oneself. In the individual's sense of self, one encounters a melding of interpersonal and intrapersonal components. Indeed, the sense of self emerges as one of the most marvelous of human inventions—a symbol that represents all kinds of information about a person and that is at the same time an invention that all individuals construct for themselves.

NEWLY IDENTIFIED INTELLIGENCES

For the first ten years after I proposed the theory of multiple intelligences, I resisted any temptation to alter the theory. Many individuals proposed candidate intelligences—humor intelligence, cooking intelligence, sexual intelligence. One of my students quipped that I would never recognize those intelligences, because I lacked them myself.

Two factors led me to consider additional intelligences. Once I spoke about the theory to a group of historians of science. After my talk, a short, elderly man approached and said, "You will never explain Charles Darwin with the set of intelligences that you proposed." The commentator was none other than Ernst Mayr, probably the most important twentieth-century authority on evolution.

The other factor was the frequent assertion that there was a spiritual intelligence, and the occasional assertion that I had identified a spiritual intelligence. In fact, neither statement was true. But these experiences motivated me to consider whether there is evidence for either a naturalist or a spiritual intelligence.

This inquiry led to very different conclusions. In the first case, the evidence for the existence of a naturalist intelligence is surprisingly persuasive. Biologists like Charles Darwin and E. O. Wilson and ornithologists like John James Audubon and Roger Tory Peterson excel at identifying and distinguishing one species from another. Persons with a high degree of naturalist intelligence are keenly aware of how to distinguish the diverse plants, animals, mountains, or cloud configurations in their ecological niche. These capacities are not exclusively visual; the recognition of birdsong or whale calls entails auditory perception. The Dutch naturalist Geermat Vermij, who is blind, depends on his sense of touch.

On the eight criteria for an intelligence, the naturalist intelligence scores well. In this type of intelligence, there is the core capacity to recognize instances as members of a species. There is also the evolutionary history of survival often depending on recognizing conspecifics and on avoiding predators. Young children easily make distinctions in the naturalist world—indeed, some five-year-olds are better than their parents or grandparents at distinguishing among dinosaur species.

Examining the naturalist intelligence through the cultural or brain lenses brings some interesting phenomena into focus. Today few people in the developed world are directly dependent on naturalist intelligence. We simply go to the grocery store or order groceries on the phone or the Internet. And yet, I suggest, our entire consumer culture is based on the naturalist intelligence. It includes the capacities we deploy when we are drawn to one car rather than another, or when we select one pair of sneakers or gloves rather than another.

The study of brain damage provides intriguing evidence of individuals who are able to recognize and name inanimate objects but who lose the capacity to identify living things; less often, one encounters the opposite pattern, where individuals are able to recognize and name animate entities but fail with artificial (man-made) objects. These capacities probably entail different perceptual mechanisms (Euclidean geometry operates in the world of artifacts but not in the world of nature) and different experiential bases (we interact with inanimate objects and tools very differently than with living beings).

My review of the evidence on spirituality proved less straightforward. People have very strong views on religion and spirituality. For many (particularly in the contemporary United States), experiences of the spirit are the most important ones; and many assume that a spiritual intelligence not only exists but represents the highest achievement of human beings. Others, particularly those of a scientific bent, cannot take seriously any

discussion of the spirit or the soul; it smacks of mysticism. And they may be deeply skeptical about God and religion—especially so in the academy. Asked why I had not endorsed a spiritual or religious intelligence, I once quipped, "If I did so, it would please my friends—but it would please my enemies even more!"

Quips are no substitute for scholarship. I devoted the better part of a year to reviewing the evidence for and against a spiritual intelligence. I concluded that at least two facets of spirituality were quite remote from my conception of an intelligence. First, I do not believe that an intelligence should be confounded with an individual's phenomenological experience. For most observers, spirituality entails a certain set of visceral reactions—for example, a feeling that one is in touch with a higher being or "at one" with the world. Such feelings may be fine, but I do not see them as valid indicators of an intelligence. A person with a high degree of mathematical intelligence may undergo feelings of "flow" in the course of solving a difficult problem, but the person is equally mathematically intelligent even if he or she has no such phenomenological reaction.

Second, for many individuals, spirituality is indissociable from a belief in religion and God generally, or even from allegiance to a particular faith or sect: "Only a real Jew/Catholic/Muslim/Protestant is a spiritual being" is the explicit or implicit message. This requirement makes me uncomfortable and takes us far from the initial set of criteria for an intelligence.

But although a spiritual intelligence does not qualify on my criteria, one facet of spirituality seems a promising candidate. I call it the existential intelligence—sometimes described as "the intelligence of big questions." This candidate intelligence is based on the human proclivity to ponder the most fundamental questions of existence. Why do we live? Why do we die? Where do we come from? What is going to happen to us? What is love? Why do we make war? I sometimes say that these are questions that transcend perception; they concern issues that are too big or too small to be perceived by our five principal sensory systems.

Somewhat surprisingly, the existential intelligence does reasonably well in terms of our criteria. Certainly, there are individuals—philosophers, religious leaders, the most impressive statesman—who come to mind as high-end embodiments of existential intelligence. Existential issues arise in every culture—in religion, philosophy, art, and the more mundane stories, gossip, and media presentations of everyday life. In any society where questioning is tolerated, children raise these existential questions from an early age—though they do not always listen closely to the answers. Moreover, the myths and fairy tales that they gobble up speak to their fascination with existential questions.

My hesitation in declaring a full-blown existential intelligence comes from the dearth, so far, of evidence that parts of the brain are concerned particularly with these deep issues of existence. It could be that there are regions—for example, in the inferotemporal lobe—that are particularly crucial for dealing with the Big Questions. However, it is also possible that existential questions are just part of a broader philosophical mind—or that they are simply the more emotionally laden of the questions that individuals routinely pose. In the latter instances, my conservative nature dictates caution in giving the ninth place of honor to existential intelligence. I do mention this candidate intelligence in passing, but, in homage to a famous film by Federico Fellini, I shall continue for the time being to speak of "8 ½ Intelligences."

THE UNIQUE CONTRIBUTIONS OF THE THEORY

As human beings, we all have a repertoire of skills for solving different kinds of problems. My investigation began, therefore, with a consideration of these problems, the contexts in which they are found, and the culturally significant products that are the outcome. I did not approach "intelligence" as a reified human faculty that is brought to bear in literally any problem setting; rather, I began with the problems that human beings solve and the products that they cherish. In a sense I then worked back to the intelligences that must be responsible.

Evidence from brain research, human development, evolution, and cross-cultural comparisons was brought to bear in the search for the relevant human intelligences: a candidate was included only if reasonable evidence to support its membership was found across these diverse fields. Again, this tack differs from the traditional one: since no candidate faculty is necessarily an intelligence, I could make an up-or-down decision on a motivated basis. In the traditional approach to intelligence, there is no opportunity for this type of empirical decision.

My belief is that these multiple human faculties, the intelligences, are to a significant extent independent of one another. Research with brain-damaged adults repeatedly demonstrates that particular faculties can be lost while others are spared. This independence of intelligences implies that a particularly high level of ability in one intelligence, say mathematics, does not require a similarly high level in another, like language or music. This independence of intelligences contrasts sharply with traditional measures of IQ that find high correlations among test scores. I speculate that the usual correlations among subtests of IQ tests come about because all of these tasks in fact measure the ability to respond rapidly to items of a logical-mathematical or linguistic sort; these correlations might be substantially reduced if one were to survey in a contextually appropriate way—what I call "intelligence-fair assessment"—the full range of human problem-solving skills.

Until now, my discussion may appear to suggest that adult roles depend largely on the flowering of a single intelligence. In fact, however, nearly every cultural role of any degree of sophistication requires a combination of intelligences. Thus even an apparently straightforward role, like playing the violin, transcends a reliance on musical intelligence. To become a successful violinist requires bodily-kinesthetic dexterity and the interpersonal skills of relating to an audience and, in a different way, of choosing a manager; quite possibly it involves an intrapersonal intelligence as well. Dance requires skills in bodily-kinesthetic, musical, interpersonal, and spatial intelligences in varying degrees. Politics requires an interpersonal skill, a linguistic facility, and perhaps some logical aptitude.

Inasmuch as nearly every cultural role requires several intelligences, it becomes important to consider individuals as a collection of aptitudes rather than as having a singular problem-solving faculty that can be measured directly through pencil-and-paper tests. Even given a relatively small number of such intelligences, the diversity of human ability is created through the differences in these profiles. In fact, it may well be that the total is greater than the sum of the parts. An individual may not be particularly gifted in any intelligence, and yet, because of a particular combination or blend of skills, he or she may be able to fill some niche uniquely well. Thus it is of paramount importance to assess the particular combination of skills that may earmark an individual for a certain vocational or avocational niche.

In brief, MI theory leads to three conclusions:

1. All of us have the full range of intelligences; that is what makes us human beings, cognitively speaking.
2. No two individuals—not even identical twins—have exactly the same intellectual profile because, even when the genetic material is identical, individuals have different experiences (and identical twins are often highly motivated to distinguish themselves from one another).
3. Having a strong intelligence does not mean that one necessarily acts intelligently. A person with high mathematical intelligence might use her abilities to carry out important experiments in physics or create powerful new geometric proofs; but she might waste these abilities in playing the lottery all day or multiplying ten-digit numbers in her head.

All of these statements are about the psychology of human intelligence—to which MI theory seeks to make a contribution. But of course they raise powerful educational, political, and cultural questions. Those questions will engage us in later parts of the book.

CONCLUSION

I believe that in our society we suffer from three biases, which I have nicknamed "Westist," "Testist," and "Bestist." "Westist" involves putting certain Western cultural values, which date back to Socrates, on a pedestal. Logical thinking, for example, is important; rationality is important; but they are not the only virtues. "Testist" suggests a bias towards focusing on those human abilities or approaches that are readily testable. If it can't be tested, it sometimes seems, it is not worth paying attention to. My feeling is that assessment can be much broader, much more humane than it is now and that psychologists should spend less time ranking people and more time trying to help them.

"Bestist" is a thinly veiled reference to David Halberstam's 1972 book *The Best and the Brightest*. Halberstam's title referred ironically to the figures, among them Harvard faculty members, who were brought to Washington to help President John F. Kennedy and in the process launched the Vietnam War. I think any belief that all the answers to a given problem lie in one certain approach, such as logical-mathematical thinking, can be very dangerous. Current views of intellect need to be leavened with other, more comprehensive points of view.

It is of the utmost importance that we recognize and nurture all of the varied human intelligences and all of the combinations of intelligences. We are all so different largely because we have different combinations of intelligences. If we recognize this, I think we will have at least a better chance of dealing appropriately with the many problems that we face in the world. If we can mobilize the spectrum of human abilities, not only will people feel better about themselves and more competent; it is even possible that they will also feel more engaged and better able to join the rest of the world community in working for the broader good. Perhaps if we can mobilize the full range of human intelligences and ally them to an ethical sense, we can help increase the likelihood of our survival on this planet, and perhaps even contribute to our thriving.

"The unschooled mind: why even the best students in the best schools do not understand"

Howard Gardner

I'm very honoured to have been invited to give the Peterson lecture to gathered representatives of the IB Organization. I must confess that I didn't even know about the IB until a year or two ago. It was my loss and my ignorance but everything that I've learned about it, has intrigued me and I think you have a convert on your hands. (Addendum in 2003: By now I know a fair amount about IB, have studied the Theory of Knowledge Course, and am an unabashed fan).

I'm a developmental psychologist and Geneva is in fact a special place for me. Twenty five years ago I married a developmental psychologist and we decided to launch our honeymoon by coming to Geneva. We met and shook the hand of Piaget.. At the time I knew that I would study cognitive development but of course could not anticipate what I would have to say about developmental psychology in the future. I have had a very lively career over the last 25 years during which I challenged Piaget on several issues because I felt he was very central to my work and I admired him. My three arguments with him were as follows.

First of all, Piaget believed that if you studied children you had to know what they were going to become - what the end state of development is. Piaget thought it was to be a scientist; that's what Piaget was. However, in my own training I had spent a lot of time working in the arts. I felt that there was something wrong with a theory which only talked about the mind of the scientist as being the end-all of a child's development. So I began to explore what development would be like if one thought of participation in the arts as an artist, or a critic, or a performer or a connoisseur as being a viable end state for human development. This is not to say that human beings should develop to become artists any more than they should develop to become scientists but rather that we can develop many different kinds of human beings.

The second argument I had with Piaget, and the one that I became infamous for, was against the notion that there was a single thing called intelligence which could be measured by an intelligence test. Now it's not widely known that Piaget studied in Alfred Binet's laboratory. Binet was dead but the laboratory was still there under the direction of a psychologist named Théodore Simon who had worked with Binet. Piaget became interested in children's minds because of the mistakes the children made on the intelligence tests. Binet was a great scientist, credited with the creation of the IQ test. I do not blame him for any of the abuse done in the name of intelligence and intelligence testing. Binet's ideas affected an American named Lewis Terman who in 1916 created the first normed standardised intelligence tests. For ever afterwards psychologists assumed that they could establish how smart somebody was, and in fact what intelligence is, by giving a test which took an hour or so.

In fact, some people now give the QT (the quick test) which just takes four or five minutes. Why spend an hour if you can test intelligence in four or five minutes? Those of you who are from the United Kingdom, will doubtless recognise [shows a picture] Hans J. Eysenck, the world's most famous psychologist. He used to be a great defender of intelligence tests until this "hair dryer" [picture] came along with 18 electrodes attached to it. Mr. Eysenck and his friends now believe that if you simply put this beanie on a person's head and look at the brain waves for a few seconds, you can tell how smart that person is. Well, I think that the mind and

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the brain are much more complicated than that and thanks to a project in which I became involved over 10 years ago, and where I had the pleasure of meeting Leo Fernig [of UNESCO], I developed a quite distinctive way of thinking about intelligence.

The way that I define intelligence is the ability to solve a problem, or to make something, to fashion a product which is valued in at least one culture or community. That may not seem like an exotic definition to those of you who are not psychologists, but in fact it is not consistent with what most psychologists believe. Psychologists think solving problems is important, but they shy away from any concern in making something, writing essays, staging plays, designing buildings, because you can't assess that in four or five minutes, or with a beanie. Moreover psychologists get very upset when you talk about an ability being valued in a culture; that is because it suggests that, unless a culture provides certain opportunities, a person might not seem to be smart. What should be disturbing to everybody in this room is that most psychologists believe that intelligence is completely in the brain ... and if you know exactly where to stick the thermometer with a dipstick you can figure out how smart that person is.

My view of intelligence, which I'm not going to expand on today, says intelligence is always interaction between potentials and what's available in a culture. For example, Bobby Fischer is one of the greatest chess players in the history of the world. But if Bobby Fischer had been born in a culture where there was no chess, he would just be, to use a technical term, a schlemiel [idiot] because he had a brain that was perfectly matched to something in his culture, namely, chess but mismatched to just about everything else.

Anyway, doing a fairly elaborate analysis which is described in a book called "Frames of mind", I eventually argued that there are 7 different kinds of intelligence. I'm not going to run through them because that would be another lecture. It is worth pointing out, however, that Piaget thought he was studying **all** of intelligence. But I believe he was studying logical, mathematical intelligence (later in his life, I think he came to the same conclusion about the focus of his own work) whereas I talk about intelligence which artists have as well as those which are in the human sphere - something which I think is a great concern to you as you begin to deal with global issues, moral issues, issues of value and the like.

My third argument with Piaget - the deepest one and the one I want to talk about today - had to do with the most interesting claim that he made. If you remember anything from your studies of Piaget, you will remember that he maintained that children pass through stages of cognitive development. So infants know the world in one way, five-year-olds in another way, ten year olds in another way, and fifteen-year-olds in still another way. Part of this developmental sequence is that when you go from nine to eleven or from thirteen to sixteen years not only do you see the world in a very different way, you can't even remember how you used to see the world.

So at age seven you don't believe that you ever thought that if a ball of clay was squished, there was less clay there; or that if water were poured into a different kind of vessel, there will be more or less water depending on the shape of the vessel. Yet every four-year-old in the world believes that. Anyway I'm not going to argue that Piaget's demonstrations were wrong because many of them were more correct than wrong. Where Piaget was wrong, I believe, was in his argument that, when people get older, they see the world in a different way and they no longer have access to earlier ways of knowing. In fact, I'm going to argue that most of us, except in areas where we are expert, continue to think the way we did when we were five years of age. We continue to think the way we did before we went to school. That's a pretty radical thesis, and I decided I was not going to pre-judge the IB schools. Maybe you are exceptional in that you have succeeded in extinguishing the less productive aspects of the five year old mind. I hope we will have time to discuss that after my talk.

So, my talk is on the subject of education for understanding. If I said to you: what *is* understanding and *how* can we determine whether understanding has been achieved? - that is a much more difficult question.

I am going to define understanding as the capacity - knowledge, skills, concepts, facts - learned in one context, usually the school context, and used in a new context in a place where you haven't been forewarned that you should make use of that knowledge. That's what understanding is. If you were only asked to use knowledge in the same situation in which it was introduced, you might understand, but you might not; we can't tell. But if something new happens out in the street or in the sky or in the newspaper, and you can draw on your earlier knowings, then you understand.

In my book, "The Unschooled mind", I have a section on the 1991 Gulf War which provided brilliant examples in America of not understanding at the highest levels. In history, in political science, in economics and in physics, there were rampant examples of misunderstanding. I will not go into that now. Instead, I'm going to introduce my "problématique" with three quite common sense examples.

In the first five years of life children all over the world, with very little formal tutelage, learn to speak, to understand, to tell stories, to tell jokes, to draw, to sing, to invent new tunes, to engage in pretend play - all the things which Piaget and other psychologists demonstrated. Even though nobody knows how to teach these things, kids learn them all. Then they go to school and suddenly, in the very place where we are supposed to know how to teach them, it's very hard and many of them don't do well. That's a paradox. That's an enigma.

Vignette number two.

Students at the very best universities in the United States (places like MIT and Johns Hopkins), with very high grades in physics, leave their class and are given a problem to solve on the street, or a game to play, which involves various physical principles. Not only do they fail to use what they learned in school but they actually answer in the same way that five-year-olds do, or for that matter in the way pre-Aristotelians and Aristotelians did.

Let me use an example. Ask almost anybody what happens, what forces obtain when you flip a coin. Most people will come up with the following answer (even people who have taken physics courses): you've got a certain amount of force in your hand and you transfer that force to the coin; for a while that force makes the coin go up and then, when the force kind of gets spent, the coin is tired and kind of flips to the ground. (Now, I'm not a physicist so I believe that account, more of less). However, physics friends tell me that the second you release the coin, the only force that obtains on the coin is gravity; that's the only force that's working.

However, that goes against a very powerful theory that you develop when you're young. And it's not that theory that's abandoned, it's Newton's and Galileo's laws of motion that prove very difficult to master.

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Vignette number 3 is a personal one. I've a daughter, a very nice girl and a very good student. She graduated Phi Beta Kappa from a very good American college. She called me up when she was a sophomore in college, crying on the telephone. I said: "why are you crying?" She said, "it's my physics; I don't understand it." I said: "well, you know (and I was telling the truth) I really respect you for taking physics because it's difficult and I wouldn't have taken it in college." And I didn't take it in college. I then lied to her and said: "I don't even care what grade you get, but it's really important that you understand your physics." So I said: "go to your instructor and have him or her explain to you what it is you don't understand." And she said : "Dad, you don't get it! I've never understood."

This had a profound impact on me. My daughter was not saying that she was a faker or a "poseur". What she was saying is what I think most of us experience: we know the moves to make in school, to get good grades and even to be successful, but we know that if people put the questions to us in another way, if they push to see how much we have really understood, the whole house of cards might fall. That's what she was saying.

At least in the United States, there are great obstacles to understanding.

1. *Short answer assessments* or what I call a "text test context". You read a text book. The test is based on the text book and the text book tells you the answers you have to give.
2. *The correct answer compromise* is an "entente" between the teacher and the student. If you respond this way, nobody should ask any further question. No one is made uncomfortable, but deeper understanding is avoided.
3. *The pressure for coverage* which means: there are 37 chapters in the book and you must get through all 37 chapters.

So, we have three vignettes. The young child learns so easily; the school child has difficulty. The students who get "As" at the best universities in the world are still Aristotelians in their models of the physical world. And then, of course, the most powerful evidence of my daughter. What's going on here? This is the answer: I call it cognitive Freudianism.

Freud convinced people that, as adults, we continue to have the same personality traits as when we were children. We fight the same battles we fought with our parents and our siblings. Most people who live in a modern western society believe this. (If you don't believe it and you pay me US$100 an hour, I will convince you that it's true.) That's what psychoanalysis is all about. I'm making the claim that Freud was correct in an area that he wasn't expert in, but that Piaget was. Namely, except in areas where we are experts, most of us continue to think the way we did when we were five years of age.

An expert is a person who comes to understand the world differently. But that is very, very difficult to do and I'm going to argue today that it's not done very often. This is the thesis of the talk.

Later on, I'm going to give you evidence that no matter where you look in the curriculum, you will find students who don't understand: physics, mathematics, biology, literature, art. It's ubiquitous. Then when I get two thirds into the talk, I will tell you that there are things we can do about it. It's not hopeless. It is possible to educate for understanding.

But now, I'll do something that's going to take about ten minutes. When I met Patricia Davidson [chair of the IBO Examining Board] in the airport in Zurich, I said to her: "is this lecture ceremonial or should I deal with real content ?" She said: "Make them work hard,

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make the interpreters work hard and make the audience work hard." So what I'm going to do now is give you a fairly technical description of why it is so difficult to go beyond the five-year- old mind.

My analysis has 3 foci which I have introduced to you already. There is the young natural learner: that 3, 4 or 5 year old who speaks so much about the world without formal tutelage. There is a student in most schools who basically masters what school requires so he or she can get to the next level. But I will argue he doesn't really understand. Then there's the individual we want: the person who can use knowledge in new situations. That's my definition of an expert.

There is a form of knowing (theory of knowledge) that goes with each of these 3 foci. The expert is a person who can use the skills that are valued in his or her culture in context. So when an historical example comes up, he can draw on history; when a physical example comes up he can draw from physics, and so on. That's what we want; that's why we go to school. If people are not going to be able to use the knowledge we may as well close schools down. Scholastic knowledge is what we are very good at doing in school; but unless that scholastic knowledge can be activated in new circumstances it remains inert and essentially useless..

We teach people notations, squiggles on a paper like some of you are doing, formal concepts - what is gravity, what is density, what is force. People who have no sense of what it's like in the world can give you a formula and a definition if that's what is called for in class. Then, if you're lucky and you attend an IB school, you get epistemic forms. Epistemic forms means how the people think in the different disciplines because to think like a historian is not the same as to think like a literary critic or a biologist. (This, I have subsequently learned, is the focus of the Theory of Knowledge course).

So that's what school is supposed to do. But in the first years of life a natural learner benefits from what Piaget so brilliantly described: sensory motor knowledge, learning about the world, using your hands and your eyes, exploring the world of objects, the world of liquids poured from one container to another and what I call first order symbolic competence. People use words, pictures, gestures, to communicate meanings. That's what every five-year-old can do.

That's the good part. However, five-year-olds do one thing which is troublesome: they form intuitive conceptions or theories - theory of matter, theories of mind, theories of life. Every normal five-year-old develops these theories. And it's very good for getting along in the world. However, the theories are wrong. School is supposed to replace the erroneous theories with better theories.

So what's a theory of matter? A theory of matter is: if I have a heavy object in this hand, a light object in this hand and I release them at the same time, the heavier one will fall more quickly. That's what you learn intuitively. Heavy things fall more quickly. However, Galileo went to the tower of Pisa, dropped two objects, and since then we understand that that's not in fact what happens. We understand that the laws of acceleration are independent of weight. But as children we develop a very powerful theory of matter and that's very hard to shake.

Here's a theory of life: every five-year-old believes if it's moving it's alive; if it's not moving, it's dead. This is a very useful theory. However it doesn't help for sleeping dogs, and computers are a real problem. Are computers which display moving images alive or dead? It's very hard to say.

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A theory of mind is very relevant to what I've heard talked about with my new acquaintances here in the world of IB. I've got a mind; you've got a mind. If we look the same our minds are the same. If we look differently, our minds are different. If you look like me, you've got a good mind; if you look differently, you've got a bad mind. This is a very powerful theory which is very well entrenched. It shows up in all kinds of places. Just turn on the television for evidence. It's this that education is supposed to deal with, and it's this, I maintain, that education has, by and large, failed to deal with. These are just again the scholastic acquisitions.

Why does this happen? I claim it happens because there are different kinds of constraints operating on us.

The first one has to do with the kind of species we are. We learn certain things very easily. We develop certain theories very readily, and other ones are very, very hard for us to develop. It's a whole interesting evolutionary question why that should be the case.

There are institutional constraints. If you put 50 people in a room like this and one person in front of them, it's very hard to explain things so all 50 people can understand; for every person who is nodding, three are nodding off.

There are also disciplinary constraints. As I said, the moves that have been developed over the centuries for analysis in one discipline are very different from the moves in other disciplines. Physical causality is not like historical causality or literary causality.

So, those are constraints which contribute to the problem I am describing.

Anticipating what we might do, there is some hope. The hope lies in two institutions. One of them is very old: the apprenticeship. There are many powerful clues about how to educate for understanding contained in the apprenticeship. The other is a new institution, more familiar in the United States than in most other countries, but it is spreading rapidly: the children's museum, or the science museum, or the discovery museum, or, for those of you who have been to San Francisco, the *Exploratorium.* There are very powerful education implications in those two institutions.

What follows is an attempt to summarise this very technical argument.

The natural learner displays what I call intuitive understanding. He or she is very promiscuous with the theories already developed in the young mind. Whenever anything happens, the young child draws on the theories of mind, matter and life, to explain them, whether or not those theories are appropriate at all.

The scholastic learner never tries to apply the theory anywhere, except where he or she is told to. It's exactly the opposite. So, the scholastic learner gives a ritualised performance. The teacher asks the question, the student gives the prescribed answer or they are told that they are wrong, and you go on to the next student. The disciplined learner, the expert, produces a discipline of understanding, which means, not only can he or she draw on knowledge when it's appropriate, but equally important, doesn't draw on that knowledge when it's not appropriate. The five-year-old is too promiscuous and uses it always. The ten-year- old is repressed (the opposite of being promiscuous) and never uses it. But the person with

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disciplined understanding has good taste and uses the knowledge just when it's appropriate. This comes about because there are constraints, also gaps.

What I've tried to do is to say that there are some deep, if you will, some epistemological reasons, why it's very difficult to teach for understanding.

What I want to do now is to take a "Cook's Tour" of the different disciplines to show you that this isn't a problem just for somebody else's discipline; it's a problem for every discipline.

I've already mentioned physics. Most people remain five-year-olds or Aristotelians even though they studied physics. Here is a wonderful example, actually from astronomy; some of you may have seen this film. Twenty-five Harvard students have just graduated, all wearing their gowns and their mortar boards. An interviewer says to the students: "Tell me, why is the earth warmer in the summer than it is in the winter?" Twenty-three out of the 25 students immediately came up with the same answer, the answer which you would come up with if you didn't know what I was lecturing about: namely that the earth is closer to the sun in the summer than it is in the winter. Now if we think about it, that doesn't make any sense because it wouldn't account for the seasons in different parts of the world. The right explanation has to do with the angle of the world on its axis as it spins around. But 23 out of 25 students forget to apply what they have learned in their astronomy classes and give the same five-year-old kind of answer.

You might say physics is hard. How about biology? Perhaps biology is much easier? Research shows that students who have taken not one, but two or three courses in biology focusing on the topic of evolution, still do not understand the basics of evolution. They still believe that something in one generation can be passed on to the next, even if it was acquired in that generation. They are also still perfectionists. They think that each organism is trying to get more perfect and there is an unseen hand that's guiding that perfection rather than simply variation and selection within a particular ecological niche. So problems in physics extend to biology and to the other sciences as well.

What about mathematics? Mathematics is all abstract. It has nothing to do with the real world. So maybe people don't have misconceptions in the area of mathematics. What they have instead, is what I call rigid algorithms. They learn to fill in numbers into a formula.

This is the problem. There are six times as many students as professors. If there are ten professors, how many students are there ? Anybody wants to risk an answer ? I guess the answer is no. Anyway, that is quite a simple problem. The answer is 60. If I ask you to capture the above information in a written equation where S stands for students and P stands for professors, most people will write the following equation: $6S=P$. This is because if you parse the sentence it says there are six times as many students as there are professors. However what they are actually writing is "six times sixty equals ten" which is clearly an absurd result.

What happens in mathematics is that students learn how to plug numbers into formulas, how to solve equations. As long as the information is presented to them in a certain canonical order, they will get the answer right. If, however, the problem is presented in a new way, in a way which actually describes understanding of the formalism, most people will not get it right because they will not understand the formalism.

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I can think back to my own education. I studied the quadratic equation and I must have solved 500 problems with the quadratic equation. I'm sure by the time I finished school, I could do the quadratic equation in my sleep. Never did anybody give me any education of what a quadratic equation stood for. Nowadays if I ran into a problem I wouldn't have a clue that it involved the quadratic equation, even though I might, on a dark and stormy night, remember what a quadratic equation was. But I got very good grades in mathematics because I wasn't expected to know where to use this kind of formalism.

So, the problem in science is misconceptions. The problem in mathematics is rigidly applied algorithms

How about in the arts, in the humanities ?

In the arts and the humanities the problem is different. It's what I call scripts or stereotypes. Early in life children develop very powerful theories about the world. A favourite script is the restaurant script. Every four-year-old knows that if you go to a restaurant, somebody comes and seats you. You are given the menu; you order. Food comes. You eat it and then you call for the cheque, and you leave.

If you go to Mc Donalds you pay first but that's an exception to the script. Every four-year-old also knows about birthday parties: who comes, what you serve, that kind of thing. The rules are different in different cultures but everybody knows about birthday parties.

Another script which you develop when you are very young is the Star Wars script--named both after the movie and after President Reagan's strategic defence initiative. Star Wars says: it's good to be big; you should be big yourself; if you're not big, align yourself with somebody who is big. If you look like that person, you will be good and people who look different will be bad. That's the Star Wars script and it's very very powerful!

You can have people who've studied world history and you ask them about the causes of the first world war, and they say: "Oh, it's very complicated. There was colonialism, imperialism, ethnic strife and long term rivalries" and they give you a very nuanced response. Then you say to them: "Well, what's happening in the Gulf ?" They will say: "Well, there is this bad guy named Saddam Hussein and if we get rid of him, everything will be OK." Now, that's a Star Wars type of explanation and, as I hinted before, it was very widely used in my country. In fact, we like to use Star Wars wherever we can in America.

In 1986 the bad guy was Muammer Kaddaffi; in 1988 it was Manuel Noriega. (We got rid of him, but the problems remained; in fact, they got worse.) In 1990 it was Saddam Hussein and in 1992 I think it was Bill Clinton, but he won so we had to find somebody new! But it's a very powerful way of thinking and you find it in social studies.

Actually, the best example of the unschooled mind in the arts comes out of the university of Cambridge in the UK. In the 1920s a literary critic and poet named I.A. Richards did a study of Cambridge undergraduates. He published it in a book called "Practical Criticism." He took Cambridge undergraduates who were the best and brightest literary students. He gave them twelve poems and he asked them two questions about the poems:

- what do they mean ?
- are they any good?

He performed one manipulation on the poems. He removed the names of the poets. (It's like going to the Louvre without the labels, right?)

What did he find? He found that the students didn't have a clue about which poems were good (according to the critics) and which were bad. They rejected John Donne. They rejected Gerald Manley Hopkins. They embraced a Sunday poet who couldn't get into the "Cambridge Chronicle" and, when they were asked what accounted for the quality, they replied: if a poem rhymed, scanned, dealt with a pleasant subject, but not too sentimental, it was good. But if it dealt with philosophy or anything tragic or anything abstract, it was bad. So, here you have very, very good students who have studied literature, who, when the book clue is removed (namely this is by a good poet, this is by a bad poet or by a non poet), display the same kind of taste that someone with no education in literature would exhibit.

So, what I've tried to do now in part two is to argue that in every area of the curriculum you have real problems which reveal how difficult it is to educate for understanding. You have misconceptions in the sciences, rigidly applied algorithms in mathematics and scripts and stereotypes in social studies, humanities and the arts. Well, this is the end of the bad news part of the talk. We now move into a mode where I'm going to try to say that there is some hope after all. As I said, one source of hope is in taking some lessons from the old institution of apprenticeships and the new institution of children's museums.

Now, I want to be very clear about this point. People usually misunderstand me to say that we should institute seven year agreements between the apprentice and the master where the apprentice is indentured and has to sweep the floor and that kind of thing, or that we should close schools down in an Ivan Illich sense and put everybody in children's museums. That's not what I mean.

What I mean is that there are very powerful educational messages in these two institutions which I think can help educate for understanding. In the case of the apprenticeship, a young person works for someone who is the master of his or her discipline or craft, and who uses that discipline or craft every day in the course of genuine problem solving. The master poses the problems and requires products from the apprentice at his or her level of competence; when the apprentice becomes more competent then the standards are raised.

The master never has to take kids and test them at the end of the week, or the end of the year because, essentially he and the student are assessing every day. Moreover the master embodies the learning that he or she wants the child to have.

So, in the United States, every teacher can read and write but very few of our elementary school teachers actually *do* read and write. In fact, in a very alarming statistic, the average American school teacher reads one book a year. People who live in a literate world who read and write and talk about what they are reading and writing will have youngsters who do the same. People who simply say you should read but turn on the TV for seven hours give a very different message.

As far as the children's museum is concerned this is a very new invention. Basically, until 25 years ago, there were almost no children's museums. But these are places which contain very lively demonstrations of many of the principles that students learn about in school, across the curriculum. They allow children to explore those principles, those ideas, at their own pace and in ways that are comfortable for that child. Frank Oppenheimer, who founded the *Exploratorium* in San Francisco, said: "Nobody flunks museum." It's a very powerful idea.

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I became a devotee of children's museums because when I took kids to children's museums I often found that kids who were called bright in school could not find their way around. They were very unschooled. But kids who were not considered bright in school could often learn very well in those contexts. I will explain later why that's very important.

For each of the areas of the curriculum, in which I have diagnosed a problem, I believe there is a move that we can make as educators which can be very helpful.

In the case of misconceptions, in the celebratory year 1992 I recommend Christopherian encounters, named after Christopher Colombus. If you believe the world is flat, but every day or every year you travel around the world and you come back to where you started before, that tends to belie the notion that the world is flat. In a Christopherian encounter you expose your theories to disconfirmation. If your theories are consistently disconfirmed, you will slowly abandon them, and hopefully construct a better theory.

Most American school kids, probably most school kids everywhere, believe that the reason that you are warm when you put on a sweater, is because that sweater has warmth in it. If every year, in school during the winter, you put a sweater outside and you come in the morning and find it is freezing cold, that tends to disconfirm the notion that there is warmth inherent in the sweater.

Christopherian encounters have to happen over and over again. To use an analogy which I used when I spoke with the interpreters about my talk, what I believe is: think about the brain with a mind as a surface which, earlier in life, becomes very much engraved with these primitive theories. What school usually does is simply to put some powder over that engraving so you can't see it. And as long as you're in school, the powder is what you notice. When you leave school, and you slam the door, the powder puffs up and the engraving is still there, the early theory. What happens in the Christopherian encounter is that you slowly upgrade that early engraving and you put a new and better one.

But you can see that it doesn't happen in one time. Let me tell you what's wrong with the "one time" thing. If you ask my son Benjamin, who is now all of seven years, what's the shape of the world, he will tell you it's round. This makes you think he's very smart. But if you asked Benjamin where he is standing he will say: "That's easy. I'm on the flat part underneath." His theory has been totally unaffected but he has learned the powder that is required: namely, if you want to shut up your father, you say that the world is round because that's what grownups say, but who could believe it ?

Thus Christopherian encounters challenge those notions every day.

In mathematics, the cure for a rigidly applied algorithm is what I call rich exploration of the relevant semantic domain. What that means in English is that you must know what the equation stands for. You have to understand the formalism. So if you are going to do distance, rate and time problems - a common algebra exercise - you do a lot of experimenting. You try to predict how long it will take for something to get from one point to the other. You develop an intuition for the formalism so that when you learn the formalism it actually refers to something that you already have an intuition for, that you already have an understanding for.

This has been done quite brilliantly with calculus where, before any of the formalism is introduced, kids learn to make predictions about their bodies moving at various speeds and what kind of graphs would be produced over the course of time, and things like that.

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A mathematician is not somebody who remembers all the formalisms. A mathematician is somebody who doesn't care if he remembers because, if necessary, he/she can derive it again because he/she understands what it stands for. That's why most of us are not mathematicians.

In the case of the humanities, the cure for stereotypes is the regular adoption of multiple stances. If it becomes a regular habit of mind to look at things from many different points of view, you will gradually abandon stereotypical thinking.

During the Gulf war, my older son went to school where there were kids from many different countries. The teacher had a very good idea. Rather than everybody just giving what the cable news network reported, he had a student from Iran, and a student from Kuwait, and a student from Israel, etc., give their understanding of what was happening every day. Then, a few weeks after that, the teacher asked the kids in the school: "What do you think Moshe will think about this and what do you think Omar will think about this?" That's giving students the opportunity to put themselves into other people's minds.

If you study any revolution, from the point of view of the vanquished as well as the victors, you get a very different story. If you study the American revolution from the point of view of the British, where it was a colonial uprising, and from the point of view of the French, where it was a good opportunity to get at the British, it's a very different story than if you just read the average American text book. That's how you break down stereotypical thinking, but it has to be a regular habit of mind, otherwise it won't work at all.

Well, you might say this is all very good and just what I would expect of a Harvard professor: lots of theory. I actually do a lot of empirical work, but that's another story. However, I am going to describe, as we get to the close of my presentation, a new project that I'm involved in which is actually designed to educate for understanding.

It is based upon three core ideas which I have worked out in conjunction with some colleagues at Harvard:

1. the identification of rich, generative ideas; nutritious topics on which it's worth spending a lot of time;
2. the development of different kinds of teaching languages - multiple ways to approach those topics, so we can be sure that students have maximum access to those ideas; and
3. what I now call "ongoing assessment."

"Ongoing assessment" (which I used to call "assessment in context") means assessment is taking place all the time by students and by peers as well as by the teacher.

We believe that if you can identify rich ideas, explore them in multiple ways and give students much opportunity to assess their own learning, that there is a chance for education for understanding.

I now want to flesh those ideas out because they are very abstract.

First of all, the greatest enemy of understanding is **coverage**. I said that earlier. If you are determined to cover everything in the book, you virtually guarantee that very few students will understand. So, if you want to educate for understanding you've got to make tough choices about what to focus on. And obviously you should focus on those things which have the biggest mileage. If you're teaching a course in history or social studies and you decide, say, to focus on democracy, or if you're teaching a course in biology and you choose to focus on evolution, you can cover a lot of the important material in those subjects by focusing on those topics. It will mean, however, if you're doing history you're not going to get through every decade. If you're doing biology, you're not going to get through every cycle or through every part of the cell, or every part of the tree. It's a hard choice, but we think it's a choice worth making. If you have rich concepts and you spend time on them, you can approach them in different ways.

Growing out of my theory of multiple intelligences, I claim that almost any topic which is worth spending time on can be approached from at least five different "windows" into the same room.

1. Narrational - basically the story mode
2. A quantitative, logical rational way of dealing with numbers, principles, causality
3. What I call a foundational way, asking very basic kinds of questions such as: Why is this important? How does it relate to what came before? How is it related to today ?
4. Aesthetic, what does it look like ? What does it sound like? What appearance does it make? What patterns and configurations? How does it impress you ?
5. Finally, hands on: What is it actually like to be this thing, to do this thing? If you're studying evolution, what is it like to breed drosophila? If you're studying democracy, what's it like to be in a group that decides by consensus as opposed to one that decides by autocracy, oligarchy or some other political principle?

There are two advantages of using these multiple entry points.

First of all, you're more likely to reach every child, because not every child learns most easily in the same way. That's one of the burdens of the theory of multiple intelligences, which you've been spared today, but I believe that kids have different ways of learning.

Second of all, equally important, if you approach a topic from many different vantage points you're modelling for a student what it is like to be an expert. Because an expert is always somebody who can represent knowledge in more than one way. No expert only can think about his or her topic in one way. Experts have very flexible ways of thinking about their topics and that's what you're modelling as a master to your apprentices if you approach a topic in a number of different ways.

That leaves assessment.

In what we call authentic assessments, we get very far away from short answer examinations which are particularly a plague of the USA to what I call performance-based exams where you actually demonstrate what it is that you're supposed to be able to do. Only in the USA would there be a conviction that, if you want to know how somebody can write, rather than ask him to write, you ask him to fill in the blanks. But other things which you've heard of - projects, exhibitions, portfolios and what I call "process folio" which is not just your finished work, but actually your drafts and you're thinking *en route* to fashioning a product - are good ways of assessing whether the students are really understanding.

In the work that we are doing on this project on understanding we work with teachers in local schools and we ask them first to define what we call "understanding goals" – these are the broad things that we want to achieve in a course. They will be very familiar things to you, like having a sense of the scientific method or understanding something about the nature of revolution.

What we then do, which may not be so familiar to you, is we define a whole family of "understanding performances" - these are performances which, if a student can carry them out, will count as evidence for understanding.

This is a play with language, but I think it's an important play, because people tend to think of understanding as something that happens in the head. We say, maybe it does but we don't know whether you understand unless you can perform your understanding publicly. So, your performance involves analyses, critiques, debates, projects that you create, exhibitions that you put on, things like that.

Finally, given the "understanding goals" and the "understanding performances," how are those performances going to be assessed? And, as I think is the case with IB, you make the assessment criteria absolutely clear. People know exactly what they are going to have to be able to do in order to perform an understanding. There are no surprises, no mysteries, no key to the answers, but rather examples all around of what a good performance is and what are not such good performances, from apprentice level all the way to that of a master.

Now I'm going to make an interesting kind of confession to you. I've talked about this stuff for a while and I've researched it for a long time, but, like many other professors, I never actually used it in my own teaching. Last year, I decided to do an experiment with my students who are even more privileged than I.A Richard's Cambridge undergraduates - these are Harvard graduate students. I took my Harvard graduate students in the basic course in cognitive development where they study Piaget, Bruner, Vygotsky and people like that, and I tested them three times during the course of the year: in the beginning, in the middle and at the end. I tested them for two things: their mastery of content and their understanding in terms that I have defined today. Could they use what they were learning in the course to explain new situations ? - things in the newspapers, vignettes which I brought in, and so on. The results were quite shocking!

Imagine a graph in your mind - this is good, this is bad, this is over the course of the year; you can reverse them. In content, the students went steadily up. They knew very little content in the beginning, a fair amount in the middle and were very good at the end. They were good students. They are Harvard students. But you know what happened to the understanding? Absolutely flat. And not a ceiling effect, but a floor effect. They weren't very good in the beginning, they weren't very good in the middle, they weren't very good at the end. There were a few exceptions, just like there are few exceptions everywhere, but even at Harvard, they don't necessarily understand what their professors are teaching!

So fortunately, we got a grant (that's always what you should try to do when you have a negative result) and this year, we've going to try to teach for understanding. It's going to be very different. I hope the results will show we're successful. But if not, we'll just keep doing it again, because obviously it's very important for students to understand.

I'm going to finish with a number of thoughts that I have had during the past year. Little epigrams which summarise the things that are important to me.

First of all, after working for 25 years in the area of psychology I realised that I've been interested primarily in two things. One is how to observe students carefully, and multiple intelligence theory is a way to look at students more carefully. The other is how to observe

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student work more carefully - and that is done by having assessment that looks at student performances very carefully.

I don't know how it is in your schools but I can tell you that in most of the schools that I visit, not much time is spent watching the students and developing a model of how particular students learn; not nearly enough time is spent looking at student work. I will give you a few more examples of that. This is what I call the teacher's fallacy. I succumbed to it for 20 years. I taught a great class, therefore the students understood. It's rather Cartesian isn't it? I teach, therefore you understand. The only way you can find out if students are understanding is to actually have them do some work.

One thing which has become very popular in the USA is the minute paper. At the end of the course, and every session, you ask the student to write down one thing that he or she learned in the period and one question that they have. It's a revelation! I never cease to learn when I do the minute paper. And the misconceptions are of course what's beautiful. They are wonderful misconceptions but unless misconceptions get out in the open they sit there underneath that powder. Portfolios are great! But I don't have time to look at my students work! I'm too busy, too much pressure for coverage, too many faculty meetings. I've a second job.

If you don't have time to look at students' work, the unfortunate conclusion is you shouldn't teach. Because, if you don't look at your student's work, you have no idea whether they are learning anything. I used to think that, if we simply change the assessment, everything else will be fine.

Because in the United States we typically have terrible assessments. I did realise that you can have wonderful assessment. But if the curriculum isn't good, the assessment is worthless. You can have wonderful examining boards sitting here in Geneva but if the curriculum isn't adhered to or hasn't been made up yet, it's worthless. I'm sure you have had experience with that. You can have wonderful assessment and curriculum but if the staff isn't developed, teachers aren't educated even before or during the experience, the assessment and curricular are worthless.

There is also something which I have to deal with and I think you have to deal with as well even if all these things are in place: if people don't really want to have that kind of education, it's not going to work out.

We now come to my last slide which says: "school doesn't have to be the way you remember it."
Unfortunately, the unschooled mind even applies to parents and teachers; they have a stereotype formed by the age of five about what school is like. Namely, somebody in front of the room talking like me, and they're sitting in their seat, trying to be quiet and all the knowledge is in my head and the purpose is to put it into your head.

That's a very powerful idea. Whether people love school or hate school, they all have that stereotype.

Unless we can help people think differently about what school can be like, what can be studied, how it can be taught, how it can be learned, then the opportunity for education for understanding is not going to be seized.

Now Piaget said one valuable thing which I didn't adhere to. He said that developmental psychologists should not try to be educators. And he steered clear of ever having any educational theory. I have stepped into the lion's den today and given you an educational theory that comes out of developmental psychology.

I did say, I didn't know whether it would resonate with those of you working in IB because maybe all of your students, all of your teachers, do understand. But, if so, I'd like to hear how you do it and if not, I will be happy to work on the problem together with you.

(transcript 16 June 2003

The Development and Education of the Mind

The selected works of Howard Gardner

Howard Gardner

World Library of Educationalists

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INTRODUCTION

In the middle of the 20th century, young persons whom I knew dreamt about one day becoming astronauts, athletes, or architects. Some thought about becoming writers, a handful considered careers as teachers. I doubt that any contemporaries considered a career as a writer on education. Now, as I introduce a collection of my writings about education, I can spin an autobiography that logically culminates in this volume. And yet, that would be disingenuous.

A scholarly career is anything but a straight line – and that is all to the good. If one could predict a line of work in a discipline with accuracy, it would scarcely be worth carrying out: the surprises are what makes scholarship fun and serious. My own scholarly training has been in psychology. The two great figures in my field – Sigmund Freud and Jean Piaget – both embarked on careers quite different from that originally envisioned. Freud wanted to be a basic scientist in neurology and in fact, before turning to psychoanalysis, constructed a model of how the brain works. (It seems more plausible in 2005 than it did in 1905 or 1955!) Piaget saw himself as a biologist interested in the nature of knowledge. But as he subsequently pointed out, the "detour" that he took to investigate the minds of children lasted a lifetime. While I am under no illusion that my own contributions to psychology rival those of these and other masters, I too followed a career path quite different from that envisioned when I was attracted to psychology by my charismatic undergraduate tutor, Erik H. Erikson (who happened to be a student of Freud's and a colleague of Piaget's).

So, perhaps it is better to spurn autobiographical rationalizations and instead pose four questions about how best to "read" an individual who writes about education.

To begin with, through what disciplinary lens or lenses does the scholar approach educational issues? One approaches Herbert Read, a poet and art critic, quite differently from how one approaches the philosopher John Dewey, the psychologist B.F. Skinner, or the theologian John Henry Cardinal Newman. In my own case, I was trained in developmental psychology, the study of how children evolve in various spheres; cognitive psychology, the effort to model thinking; and neuropsychology, the examination of the effects of brain damage on human cognition and personality. While, among psychologists, I feel a bit of a renegade, I feel very much the psychologist when in the company of those with other disciplinary trainings. When considering human nature, I think almost reflexively in terms of the individual and especially his/her mind; the contributions of biology – neuroscience and genetics – to thought; the equally substantial contributions of parental models, peer examples, teacher input, and the messages that waft thought the culture.

To this scholarly lineage I should add my long-time interest in artistry and artistic cognition. As a child I was a serious pianist, and I have long gained sustenance from involvement with the arts. When I first became a psychologist, I was amazed at the virtual absence in American textbooks of consideration of artistic development and artistic cognition. And so I determined to give as much attention to artistic considerations as most other psychologists direct toward the scientific terrain. As you read my writings, you will discover artistic concerns and leitmotifs throughout.

The second question to raise concerns the personal educational experiences of the writer. It has long been noted that almost everyone has strong opinions about education because all of us have had years of experience in schools. As I reflect on my own education, I note the following chapters.

As a young person in the 1950s, I attended public schools in the small city of Scranton, Pennsylvania. The schools were adequate but certainly undistinguished. I found school unchallenging and learned more through my own wide but haphazard reading and my interaction with a few intellectually oriented peers and a handful of relatives and other adults who took an interest in a talkative and curious young student. More consequential was my own training as a young pianist, training which revealed considerable talent but which I abruptly terminated when but 12 years of age. (I did not want to practice the three hours a day mandated by my teacher.) During my freshman year in public high school I continued to be unchallenged and so decided, with my family, that I should attend an independent school. Nearby Wyoming Seminary was somewhat more intellectually oriented but still insufficiently demanding. Only when I was fortunate enough to attend Harvard College in the early 1960s did I discover what a truly engaging intellectual environment could be like. And that is probably why I have remained at Harvard for 45 years.

Personally, then, my educational experiences ranged from the unremarkable to the privileged. However, other educational experiences have had powerful effects on me. Directly upon completion of college, I had the privilege of working with the psychologist-turned-educator Jerome Bruner on the development of a model elementary school curriculum in the social sciences called "Man: A Course of Study." This curriculum treated fifth graders as active thinkers who could appreciate key insights from the range of the human sciences, from anthropology to linguistics to psychology. While clearly directed toward the "high end" of the market, this curriculum made a deep impression on me. Given that my first wife Judy Gardner and I had both worked for Bruner, it is perhaps not surprising that we decided to send our three children to the Shady Hill School in Cambridge, Massachusetts, at the time one of the outstanding examples of progressive education in the United States. I also became fascinated with the "open classroom" method that had developed in Leicestershire in the 1960s and taught for a semester in an "open classroom" in Newton, Massachusetts. Finally, I must mention my 20-year relationship to the preschools in Reggio Emilia, Italy, to my mind the most impressive demonstration of how even three- and four-year-olds can become intellectually engaged with challenging puzzles and ideas.

Looking back over these personal experiences as a growing child, and the signal exposures during my adult years, it is clear that I reject most of my own formal education as a child, while embracing the more intellectually demanding and personally challenging regime of progressive education. I agree with those educational analysts who assert that the best education is a progressive education; alas, as some also point out, when progressive education is not done well, it can be a disaster, leaving the child with little knowledge, little discipline, and a veiled contempt for what passes as education.

A third question has to do with the general value system of the writer. As already suggested, I am sympathetic to the progressive view of human nature as put forth variously in the writings of Jean-Jacques Rousseau, John Dewey, Jean Piaget, and Jerome Bruner. In contrast to a Lockean view of the child as a blank slate, a Skinnerian view of the child as an actor who must be molded, or a traditionalist view of the child as an inheritor of the best thought of the past and a skepticism vis-à-vis the present and the future, I favor a far more open-ended view of learning. Children have enormous potentials, these potentials should be broadly nurtured, but we should avoid didacticism or excessive guidance. And while there should of course be the transmission of cultural knowledge, I believe that the questions that one learns to ask are ultimately more important than the answers that are passed on from one generation to the other.

At the same time, however, I do not believe that education is easy or natural. In that sense, I depart from the friendlier voices in the progressive tradition. The primary purpose of education should be the inculcation in young minds of the major disciplinary ways of thinking. These turn out to be deeply counterintuitive. And so the educator is challenged to determine how best to counter commonsense views, which are often common nonsense; and how to develop habits of thought – such as those of science, art, mathematics, history – which took centuries to evolve to the current still-tentative form.

This amalgamation of values makes it difficult to pigeonhole me – at least for me! The educational liberals who resonate with my ideas about individual differences are often nonplused or annoyed by my focus on the development of disciplinary thought. And traditionalists who like the focus on disciplines cannot abide my interest in open-ended questions and in the many ways in which a child can be taught or assessed.

A final question to ask of an educational writer concerns his actual writings and the initial reactions to them. Since I have already suggested that most individuals do not hanker to be educational writers, it is important to know what were the first writings. In my case, while I had taught both young children and piano and was a researcher at a school of education, I published almost nothing in education until I was 40. My book *Frames of Mind: The Theory of Multiple Intelligences* was a psychological study, aimed primarily at my psychological colleagues. The few educational passages were included primarily because the funder of the study had a strong interest in educational questions.

No one was more surprised than I at the enormous interest elicited by this work, first manifest in the United States, and then, over the next two decades, in many other parts of the world. From being a psychologist who addressed his writings to those in developmental psychology, cognitive psychology, neuropsychology, and – to a limited extent – to the general public, I was instantly converted into a writer – and, indeed, treated as an expert – on educational issues.

Conceivably, I could have ignored this "reaction of the field" and returned to my psychologist's silo. I did not, however. I imagine that my conversion into a writer about education had a number of causes: 1) the fact that I had always had an interest in educational issues, dating back to childhood, and had worked with Jerome Bruner, himself a psychologist who was esteemed by educators; 2) my long-time association with Project Zero, a research group that has always been housed in the Harvard Graduate School of Education; 3) the fact that my book was published in the very year that the famous critique of American education, *A Nation at Risk*, was issued, and that educational issues soon moved to the front burner of policymakers and the public, where it has remained ever since; and 4) not least, the great interest in my work shown by educators. I was showered with attention, asked many good questions, given the support to pursue some of them empirically, and, with little hesitation, I took on these challenges.

On the subject of writing, let me add a reflection on my own writing. I began my scholarly life as an historian and, more than most psychologists, I tend to think of issues in terms of historical determinants and context – perhaps that is why I became a developmental psychologist! I like to read and study widely, and so my writings are more inter-disciplinary than those of most psychologists: you will find here abundant references to the natural sciences, the arts, and the humanities. While it remains for others to critique my writing, from my own perspective my greatest strengths are as a systematizer and a synthesizer. I raise a question – the nature of artistic cognition, the component of intelligence, what it means to understand – read and think widely about the question, and then put forth my own best taxonomy or mosaic or narrative. Much of my early writing put together the work of others; but with the passage of years, I have developed my own strong views and my own (I hope not strident) voice. It will be interesting to see whether readers also discern the shift from Gardner the synthesizer to Gardner the theorizer and occasional provocateur.

While rejecting the presentation of a strict autobiographical account of "how I got here," I have sought to provide information which should help readers understand "where I am coming from." (For those interested in autobiography, I have listed several sources.) In addition, to guide the reader through this collection of papers, I offer a rational account, or at least a rationale, for the selection.

I begin this collection with a set of tributes to the thinkers who had the greatest influence during my intellectual formation. The psychologist Jean Piaget is the giant in my original field of scholarship; like all other cognitive-developmental psychologists, I owe my greatest debt to him. The other three individuals are all persons with whom I had the privilege of working personally. My interests and background are closest to those of Jerome Bruner, and it is probably the case that my career has been more closely modeled after his luminous example than after anyone else's. I was greatly informed – indeed, formed – by the philosophical thinking of Nelson Goodman, the brilliant thinker who started Project Zero; and I was stretched in new and unanticipated ways by my work with Norman Geschwind, an innovative conceptualizer and a keen observer of patients with revealing neurological conditions.

Work with these thinkers led me to pursue two parallel lines of research – one with children, the other with brain-injured adults. This work was rewarding in itself and I believe that I made contributions to the research literatures on children's cognitive development and on the breakdown of cognitive capacities after damage to the brain. Much of this work was carried out with Ellen Winner, whom I had the good fortune to marry in 1982. In the final chapter in this section, written in the late 1970s, I both delineate the reservations that I was developing about the work of Jean Piaget and the synthesis about the nature of human symbolization that I was formulating.

In the next part of the book, I put forth the major claims of the theory of multiple intelligences, the work for which I am best known. The six chapters encompass, respectively, a brief introduction to the theory; a critique of the major misconceptions that I have encountered; a consideration of the political aspects entailed in writing about a topic like intelligence; a proposal of how media can be mobilized to take advantage of our multiple intelligences (MI); my changing views about how best to define intelligence; and a survey of the "MI field" after the first two decades.

My work with Nelson Goodman at Project Zero centered on the nature of artistic cognition and artistic education. Indeed, both my work with children and my work with brain-damaged adults was firmly rooted in artistic cognition. The first three chapters in Part 2 portray, in turn, the relationship between artistry and intelligence; an educational approach to curriculum and assessment called ARTS PROPEL; and a museum exhibit that had remarkable educational power. The final chapter grew out of a series of trips that I made to China in the 1980s in my capacity as an arts educator. My observations and informal experiments (carried out with Ellen Winner) teased out fundamental differences in how our respective cultures think of arts and creativity – and also complexified in instructive ways my own views about the development of creativity.

Upon first learning about multiple intelligences, many individuals see an MI classroom or school as an end in itself. I soon became convinced, however, that MI cannot be a viable educational end. Rather, the goals of education need to arise from our own values, and they need to be stated explicitly and revisited perennially. Once the territory has been staked out, then it becomes possible to determine how a recognition of MI might – or might not – aid in achieving these educational goals.

Once I began to ponder my own educational philosophy, I became convinced of a supravening educational goal: the development of thinking within the major scholarly disciplines. Of course schools can properly pursue more than one goal. But, to my own mind, if education does not inculcate the major disciplinary ways of thinking, then it has failed in a fundamental way. In the fourth part of this book, I delineate my conception of disciplinary understanding; how difficult it is to achieve; and how, once that goal has been set forth, an approach founded on MI can prove productive.

With the passage of time, the accumulation of age, and, one hopes, the achievement of some measure of wisdom, scholars like me are called upon to offer their more general conspectus of education. In the fifth and final part of the book, I put forth my current – though I dare to hope not my final – thoughts about some broad educational issues. I begin by sketching a view of assessment that is far different from the one currently being pursued not only in the United States but in much of the world. Written in the early 1990s, I believe that "assessment in context" is even more timely and more needed now than it was then.

The next three chapters in the book deal, respectively, with the progressive tradition, in whose camp – despite some lapses – I have remained; the ways in which education changes over time, with particular respect to the theme of globalization; and a possible outline of education in the future. The final chapter in the book presents a bridge from my 20 years of writing on education to my current concern with ethics in the professions – a study that my colleagues and I call the "good work project." While the work on professional ethics is not at present rooted in education, we expect that the ultimate result of the study will include educational interventions for young persons, individuals beginning the professions, and veterans who want or need a refresher on the core values of their profession. Just as I have come to believe that all educational issues harbor value components, I also believe that the inculcation of values is fundamentally an educational challenge – one that never ends for the individual or the species.

To the extent possible, I have ordered these chapters so as to convey a coherent, cumulative story. Indeed, one could read the book from beginning to end – though I doubt that many will find that the best way to approach the book. In lieu of my own autobiographical account, which is now available in many places (Gardner 1989b, Chapters 1 to 4; Gardner, in press; Gardner, n.d.; Winner, n.d.), I am pleased to open the volume with a brief biography of me, written by Mindy Kornhaber, a long-time colleague and friend.

I have written a great deal, though I hope that I can escape the dismissive label "no unpublished thought." Indeed, by my calculation, I have authored or co-authored at least 20 books, 400 articles, and 150 topical articles and reviews, about half of them on education. Clearly, with a 130,000 word limit, I have had to be quite selective! I elected not to quote from any of my books, to update passages that were clearly anachronistic, to correct errors, and, to the extent possible, to eliminate passages that are clearly redundant; in such cases, I refer readers to a chapter or chapters that cover essentially the same ground as the eliminated material. That said, I have permitted a limited amount of repetition or paraphrase, so that each chapter can be read as self-standing. In lieu of separate bibliographies, I have amassed all references into a single master bibliography.

It remains for me to thank the colleagues who have explicitly given me permission to reproduce material that we have co-authored: Veronica Boix-Mansilla, Thomas Hatch, Mindy Kornhaber, Shirley Veenema; and several other long-term colleagues, including Mihaly Csikszentmihalyi, William Damon, David Perkins, Ellen Winner, and Edgar Zurif;

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In the current environment, it is impossible for an empirically oriented researcher to proceed without generous funding from public and private sources. At the conclusion of this introduction, I have provided a cumulative list of my funders over the years. But I must single out for special appreciation three foundations – the Atlantic Philanthropies, the Hewlett Foundation, and the Spencer Foundation – for their many years of flexible support. And I must single out six individuals – Jeffrey Epstein, Tom Lee, Ann Tenenbaum, Louise Rosenberg, Claude Rosenberg, and Courtney Ross – for the support of research and their valued friendship.

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The 25th anniversary of the publication of Howard Gardner's Frames of Mind: The Theory of Multiple Intelligences

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In 1983, psychologist Howard Gardner published Frames of Mind, the book in which he introduced his 'theory of multiple intelligences' (MI theory). Gardner wrote this book as a psychologist and thought that he was addressing principally his colleagues in psychology. He devoted little of the book to educational implications and never expected that his ideas would be picked up by educators, first in the United States and then, eventually, in many countries across the globe. During this year, when Gardner turns 65, he will be making a number of presentations in which he reflects on the course of his thinking over the years, as well as his speculations about the future course of work in this tradition.

While many individuals believe that Gardner set out to dislodge IQ and standard intelligence theory, in fact he did not have this target in mind when he began the research that led to the theory. Indeed, as one who had done well on standardized tests and had been trained in the Piagetian tradition, he had devoted little thought or study to theories of intelligence altogether. Rather, it was his empirical work with normal and gifted children, on the one hand, and with brain-damaged patients on the other, that convinced him that the standard view of a 'single, unitary, undecomposable intelligence' could not be correct. The work of synthesizing that led to MI theory consisted of surveying a whole set of literature and disciplines that might yield a more comprehensive and more veridical notion of human intellect.

The most important steps taken by Gardner involved arriving at a working definition of 'an intelligence' and devising a set of criteria of what counts as an intelligence. As he describes it, an intelligence is a (biological and psychological) potential to solve problems and/or create products that are valued in one or more cultural contexts. Armed with this definition and these criteria, Gardner identified seven relatively autonomous capacities that he named the multiple intelligences: linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, interpersonal, and intrapersonal. In more recent writings, Gardner added an eighth (naturalist) intelligence and continues to speculate about a possible ninth (existential) intelligence.

The two most important scientific implications of the theory are complementary. On the one hand, all human beings possess these 8 or 9 intelligences—that is what makes us human. On the other hand, no two human beings—not even identical twins—exhibit precisely the same profile of intelligences. That is because even when genetics are controlled for (as is the case with monozygotic twins), individuals have different life experiences and are also motivated to differentiate themselves from one another.

In part because he had not thought of himself as an educator, Gardner did not lay out—and indeed never has laid out-- a program for the education of multiple intelligences. He was amazed when, shortly after the book was published, a group of elementary school teachers from Indianapolis approached him and said that they wanted to start an "MI School." For over twenty years, Gardner has been an informal adviser to the Key Learning Community; but he has always stressed that the teachers are the educators, the school people, and his views should be take as advisory only. He has assumed the same low-key stance toward the many other educators around the world who have approached him with requests for help in setting up an "MI school."

For the same reason, Gardner kept silent for a decade when individuals approached him for comments on various implementations of his ideas. Only when he saw his ideas radically abused, as happened in Australia in the early 1990s, did he intervene. (Gardner objected strenuously to a statewide educational intervention that described major racial and ethnic groups in Australia in terms of the intelligences that they purportedly had and the ones that they purportedly lacked).

Spurred by this "wake up call", Gardner did write about the various myths and misunderstanding of MI theory—for example, confusing an intelligence with a learning style, or asserting that all children are strong in at least one intelligence. Moreover, he now believes that any serious application of MI ideas should entail at least two components;

1. An attempt to individuate education as much as possible. The advent of personal computers should make this goal much easier to attain.

2. A commitment to convey important ideas and concepts in a number of different formats. This activation of multiple intelligences holds promise of reaching many more students and also demonstrating what it means to understand a topic thoroughly and deeply..

Looking toward the future, Gardner expects MI theory and practice to expand in a number of directions:

1. Application of these ideas in institutions other than schools—for example, museums, government, the workplace;

2. Devising of computer software and virtual realities that present or teach the same topics via the activation of several intelligences;

3. Exploration of the genetic bases for the various intelligences. When Gardner began his work, almost nothing was known about the genetics of various abilities. This situation should change dramatically in coming years.

4. Refinement of our understanding of the neural bases of intelligences and the ways that they develop and interact. Gardner's original theory was based in significant part on the knowledge of brain specialization available around 1980. There has been an explosion of knowledge about neural networks and connections since this time, as well as the emergence of many new techniques for assessing brain structure and functioning in vivo.

This knowledge can and will lead to a superior delineation of human capacities, and, in all probability, to a more authoritative statement of the boundaries between and across different human intelligences.

5. Study of how MI theory has been implemented around the world. While MI ideas have been picked up in a broad range of developed and developing societies, the ways in which these ideas have been used, and the obstacles that they have encountered, differ dramatically and at times in unexpected ways. To document this trend, Gardner and colleagues Jie-Qi Chen and Seana Moran, are editing a book that contains over two dozen essays by theorists and practitioners from a wide gamut of countries and institutions. Among the most striking is the Explorama at Danfoss Universe in Denmark, an entire theme park based on MI theory. Many of the authors are gathering at the March 2008 meeting of the American Educational Research Association; it is expected that the edited book, to be published by Jossey-Bass, will appear in 2009.

In addition to the question of how MI theory has been understood and fashioned in different soils, the book will also address the more general issue of how ‘educational memes’ travel.

6. Synthesis of MI theory with other work currently being undertaken by Gardner and colleagues. Over the last dozen years, Gardner and a team of researchers have been studying ‘good work’ (goodworkproject.org) This work focuses on the benevolent uses to which human intelligence, creativity, and leadership can be (but are not necessarily) applied. More recently, Gardner’s research group has also begun to examine how the current generation of young people is being affected by the new digital media—another area ripe for investigation in terms of MI theory. Finally, Gardner has recently ventured into the policy arena, as in his recent book *Five Minds for the Future.* Gardner is pondering the relationships – as well as the tensions—between how human beings are understood by scientific study (as in MI theory) and how they should be nurtured by educational institutions.

March 10 2008

MIND, BRAIN, AND EDUCATION

A First Course in Mind, Brain, and Education

Peter R. Blake[1] and Howard Gardner[1]

ABSTRACT—We describe what may well be the first course devoted explicitly to the topic of Mind, Brain, and Education (MBE). In the course, students examine four central topics (literacy, numeracy, emotion/motivation, and conceptual change) through the perspectives of psychology, neuroscience, genetics, and education. We describe the pedagogical tools we use to develop the skills critical for synthesizing information across the disciplines associated with MBE.

A NEW FIELD OF STUDY

Disciplines grow, evolve, differentiate, become reorganized, and sometimes disappear. Sixty years ago, the interdisciplinary fields of human relations, social relations, and behavioral sciences appeared to be on the rise. History of science was in its infancy, while no one had thought of cognitive science. Today, history of science is an established field of study, cognitive science has replaced psychology in many universities (and even more bookstores), and hardly anyone remembers Harvard's and John Hopkins' Departments of Social Relations or Yale's Institute of Human Relations.

Intellectual trends within the academy reflect a broader public interest in these disciplines that are deepening and altering our understanding of the world and ourselves. Whereas physics received much attention in the first half of the 20th century, biology flowered in the latter half of the century with new technologies and major breakthroughs at all levels of the organism—from the genome to the brain to the biological system. Increasingly, biology dominated the pages of science journals, newspapers, and magazines, and increasingly, journalists and the general public looked to biology for the answers to many issues, including how best to understand the human mind, human behavior, and human learning.

In the 1990s, scholars in a number of universities were beginning to ponder the implications of new biological findings for teaching and learning in the schools. At the Harvard Graduate School of Education (HGSE), Kurt Fischer conferred with colleagues, like Ann Brown, Howard Gardner, David Perkins, and David Rose, about the desirability of a more explicit connection of cognitive development and emotional development, on the one hand, and the need to introduce newly emerging methods and findings in the biological sciences, on the other. Harvard University already had a promising interdisciplinary program in "Mind, Brain, and Behavior"; faculty of HGSE sought to pattern our own initiative after that model in a number of ways.

It is worth mentioning that our sentiments were not immediately endorsed by other faculty members at the school. Many individuals in education are uneasy with the notion that education should embrace the biological sciences. Some of the uneasiness may result from the technical and occasionally forbidding nature of the work itself. But the deeper suspicion stems from the belief—which we consider completely unwarranted—that if one tries to apply findings from the biological sciences, one is thereby endorsing the view that learning and potential are fixed and cannot be changed. Indeed, at one time, faculty uneasiness with a proposed Mind, Brain, and Education (MBE) focus became so acute that we jokingly proposed the title "Mind, Blank, and Education."

In the year 2000, having allayed the worst fears of our colleagues, we officially announced a concentration in MBE, and in 2002 Fischer and Gardner began to teach a yearlong course called "Cognitive Development, Education, and the Brain." We believe that this course may be the first course on this topic to be regularly offered at a school of education. We have learned much over the years, and the course has changed significantly as a result of these lessons. In this essay, we describe the goals of the course, pedagogy and curriculum, lessons learned, and plans for the future.

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THE STRUCTURE OF THE COURSE

Among the scholars thinking about the connections between mind, brain, and education, Bruer (1997) characterized the leap from biology to education as "a bridge too far." This view summarized the fears of many that biological findings were being oversimplified for the public, leading to false claims and overstated implications for education. Bruer encouraged educators to let cognitive psychologists vet the information from neuroscience, genetics, and related fields.

Needless to say, many educators chafed at the idea that they needed a gatekeeper to process information from relevant sciences. It was true that few professionals in any field could evaluate the implications of the new research for education, but psychologists did not necessarily have the best view of the classroom. Situated as we are in a school of education, we decided to develop an alternative to the bridge model: We would train students to evaluate research findings and engage in new forms of integrative thinking. The MBE professionals graduating from this program should be adept at communicating across disciplinary boundaries and making decisions that best serve the educational goal at hand.

We knew we could not accomplish this overarching goal in a standard one-semester course. Several deviations from normal class structure would be necessary, the first of which was to make the course yearlong. At our school, where the Master's program itself takes only 1 year, this status was hard-won.

A second central decision concerned the mode of teaching. Integrative thinking and problem solving require practice. We chose to use an atelier (workshop) model to provide our students with the intellectual space for guided practice. The course provides a wide array of resources relevant to mind, brain, education, most of which resides on the course Web site: background materials, Web links, discussion boards, videos, and podcasts. Students with various degrees of sophistication in the constituent disciplines support one another by sharing resources, readings, critiques, and notes. To accommodate an activity- and discussion-based classroom environment without sacrificing important content elements, we filmed several dozen lectures and put them on the course Web site (for copyright reasons, the Web site is only available to enrolled students). Students watch these video lectures as part of their preparation for the class, thereby allowing more time for in-class interactions.

The MBE program draws a diverse group with backgrounds and experience in special needs education, medicine, biology, cognitive science, counseling, and so forth. The open structure of the class sessions allows us to capitalize on the expertise of the students. Students in our class also join research labs across the university—from neuroimaging to comparative psychology—and thus contribute cutting-edge knowledge to our discussions. Frequently, these cross-disciplinary connections emerge in the students' yearlong projects. In keeping with the workshop model, students devise their own projects and develop them with the guidance of the teaching staff. Projects may entail empirical research, curriculum design, or a theoretically oriented synthesis.

A third decision regarded the products of the course: what students will take away. We loosely describe the end product as a "conceptual toolkit." The toolkit includes (a) an ability to take multiple disciplinary perspectives on issues; (b) specific, research-based knowledge in four domains of learning; and (c) case-based experience that looks at a child as a whole. We discuss each of these dimensions below.

Multiperspectivalism

In a year, it is not possible to become an expert in each of the areas of the course, let alone to master the several disciplines involved in mind, brain, education. We have set a more modest but still ambitious goal. We characterize the course as involving three perspectives or, more familiarly, three "hats": those of the neuroscientist, the psychologist, and the educator. In recent years, we have added a fourth hat: that of the geneticist. We want to give each student the opportunity to try on these hats and to learn to read and speak the language of experts from those four spheres.

Take, for example, the understanding of reading disorders (Fischer, Immordino-Yang, & Waber, 2007). The geneticist explores which aspects of the genome correlate with reading problems, whether these elements are heritable, and how they are manifested in different environments. The brain scientist looks for anatomical and functional differences between the brains of normal (or expert) readers and those individuals who have frank problems in decoding and/or understanding written text. The psychologist builds models of the processes involved in naming, reading of nonsense syllables, rhyming, and other key skills and carries out experiments to see which of these skills is impaired and in which ways. The educator chooses curricula and pedagogy that are appropriate for dyslexics in general or for specific profiles of reading disorders.

The student in our course is exposed to these different perspectives. In the classroom-as-atelier, we ask the student to engage in debates and analyses that call on her to assume these various perspectives, seriatim. "Performances of understanding," as we term them, require students to examine an unfamiliar case—for example, a video clip of a dyslexic child along with her scores on a number of reading tests—and to assume one or more of the perspectives (cf. Wiske, 1998). Students may then debate the merits of their positions and come to recognize the need for a more integrative assessment of the case.

The capacity to wear specific hats is at the core of multiperspectival thinking. Ideally, such thinking entails the capacity to put together the perspectives and come up with an analysis where the whole is greater than the sum of its parts. Ideally, the student also can discuss the limitations of the perspectives and the kinds of work that would be needed to secure a better answer to the problem that has been posed.

Four Throughlines

At the beginning of the year, we assign basic readings that will help students appreciate the multiple perspectives we seek to cultivate. However, without concrete material to work with, many students will be unable to absorb and make use of the theoretical materials. To ground the course in the fundamental concerns of basic education, we defined four domains of learning: numeracy, language and literacy, motivation and emotion, and conceptual change. We spend several weeks discussing the current theories, methods, research, and educational problems relevant to each domain.

The content for each throughline provides a focal point for discussion and a connection to education. During the first term, we ask students to wear primarily the psychology hat to organize and analyze the research in the four domains. We emphasize a few general theoretical approaches—developmental, modular, information processing—to help students assess the empirical evidence and extrapolate the implications of the research for education. The biological hats do not remain on the shelf during this time, but their use is limited to broad methods, imaging techniques, and key ideas like gene expression.

In the second semester, the biological hats assume a primary role. After consideration of the brain at the neural, anatomical, and functional levels, we revisit the throughlines using research from the neuroscience literature. Genetics plays a limited role, although the connections to education are growing (Grigorenko, 2007a, b). The main challenge for both students and staff is to answer the question: What does the biological level add to our understanding of education? The answer is often clearest in the area of learning disabilities, such as dyslexia, where neural evidence can validate or invalidate theoretical views of reading that in turn influence interventions (Fischer et al., 2007; Wolf, 2004). However, by adopting a neuroeducational perspective such as provided by Rose's Universal Design for Learning, we can push students to find integrative solutions for all students (Rose, Meyer, Strangman, & Rappolt, 2002).

Across the throughlines, general tensions emerge, such as domain-general versus domain-specific capacities and nativist versus connectionist accounts, and we encourage students to wrestle with these antinomies in light of the empirical research we cover. As instructors, we try to remain theory and method agnostic so that students may learn to adopt relevant approaches for the problem at hand rather than trying to force the facts into a particular theoretical framework. Students learn to respect the theotetical orientations within different disciplines with an eye toward integration and application. Our students are prepared to ask appropriate questions of the experts in a field and then determine implications for a curriculum and pedagogy.

Case Studies

The throughlines allow us to focus on how learning generally occurs within different content domains. But of course learning can occur very differently across individuals. To address the issue of individual variability, we are developing case profiles that we revisit in each content segment and with multiple perspectives. The goal, in the words of our colleague David Rose, is not to present textbook examples of specific disabilities but rather to capture the "messy realism" of actual students.

One case, for example, is a bilingual 6-year-old who is recognized as creative and highly sociable by her teachers but who is struggling with phonological processing. Our task is to understand how the elements of her profile interact, what educational risk factors we might predict, and how to help this student succeed. While the potential for reading comprehension problems may appear obvious in this case, less obvious are the emotional and motivational implications of failure and low grades that often stem from and may contribute to this kind of language problem. As her affective neural networks become rewired as a function of her difficulties in learning to read, how will this affect her knowledge, creativity, and interest in learning, and how can we find out? The profiles remind us that, as educators, we must look at the whole child in order to leverage strengths as well as address weaknesses of learners.

LESSONS LEARNED

Since we began this course in 2000, similar programs have appeared across the country and abroad. Several universities now have some form of a mind, brain, behavior initiative, with education the most likely field of application. Reflecting back on the development of our course, we can offer some lessons:

The Value of Synthesizing Activities

A relatively new emphasis in our pedagogy grows out of recent interest in synthesizing (Gardner, 2007). We model for students how to sift through a vast literature, decide what is important, and then organize it in ways that make sense for oneself and for others. A good synthesis respects the methods of each discipline, demonstrates the value added of interdisciplinary work, and exhibits caution about the ultimate claims (Boix-Mansilla, 2006).

Two synthesis activities we have used are minute papers and the provision of metaphors for key course concepts.

Minute papers involve short, quick responses to an issue; for example, after a difficult topic has been introduced, students are asked to indicate one facet that they understood and one about which they are still confused. Another activity asks students to create their own metaphors for challenging new concepts; for example, they are asked to contrast "development" and "change" or "assimilation" and "accommodation" by positing metaphors that capture the difference between these two concepts. These performances initially reveal great variability in learning. Over the year, however, performance typically improves. Our student reviews reflect struggle with these activities; students are apprehensive about the synthesizing activities but recognize that they learn from them.

Problems Understanding the Theory-Agnostic Stance and the Nature of the MBE Toolkit

The first term proves most difficult as students unfamiliar with the practice of science look for a single, unifying theory for MBE. We repeatedly emphasize that different theoretical positions are valid for different problems. This problem can become more acute as we add new concepts and tools from other disciplines. The student's key task is to find the frameworks that are "usefully true" for the problem at hand. We have found it helpful to provide early readings on scientific practice from an educational perspective such as those available from the National Research Council (Shavelson & Towne, 2002). Then, we dedicate a class to applying these ideas by comparing a few theories of cognitive development, such as Piaget's and Chomsky's, and evaluating their usefulness for different problems.

Finding the Balance Between Breadth and Depth of Content

We all feel that there are certain essential things that students should be exposed to, but this conviction can lead to a proliferation of discussions that leave students overwhelmed and unable to integrate the information. We also know that it is better to hone a syllabus to emphasize a few key ideas that can be traced throughout the year. While this is a common problem for all courses, it is particularly true for a multidisciplinary endeavor.

A Yearlong Course

Teaching students the basic facts of multiple disciplines could probably be accomplished through a semester-long survey course. However, to integrate and synthesize information from multiple disciplines in any meaningful way requires a yearlong commitment at a minimum.

Staff Continuity

From the earliest manifestation of the course, we asked our teaching fellows to stay with the course for multiple years. The first year on staff is an apprenticeship, with typically less teaching and grading responsibility. This introductory year on staff allows apprentices to revisit the materials and deepen their own synthesis of the content. Each staff member also continues to develop his or her own expertise in chosen research areas. Each year, we draw on the knowledge and skills of the teaching staff to shape course activities and presentations. A multiyear commitment asks much of the staff, but we believe this structure pays dividends to the project as a whole.

CONCLUSION

Though we feel that the course has hit its stride, we continue to refine it each year. The refinement occurs as a result of feedback from students solicited at regular intervals, new findings in the several contributing fields, and the involvement of new lecturers, teaching fellows, and students with a helpful gamut of backgrounds. We also continue to add to our library of resources—privileged or copyrighted materials available only to our students via the Harvard intranet, as well as materials accessible on the HGSE "usable knowledge" Web site: http://www.uknow.gse.harvard.edu.

Since the inception of the course, other programs have been launched in the general area of neuroeducation. Each of these programs, and its constituent courses, will appropriately reflect the interests and expertise of students and instructors at the respective institutions. No doubt, we and others will benefit from the opportunity to learn more about these parallel offerings. Indeed, one motivation for the present publication is our desire to enter into exchanges with colleagues who are involved in analogous undertakings.

For the most part the initial architects of the MBE enterprise have been senior scholars. But the future of the field clearly lies in the hands of those students and young scholars who are motivated to undertake fresh lines of research as well as interventions that hold promise. A major vehicle for attracting such students is the courses that are being offered at colleges and universities. As the courses improve, the quality of researchers and practitioners is likely to be enhanced; and these full-blown neuroeducators will, in turn, contribute to further improvement in curricula and pedagogy.

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TEN

Howard Gardner

HOW EDUCATION CHANGES

Considerations of History, Science, and Values

THE GLACIAL PACE OF INSTITUTIONAL CHANGE UNDER NORMAL CONDITIONS

The transmission of knowledge and skills to the next generation, the process of education in formal and informal settings, is inextricably bound with the emergence of Homo sapiens over the last several hundred thousand years (Bruner 1960; Donald 1991; Tomasello 2000). Formal schools, however, are just a few thousand years old; and the notion of universal education, in which all young persons in a society receive several years of competent schooling, is still a distant dream in many corners of the globe (Bloom and Cohen, 2001; Bloom, this volume).

For the most part, institutions change slowly. Such gradual change may be a positive element. The practices associated with an institution tend to be worked out by trial and error over long periods of time. While such experimentation does not guarantee a stronger and more effective institution, at least the most problematic structures and procedures are eliminated. When it comes to educational institutions—which have come to bear a primary responsibility for the intellectual and moral health of the next generation—such conservatism is especially to be recommended. We do not—or at least we should not want to—

sacrifice our children to the latest fad. On occasion, shock treatments are administrated to an educational system—for example, consider the dramatic changes that took place in Japan after the Second World War or in China following the Communist Revolution in 1949. Such changes may achieve their initial goal. But less welcome consequences can also occur; for example, hiding large parts of history in the case of Japan, alienating children from their parents in the case of the Cultural Revolution in China.

Education stands out in one crucial way from most other societal institutions. Put directly, education is fundamentally and primarily a "values undertaking," and educational values are perennially in dispute. Members of a society can reach agreement with relative ease about the purpose of medicine—to deliver high-quality health care to all citizens; nor need the purposes of the military or the monetary system be perennially disputed. However, except for certain fundamentals, the purposes of education, and the notion of what it means to be an educated person, are subjects about which individuals—both professional and lay—hold distinctive and often conflicting views. Clearly, the values that undergirded the educational system in imperial Japan or China differed radically from those that came to motivate the system in a fledgling democratic society like Japan in 1950 or an experimental socialistic society in China at the same time. As I once put it whimsically, "in the United States of 2000, how could we possibly create an educational system that would please the three Jesses—conservative North Carolina senator Jesse Helms, charismatic African American leader Jesse Jackson, and flamboyant Minnesota wrestler-turned-governor Jesse Ventura?"

While the gradual change of educational institutions can readily be justified, we must also ask what can, and should, happen to educational institutions when dramatic alterations take place in the ambient society. Such changes can take place as a result of a shift in values: that is what prompted changes in East Asia a half century ago. However, changes can also take place as a result of scientific findings that alter our understanding of the human mind or because of broader historical forces, like globalization, that affect regions all over the world. At such times, the tension between the pace of institutional change, on one hand, and the pace of scientific discoveries and historical forces, on the other, can become acute.

THE EVOLUTION OF FORMAL EDUCATION FROM RELIGIOUS TO SECULAR AUTHORITY

For much of its relatively short history, formal schooling has been characterized by a religious orientation. Teachers were typically members of a religious order; the texts to be read and mastered were the holy books; and the lessons of school were ethical and moral in character. (The madrasas of the Islamic world, the cheders that have accompanied the Jewish diaspora in recent decades, and the rise of fundamentalist schools in the United States would have seemed much less anomalous a few centuries ago.) Religious instruction, or a state religion, is still common in many European countries, while the "state religion" of communism is only gradually waning as an educational staple on the Chinese mainland. (It remains alive and well in Cuba.)

Yet, despite the persistence of such religious or quasi-religious strains, most of the developed world, and much of the developing world, has converged on a form of precollegiate education that is largely secular in thrust. The major burden of the first years of school—the primary grades—is threefold: (1) to introduce children to the basic literacy systems of the ambient culture—the "three R's," to use the English parlance; (2) to acclimate youngsters to the milieu of decontextualized learning, where—in contradistinction to the learning that is most readily accomplished by human beings—one learns about events and concepts outside of their naturally occurring contexts (Bruner, Olver, and Greenfield 1966; Resnick 1987); (3) to give children the opportunity to play and work together civilly with those individuals with whom they can expect to grow and eventually spend their adult years. While such processes used to begin around the age of six or seven, it is notable that many countries now attempt to inculcate these skills in the preschool years, sometimes as early as the fourth or fifth year of life.

A century ago, only a small percentage of the population received even this much education before those with "basic education" returned to the farm or proceeded to the factory. Bloom and Cohen note that in "recent decades, progress towards universal education has been unprecedented. Illiteracy in the developing world has fallen from 75% of people a century ago to less than 25% today" (2001, p. 1). Still the amount of education in the developing world is modest: the "average number of years spent in school more than doubled between 1965 and 1990, from 2.1 to 4.4, among those age 25 and over in developing countries" (Bloom and Cohen 2001, p. 1). In contrast, in the developed world, nearly all youngsters receive education at least through some secondary school, and in some lands, a third to a half or even more receive some form of postsecondary education.

Following the years of primary school, the burden of education shifts. Complementing the missions stated above, most formal educational institutions also strive to help students obtain fluency in the basic literacies, so that they can deal readily with all manner of texts; assist them in mastering the fundamentals of several key disciplines, particularly mathematics and the sciences; and provide tools so that students can understand and participate in the formal and informal social, economic, and political systems of their country. This latter goal is achieved both through direct instruction in history, literature, and civics and through a demonstration of these processes in the manner in which the school operates. Specifically, in authoritarian cultures, almost all of the processes of education are dictated by a central authority, such as the Ministry of Education or the dominant religious order. In more democratic cultures, students and teachers have considerable say in the governance and activities of the school, and sometimes even curricular choices are left to the local educational establishment.

It would be an exaggeration to claim that education across the developed world is centrally orchestrated. Vast and gritty differences exist across and even within nations. Yet there is surprising convergence in what is considered a reasonable precollegiate education in Tokyo or Tel Aviv, in Budapest or Boston. Following ten to thirteen years of school, students are expected to have studied several sciences, mastered mathematics through beginning calculus, know a good deal about the history and governance of their own country, be able to read and write fluently in their native language. Most nations have or are moving toward standardized curricula and assessments in these areas—another indication of globalization's momentum. Countries differ notably in the extent to

which they require mastery of languages other than the native tongue(s), knowledge of the history and culture of other parts of the world, and acquaintance with "softer" subjects like the arts or literature. International comparisons, such as the International Mathematics and Science Survey (TIMMS), exert increasingly strong pressures in the planning chambers of educational ministries. And programs like the International Baccalaureate are spreading rapidly to many countries—developing as well as developed—throughout the world (Walker, 2002a).

From this description, it may seem that large parts of the world have managed to strip education not only of its religious moorings but also of a clash among competing values. To some extent, this characterization has validity. There is little dispute across the globe that future citizens need to be literate, numerate, capable of scientific thought, and knowledgeable about the history, traditions, and governmental system of the nation in which they are being educated. Yet the specter of values still looms large in two respects. First, competence in science, mathematics, engineering, and technical subjects has come increasingly to be valued, perhaps overvalued, in comparison, say, to the arts, literature, moral education, or philosophy. In this sense, a technical education is equally important to fundamentalist Muslims, Hindus, Christians, and Jews; piano or calligraphy lessons take place after school or on weekends for those who can afford it. Second, especially within democratic societies, there are large and unresolved disputes about what competence means. Thus, within the sciences, competence can mean mastery of large bodies of factual information, familiarity with laboratory procedures, in-depth understanding of selected key concepts, and/or the ability to make new discoveries or raise new questions. And educational policy makers disagree about whether future citizens should know political or social history, embrace triumphalist or critical accounts of their own history, learn to support or to critique the status quo. The sphere of values remains alive and well in education.

Until thirty years ago, even students who received the highest-quality education typically left school during adolescence. Nowadays, however, some form of tertiary education is becoming common, even expected, especially in developed countries. The American option of some years of "liberal arts" is exceptional—and may be an endangered species even in the United States; it is (perhaps reasonably in some countries) assumed that sufficient liberal arts were conveyed in the precollegiate years and that the tertiary years should focus on professional or at least preprofessional training, again with an emphasis on technical professions. Whether or not tertiary education occurs at the end of adolescence, it is widely recognized that some forms of adult or "lifelong" learning will be necessary across the occupational spectrum. Which institutions should handle such an education and what value systems will be embodied are questions that will need to be addressed in the coming years.

THE EMERGING IMPACT OF SCIENTIFIC FINDINGS ON EDUCATIONAL PRACTICE

For centuries, significant changes in the educational system have been due largely to historical events. The emergence of large cities in Europe gave rise to the universities of the late Middle Ages. The invention of the printing press made possible wide-scale literacy and allowed individuals increasingly to take charge of their own education ("Just give me a library card, please"). The changing status of women both allowed more young girls into the educational system and ultimately conferred career options beyond teaching on large numbers of capable adult women.

Since the rise of psychology and other social sciences in the latter part of the nineteenth century, educational policy makers have sought to base their recommendations on emerging knowledge about human beings. Note that this is itself a values statement: the claim that scientific discoveries about human nature ought to be a basis for educational changes might seem bizarre in an educational milieu where sacred considerations are dominant.

With little question, in recent years the largest impact on educational policy making has come as a result of psychometrics. Testing has a long history, but its rationale took a sharp turn in the early twentieth century. The impetus for this turn came from the growing belief that individuals differed from one another in intellectual potential and that psychologists could measure these differences reliably through an IQ (intelligence quotient) test.

Interestingly, the test makers initially embraced a range of political and social positions. Alfred Binet, the French psychologist who created the first intelligence tests, sought to identify individuals with potential learning difficulties so that these persons could achieve special help and support. American progressives who embraced intelligence tests saw them as ways of improving education generally by placing it on a more scientific basis: as Lord Kelvin famously pointed out, measurement is the key component of any scientific practice (Lemann 1999). However, testing has also been embraced by those with a contrasting political and social agenda. For many scientists and policy makers in the early twentieth century, testing was a scientifically validated way of selecting those with talent and consigning those who scored poorly to the backwaters of school and society (Gould 1981).

Contributing strongly to educational policy and practice have been the models of human learning that have emerged in psychology. Each of the principal models has antecedents that date back to earlier philosophical positions, but each has been reinforced by researchers who draw on data and scientific ways of thinking. For example, B. F. Skinner (1938), the behaviorist, drew on studies with animals and human beings to argue that learning is best effected by a careful schedule of rewards and punishments (more technically, schedules of reinforcement). This epistemological position—which dates back to the empiricist philosophers of the seventeenth and eighteenth centuries—called for carefully calibrated curricula that guided learners smoothly from one concept or practice to the next, slightly more complex one—in a way as error free as possible.

Consider two contrasting pictures of human nature that derived from the psychology of cognitive development. Drawing on the famed Swiss psychologist Jean Piaget (1983), many educators have called for a system in which young individuals discover for themselves the laws that govern the physical, biological, and social worlds. According to this position, which reverberates with Rousseauian sentiments, attempts to inculcate facts and concepts directly are ill-advised: only superficial learning can result. Students are better off if—like Rousseau's Emile—they can explore for themselves the operations of, say, a lever, an abacus, or the rules that govern a billiard ball and figure out the operating principles. While not rejecting the Piagetian perspective in toto, the influential Russian psychologist Lev Vygotsky (1978) added two important components. First, he noted that there is a great deal of knowledge about such concepts already circulating within the society and that the challenge of education is to help students internalize what has already been established by previous generations. Second, he showed that proper support, or scaffolding, for the learning child is always advisable and sometimes necessary if the child is to achieve more sophisticated understandings and skills. It is illusory to believe that children can on their own figure out the major ideas that have slowly emerged in the scholarly disciplines, even though they may be able to master certain universal understandings without explicit tutelage.

Even though most educators have not read Binet or Skinner, Piaget or Vygotsky in the original (and most parents have not heard of these authorities), the legacies of these intellectual giants have exerted an impact on education around the world. The belief in formal tests as means of selecting and comparing has proved an incredibly powerful twentieth-century virus. Behaviorist methods are widely used, particularly with populations that exhibit cognitive or emotional problems. But discovery methods are also prominent in many scientific and mathematics classes, while concern with the proper forms of support or scaffolding permeate discussions about education, ranging from Head Start programs to apprenticeships in scientific laboratories or medical schools.

THE CHALLENGE POSED BY NEW DISCOVERIES

Just as generals often fight the last war, many educators base their well-intentioned practices on outmoded ideas about human cognition. In the past quarter century, I have had the opportunity to observe two major changes in how scientists think about human learning and to anticipate the emergence of a third. In each case, these paradigm shifts could have major educational implications, ones that remake how teachers work with students. In tracing the course and fate of these understandings, we can gain important insights into what happens when scientific discoveries meet educational practices.

From Intelligence to Intelligences

Let me begin with the example of intelligence. For nearly a century, a consensus has obtained among those who are charged with thinking about intelligence. Put succinctly, the consensus stipulates that there is a single thing called human intelligence; individuals differ from birth in how smart they are; one's intellectual potential is largely determined by one's biological parents; and psychologists assess a person's intellect by administering a test of intelligence. These views date back to the claims of Charles Spearman (1904) and Lewis Terman (1916) at the turn of the century, and they have been espoused in recent years by such experts as the British psychologist Hans Eysenck (1987) and the American social scientists Richard Herrnstein and Charles Murray (1994).

While this consensus was challenged from early on by both scholars (Thurstone 1938) and commentators (Lippmann 1922–1923/1976), only recently has there been a more concerted critique by scientists of various stripes. Among scholars of artificial intelligence, there is a growing recognition that notions such as "general problem solving" are not well-founded and that successful computer programs contain specific knowledge about specific forms of expertise. Among neuroscientists, there is agreement that the brain is not a general, equipotential organ: rather, specific capacities (e.g., language, spatial orientation, understanding of other people) are associated with specific regions of the brain and have evolved over the millennia to entail specific kinds of information processing (for relevant references, see Gardner 1983/1993a, 1985). Among anthropologists and psychologists, an increasingly vocal minority has proposed the existence of several relatively independent forms of intelligence (Battro, this volume; Goleman 1995; Mithen 1996; Rosnow, Skedler, Jaeger, and Rin 1994; Salovey and Mayer 1990; Sternberg 1985; Tooby and Cosmides 1991).

In a formulation developed two decades ago, I argued that human beings are better thought of as possessing half a dozen or more separate sets of capacities that I termed multiple intelligences (Gardner 1983/1993a). As currently construed, the list stipulates eight intelligences (linguistic, logical mathematic, spatial, musical, bodily-kinesthetic, interpersonal, intrapersonal, and naturalist), with a possible ninth, or existential, intelligence. Each intelligence embodies a separate form of information processing, and while intelligences readily operate in synchrony in normal individuals, there is no necessary relation between one intelligence and another.

"MI theory," as it has come to be called, has two fascinating and complementary facets, and both of these can play out in the educational sphere. The first implication is that all of us possess these several intelligences: they make us human, cognitively speaking. Thus any teacher faced with youngsters who are not totally impaired can assume that the students possess all of these intelligences. If one chooses, it is possible to teach to the specific intelligences, to develop them, to draw on them in conveying consequential educational materials.

The second facet is that each individual possesses a distinctive profile of intelligences. Even identical twins—literally clones of one another with the same genetic profile—may each exhibit a characteristic "scatter" of intellectual strengths and weaknesses. These differences are due, presumably, to several factors: for example, even when two individuals have identical genetic information, they don't undergo the identical experiences in the world (or even in the womb); and two individuals who appear indistinguishable on a physical basis may be strongly motivated to distinguish themselves from one another.

The assertion that we possess a range of intelligences, with each person's profile as idiosyncratic, immediately poses a fascinating educational dilemma. One horn of that dilemma proclaims that we should ignore these differences or even try to erase them. The opposing horn holds that we should recognize these differences and try, insofar as possible, to turn them to our educational advantage.

It is fascinating to realize that throughout most of human history, differences among individuals have been considered a nuisance factor in educational circles. We have favored uniform schools—in which each person is treated the same as every other one. Moreover, this "equal treatment" appears on the surface to be fair, since no favoritism has apparently been shown.

However, one can also argue—as I have—that such "uniform" schools are actually unfair (Gardner 1993b, 1999a). They privilege one profile of intelligences—almost always the blend of language and logic that is probed in intelligence tests—and ignore or minimize the other

ones. It would be possible to take entirely the opposite tack—one that I have labeled "individually centered education." In this alternative philosophy, one finds out as much as possible about each student and then crafts an education that helps each student learn as much as possible, in ways that are congenial to that student. I believe that such individualized education will come to fruition very soon. This outcome will occur not because of my theory or my preaching but because technology will make it possible to individualize education as much as we want to. And once it becomes clear that algebra or French or economics or music theory can be presented in many ways, then it will constitute malpractice to perseverate in using the methods of uniform education (see Turkle 1997, this volume).

The case of MI theory makes it clear that scientific findings can readily yield educational implications. Indeed, once MI theory had been enunciated, educators in many parts of the world began to claim that they were refashioning their classes or schools in the light of the theory. I was pleased that these ideas—psychological ones—had stimulated their thinking. But it soon became clear that MI theory was like an inkblot test—an ambiguous stimulus that could be interpreted in highly idiosyncratic ways. Some educators saw MI theory as a rationale for arts education or special education; others saw it as a pretext for creating tracks, in terms of the various intelligences; still others considered MI theory as a suggestion to teach seven to eight topics and/or to do so in seven to eight different ways. Even the psychometricians got into the act: I was approached by several publishing companies and asked if I wanted to develop a battery of tests, one for each intelligence!

The decisions one makes in such instances clearly reflect one's own value system. One can never proceed directly and unambiguously from a scientific finding to an educational practice. Indeed, this stricture pertains even to the traditional view of intelligence. I had a chance to discuss the findings of *The Bell Curve* with its senior author, Richard Herrnstein, before his untimely death. Herrnstein and I agreed that if one premise of the book was correct—that it is difficult to change IQ—one may draw two diametrically opposite inferences. The Herrnstein-Murray inference is that it is not worth trying to raise IQ and that one should simply accept these differences and make the best of them. But an opposite, more optimistic inference is that one should devote all one's energies in an attempt to raise IQ and one might well hit upon a method that is successful.

The embracing of MI theory, at least at a nominal level, is an example of how a scientific finding can be readily validated by the educational community. However, such a friendly reception is not always the case.

The Challenges of Disciplinary Understanding

Once one has acquired the basic literacies, the next educational milestone entails mastery of various subjects or disciplines. While the list of valued disciplines differs across societies, in general it features a number of sciences (biology, physics, chemistry), several branches of mathematics (algebra, geometry, precalculus), as well as a smattering of more humanistic pursuits (history, geography, one or more art forms). If the literacies represent the consensual curricula for the elementary grades, disciplinary mastery and understanding is the curriculum of choice for secondary schools and perhaps college as well.

Let me say a word about each of these terms. When I speak of *disciplines,* I intend a distinction between subject matter (learning the names, facts, and concepts of a particular subject) and discipline (mastering the distinctive ways of thinking that characterize a scientist, historian, humanist, or artist). Both scientists and historians offer explanations of events, but the nature of the data that they examine and the kinds of explanations that they offer are distinctively and instructively different. When I speak of *understanding,* I venture well beyond the simple capacity to recall what one has read or heard about. An individual who understands a disciplinary topic can apply that understanding to new situations, ones that she has never encountered before. In the absence of such performances of understanding, acquired knowledge remains inert—incapable of being mobilized for useful purposes.

In the past, both traditionalists and progressives woefully underestimated the difficulties entailed in disciplinary understanding. Traditionalists saw disciplinary study chiefly as the mastery of factual and definitional information drawn from various subject matters; and such mastery entailed chiefly repetition, drill, and preconfigured problem sets (Bereiter and Engelmann 1966; Hirsch 1987, 1996). Progressives believed that disciplinary understanding flowed naturally from the opportunity to explore topics in depth, in natural settings, at one's own pace (Bruner 1960; Dewey 1964; Jervis and Tobier 1988). Just as literacy should arise as a matter of course following opportunities to practice in a literate environment, so disciplinary mastery should arise naturally from deep immersion in the relevant subject matter.

Alas, both of these educational perspectives have proved wrong. A large body of research from the cognitive sciences over the last few decades has documented an alarming state of affairs. It turns out that the understanding of the principal ideas in the various disciplines has proved much more challenging than most educators have believed. The smoking gun can be found in the study of the sciences. Even students who get high grades in the sciences at leading secondary schools and universities turn out to have very tenuous understanding of the principal ideas in various subject areas. This result has been ascertained by examining such students outside of their classroom environment. Not only are most students inadequate in applying properly what they have learned in class, but in many cases, they give the same answers to problems and questions as are given by students who have not even taken the course in the first place! (For a summary of the relevant literature, see Gardner 1991, 1999b.) Thus, for example, even our high-scoring high school and college students fail to evince understanding of evolution, or the laws of motion, or the principles of economics when they are questioned outside a text-test context.

In *The Unschooled Mind* I have laid out this state of affairs in some detail. Whether one looks at the physical sciences, the natural sciences, the human sciences, mathematics, history, or the arts, the same picture emerges: most students prove unable to master disciplinary content sufficiently so that they can apply it appropriately in new contexts. For the most part they have simply memorized facts and definitions and can parrot back this "inert knowledge." Perhaps their teachers were asking them to do only this, so that in such cases, low expectations may well be at work. However, considerable evidence now documents strong cognitive forces that stand in the way of disciplinary understanding.

Why does this happen? I have argued that in the early years of life, young persons develop very powerful theories about the world: theories about objects, physical forces, living beings, life and death, other persons, the nature of the mind, and the like. These theories are based largely on common sense, though they may bear traces of both our biological heritage and the folk theories that young persons hear enunciated around them. Sometimes these theories turn out to be essentially correct; sometimes they are charming, to boot; but more often than not, they are simply erroneous misconceptions. To the extent that they are aware of them (and often they are not!), parents and teachers would like simply to eradicate these erroneous theories. Such mind transformation turns out not to be easy to do, however. In my view we have underestimated *both* the strength of these early theories *and* the amount of scaffolding, challenging, and consolidating that is needed to replace intuitive, unschooled theories with a new and superior understanding.

Again, the recognition of new data about the human mind should prove provocative to educators, but in this case it does not immediately dictate commensurate educational practices. One could, for example, simply dodge the challenge of disciplinary mastery and remain at the level of Gradgrindian (or Hirschian) factual mastery. One could decide to challenge directly the misconceptions of the young and see whether the proper conceptions can readily arise in their place. One could let the misconceptions play out, see where they are inadequate, and let youngsters themselves contrive better understandings. One could develop targeted curricula that provide support for specific forms of disciplinary understanding. It hardly needs to be remarked that the kind of local and national assessment instruments in play will exert a powerful impact on the educational strategy that is followed. If the instrument calls for a great deal of coverage—spanning the proverbial terrain from Plato to NATO in a world history course—then any chance of eradicating misconceptions will be undercut. And in my view, the latter scenario is what has happened so far. Few educators are willing to face the serious implication of the finding that genuine disciplinary understanding is rarely found, even among our most successful students.

Beyond Disciplinary Understanding—History Marches On

In the fall of 2002, both the Rhodes Scholarship and the Marshall Scholarships were announced at Harvard University. Seven students

won these coveted awards, which provide support for study at a British university. What caught my eye was the fact that all seven of these students had undertaken interdisciplinary study while undergraduates. One student was enrolled in history and literature, a second was in physics and biochemistry, a third was in philosophy and international relations. All three of these individuals were also seriously involved in the arts.

While it has rarely been written about in the popular media, a major sea change has occurred in the academy over the last fifty years. A large number of interdisciplinary centers, programs, projects, and departments have sprung up all over the educational landscape, from middle school, through college and university curricula, all the way to advanced think tanks in the sciences, the humanities, and policy studies. This trend has reflected a variety of forces, ranging from the sober (so many contemporary problems demand input from a number of disciplines) to the mundane (it is attractive for a faculty member to have her own center, in which she can explore issues of interest to her in the ways she finds congenial with colleagues of her own choosing). And the actual work carried out under the rubric of interdisciplinarity has ranged from pathbreaking to self-absorbed to trivial.

For the last few years, my colleagues and I, complementing our studies of disciplinary understanding, have been exploring the nature of interdisciplinary work (Boix-Mansilla and Gardner 1997; Gardner and Boix-Mansilla 1994). There is no question that interdisciplinarity is in the air and that much work is being carried out under its banner. What has struck us is the astonishing lack of standards for what counts as adequate or appropriate interdisciplinary work. While standards are in place for judging the quality of work in the traditional disciplines, there has not been time—and perhaps there has not been motivation—to set up analogous kinds of indices for quality work in various interdisciplinary amalgams. Thus one is thrown into an uncomfortable situation: either accept all the work uncritically ("if it is interdisciplinary, it must be meritorious"); apply indices from the disciplinary world that may not be appropriate; or try to assess the impact of the work—which may not necessarily reflect its quality. (As the cases of cold fusion and Alan Sokal's spoof of postmodernist analysis remind us, the best scholarship is not necessarily the brand that gets the most attention, at least in the short run.)

The rise of interdisciplinary studies is not a scientific phenomenon; rather it is a historical fact of our time. Trends in our increasingly globalized society have brought interdisciplinary concerns to the fore. Issues like poverty reduction, anti-terrorism, privacy, prevention of disease, energy conservation, ecological balance—the list could be expanded at will—all require input from and syntheses of various forms of disciplinary knowledge and methods. Educational institutions seek, in their ways, to respond to the demand for this kind of skill; and the more adventurous students are attracted to studies that call for a blend of disciplinary expertises. Yet in a world that still believes in one kind of intelligence and that has not appreciated the difficulty of understanding even a single discipline, we are hardly in a position to mount interdisciplinary programs and feel confident about evaluating their success. Perhaps it will be necessary to institute psychological studies of the synthesizing or interdisciplinary mind.

EDUCATIONAL OPTIONS IN AN ERA OF GLOBALIZATION

Nearly everyone recognizes that the youth of today are being prepared for a world that is different in fundamental ways from the world of 1900, 1950, perhaps even 1975. In addition to the obvious differences in political alignments and technological sophistication, youth today partake of a powerful hegemonic cultural message emanating from the United States, as well as strong and divergent cultural countercurrents streaming in from major societies. Any student growing up in such a world needs to be able to navigate among these diverse and powerful messages (see Friedman 2000; Giddens 2000; also see Jenkins, Maira, and Watson, this volume). Yet there is not even the beginning of a synthesis of how this altered world should impact education, particularly education at the primary and secondary levels (see Suárez-Orozco and Qin-Hilliard, this volume). Here, I put forth some suggestions for a curriculum suitable to the era of globalization. I do so with the explicit awareness that all educational recommendations presuppose a certain set of values. Mine are based on an education that is suitable for a democratic society, in which individuals have a fair degree of say in where they live and how they live; in which the use of one's mind to the fullest is a prominent value; and in which all able-bodied individuals are expected to contribute not only to the security and well-being of their families but also to the health of the broader communities in which they live.

Beginning on a conservative note, I believe that we should not turn our backs on those methods and procedures that have been worked out over long periods of time. Though there is always room for improvement, we know a great deal about how to develop the literacies in young persons, both those who can learn in normal ways and those who have specific learning problems—for example, in the decoding of written alphabetic text.

Once we come to the mastery of disciplines, however, we can no longer afford business as usual. Now that we know the difficulties of disciplinary mastery, we need to recognize that this concern must occupy a large proportion of our pedagogical energies. My recommendation in this area is to cut down radically on the number of subjects to master in precollegiate education: I would favor all students learning at least one science, one area of history, one art form, expression and appreciation in their own language, and especially in countries where the principal language is not widely spoken beyond its borders, expression and appreciation of English.

Once a sharper focus has been adapted, it is indeed possible to teach for disciplinary understanding. Such teaching is best done by focusing on the principal deep ideas in the discipline and approaching them from many different angles (Blythe 1998; Cohen, McLaughlin, and Talbert 1993; Wiske 1998). A depth-over-breadth engagement with a limited number of topics and disciplines is most likely to undermine the misconceptions and to establish deep and robust forms of understanding. Interestingly, the idea of multiple intelligences can be used here. For if one focuses sharply on a limited number of concepts, it is possible to approach these concepts in several ways, exploiting our various human intelligences. Such a multiperspective approach yields two dividends: it reaches more students and it exemplifies what it means to have expertise (Gardner 1999b). After all, the expert is the individual who can think of a topic in lots of different ways.

My focus on a few key disciplines reveals that I believe in the idea of a core curriculum. In that sense I am a traditionalist. But I am completely open to the presentation of the curriculum along any number of pathways and to the assessment of mastery in several different ways. In matters of pedagogy and assessment, I am a pluralist. These ideas clash with those who want to revert to the ideal of uniform schools; they are congenial to those who see themselves as helping each student to realize his or her full potential in ways that are congenial.

Because of my fealty to the disciplines, I have been a strong believer that interdisciplinary work should await the mastery of a number of individual disciplines. We would not take seriously a claim of bilingualism unless a person had mastered more than one language; and so I reason that one should not evoke the term *interdisciplinary* until one has exhibited mastery of more than one discipline. Pursuing this line, disciplinary education becomes the challenge of secondary education, interdisciplinary education the superstructure associated with tertiary and postgraduate education.

Recently, however, I have softened this line. Because interdisciplinary work has become so important in our world, it may not be practical to withhold its practice until complete mastery of specific disciplines has coalesced. Perhaps it will be possible for an individual to achieve sufficient mastery of one discipline so that he can become part of a multidiscipline team. The challenge for this new team member is to bring a particular disciplinary perspective to bear on a problem and to gain enough expertise so that he can appreciate the contributions of the other disciplines, pose insightful questions, and integrate the answers into his understanding. I see no reason why novices should not be allowed to observe these interdisciplinary exchanges and benefit from them. However, it is vital that such novices understand that ultimately one will not be able to participate in a legitimate way in an interdisciplinary team unless one has paid one's disciplinary dues.

Membership in such teams points up another vital desideratum for participation in a global society. Simply being the smartest person in one's discipline will no longer suffice. Individuals need to be able to work effectively and in a civil manner with individuals who have different expertises and who come from different cultural backgrounds (Murnane and Levy 1996; Resnick 1987; Suárez-Orozco and Qin-Hilliard, this volume). We might say that such individuals need to develop interpersonal intelligence and multicultural understanding.

While there is a place for direct instruction in these realms, there is little question that youngsters are most powerfully affected by the examples that they see around them each day. To the extent that parents, teachers, and their respective communities exhibit strong forms of personal relations and cultural sensitivity, we can expect that youngsters will be equipped to participate effectively in working and playing teams. If, however, such forms of sensitivity have not been exhibited regularly by those who are closest to the young, then educational or work institutions face a daunting challenge.

Many have proposed that in our highly competitive global society, creativity, originality, thinking "outside the box" are at a premium. Silicon Valley represents eloquent testimony to the importance—as well as the risks—of a highly creative ambience. Yet it is questionable whether the enhancing of creativity should be a task of the schools. Much depends on whether the lessons of creativity are manifest "on the street" and in commercial enterprise—as they are in Silicon Valley or Hong Kong—or whether the conformism and tradition encountered daily on the streets and in the home need to be countered boldly in the educational system.

TOWARD ONE POSSIBLE EDUCATIONAL REGIME FOR A GLOBAL ERA

I propose that precollegiate education in the future encompass the following relatively new skills and understandings (see Suárez-Orozco and Qin-Hilliard, this volume). These need not be transmitted by schools or by schools alone, but unless they are passed down via other sectors of the society, their transmission will become the challenge par excellence for the precollegiate educational system.

1. *Understanding of the global system.* The trends of globalization —the unprecedented and unpredictable movement of human beings, capital, information, and cultural life forms—need to be understood by the young persons who are and will always inhabit a global community. Some of the system will become manifest through the media; but many other facets—for example, the operation of worldwide markets—will need to be taught in a more formal manner.

2. *Capacity to think analytically and creatively within disciplines.* Simple mastery of information, concepts, and definitions will no longer suffice. Students will have to master disciplinary moves sufficiently so that they can apply them flexibly and generatively to deal with issues that could not be anticipated by the authors of textbooks.
3. *Ability to tackle problems and issues that do not respect disciplinary boundaries.* Many—perhaps most—of the most vexing issues facing the world today (including the issue of globalization!) do not respect disciplinary boundaries. AIDS, large-scale immigration, and global warming are examples of problems in need of interdiscplinary thinking. One could take the position that it is first necessary to master individual disciplines; moving among or beyond disciplines then becomes the task of tertiary or professional education (Gardner 1999b). However, there is much to be said for beginning the process of interdisciplinary work at an earlier point in education—as is done, for example, in the "theory of knowledge" course required of students in the International Baccalaureate or the courses in "problem-based learning" taught at the Illinois Mathematics and Science Academy. How best to begin to introduce rigorous multiperspective thinking into our classrooms is a challenge that we have only begun to confront; and as noted, our psychological understanding of the mind of the synthesizer has yet to coalesce.
4. *Knowledge of and ability to interact civilly and productively with individuals from quite different cultural backgrounds—both within one's own society and across the planet.* Globalization is selecting for interpersonal competencies, including the ability to think and work with others coming from very different racial, linguistic, religious, and cultural backgrounds (see Maira, this volume; C. Suárez-Orozco, this volume). Mastery and cultivation of these competencies will be the cornerstone of educational systems in the most successful democracies of the twenty-first century (see Suárez-Orozco and Qin-Hilliard, this volume).
5. *Knowledge of and respect for one's own cultural tradition(s).* The terrorists who crashed into the Twin Towers of the World Trade Center privileged the scientific and technical knowledge and cognitive skills that globalization has to offer. At the same time, they despised the Western, and especially the American, values, ethos, and worldview that in many regions of the world—including much of Western Europe—pass as globalization's underside. Societies that nurture the emergence of the instrumental skills needed to thrive *while* not subverting or undermining the expressive domains of culture—values, worldviews, and especially, the domain of the sacred—will endure and may even have the edge in globalization's new regime. Managing the dual process of convergence (in the instrumental domains of culture) and divergence (in the expressive domains of culture) may well be among the most critical tasks of education for globalization. Societies that can manage this psychic jujitsu will thrive.

6. *Fostering of hybrid or blended identities.* Education for globalization will select for the crafting and performing of hybrid identities needed to work, think, and play across cultural boundaries (see C. Suárez-Orozco, this volume). These will be increasingly indexed by multilingual competencies and transcultural sensibilities that will enable children to traverse discontinuous cultural meaning systems; to metabolize, decode, and make meaning in distinct, sometimes incommensurable cultural spaces and social fields. Societies that privilege transculturation and hybridity will be in a better position to thrive, while societies that enforce a regime of compulsive monoculturism and compulsive monolinguism are likely to lose out under globalization's emerging regime.
7. *Fostering of tolerance.* Education for globalization will give those societies that tend to (1) tolerate or, better yet, privilege dissent, (2) foster doubt (in Francis Bacon's sense), and (3) provide equality of opportunity will have a powerful edge over societies that tend to privilege reflex-like consent and inequality of access to opportunity due to various ascribed qualities. More ominously, our world is unlikely to survive unless we become far more successful at fostering tolerant attitudes within and across nations.

CONCLUDING NOTE

Though many may wish that they would go away, the main lines of globalization are here to stay. It is difficult to envision a world in which the economic trends, communication technologies, movements of population, and cultural messages of the past few decades will somehow be reversed. Even events as epochal as those of September 11, 2001, are likely to modulate the forces of globalization rather than derail them in a fundamental way.

Yet local or national institutions, mores, and values will not necessarily disappear. Indeed the very power of the forces of globalization will in many cases prompt strong reactions, sometimes violent, sometimes effective. Those newly emerging institutions that can respond to the forces of globalization while at the same time respecting the diversities of cultures and belief systems are most likely to have a long half-life.

Chief among those institutions will be educational systems, with those charged with precollegiate education assuming enormous importance for the foreseeable future. Educational systems are inherently conservative institutions, and that conservatism is in many ways justified. Still, just as educational systems eventually adapted to the agricultural and industrial revolutions, just as they eventually responded to the decline of religion and the invention of print and audiovisual technologies, they will have to adapt as well to the facts of the globalized, knowledge-centered economy and society. In doing so, they will have to somehow integrate the new scientific findings, their multiple (and sometimes seemingly contradictory) educational implications, with past and present historical trends, and to do so in light of their most cherished values. This task may take one hundred years or more; but as a French military leader once famously remarked, "In that case, we had better begin today."

NOTE

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COMMENTARY:

A Disciplined Approach to School Reform

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Lessons from the ATLAS Experience School reform is a notoriously ambitious undertaking; and even among school reform efforts, ATLAS stands out in terms of the scope of its ambition. Seeking to address education from kindergarten through twelfth grade, the ATLAS program includes the creation of planning and management teams, the forging of ties to the wider community, the incorporation of up-to-date technologies, and substantial reconsideration of crucial aspects of curriculum, instruction, and assessment. Indeed, quite self-consciously, ATLAS seeks to meld lessons drawn from the experiences of four complex partner educational organizations that themselves have collectively been involved in school reform throughout the United States for well over 100 years.

For those of us involved in the ATLAS trek from its beginnings in 1991, it has been a bumpy but sometimes exhilarating ride. While the school reform team brought redoubtable strengths to its challenging enterprise, we encountered Murphy's law at almost every turn. Thanks to an inspiration of Ted Sizer's, we decided that it was important to document and evaluate ATLAS' efforts, and so in 1993 we secured independent support for the ATLAS Seminar. This volume, one of the fruits of the ATLAS Seminar, offers individuals interested in school reform the opportunity to relive the ATLAS ride, to encounter some of the obstacles, to recoup some of the insights.

This volume captures well--some might even quip, captures too well--some of the central tensions in ATLAS: the different views and stances of the partner organizations (and, one must stress, the differences found as well within each organization); the struggle to decide what is really central and what is peripheral; the constant "walking of the fault line" between theory and

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practice; and the considerable pressures that impact the work of teachers, students, and administrators on a daily, if not hourly, basis.

Of many approaches to research and theorizing about schools, the creation of taxonomies or typologies is among the most important. Bethany Rogers has made a contribution to scholarship in delineating four competing foci for the curriculum: the measurements mandated by a political jurisdiction; the concepts and approaches to knowledge as captured in the scholarly disciplines; the passions and approaches of teachers; the interests and the "relevances" of students. Rogers is correct in stating that individuals and organizations differ profoundly in their priorities; and she has made a reasonable case for how her "ideal typology" played out in the four partner organizations. Even if the partner organizations do not enthusiastically endorses Rogers's "placements" of each, both the reformers and the readers benefit from a crystal-clear statement of these options.

We see the utility of this taxonomy in the essay by Donna Muncey and Joyce Payne. These authors have correctly identified the severe tensions that result when an enabling organization (like ATLAS) works with a jurisdiction (like Prince George's County in Maryland) where each party embraces a fundamentally different set of assumptions about authority. The authors go on to show the equally crippling problems that arise when a school deviates from the "authority norms" of the surrounding community, or when a new set of building or community administrators abruptly introduces a new set of authority considerations. It is no wonder that lasting school reform is virtually impossible to achieve under such circumstances--and it is wonderful (if I may borrow the same word stem) that good things can nonetheless happen in this lamentably combative milieu.

One of the lessons that I have learned--I almost said "one battle scar I've acquired"--is that it pays to be as clear as possible about one's own vision of school reform. Unfortunately, circumstances conspire to make such clarity difficult to achieve. Within ATLAS, it was important to maintain comity and direction, and overly explicit statements of visions threatened to disturb equilibrium. (Indeed, the curriculum group proved to be the most divisive of the four seminar teams.) Some members were extremely uncomfortable with the shrillness of the debate--for example, whether disciplines were "friends" or "enemies" of reform, and whether planning teams were fundamental or frills in curricular reform. Moreover, since it was important to maintain good ties between ATLAS Central (as the university-based team of researchers came to be called) and the three major community sites mentioned here, there was much to be said for blurring around the edges. Perhaps, as Winston Churchill commented on more than one occasion, the possibility for such "muddling through" is indeed the principal virtue of democracy.

Scholars have an advantage that practitioners and politicians lack; we can attempt to be as clear as possible. As a result of my work on ATLAS, I have achieved clarity about my own thoughts about curriculum. I present them here; and I go on to suggest how they might fit within a pluralistic educational landscape.

A Focus on Disciplinary Understanding Particularly in a democracy, schools have and should realize many purposes. However, I have no hesitation in saying that the central role for schools should be to educate the minds of future citizens. No other purpose can possibly justify the expense and the time devoted to scholastic institutions in any land.

"Educating the mind" obviously leaves too much running room--it spans the landscape from strident or subtle propaganda to hermetic study of ancient scratchings. There is no point in mandating that schools accomplish what youth will acquire anyway on the streets, in their families or churches, or from the media. Rather, schools should pass on that often challenging and elusive knowledge that has been built up over the centuries by reflective men and women from several cultures.

But there is way too much knowledge and way too much information, and even those excessive quantities are being doubled with regularity. We need to make hard decisions about which knowledge to teach and which ways of knowing should be privileged.

In The Well-Disciplined Mind (Gardner, 1999), I argue that education from kindergarten through secondary school ought to have as its principal goal an initial mastery of the culture's sense of what is true (and not true); what is beautiful and what is not; and what is good and what is evil. Citizens should live in ways that honor (and add to) truth, that appreciate and create beauty, and that are moral rather than immoral.

To make my argument concrete, I focus on three instances. As an example of truth, I use the theory of evolution--the only plausible scientific explanation of where humans and other species come from. As an example of beauty, I draw on the music of Mozart. As an example from the moral sphere, I focus on the Holocaust undertaken by the Nazis in Germany. I stress that these are only examples--substitute the truth of plate tectonics, the writings of Virginia Woolf, or the moral example of Nelson Mandela, if you like. All examples necessarily reflect the values of a particular culture and a particular set of individuals.

Obviously, this is a traditional set of goals--one that could have been, and probably was, stated thousands years ago. Its ancient provenance is neither good nor bad in itself. I depart from my forbears in two important respects. First of all, I do not believe that there is any definitive version of truth, beauty, or goodness; these virtues are constantly being defined and debated. Second of all, I favor the greatest flexibility in how these "virtues" are presented to children and how their emerging understandings are probed and documented for purposes of accountability.

Given this commitment to understanding of important virtues, the question still arises about the authority for the curriculum. Theoretically, one could grant to the state or to the teacher or even to the child the right to choose the truths, beauties, or goodnesses. And, indeed, each of these agencies ought to have a role in making determinations about the curriculum.

However, only one group has been centrally committed to these topics: the scholars and practitioners who are truly expert in the several disciplines. They master the work of the past and they contribute to our future schemes of knowledge. To deny them the central role in the curriculum is to perform Hamlet without the titled personage.

What is notoriously lacking in American education today is a coherent view, kindergarten through high school, of the principal understandings from the major disciplines, along with a sense of how they can best be achieved. Instead we have a ragtag collection of facts, concepts, problem sets, and lab demonstrations that have "worked"--or are said to have worked--in the past, with neither a rationale for why they are included today nor a sense of how they can be cumulative in a child's education. Indeed, youngsters who manage to make sense of the curricula in most schools (or pathways of schools) are virtual magicians; for they are finding patterns where little structure has initially been placed.

Once one determines central understandings from the disciplines, other pieces of the educational puzzle fall into place. One can then construct inviting lessons and projects that bring the student in contact with important ideas; one can envision sequences that obtain across the semester or even, *mirabile dictu*, across years; one can create assessments that monitor the extent to which understandings have been achieved and can be performed.

The disciplines play the central role in this endeavor. Not only are they the chief determiners of which understandings are worth achieving. More important, they furnish the ways in which students can in the future approach questions, concepts, and theories. Thus the student who has learned about the scientific method appreciates the relation among theory, hypothesis, experiment, and data: she can evaluate the report of a controversial medical experiment. The student who has immersed herself deep in works of art understands how an artistic medium can be used to convey certain feelings or capture the ambiguity of a passage or scene: so informed, she can visit an exhibition or attend a performance with some preparedness. The student with historical sensitivity comprehends how one can infer plausible causality through the examination of several primary and secondary sources; she is equipped to read about an event half way around the world and make a determination of whether the analogy of Munich or Vietnam or Nazi Germany is, or is not, relevant.

Achieving this educational goal is critical. It has been well said--and Nathan Glazer might well agree--that education is what remains after the facts have been forgotten. If adults have only facts, if they are but a storehouse of inert knowledge, we will have failed them. If, however, they have obtained ways of thinking historically, mathematically, scientifically, or artistically, they will be equipped--and motivated--to make sense of new materials; and they will be able to go back and relearn what they may once have known. Students can learn these approaches from any number of topics; and they are far more likely to master them through in-depth study of a few carefully selected topics than through a superficial blitz across numerous topics.

Understandings and Authorities I have sought to state my own educational desiderata clearly (if succinctly—the full undertaking covers several hundred pages in my book). And I have made it clear that, for me, the ultimate authority in matters curricular should be the disciplines as they are understood by leading practitioners and inflected by those with an interest in the education of the young.

However, perhaps revealing a tinge of postmodernism in my traditionalist garb, I do not believe that authority is a zero-sum enterprise. Were one to embrace disciplinary understanding as an educational goal, an educational body could certainly create assessments that honor that goal; and those assessments would, in a sense, exert authority.

Teachers ought to see themselves as embodiments of the disciplines; as individuals who think in disciplined ways and who may also contribute to the disciplines. They ought to have latitude in how materials are chosen and presented, for, in Lee Shulman's term (1986), they are the experts in pedagogical content knowledge.

Finally, there are integral ties between students and disciplines. The disciplines emerge from the human desire to secure answers to questions posed by nearly every young person: Who are we, Where do we come from, What are we made out of, What is going to happen to us? The disciplines represent civilization's cumulative efforts to create means of approaching these questions systematically and ways of securing answers of some reliability. In addition, every growing person wants to achieve competence in the activities and practices that are valued in the culture. Youngsters who live in a culture where the disciplines--be they history or music or gardening or skating—are practiced and valued, will want to enhance their own skills and achieve disciplined expertise. Moreover, as Ted Sizer points out, students will necessarily make sense of the curriculum in their own way, thus ensuring that in some sense they retain ultimate authority over the representations in their own minds.

A Pluralistic Educational Universe Even if my educational vision makes sense to some, it will certainly not be right for everyone, and this is especially true in a large, multicultural society. The essays in this volume suggest some of the productive ways in which one can differentiate educational visions.

A first way has to do with age or developmental level. Education for the young proceeds properly from the interests of young children; in that sense, the students can reasonably be seen as a proper authority for the curriculum. By the time of middle and secondary school, the disciplines themselves rise to the fore. In an introduction to the disciplines, teachers play a crucial role. Then, as the student herself comes to acquire the approaches of particular disciplines, the discipline itself can provide guidance and authority.

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The state clearly holds authority for many issues ranging from health and safety to ensuring that citizenship is included in the curriculum. The state also has a legitimate role in determining that education is in fact occurring; and in making sure that selection and promotion procedures used by institutions are equitable. Its power--and the resultant controversy--occurs because of deep disagreements about what should be central in the curriculum.

A second consideration has to do with the commitment of a school to the full-blown reform process. My own observations suggest that highly traditional schools basically accept the authority of the state--and that includes both curricular and assessment mandates. If a school is to undertake any kind of change, it first needs to install those structures that permit conversation, debate, and decision making--here management structures like those developed by the School Development Program play a crucial role.

When such structures have been put in place, schools become interested in revisiting other questions of authority. Most schools will first consider an enhanced role for teachers in the decisions about curriculum, assessment, and instruction. The more daring may also consider granting authority to students. The point here is that there may be a natural developmental trend in the ways in which issues of authority are handled; I would be more than a little surprised to see a group of empowered teachers willingly reconcede authority to an outside testing agency.

There is, finally, a consideration of taste. Even when individuals or municipalities seem "equated" on certain variables, they may well continue to hold quite different visions of the educated person. I find nothing surprising or wrong with this. If, however, we live in one society, we then face a difficult choice: do we agree simply to live with alternative visions, or do we seek to hammer out some kind of consensus or compromise?

For a country as heterogeneous as the United States, it seems unreasonable to expect us to endorse "one best system." Yet, I personally find the idea of letting 15,000 district flowers bloom to be at best unwieldy and at worst abhorrent. Therefore I personally favor setting up a small number of K-12 pathways, which appeal quite explicitly to different tastes. These patterns could range from the traditional to the progressive; from one centered on factual mastery to one based on understanding; from one committed to technology to one that highlights experiential learning in the community. Families would choose from among these pathways; and because the number is small, they could be replicated across communities. In that way, a child that moves within or between communities could continue to attend a school that subscribes to the philosophy of his pathway.

How can a community move toward a curriculum that provides genuine education for its youngsters? Delineating the options is a necessary first step. Stakeholders need to commit to honest debate, with a willingness to listen and to compromise. If a reasonable consensus is not possible, that fact should be recognized—and this is my frank, though reluctant conclusion about the Prince George's County ATLAS effort of the middle 1990s. If a reasonable consensus can be reached—as was the case with Gorham, Maine—then one can move toward implementation and, ultimately, toward appropriate assessments.

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In a number of ways, ATLAS represents a good model for this process. As the essays in this volume make clear, ATLAS itself was a compromise, drawing on selected beliefs and practices of four quite distinct organizations. Still, there is enough coherence in philosophy and structures to make ATLAS schools identifiable. ATLAS has thought through key K-12 educational issues and has a strong commitment to the notion of an integrated pathway operating throughout the community. Unlike more targeted reform efforts, ATLAS is sufficiently comprehensive that it deals with the major issues that will arise in any scholastic community.

Finally, there can be variety among ATLAS communities. Some may wish to enter the portals of ATLAS through community standards, some through the disciplines, some through the purview of the teacher or the student. Beginning on a stretch of dry land is appropriate. Ultimately, however, the authority cannot and should not reside in one place. Perhaps it will be the mark of a mature ATLAS community that all four of the constituencies are addressed in a way that evolves comfortably rather than one that is constantly riddled with conflict.

The Five Minds for the Future

By Howard Gardner

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At the start of the third millennium, we are well attuned to considerations of 'the future'. In conceptualizing the future, I refer to trends whose existence is widely acknowledged: the increasing power of science and technology, the interconnectedness of the world in economic, cultural, and social terms, and the incessant circulation and intermingling of human beings of diverse backgrounds and aspirations.

As one who has witnessed discussions of the future all over the world, I can attest that belief in the power of education—for good or for ill—is ubiquitous. We have little difficulty in seeing education as an enterprise—indeed, *the* enterprise—for shaping the mind of the future.

What kind of minds should we be cultivating for the future? Five types stand out to me as being particularly urgent at the present time. One by one, let me bring them onto center stage.

1. The Disciplined Mind

In English, the word 'discipline' has two distinct connotations. First, we speak of the mind as having mastered one or more disciplines—arts, crafts, professions, scholarly pursuits. By rough estimates, it takes approximately a decade for an individual to learn a discipline well enough so that he or she can be considered an expert or master. Perhaps at one time, an individual could rest on her laurels once such disciplinary mastery has been initially achieved. No longer! Disciplines themselves change, ambient conditions change, as do the demands on individuals who have achieved initial mastery. One must continue to educate oneself and others over succeeding decades.

Such hewing of expertise can only be done if an individual possesses discipline—in the second sense of the word. That is, one needs continually to practice in a disciplined way if one is to remain at the top of one's game.

We first acquire a 'disciplined mind' in school, though relatively few of us go on to become academic disciplinarians. The rest of us master disciplines that are not, strictly speaking, 'scholarly'; yet the need to master a 'way of thinking' applies to the entire range of workers—whether it be lawyers, engineers, crafts persons, or business professionals involved personnel, marketing, sales, or management. Such education may take in formal classes or on the job, explicitly or implicitly. In the end, a form of mastery will be achieved, one that must continue to be refined over the years.

Nowadays, the mastery of more than one discipline is at a premium. We value those who are interdisciplinary, multi-disciplinary, or trans-disciplinary. But these claims must be cashed in. We would not value a bilingual person unless he or she can speak more than one language. By the same token, the claim of pluri-disciplinarity (if you'll excuse the neologism) only makes sense if a person has genuinely mastered more than one discipline and can integrate them. For most of us, the attainment of multiple perspectives is a more reasonable goal.

2. The Synthesizing Mind

Nobel Laureate in Physics **Murray Gell-Mann**, an avowed multi-disciplinarian, has made an intriguing claim about our times. He asserts that, in the 21st century, the most valued mind will be the synthesizing mind: the mind that can survey a wide range of sources, decide what is important and worth paying attention to; and then put this information together in ways that make sense to oneself and, ultimately, to others as well.

Gell-Mann is on to something important. Information has never been in short supply. But with the advent of new technologies and media, most notably the Internet, vast, seemingly indigestible amounts of information now deluge us around the clock. Shrewd triage becomes an imperative. Those who can synthesize well for themselves will rise to the top of their pack; and those whose syntheses make sense to others will be invaluable teachers, communicators, and leaders.

Let's take an example from business. Suppose that you are an executive and your firm is considering the acquisition of a new company in an area that seems important, but about which you and your immediate associates know little. Your goal is to acquire enough information so that you and your Board can make a judicious decision, and you need to do so in the next two months. The place to begin is with any existing synthesis: fetch it, devour it, evaluate it. If none exists, you turn to the most knowledgeable individuals and ask them to provide the basic information requisite to synthesis. Given this initial input, you then decide what information seems adequate and where important additional data are required.

At the same time, you need to decide on the form and format of the ultimate synthesis: a written narrative, an oral presentation, a set of scenarios, a set of charts and graphs, perhaps a discussion of pros and cons leading to a final judgment. At last, the actual work of synthesis begins in earnest. New information must be acquired, probed, evaluated, followed up or sidelined. The new information needs to be fit, if possible, into the initial synthesis; and where fit is lacking, mutual adjustments must be made. Constant reflection is the order of the day.

At some point before the final synthesis is due, a proto-synthesis should be developed. This interim version needs to be tested with the most knowledgeable audience of associates, preferably an audience that is critical and constructive. To the extent that time and resources are available, more than one trial run is desirable. But ultimately there arrives a moment of truth, at which point the best possible synthesis must suffice.

What kind of mind is needed to guide the synthesis? Clearly, though he should have a home area of expertise, the synthesizer cannot conceivably be an expert of every relevant discipline. As compensation, the synthesizer must know enough about the requisite disciplines to be able to make judgments about whom and what to trust—or to identify individuals who can help make that determination. The synthesizer must also have a sense of the relevant forms and formats for the synthesis, being prepared to alter when possible, or advisable, but to make a final commitment as the deadline approaches.

The synthesizer must always keep her eyes on the big picture, while making sure that adequate details are secured and arranged in useful ways. This is a tall order, but it is quite possible that certain individuals are blessed with a 'searchlight intelligence'—the capacity to look widely and to monitor constantly, thus making sure that nothing vital is missing; and

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that they also have the capacity to value the complementary 'laser intelligence' that has fully mastered a specific discipline. Such individuals should be identified and cherished. It is crucial that we determine how to nurture synthesizing capacities more widely, since they are likely to remain at a premium in the coming era.

3. The Creating Mind

In our time, nearly every practice that is well understood will be automated. Mastery of existing disciplines will be necessary, but not sufficient. The creating mind forges new ground. In our society we have come to value those individuals who keep casting about for new ideas and practices, monitoring their successes, and so on. And we give special honor to those rare individuals whose innovations actually change the practices of their peers—in my trade, we call these individuals 'Big C' creators.

As a student of creativity, I had long assumed that creating was primarily a cognitive feat—having the requisite knowledge and the apposite cognitive processes. But I have come to believe that personality and temperament are equally, and perhaps even more important for the would-be creator. More than willing, the creator must be *eager* to take chances, to venture into the unknown, to fall flat on her face, and then, smiling, pick herself up and once more throw herself into the fray. Even when successful, the creator does not rest on her laurels. She is motivated again to venture into the unknown and to risk failure, buoyed by the hope that another breakthrough may be in the offing.

It is important to ascertain the relation among the three kinds of minds introduced thus far. Clearly, synthesizing is not possible without some mastery of constituent disciplines—and perhaps there is, or will be, a discipline of synthesizing, quite apart from such established disciplines as mathematics, mime, or management. I would suggest that creation is unlikely to emerge in the absence of some disciplinary mastery, and, perhaps, some capacity to synthesize as well.

4. The Respectful Mind

Almost from the start, infants are alert to other human beings. The attachment link between parent (typically mother) and child is predisposed to develop throughout the early months of life; and the nature and strength of that bond in turn determines much about the capacity of individuals to form relationships with others throughout life.

Of equal potency is the young human's capacity to distinguish among individuals, and among groups of individuals. We are wired to make such distinctions readily; indeed our survival depends upon our ability to distinguish among those who would help and nourish us, and those who might do us harm. But the messages in our particular environment determine how we will label particular individuals or groups. Our own experiences, and the attitudes displayed by the peers and elders to whom we are closest, determine whether we like, admire, or respect certain individuals and groups; or whether, on the contrary, we come to shun, fear, or even hate these individuals.

We live in an era when nearly every individual is likely to encounter thousands of individuals personally, and when billions of people have the option of traveling abroad or of encountering individuals from remote cultures through visual or digital media. A person possessed of a respectful mind welcomes this exposure to diverse persons and groups. A truly cosmopolitan individual gives others the benefit of doubt; displays initial trust; tries to form links; avoids prejudicial judgments.

The threats to respect are intolerance and prejudice, what in the worst case forms into individual, state, or stateless terrorism. A prejudiced person has preconceived ideas about individuals and groups, and resists bracketing those preconceptions. An intolerant person has a very low threshold for unfamiliarity; the default assumption is that 'strange is bad'. It is not easy to come to respect others whom you have feared, distrusted, or disliked. Yet, in an interconnected world, such a potential for growth, for freshly-forged or freshly-renewed respect, is crucial.

5. The Ethical Mind

An ethical stance is in no way antithetical to a respectful one, but it involves a much more sophisticated stance toward individuals and groups. A person possessed of an ethical mind is able to think of himself abstractly: he is able to ask, "What kind of a person do I want to be? What kind of a worker do I want to be? What kind of a citizen do I want to be?"

Going beyond the posing of such questions, the person is able to think about herself in a universalistic manner: "What would the world be like, if all persons behaved the way that I do, if all workers in my profession took the stance that I have, if all citizens in my region or my world carried out their roles in the way that I do?" Such conceptualization involves a recognition of rights and responsibilities attendant to each role. And crucially, the ethical individual behaves in accordance with the answers that she has forged, even when such behaviors clash with her own self interest.

My own insights into the ethical mind come from a dozen years of study of professionals who are seeking to do good work—work that is excellent, engaging, and ethical (see www.goodworkproject.org). Determining what is ethical is not always easy, and can prove especially challenging during times, like our own, when conditions are changing very quickly, and when market forces are powerful and unmitigated. Even when one has determined the proper course, it is not always easy to behave in an ethical manner; and that is particularly so when one is highly ambitious, when others appear to be cutting corners, when different interest groups demand contradictory things from workers, when the ethical course is less clear than one might like, and when such a course runs against one's immediate self interest.

It is so much easier, so much more natural, to develop an ethical mind when one inhabits an ethical environment. But such an environment is neither necessary nor sufficient. Crucial contributions are made by the atmosphere at one's first places of work: how do the adults in power behave, what are the beliefs and behaviors of one's peers, and, perhaps above all, what happens when there are clear ethical deviations, and—more happily if less frequently—when an individual or a group behaves in an ethically exemplary fashion? Education in ethics may not begin as early as education for respect; but neither 'curriculum' ever ends.

Given the high standards necessary for an ethical mind, examples of failures abound. It is not difficult to recognize behaviors that are strictly illegal—like theft or fraud—or behaviors that are obviously unethical—the journalist who publishes a story that he knows is not true, the geneticist who overlooks data that run counter to her hypothesis. In each case, the ethical mind must go through the exercise of identifying the kind of individual one wants to be. And when one's own words and behaviors run counter to that idealization, one must take corrective action. I would add that as one gets older, it does not suffice simply to keep one's own ethical house in order. One acquires a responsibility over the broader realm of which one is a member. And so, for example, an individual journalist or geneticist may behave in an ethical manner; but if her peers are failing to do so, the aging worker should assume responsibility for the health of the domain. I denote such individuals as 'trustees': veterans who are widely respected, deemed to be disinterested, and dedicated to the health of the domain. To quote the French playwright **Jean-Baptiste Molière**, "we are responsible not only for what we do but for what we don't do."

Tensions Between and Among These Minds

Of the five minds, the ones most likely to be confused with one another are the *respectful* mind and the *ethical* mind. In part, this is because of ordinary language: we consider respect and ethics to be virtues, and we assume that one cannot have one without the other. Moreover, very often they are correlated; persons who are ethical are also respectful, and vice versa.

However, as indicated, I see these as developmentally discrete accomplishments. One can be respectful from early childhood, even without having a deep understanding of the reasons for respect. In contrast, ethical conceptions and behaviors presuppose an abstract, self-conscious attitude: a capacity to step away from the details of daily life and to think of oneself as a worker or as a citizen.

Whistle blowers are a good example. Many individuals observe wrongdoing at high levels in their company and remain silent. They may want to keep their jobs, but they also want to respect their leaders. It takes both courage and a mental leap to think of oneself not as an acquaintance of one's supervisor, but rather as a member of an institution or profession, with certain obligations attendant thereto. The whistle blower assumes an ethical stance, at the cost of a respectful relation to his supervisor.

Sometimes, respect may trump ethics. Initially, I believed that the French government was correct in banning Muslim women from wearing scarves at school. By the same token, I defended the right of Danish newspapers to publish cartoons that poked fun at Islamic fundamentalism. In both cases, I was taking the *American Bill of Rights* at face value—no state religion, guaranteed freedom of expression. But I eventually came to the conclusion that this ethical stance needed to be weighed against the costs of disrespecting the sincere and strongly-held religious beliefs of others. The costs of honoring the Islamic preferences seem less than those of honoring an abstract principle. Of course, I make no claim that I did the right thing—only that the tension between respect and ethics can be resolved in contrasting ways.

In closing

There is no strict hierarchy among the minds, such that one should be cultivated before the others. Yet a certain rhythm does exist. One needs a certain amount of discipline – in both senses of the term—before one can undertake a reasonable synthesis; and if the synthesis involves more than one discipline, then each of the constituent disciplines needs to be cultivated. By the same token, any genuinely-creative activity presupposes a certain discipline mastery. And while prowess at synthesizing may be unnecessary, nearly all creative breakthroughs—whether in the arts, politics, scholarship or corporate life—are to some extent dependent on provisional syntheses. Still, too much discipline clashes with

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creativity; and those who excel at syntheses are less likely to affect the most radical creative breakthroughs.

In the end it is desirable for each person to have achieved aspects of all five minds for the future. Such a personal integration is most likely to occur if individuals are raised in environments where all five kinds of minds are exhibited and valued. So much the better, if there are role models—parents, teachers, masters, supervisors—who display aspects of discipline, synthesis, creation, respect, *and* ethics on a regular basis. In addition to embodying these kinds of minds, the best educators at school or work can provide support, advice, coaching which will help to inculcate discipline, encourage synthesis, prod creativity, foster respect, and encourage an ethical stance.

No one can compel the cultivation and integration of the five minds. The individual human being must come to believe that the minds are important, merit the investment of significant amounts of time and resources, and are worthy of continuing nurturance, even when external supports have faded. The individual must reflect on the role of each of these minds at work, in a favored avocation, at home, in the community, and in the wider world. The individual must be aware that sometimes these minds will find themselves in tension with one another, and that any resolution will be purchased at some cost. In the future, the form of mind that is likely to be at greatest premium is the synthesizing mind. And so it is perhaps fitting that the melding of the minds within an individual's skin is the ultimate challenge of personal synthesis.

Copyright Howard Gardner, 2007. All rights reserved. *Howard Gardner is the Hobbs Professor of Cognition and Education at the Harvard Graduate School of Education. He is the author of many books in psychology, education, and policy, including, most recently,* Changing Minds, Good Work, The Development and Education of the Mind. *In 2007,* Five Minds for the Future *will be published by Harvard Business School Press.*

MULTIPLE INTELLIGENCES, HOWARD GARDNER AND NEW METHODS IN COLLEGE TEACHING

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HOW TO TEACH FOR UNDERSTANDING: CHALLENGES AND OPPORTUNITIES

DR. HOWARD GARDNER

I was asked a couple of years ago what I thought was the greatest invention of the last 2,000 years. It's a good question. You might take 10 seconds to think about what you would have said. Anyway, the answer I gave was admittedly a strange one. I said that I thought that classical music was the greatest invention of the last 2,000 years. Now, I happen to love classical music. I love the music of Mozart—I hope that you do as well—but I have to admit that one of the reasons I gave that answer was that I wanted to be quoted. I mean, if I'd said, the battery or contraceptives or Windows or whatever came out yesterday, I would have said what other people said. Nobody else said classical music.

But I think there's a better answer. The one that I would give as a scholar, as an academic, is: The Disciplines, The Academic Disciplines. Disciplines like science and history and mathematics and the various art forms. The problem is that those of us who are in the academy—those of us who teach—take the disciplines for granted. They are part of what we breathe every day, and we forget that, in fact, the disciplines were invented over the last few thousand years. Many of them began in classical times. Some of them like mathematics started in the Arab world a thousand years ago; science, in Western Europe after the Renaissance.

But they are human inventions, and we could have very well have gone till today as human beings without having those disciplines. Yet they have become our mental furniture. We can't really think without the disciplines. We can't think about the past without thinking historically or biologically. We can't think about the physical world without thinking in terms of forces and matter and, if we are more current, relativity or quantum mechanics.

It seems to me that the disciplines are human beings' ways of understanding the world—the physical world, the biological world, the world of human beings, the world of artifacts, including artistic artifacts. Now, this isn't to say that we couldn't think about these things without the disciplines, but we would think about them in very primitive, simplistic and naive ways. If you can develop a system that transmits breathtaking views of the rings around Jupiter, you have indeed ascended new heights successfully on your bootstraps. It's that way with all of the disciplines: they are hard-earned victories against intuitive forms of knowledge.

THE ARGUMENT FOR THE DAY

I'm going to argue today that the major purpose of liberal education and certainly education through secondary if not post-graduate life, is to understand the disciplines which help us to answer fundamental questions such as these: What's the world made of? What does it mean to be a human being? What is beautiful? and What is true?

If you think about it, education has other purposes like keeping kids off the street. But we could do that a lot more cheaply than sending them to school for 12 or 16 years, and we could probably teach them to get along relatively well with one another less expensively (and more successfully) than we do now. So when it comes down to it, I guess I would say the literacy that we need to understand the disciplines is certainly necessary, but the disciplines themselves are, to my way of thinking, the major educational goal.

A PERFORMANCE OF UNDERSTANDING

When I talk about understanding, which is in the title of my talk and also a theme of this conference, I have something specific in mind. Understanding is very different from parroting back. If you've got a book and you've read it, or you've got a teacher who lectures and you can repeat what you've read or heard, you might understand, but you might just have a good memory. If, however, you can take something that you've learned and you can apply it appropriately to something new, something that you haven't encountered before, then you are executing what I call *a performance of understanding.* You are showing that you can make use of what it is that you allegedly learned.

Alfred North Whitehead, the great philosopher, talked about "inert knowledge"—and it's a very good term. A lot of us have inert knowledge, but unless we can activate the inert knowledge and use it, about the only thing it might be good for is doing well in one of those television quiz shows where they say, "What is the capital of X ?" or What is the atomic weight of Y?" But if you don't understand what a capital is or how atomic weights are computed and why

Note: This publication is based on a transcription of an informal oral presentation. It has been edited only in the interests of clarity.

[illegible] they matter, then the knowledge is inert; that is, you can't use it. Indeed, a good kind of litmus test for understanding is to go over the day's newspaper with students or *Time* magazine or your favorite television news hour, and see whether the *students* can explicate or whether *you* can explain what's going on.

We read about Anthrax, which most of us have probably not thought about ever in our life before. Then the question is: to what extent does what we learned about biology help us understand the risks and what we can do about them? You know, we read about terrorism and we ask to what extent are there examples from other realms of life or from other historical eras that can help us understand this? And again, if you can mobilize what you've learned before, that's the sense that it's not all been in vain. But if you never think to apply what you learned about Northern Ireland or about Basques or about the founding of the State of Israel to what's going on nowadays in the Middle East and in this country, then essentially that knowledge was wasted. It's not doing you any good.

A NON-POSTMODERN CLAIM

In a book called *The Disciplined Mind* which came out a couple of years ago, I made a distinctly, non-postmodern claim. I claimed that the understandings that we would like people to have are understandings of what's *true* or *not true*. We get the basis for making this judgment from science, math, history as well as folk knowledge, what's *beautiful* and *ugly*, or what's kitsch. (If you don't know what kitsch is, next time you're in a hotel look at the decorations in your room and you'll probably get a good exemplar of kitsch.) And you know, understanding is in the arts but it's also in beauty—and in nature. You know, there *is* beauty in nature.

Most important, I would say, are *good* and *evil*: not just understanding the difference, but in being able to act in a good and not an evil way. I said non-postmodern because, as many of you will know, part of postmodernism is to attack these notions of truth, beauty and goodness as having any coherence at all. Indeed, just last week, Stanley Fish, a very well known and well respected literary critic, wrote an article in *The New York Times*. He basically claimed that postmodernism had not been refuted by terrorism, that there was still no way of talking about good and evil or truth and lying which could encompass our world and the world of—I would use a most non-postmodern phrase—the world of ourselves and our enemies.

I was moved to write a letter to the *Times* and, as is not usually the case, they printed it. I called Fish's argument either incoherent, inconsistent or self-refuting. If I wanted to take Fish's position, I would say, "Look, we're never going to have an uncontested notion of truth, beauty and goodness." But if I would want to take the Gardner position, which is what I believe in, I would say that even though we never reach them, these ideals are something we have to aim for. Indeed, I was going to sign my letter to the *Times* "Howard Gardner, formerly of the Flat Earth Society." (But because I didn't want to sound impertinent, I didn't.) But you know, the more you think like a scientist, the more the notion that there are no truths seems bizarre.

TRUTH, BEAUTY AND MORALITY

This is all pretty theoretical. In *The Disciplined Mind*, I take three examples deliberately chosen because they are parts of curricula everywhere. In the area of truth, I look at a science example, the theory of evolution, not because it's been proved true in every regard—that's not the way science works—but rather because it's the only non-faith based explanation we have of where human beings come from.

As a beauty dimension, I chose the work of Mozart; and as an example of morality and immorality, I chose the Holocaust. Without question, those are big topics. And so I didn't just focus on evolution, I focused on what I call *Darwin's finches*. Darwin's finches constitute a very interesting puzzle. If you go to the Galapagos Islands where Darwin went, on each island there is a different species of finch. It was thinking about this question that got Darwin to think about the survival of the fittest among species that are fighting to survive in a particular ecological niche. So I focused on Darwin's finches. Maybe only one out of ten kids could get interested in *evolution* if you just used that word. But it's different if you actually go to the Galapagos or you look at films of it and you ask the question: "Why do all the finches have big beaks on this island and smaller beaks on that island?" Most kids can get into that.

THE HOLOCAUST

The Holocaust, of course, is also a vast topic. So I take a historical incident, what is called the Wanssee Conference, which took place in January of 1942. That is the conference at which Hitler's henchmen actually began to implement the Final Solution. There are two interesting things about that conference: One is there is no record, which says that this is where the Final Solution was first implemented. Yet historians all agree that it was. The trains to Auschwitz began the next day, and within a year, a million and a half people were killed. So it's pretty high circumstantial evidence.

It's also interesting—and this gets to the morality issue—that there were 14 persons, all men, at the Wanssee Conference in Berlin. Eight of them had doctorates from Central European universities so having a high degree is no guarantee that you're going to be behaving the way that most of us think is defensible.

The examples I used are ones that I felt competent to write about. I'm not at all saying everybody should study evolution, Mozart and the Holocaust, but everybody should study topics that are rich and through *whose study*—a very important phrase—through whose study one can begin to acquire disciplined habits of mind. If you really understand evolution, you learn to think like a scientist. If you really understand the music of Mozart, you can think artistically. If you really understand the Holocaust, you begin to think historically. And only if you can think historically, artistically, mathematically, scientifically and so on, are you thinking in a disciplined way.

An Insight Concerning Facts

An insight I had some years ago is that facts have no disciplinary status at all. A fact is just a proposition. It's only when you can put facts together into some kind of a tapestry of explanation, of causality, of sense making, that the facts acquire any kind of meaning.

That is what is deeply wrong, not only with those television shows but with a lot of the standardized testing that goes on. Such a practice is very fact oriented, but it never looks at whether you can put the stuff together and make some kind of sense.

Understanding as a Performance

I could have chosen examples from physics like relativity. I could have chosen examples from the visual arts, Chinese ink and brush painting. I could have chosen an example of somebody from the positive end of morality, somebody whom I very much admire, Mahatma Gandhi. In short, the examples could be changed, but the concept of the understanding as a performance stands. Intellectual understanding can be thought of as a performance by a brilliant actor or actress. When he or she is given a script to interpret and contextualize, then and only then does the performer perform in a charismatic genius. Only then does the dancer become spellbindingly inextricable from the dance.

This was a big insight that a number of us had at Project Zero about a dozen years ago. We tend to think of understanding as a little thing that goes on between the ears and, of course, I do recommend that you keep whatever you have between your ears. It is needed to keep your skull in place. But unless you can perform your understanding, unless you can actually take the knowledge and use it publicly, neither you nor other people will have a sense of whether you understand or not. Indeed, we all know this because we've all gone to lectures—in my case, it was almost always in mathematics—where we understood it perfectly when we were in the room—or so we thought. But as soon as we walked out and somebody asked us about the central point, we realized that our understanding was extremely tenuous. Only then did it dawn on us that we had allowed our understanding to be lulled into a mild hypnosis. Instead of performing, our heads had been metaphorically nodding.

People often say to me, "Howard, has your teaching at Harvard been changed by multiple intelligences theory?" The answer is not as much as I would have hoped—I'll talk about that later. But my notions about understanding have really been radically changed. Now in all of my classes we're doing performances all of the time, and that's the way in which we can see whether or not understanding has taken place.

Current Status of Understanding

There are two other closely related points I would like to take up. Of course understanding begins from day one of life, way before anybody ever meets a discipline. But if we want to assess understanding, we have to look at *disciplinary* understanding. Do students understand the physical world, the social world, the human world, the artistic world and so on? The bad news is that understanding is very difficult to achieve as well as to assess. Why is it so difficult to achieve? Why is it so difficult to (1) develop these ways of thinking from the disciplines, and then (2) apply them appropriately in new situations? That's the real enigma.

Here are some answers to why it's hard to educate for understanding. These are sociological answers: these are things we could change about our society. We wouldn't have to use short answer assessments, although I imagine many people here do. They would probably say, "What choice do I have? I have so many students?" We could talk about that. Many people use the text, and then give a test on the text. Again, I understand why we do that, but as I said earlier, you can get a very high performance as long as you have a good memory. *Unless you're asked to take what's in the text and apply it to something new, we don't know whether you're understanding it or not.*

The correct-answer compromise—I commit it every day but I'm not proud of it—the correct answer compromise is the following: "Students, if you don't push me too hard, I won't push you too hard." We get through the day, but understanding suffers because understanding is never total. Indeed, Socrates correctly pointed out that he was ahead of other people because he *knew* all the stuff he didn't understand, whereas most of us walk around with the illusion that we understand lots of things. But if we really push ourselves, we understand that our understanding is tenuous, but that it can be improved. It's rather like truth:

We'll never get to the ultimate truth, but why shouldn't we try? We'll never get to ultimate understanding, but why shouldn't we use our precious time on earth to understand as much as we can?

TEACH A LIMITED NUMBER OF THINGS IN DEPTH

The worst problem that most of us face is the pressures for coverage. The amount of information in the world increases enormously. It increases the amount of understanding that is required. So we're in an impossible position. We're aware of all this accumulated stuff, and so we feel guilty if we don't try to disperse it.

And yet, I believe—and here is where I am at odds with almost every policy maker in this country—that if you try to cover a lot of stuff, you will not have understanding. I also think that the best way to get understanding is to cover a limited number of things in depth. But that is not a popular point of view. You will not get elected to office if you take that point of view.

Cognitive freudianism was named after Piaget, the cognitivist, and Freud, the Freudian—though there are other freudians like Anna Freud. Cognitive freudianism is a term that I coined some years ago and it is, I think, the nonsociologic reason why understanding is difficult. It is the deep biological, psychological, epistemological reason, to wit: When we're young, we develop very powerful theories about the world, theories of how the physical world works, like the bigger thing falls more quickly to the ground than a smaller thing, or the world is flat because it looks flat or theories about the biological world. "If it's moving it's alive; if it's not moving, it's dead. If it's on a monitor or other screen, who can tell? It might be alive, it might be dead."

These are very common sense notions that kids develop when they're very young, and that nobody has to teach. They just pick the notion up themselves. But while some of these notions are true and many of them are charming, most of them fall flat in the face of the discipline. They just are not backed up by disciplinary insights. *And yet, for evolutionary reasons which we could talk about, these early ideas which I call early conceptions or early engravings, are very difficult to change.* They are very entrenched. It is as if during the first five to ten years of life we had a very powerful engraving in our mind/brain—not because of teaching but just because of living in the world. When we go to school, school is like powder. The powder gets poured in those engravings and it accumulates because people say, "Oh great, look at all the powder. Our kids know so much."

A DISCIPLINED ENGRAVING

The problem is that powder is basically non-disciplinary factual information. One day kids leave school, and depending on how good the memory is, the powder evaporates quickly or not so quickly, and then what is left? That same initial engraving. The nondisciplined theory has never changed. What is needed to happen—and later I'll tell you how I think it happens—is that we've got to rub away that early engraving. We have to smooth it, and then we have to construct a new engraving, a disciplined engraving, which is a more sophisticated way of thinking. We have to construct a disciplined way of thinking.

EIGHT-YEAR-OLD CREATIONISTS

An interesting finding from a psychologist at the University of Toledo named Margaret Evans. If you talk to eight-year-olds all over this country—and I would assume all over the world—you would find that they are all creationists. Every eight-year-old, whether the child grows up in a fundamentalist home or a free thinking home, the home of a Darwinian scholar or the home of somebody who's never studied biology—all eight-year-olds are creationists. Basically, all eight-year-olds believe the world was created at a certain moment, and all the creatures were created at that moment and things have never changed. This is not because of reading the Bible: it is because at the age of eight, kids realize that kids have origins and a default assumption is everything started at the same time.

That is why Darwin's ideas are so deeply difficult to understand: Darwin teaches us that human beings didn't always exist, that monkeys didn't always exist, that fish didn't always exist. It goes back to before the amoeba. So it takes a long time to really understand those ideas. Even if you want ultimately to disagree with him, it takes a long time to understand them because—this is another evolutionary argument—*our mind didn't evolve to think in a disciplined way, it evolved basically to avoid getting eaten before you have a chance to reproduce.* I mean that's the long and the short of it.

THE FLAT PART UNDERNEATH

So it's hard work to undo those things. I have an example some of you will have heard me use. When my son Benjamin was five, I asked him what the shape of the world was. He said, "That's easy, Dad, it's round." I said, "Benjamin, that's very good." And I said to myself, "Does he have a misconception?" So I said, "Benjamin, that's great but tell me, where are you standing?" He said, "That's easy. I'm standing on the flat part underneath." Kids can learn to tell us what they think we want to hear, but it's really making them understand that even though Cambridge looks reasonably flat, that if you go far enough away and you walk long enough you'll discover that, in fact, the earth is spherical.

Understanding Algorithms

So in a book called *The Unschooled Mind*, I went through the various areas of the curriculum: science, mathematics, social studies, arts, humanities. I showed that in each area, young children developed these powerful misconceptions or stereotypes or what I called "rigidly applied algorithms." The latter term is from mathematics. It refers to a principle in which you memorize the formula, and if somebody tells you to plug numbers into the formula, you know what to do. So it looks like you can understand the mathematics.

However, the algorithm is rigidly applied. Consider these two situations. You are walking down the street, and you recognize a situation where a trigonometric equation would be relevant. Similarly, you are trying to figure out a financial statement and you see something where a quadratic equation would be relevant. There's nothing really wrong with these pictures, other than that they are rather thin. It's much more difficult to decide whether to use a trigonometric formula or a geometric formula or a calculus derivative procedure if you're asked to use it where you weren't trained to. Why? Because then you really have to understand what it was meant to do. Indeed, mathematicians I've discovered are not people with particularly good memories. They are people who, when they forget the formulas, can derive it because they've understood it. I think most of us know what it's like *not* to be in that position. If you forget the formula, you are in deep trouble.

So I hope I've convinced you that the disciplinary knowledge is not there simply for the asking. I'm a cognitive scientist, a cognitive psychologist, and I think by far the most important demonstration from cognitive psychology for education is the pervasiveness of these early theories. No matter what area you look in—physical science, social science, arts, mathematics, humanties—you find these very powerful misconceptions or scripts.

Critical Decisions

I'll now say something which will be sensitive. In the United States we have a tendency to think with a five-year-old mind about foreign policy, and every five years we have a new bad guy. Now we've got a real bad guy called bin Laden, but the notion that if we got rid of bin Laden, somehow our problems would be solved is very naive. Indeed, if we got rid of him and it came out that we did, we would create many more bin Ladens

But the point is not bin Laden. There's also Sadaam Hussein, Fidel Castro, Muramar Kadaffi, Manuel Noriega—it's kind of like *Newsweek*, "Where are they now?" Some of them are now our allies, right? Because Hussein and Kadaffi might be able to help us with bin Laden. Again, it's not to say bin Laden's a good guy. Remember, I'm not a postmodernist: I know evil when I see it. But it's simplistic to think that one person is solely responsible for an organization with thousands of people in it and millions of people supporting it. It doesn't work that way. There have to be very complex supporting forces which essentially have to be convinced, not neutralized, if the current terrorist threat is going to end.

Recommendation

So if you want to have disciplinary understanding, here are the things that I recommend. First, you have to decide what's really important in the discipline—which ideas and which ways of thinking are central. Second, you have to make a commitment to spend time on this material and to cover it. Third, if you make those two commitments, *then* you can make use of the fact that we have different ways of representing the world, different kinds of intelligence.

If you only had an hour to teach your subject, what would you teach? Now, that's kind of intimidating because most of us don't feel we have enough hours even if we meet our class several times a week. On the other hand, if three years after taking your course your student still remembers an hour's worth of stuff, you should jump in the air and click your heels, right? That's a terrific thing.

But if you can decide what are the things that are most important, and you could teach them in an hour, and then you spend a whole term going into them—if you could do that, you will really have understanding. But if you try to get, as the old saying goes, from Plato to NATO in 36 weeks, you'll have a lot of inert knowledge there but very little that can be mobilized.

Multiple Intelligences

So we come to Multiple Intelligences. What is an intelligence? An intelligence is a word that I pluralized some years ago. It's a potential in mind/brain to process certain kinds of information in the world. I think of the mind/brain as a bunch of computers—that is the metaphor I use—and these computers either solve problems or make things. The contrasting notion of general intelligence is that there's only one computer, and it's either strong or weak. The idea of multiple intelligence is that we have a bunch of computers in our mind/brain. We've all got them, but some computers are going to be stronger than others at any historical moment, and some computers are going to be easier to change and strengthen than others. So it's a very different way of thinking about intelligence. In research conducted twenty years ago, I came up with a list of intelligences.

A List of Intelligences

Linguistic
Mathematical/Logical
Musical
Spatial
Bodily-Kinesthetic
Interpersonal
Intrapersonal
Naturalistic

In each case, the most efficient way to communicate what an intelligence is, is to talk about an individual or a role that exemplifies a lot of that intelligence. So linguistic intelligence is the intelligence of a poet. This is a famous Chinese poet named Li Po. Poets think in words. That is their medium: that is, their chosen form of mental representation. The second form of intelligence is mathematical/logical. It is the intelligence of the scientist, the logician, the mathematician, the computer programmer. I don't have to tell you that in schools throughout the world and especially in Western schools, linguistic and logical intelligence are at a premium. That's not controversial. Kids who are very good in language and logic do well in school, and as long as they stay in school, they think they're smart. If they were ever to venture onto the Jersey Turnpike, then they would discover that those intelligences won't help them very much.

Language logic is really the mind of a law professor. It's the mind of Bill and Hillary Clinton, who are very smart in a scholastic way. What do we do with students whose strengths are not in language/logic? [Not every student is going to have that law professor mind.] We can give up and tell them that they're dumb. Or we can say we're going to make you into language/logic people, which may work in some cases. Or we can say we're going to try to use the intelligences which are stronger as a way of helping you to attain valued educational virtues.

Musical intelligence is, of course, the ability to think musically, to represent the world in music. Spatial intelligence, the ability to imagine large spaces like a pilot or more circumscribed spaces like an architect or a sculpture or a chess player. Bodily kinesthetic intelligence is the intelligence of a dancer, the athlete, the surgeon, the crafts person, the actor, anybody who uses the whole body or parts of the body to make things or to solve problems.

Intelligences Related to Other People

Two forms of intelligence are related to other people: *Interpersonal Intelligence* and *Intrapersonal intelligence*. Interpersonal Intelligence is understanding other people; it is the intelligence of the teacher, the sales person, the religious leader, the politician. Intrapersonal Intelligence, on the other hand, is the ability to understand yourself. The latter, Intrapersonal Intelligence, is tremendously important in a world where we have to make decisions about where to live, whom to live with, what work to pursue, what to do if we want to change careers, homes, or spouses.

An intelligence which I only began to write about recently is "Naturalist Intelligence." It is the intelligence that someone like Charles Darwin had being able to make fine discriminations in the world of nature. Most of us are not farmers or fisherman or hunters any more, but we use our naturalist intelligence to tell one sneaker from the another, one automobile from another. We make the same kind of distinctions and discriminations that were so useful to survival in pre-historic times.

So the claim is that all of us have these intelligences. That is what makes us human. That is extremely important for teachers to know because it means you can count on every one of your students to have linguistic intelligence, logical intelligence, musical intelligence and all the rest. The complementary point is that no two people, not even identical twins, have exactly the same combination and strengths of intelligences. We look different from one another, we have different personalities and temperaments, and we now have scientific evidence that even identical twins, because their experiences are different, have different profiles of intelligences.

If you teach only one way, you're only going to reach one kind of student. Most of us teach the language/logic way because that's what worked for us: we're good for those particular young men and women. But for students who have other strengths, school is very, very difficult. Moreover, once they pick up the notion they can't learn because they can't learn the language-logic way, then you have an additional obstacle to deal with, which is a loss of self-efficacy. *So here are the two big cognitive ideas of today. First, we have many intelligences, many ways of representing and understanding the world . Second, our initial understandings are very powerful, often wrong, and difficult to change.*

Entering the Topic

I want to return now to the three examples from the beginning. I'm going to give you the basic argument of the talk. If you want students to understand and if you're willing to spend time on topics, you can take advantage of MI, of multiple intelligences. You can do this in three ways. The first way is how you approach the topic, how you enter the topic. For example, getting at evolution through Darwin's finches. That's an entry point.

ANALOGIES AND METAPHORS

Number two involves the analogies, metaphors and comparisons you use. Everything that we don't understand can only be understood initially with reference to something we understand better. We're always making comparisons or drawing analogies or using metaphors. Once you open up the treasure box of multiple intelligences, you can draw the analogies and metaphors and comparisons from many different domains.

Evolution is about species, but you can also talk about the evolution of fashion or the evolution of a theme in a work of art. In some ways, that metaphor will be very powerful; in other ways, not. With the metaphor or analogy, you have to always show where it works and where it doesn't. But anything new has to be approached through metaphors. So if you never heard about multiple intelligences before, I might use the metaphor of different personality types because most people know about different personality types. Again, it's not a perfect metaphor but it's a way of opening the conversation.

DIFFERENT REPRESENTATIONS

The third way to take advantage of multiple intelligences is really important, but you've got to read *The Disciplined Mind* because I can't do it in five minutes. *Any set of ideas, any set of concepts that are important can be thought about in a number of different languages, in a number of different ways of representing.* Let us take something like evolution: you can think about it linguistically, you can think about it logically, you can think about it dramatically, you can think about it cinematically. There are many ways of thinking about evolution and a person who understands a topic well can think about it in lots of ways, can capture it in many forms of intelligence. Anything you know well—yourself, your family, your home, your job, your discipline—you can think about in more than one way.

The point is that our multiple intelligences can be great allies in broaching and enhancing understanding if we're willing to spend time on things. Let's say you're studying one of these three topics that I mentioned: the Holocaust, evolution, or Mozart. Or choose your own. You want to enter that point in a way that reaches students. Here are six or seven ways in which you can do it.

SIX WAYS TO REACH STUDENTS:

1. THROUGH STORIES

Many students like stories. That's a linguistic entry point. The story of Mozart, of his collaboration with da Ponte, of the Beaumarchais play, *The Marriage of Figaro,* which becomes the opera, etc. Or we can use the story of Darwin, Darwin's voyage on the Beagle, the story of Hitler or Anne Frank or the rise of the Nazis. There are many stories you can tell.

2. THROUGH NUMBERS

The second entry point is numbers. Many people love numbers, quantities, comparisons, proportions, how many finches, what kind, what populations, who died, who lived? Look at the score. What kind of notes? What rhythms? What ratios, etc.?

3. THROUGH LOGIC

All of the topics that I describe, and probably most of the topics that you would teach, have a logic to them. Some people—my wife is like this—need everything boiled down to logic. And boy, if you say something that's not logical, you get torpedoed, even if it's over breakfast in the morning. You say, "I read this interesting article." Well, you'd better have a logical reason for calling it "interesting."

4. THROUGH EXISTENTIALISM

Some people love big questions. My three topics are, in a sense, answers to three very big questions: (1) Where do we come from? Evolution is the only scientific answer. There are faith-based answers, but evolution is the only scientific answer. (2) What are some of the wonderful things human beings are capable of? Classical music is certainly one. (3) What are some of the terrible things human beings are capable of? Genocide is certainly one.

5. THROUGH AESTHETICS

The fifth point of entry into the student's mind is through aesthetics, works of art. Some people like to make and learn from works of art. Who would have thought the three major movies of the last decade would have been based on the Holocaust: *Schindler's List, Sophie's Choice,* and *Life Is Beautiful.* Very different approaches to understanding the Holocaust.

6. THROUGH EXPERIENCE

Hands on. Doing things yourself. Many people, especially young people, want to learn things in a very hands-on way. They don't want to listen to *The Marriage of Figaro,* they want to act it out. They don't want to read about evolution: they want to breed fruit flies and see how their traits change from one generation to the other. Even in the case of the Holocaust, there are children's museums about the Holocaust. When you go to the museum, you get a photograph of a child and then when you leave, you hear what happened to that child. That's a very powerful way of learning about the Holocaust.

Some people, people in this room, like to learn through groups, collaboration, role play, debate, interchange, dialogue, dramatization. *I am not saying everything should be taught in seven or eight ways, that would be silly. What I'm saying is that everything can and perhaps should be taught in more than* *one way.* If you teach more than one way, two important things happen. First of all, you reach more kids because kids don't all have this law professor mind. Second, you show what it's like to really understand something, to be an expert. Because an expert is a person who can think about something in more than one way. When you as a teacher—when I as a teacher explain something and the student says, "I don't understand it. Can you explain it another way? Can you show it to me? Can you draw it for me? Can you act it out?" If the answer is no, no, no, then my own understanding is tenuous. In fact, I'm preparing for class on Monday, and I know my understanding is very tenuous because I can only explain this stuff one way. And so between now and Monday, I'm going to try to think about other ways to explain it. That's the way in which multiple intelligences has affected my own teaching.

WHAT DISCIPLINARY UNDERSTANDING IS NOT—AND WHY NOT

I'm going to use here an example from precollegiate education, but I think it will be true for all of us. This is what understanding is not: it's not *cultural literacy.* This is an idea developed by E.D. Hirsch, a literary critic, the second literary critic of today's talk (Stanley Fish being the first). What Hirsch and his colleagues do, as the subtitle says, is list essential names, phrases, dates and concepts.

I've got nothing against cultural literacy. I love people who are culturally literate, but it's not the same as understanding. You could know five million names, dates, phrases and concepts and, as I said earlier, those facts, those propositions, will not bring you any closer to understanding. The problem is that not only Hirsch but most people, including most policy makers, basically have a view of the mind which I call the "empiricist barn." They think of the mind as a barn. Initially, the barn is empty, the famous *tabula rasa.* There is nothing there. Then the mind begins to fill with facts. They are not particularly related: they're just little "F's" floating around. And more facts enter and finally, your mind is crammed with facts. You've got those 5,000 or 5 million little nuggets and those supposedly constitute your cultural literacy. And you know, if you talk to a lot of policy makers, that's really what they will tell you. They think the person who's got the most facts at the end of the day, the person who has eaten the *Encyclopedia Britannica* and spat it out, is the one who is educated.

THE CONSTRUCTIVIST BARN

I am a proponent of a less popular but I think more persuasive barn, the "constructivist barn." The unschooled mind early in life develops very powerful theories. Even though kids are not taught those theories, they develop them on their own because, presumably, they are equipped to think about the world in that kind of way—the heavier thing falls faster than the lighter, the world is flat. If it's alive it moves, that sort of stuff. It's the common sense and common nonsense point of view.

Kids pick up facts. They are great fact picker-uppers. But my argument is that these early theories have to be razed, R-A-Z-E-D. Kids have to be shown why they don't work. You can't say, "Well, you know, here's a photograph of the earth: it's round. Don't say it's flat any more." You don't get rid of the misconceptions with one quick parry back and forth. Anybody who has a misconception has, over and over again, to see that it doesn't work. Such persons have to construct a new interpretation of the world, an interpretation that's more in keeping with the one that has resulted from careful experimentation and observation. It's only then that children slowly begin to lose their earlier misconception. Then you have a situation where the early theories have been impoverished, and you have a lot of free floating facts around, because again we're good fact collectors. We're like flypaper, facts stick easily. As you get older, they get harder to stick. I can give personal testimony on that.

GOING DEEPLY INTO TOPICS

But then here's what school is really all about: it's trying to build disciplinary structures. My strong argument today is that *the best way to build disciplinary structures and perhaps the only way (but certainly the best way) is to go deeply into topics, approach them in many ways, get a very rich representation of them.* We learn in the process how people who do that for a living—whether they are historians, scientists, artists, or mathematicians—how they think about things.

So when you discover something new, you can say well, "Here's how I went about thinking about something that I understood. How should I go about thinking about something that I don't understand so well?" That's what a discipline is. I'm basically a psychologist. The discipline we learn is to conduct experiments. So the habit of mine that I have as a psychologist is any time I read any science in the newspaper or hear about something, I right away say, "What was the control group? Were there placebo effects? What were the variables?" These are no-brainers for me as a psychologist, but it took me ten years to learn how to think that way. You know, the *National Enquirer* makes a sizable profit based on people who never ask those questions.

INTERDISCIPLINARY WORK

Anyway, disciplinary structures consolidate after a while with good teaching, and then interdisciplinary work becomes possible. I'm now studying interdisciplinary work. Let me simply say that I don't think you can do genuine interdisciplinary work unless you have mastered more than one discipline. If somebody said they were bilingual, you would be skeptical if they didn't have more than one language, right?

So the bottom line about barns and perhaps about brains is that you cannot get to discipline simply by having facts. *You have to construct the disciplines by deconstructing the inadequate ways of thinking and constructing more adequate ones.* As far as I know, it is only when you go deeply into things that you learn how to do that. A good litmus test is to ask people what they remember from high school. Probably, it will be those projects that took weeks or months. Not a lesson in which they had a test and went on to something else. That is because in a project, you really are busy constructing things. You aren't simply memorizing them.

Why all this talk about disciplines? Are they really the most important inventions? Well, that of course was a rhetorical claim, but consider the problems of the world. Globalization, is it good or bad? Stem cell research, pro and con. State of the environment, power of telecommunications, immigration, multiculturalism, racism, September 11th—alas—what you think about in the shower, argue about at the dinner table. These are real things; this is what life today and tomorrow is about.

Out-of-the-Box Thinking

You can either use common sense about this—good guy/bad guy, flat-earth kinds of views. Or you can try to use your disciplines. Newly at a premium in this century (and this is something which those of us in education have to worry about a lot more than people did fifty years ago) is out-of-the-box thinking, because all the in-the-box thinking is done by computers, almost by definition. So it's the out-of-the-box thinking we have to worry about. We must be able to be flexibile. We must be able to handle just-in-time responses. We must be able to go beyond the disciplines because so much work now is problem based, and you have to bring more one discipline to bear. We must be able to form teams that can do this kind of work.

Hollywood-style projects and productions mean that people don't work for a company forever. They don't work on a project forever. They work on one thing, and then they're hired to work on something else—the way we used to associate with movies. Then of course, there are forms of non-linear thinking, non-linear dynamics, chaos, complexity and so on. Teaching now is not the same as teaching fifty years ago. We've got a whole set of problems, September 11th simply being the most vivid. We have a whole set of needs which are much less true in a factory kind of society where people were trained for a slot, and they stayed in that slot till they got their gold watch. So if you want to deal with these problems but you think disciplinary understanding is expensive, try ignorance of the disciplines. The poignant thing about the disciplines is that they are available to everybody including our enemies.

Tests, Tests and More Tests

So how do you find out if people have acquired the facts and skills the educators think are important? Give the students tests. If they don't do well, you know what you do? Give them more tests. It's like, if a patient is sick, taking the temperature repeatedly with the thought that *that* would make it better. It doesn't happen that way. A better view, I believe, is keeping in mind that the purpose of school is the acquisition of understanding. If you want to see if people are performing according to a certain understanding, you give them something new and see how they think about it, whether they can use those disciplinary muscles that they have developed.

Final Thoughts and Reflections

Two haunting thoughts for somebody who has spent many years now thinking about the disciplines: One is that "the disciplines are what separate us from the barbarians." Barbarians only have one discipline—wiping you out. I don't want to get too political here, but the irony of what Al Qaeda is doing is, of course, using disciplines which it didn't develop: it's borrowing them, mastering their application, and using them against us. It is using the properties of our own society—its openness and its flexibility and its multi-ism. This is an easy way in. If the society was very closed, the kind of society they want, you couldn't get into them. One other thing you can do is burn the books: that the first thing that any tyrant does. And then substitute *Mein Kampf* or *The Statements of Chairman Mao* or whatever the current iteration is.

Then, a second thought: "What will our species be like in the future?" Evolution hasn't stopped, but for the first time in human history we can affect evolution. We can change our genes. Not only can it be done, it will be done. Some people find it exciting: I find it frightening. But once we begin intentionally to change our genes, then what life will be like, what our disciplines will be like, is anybody's guess. The preparation of teachers at that time will be a very different kind of enterprise.

Questions from the Floor

Conference Participant: I teach the English language in all the arts, the dance, the drama. My question is this: I'm a constructivist at heart, and I want to know whether or not you think it's important to build upon the children's prior knowledge or impressions of any one of these disciplines?

Gardner: Well, I'm glad you asked the question about the misconceptions because some people think that you should ignore them or try to get rid of them, but that's not actually the best answer. The best answer is you have to recognize their existence because they are the way that the kids naturally think. Indeed, I think that the best thing is to bring them out on the table, let the kids actually play with them, explore them, ponder them and see where they don't work.

Every misconception has a reason for existing. I'm not a physicist, but if you think that heavier objects accelerate more rapidly than lighter ones, it is because of the air resistance. So it's the confounding of arguments that makes people have the misconception. On their own, almost no kids will come up with the right explanation. After all, it took until Galileo and Newton to figure out the basic laws of motion. But we need to reach the point where the kids see the inadequacies of the misconceptions. They are ready to try to think about another way, and that's where more directed pedagogy will come in. I think that it's important to find out about the misconceptions diagnostically, meaning you need to know what they are. But a lot of them will come out readily without the need for formal testing.

I'm very much a fan of assessment, but I make a distinction between assessment and testing. It's a semantic distinction but it's an important one. When I use the word "testing," I tend to focus on short answer instruments with right or wrong answers, which don't necessarily give you insight into how the child is thinking. When I talk about assessment, it's always giving the child something new and saying make sense of this. Because when the child has to make sense of it, the child shows you what he understands and what he doesn't understand.

A person takes a college board *test* and gets a score back. Such people are really no better off than they were before they took the test, but now they have a number. But you know, if you give them an *assessment* where they actually have to solve some problems and show their thinking or explain some situations, and you get the results back, there is a chance you might understand better where they're off base.

Conference Participant: Could you talk a bit more about how you would deconstruct some common sense idea?

Gardner: Right. If I can paraphrase your question, nowhere in our lives are unschooled ideas more powerful than in the education world. So it's up to us to find out what those ideas are and then correct them. The way we find out what they are is by testing. If the students don't do well, test again. I mean, I used to laugh at the Bush-Gore debates because, Bush would say, "I'd test them once a year"; Gore would say, "I'll test them twice a year." Bush would say, "I'll test the principals." Gore would say, "I'll test the custodians." It's the unschooled mind at work.

One thing I've learned which I should have known from the start, is that you can never get rid of something by criticizing it. The only way you can only get rid of something is by creating something that's new and better. The reason that standardized testing exists is not because it's very good, but because people have been reluctant to use other forms of assessment.

THE COALITION OF ESSENTIAL SCHOOLS

Working alone, it's pretty tough, especially if you're in the public schools or in a public university. Working with other people, it becomes less difficult. The best example here is something called the *Coalition of Essential Schools*, which is a network of high schools. There are about 1,000 Essential Schools in the country, and they adopt many of the ideas that I'm sympathetic to. One of these ideas is that, "Less is more." It's better to go deeply into topics rather than try to skim a lot of stuff very superficially.

When you graduate from a coalition school, you don't take a bunch of tests. You have to make 14 exhibitions. These are evaluated not only by teachers but by outsiders. When these schools are well done—and there are not that many because it's hard—their graduates are very attractive to colleges. Many of you will know Debbie Meier, who for many years was the principal of Central Park East Schools in East Harlem and who now is a principal of the Mission Hill School in Boston.

Students from the Central Park East Secondary School in East Harlem did very well in getting into college and in graduating from four-year colleges, even though they weren't particularly standardized test types. That is because there was a curriculum there focused on understanding. The school was very committed to it, and Deborah Meier was a very tough customer who the city fought at its peril. She was a great believer that it's better to ask for forgiveness than permission.

So at the secondary level, if you want to fight the establishment, it's hard. You have to be courageous, and you have to be prepared to lose and then fight again. At the tertiary level, it is easier especially in private universities because nobody tells you what to do. But I think the heat is on, especially for public universities. There will be more accountability, and the issue is not the accountability which I am in favor of, it is—to put it in a kind of a sophomoric way—are the assessments going to be stupid ones or smart ones.

There are people who are working on creating smart assessments. You know, the University of Phoenix was mentioned before. There is probably a lot to be learned from the University of Phoenix. I personally wish it didn't have to exist, and in my book, *The Disciplined Mind*, I have a section that's rather critical of the University of Phoenix. But they are demons on assessments, and their assessments focus on the things which their students want and which their employers want. Of course, what they don't have is liberal arts. They don't have a library—things which to me are the center of the university. They are parasitic in a sense on the rest of the world to do scholarship and so on. Nonetheless, I think they're very serious about assessment, and there are things to be learned from them.

Conference Participant: How can you emphasize or portray even at the younger ages the role of participating students in such a complex system? That not so well put, I...

Gardner: That's a good question and it's a just and implicit criticism of my presentation. I guess if I were talking to students, I hope I wouldn't have given exactly the same talk. First of all, these ideas about intelligence are actually very freeing for young people because they realize that it is too simplistic to think about just one kind of smart.

But I think the more important thing is this: kids must come to understand that basically they're responsible for their own learning, that is the most important step. But it takes often decades for that to be achieved. Constructivist progressive approaches are much better on that score. They leave a lot more to the learner's invention. If you have a teacher who tries to control everything, of course, that's going to create a feeling of inefficacy or of patienthood rather than agenthood on the part of youngsters.

But the biggest problem is really motivation. Multiple Intelligences and understanding would be much, much simpler to implement if most kids were interested in school and what goes on in school. And they're not. And the question is: Why not? Probably, the fault is multiple. There are a lot of interesting things outside of school. In a sense, we're competing with things which didn't have to be competed with fifty or one-hundred years ago. But also, the lot of teachers is harder because we feel there is more to teach and there are more people spying on us about what we're doing, so there is less flexibility to adapt things to students.

I've been very much influenced, as you may know, by the work of Mihaly Csikszentmihalyi on flow. Csikszentmihalyi argues that you are motivated to do something when you're in a state of flow. A state of flow is one where you are so interested in what you're doing you lose track of everything else. Flow occurs in the zone—not a term I always use—between boredom and anxiety. If you are too skilled, you get bored. If the challenges are too great, you get anxious. So what you want as an educator is to create a space for kids where the challenges and their skills mesh with one another. Plato said the purpose of education is to make you want to do what you have to do. We cross a Rubicon when the child realizes he or she is responsible for the learning and nobody else can do it—not the parents, not the tutor, not the teachers. By the same token, once a child gets interested in learning and wants to learn, then you can stop paying tuition.

I'm lucky enough to teach at Harvard and especially at Harvard College. We could get rid of the faculty, and the students would instruct themselves. That's not the problem in most places. The problem in most places is that students are saying, "Why am I in school?" If we don't have good answers to those questions, then it's very tough.

Conference Participant: (Inaudible question)

Gardner: I'm told this is the last question so I'm going to use it to answer it as best I can, and then to give an answer in a more general comment. An honest answer to your question is that until September 11th, my conception of education was further from being realized in our country than it had been 10 years ago. The reason is one for which people like me should take some blame. In the early 1990's, there was an excitement about performance-based assessments, and a number of states, Vermont chief among them, embraced these perhaps somewhat prematurely and uncritically. Then they had trouble getting reliability, which means getting people to agree on the scoring. So as often happens in America, there was an overreaction, and people kind of condemned the whole method rather than its initial implementation.

There are some states such as Massachusetts that I would give not a bad grade to. There are others, I think Maryland and Connecticut are examples, where the assessments have a significant performance-based component. I think you probably all know the one where it's the least. That is Texas. You have this situation in Texas where the kids get steadily better at the task, but when other instruments are used, the kids aren't better at all. So this is a typical example of teaching to the test rather than developing more generalist skills.

One last comment. The new work I'm doing is called *Good Work*. The subtitle of the book that just came out is *When Excellence and Ethics Meet*. It is a book about what it means to be a professional. Even though the examples are drawn principally from medicine, science and journalism, they apply to every area. What does this have to do with teaching? Well, and I'm trying to be objective here without being invidious, teaching at the college level in America is basically a profession. Teaching at the precollegiate level especially in public schools is aspiring to be a profession. It's not a profession yet. When I say that, what I mean is that a profession is an agreement between (1) the laity, the general public, and (2) a group of people who are called professionals. In return for certain services to the society, the professionals are given a certain status and a certain amount of autonomy.

This has not happened in America with pre-collegiate education yet. It doesn't have the respect that it needs and doesn't have the autonomy that it needs. *However, and here is the deep dark secret: Professionalism cannot be given; it has to be seized.* Nobody made doctors professionals, they made themselves professionals. So to with other areas.

In England in the late 1980's, a very demanding test was imposed on all the teachers to give to the students. The teachers said "We won't do this," and the government backed down. I'm not recommending civil disobedience, that's your decision not mine, but I am saying that if doctors are told, "You can't see a patient for more than five minutes because you're in an HMO," the doctor should say, "I have a Hippocratic oath. I've got to see the patient as long as necessary."

It's very hard to be a teacher in pre-collegiate America today, but unless the teachers have a sense of the lines that they won't cross even though they're told to, teaching will never be a profession. So lurking in this question about examinations is the proposition that you may have to give the exam that the state mandates, but if you believe other kinds of exams are better, you've got to give those, too. And the more that you can show people that those are getting at things which are really important, the quicker teaching will become a profession.

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CHAPTER 1

Birth and the Spreading of a "Meme"

Howard Gardner

In 1983, I published *Frames of Mind: The Theory of Multiple Intelligences.* At the time, I was a full-time research psychologist living in the Cambridge-Boston area. I divided my time between two research sites: the Boston Veterans Administration Medical Center, where I worked with and studied individuals who had suffered one or another form of cortical damage, and Project Zero, a research group at the Harvard Graduate School of Education that focused on issues of human development and cognition, particularly in the arts. My own work at Project Zero examined the development in children of various skills in several art forms. I had been trained as a developmental psychologist, in the traditions of Jean Piaget, Lev Vygotsky, and Jerome Bruner, and I thought of myself as belonging to, and addressing, that segment of the scholarly community.

Had I not worked in tandem with these populations—normal and gifted children, on the one hand, and once-normal individuals who had suffered brain damage—I would never have conceived of MI theory (as it later came to be called). Like most laypersons and most other psychologists, I would have continued to believe in the IQ orthodoxy: there is a single thing called intelligence; it allows us to do a variety of things more or less well, depending on how "smart" we are; we are born with a certain intellectual potential; this potential is highly heritable (that is, our biological parents are the principal determinants of our intelligence); and psychometricians can tell us how smart we are by administering some form of intelligence test.

But every working day, I was exposed to striking exceptions to this orthodoxy. I encountered brain-damaged individuals whose language was grossly impaired but who were able to find their way around unfamiliar settings; I observed brain-damaged patients who were lost spatially but could carry out all manner of linguistic tasks. Analogous double dissociations could be observed across the cognitive spectrum. I was so intrigued by such phenomena that in 1975, I published *The Shattered Mind: The Person After Brain Damage.*

Much the same anomaly cropped up in my studies with children. A young person might be excellent in poetry, fiction, and oral expression but have difficulty in drawing even a passable person, plant, or airplane. A classmate might be an excellent draftsman and yet have difficulty speaking, writing, or reading. Such ideas began to be expressed in my 1973 book, *The Arts and Human Development,* and my 1980 book, *Artful Scribbles.* Again, this pattern of dissociations did not comport with the orthodoxy that I had absorbed as a child growing up in the United States in the 1950s and as a student of developmental and cognitive psychology in the 1960s.

This vague intuition that "something is rotten in the state of intelligence theorizing" would probably have remained unredeemed had it not been for a Dutch philanthropic organization, the Bernard Van Leer Foundation. In 1979 the foundation presented a generous grant to the Harvard Graduate School of Education to elucidate the question, "What is known about the nature and realization of human potential?" A big question—I used to quip that it was "more of a West Coast than an East Coast question." In the event, I was asked to prepare a synthesis of what had been determined about human cognition from the biological, psychological, and social sciences.

BIRTH OF THE THEORY

Some years before, I had sketched the barest of outlines of a book called "Kinds of Minds," but that project had never been launched. Receipt of five years of generous support from the Van Leer Foundation gave me an invaluable opportunity. With the help of several gifted research assistants, I surveyed a wide literature about cognition, including studies in genetics, neuroscience, psychology, education, anthropology, and other disciplines and subdisciplines. This survey not only strengthened my growing intuition that cognition was not monolithic; it also provided the hard-empirical evidence with which to substantiate this claim.

Two steps remained. The first was what to call these dissociable human faculties. I considered a variety of labels and finally determined to call them "human intelligences." This lexical turn has offended some ears, and it still generates an underscore when I type the word on my computer. But it had the advantage of drawing attention to the theory, in part because it poached on a territory that had hitherto belonged to a certain kind of psychologist.

(Never underestimate the backlash when you step on the toes of a group that sees itself as all-knowing.) I am pretty sure that I would not be writing this introduction twenty-five years later had I written precisely the same book but called it "Seven Human Faculties" or "Seven Cognitive Talents."

The second step entailed a definition of an intelligence and a set of criteria for what should count as an intelligence. I came to think of intelligence as a biopsychological potential to process information in certain ways in order to solve problems or create products that are valued in at least one culture or community. More colloquially, I thought of an intelligence as a specially tuned mental computer. Whereas standard intelligence theory posited one all-purpose computer that determined one's strength across the landscape of tasks, MI theory posits a set of several computational devices. Strength or weakness in one does not predict strength of weakness in another. What I had observed in dramatic fashion in brain-damaged individuals, what Oliver Sacks and Alexander Luria have written about with poignancy, is in fact the human condition. What we typically term "intelligence" is really a combination of certain linguistic and logical-mathematical skills, particularly those that are valued in a modern secular school.

As for criteria, these followed from the several disciplines that I had been surveying. As I laid it out in Chapter Four of *Frames of Mind,* an intelligence fits eight criteria reasonably well:

1. Potential isolation by brain damage
2. The existence of idiots savants, prodigies, and other exceptional individuals with jagged cognitive profiles
3. An identical core operation or set of operations
4. A distinctive developmental trajectory, culminating in expert performances
5. An evolutionary history and evolutionary plausibility
6. Support from experimental psychological tasks
7. Evidence from psychometric findings
8. Susceptibility to encoding in a symbol system

I consider the set of criteria to be the most original and the most important feature of MI theory. Anyone can generate additional intelligences, but unless they fit some criteria, the positing of an intelligence becomes an exercise of the imagination, not a work of scholarship. Interestingly, neither supporters nor critics of the theory have paid much attention to the criteria. From the beginning, I made it clear that application of the criteria was to some extent a matter of judgment. There is no iron-clad rule for determining whether a candidate intelligence does or does not fit the criteria. That said, I have been very conservative in adding to the list of intelligences. As itemized the next paragraph, in twenty-five years, I have added only one intelligence and still on the fence about.

As for the intelligences themselves, I have already mentioned the two that are typically valued in modern secular schools and are invariably probed in intelligence tests: skill in language (linguistic intelligence) and skill in logical-mathematical operations. The other intelligences are musical intelligence; spatial intelligence; bodily-kinesthetic intelligence (using your whole body or parts of your body to solve problems or to make things); interpersonal intelligence (understanding of others); intrapersonal intelligence (understanding oneself); naturalist intelligence; and a possible ninth intelligence, existential intelligence (the intelligence that generates and attempts to clarify the biggest questions about human nature and human concerns).

On a scientific level, the theory makes two claims. First, all human beings possess these intelligences; put informally, they are what make us human, cognitively speaking. Second, no two human beings—not even identical twins—possess exactly the same profile of intellectual strengths and weaknesses. That is because most of us are genetically different from our conspecifics, and even identical twins undergo different experiences and are motivated to distinguish themselves from one another.

INITIAL REACTIONS

When I introduced MI theory, I fully expected that it would be read, analyzed, and critiqued primarily by psychologists. In fact, the theory proved of interest primarily to educators (and to parents and the general public as well). This locus of interest fascinated me because there was relatively little about education in the book. And just because I had almost nothing about the educational implications of MI theory, readers were free to make what uses they wanted.

Indeed, MI theory became a kind of Rorschach (inkblot) test of the reader-educator. Some saw the theory as about curriculum, others about pedagogy or assessment. Some thought that the theory was particularly relevant for gifted children, others for those with learning disabilities. Some used the theory to argue for homogeneous grouping and the utility of tracking, others for heterogeneous grouping and the elimination of tracking. You can see some of these contrasting predilections expressed in the chapters that follow. What was interesting is that none of these ideas was endorsed in *Frames of Mind.* Rather, readers used the book to support ideas that they had already favored for other reasons. Again, you can discern this trend in subsequent chapters of this book.

Not immune to what the market was telling me, I began to think about educational issues and to consider ways in which MI theory might be useful to educators. I also paid attention to the particular applications that educators were making and began to communicate directly with educators who had an interest in the theory. By the mid-1980s, I was in contact with the eight teachers who were shortly to launch the Key School (now the Key Learning Community) in Indianapolis, by all accounts the first MI school in the world (see Chapter Twenty-Four). And by the late 1980s, I had had considerable contact with Tom Hoerr, then and now the head of the St. Louis New City School, who used MI ideas in a way quite different from the teachers at the Key Learning Community (see Chapter Twenty-Five).

Because I had not put forth educational goals of my own and because I was intrigued by the multifarious ways in which the theory was being drawn on, I did not address this issue of an "MI education" for a decade. Finally, when I encountered a use that I particularly deplored, I spoke out. I went on television in Australia to denounce an educational program that, among other things, listed the various ethnic groups in a state and mentioned the intelligences that they had and the ones that they lacked. Of course, this was pseudoscience (as well as veiled racism) and deserved to be labeled as such. Fortunately, the program was cancelled shortly after.

MISUNDERSTANDINGS

I also began to delimit some of the common misunderstandings of the theory, including ones that were prominent among educators. In a 1995 article, "Reflections on Multiple Intelligences: Myths and Realities" (1995) and in subsequent publications, I cautioned educators on several points:

- An intelligence is not the same as a sensory system. There are no "visual" or "auditory" intelligences.
- An intelligence is not a learning style. Styles are ways in which individuals putatively approach a wide range of tasks. An intelligence is a computational capacity whose strength varies across individuals.
- An intelligence is not the same as a domain or discipline. A domain or discipline is a social construct. It refers to any profession, academic discipline, hobby, game, or activity that is valued in a society and features levels of expertise. Skill in a domain can be realized using different combinations of intelligences. And strength in a particular intelligence does not dictate in which domains it will be brought to bear.
- People are not born with a given amount of intelligence, which serves as some kind of limit. We each have potentials across the intellectual spectrum; the extent to which these potentials are realized depends on motivation, skill of teaching, resources available, and so forth.

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- An individual should not be described, except in informal shorthand, as a "spatial" person, a "musical" person, or "lacking interpersonal intelligence," for example. All of us possess the full spectrum of intelligences, and intellectual strengths change over time through experience, practice, or in other ways.
- There are no official MI or Gardner schools. Many principles, goals, and methods are consistent with the principal assertions of MI theory.

MAJOR EDUCATIONAL IMPLICATIONS

After two decades of considering the educational implications of MI theory, I have concluded that two are paramount. First, educators who embrace MI theory should take differences among individuals seriously and should, inasmuch as possible, craft education so that each child can be reached in the optimal manner. The advent of personal computers makes such individuation easier than ever before; what was once possible only for the wealthy (personal tutoring) will soon be available to millions of learners around the world.

Second, any discipline, idea, skill, or concept of significance should be taught in several ways. These ways should, by argument, activate different intelligences or combinations of intelligences. Such an approach yields two enormous dividends. First, a plurality of approaches ensures that the teacher (or teaching material) will reach more children. Second, a plurality of approaches signals to learners what it means to have a deep, rounded understanding of a topic. Only individuals who can think of a topic in several ways have a thorough understanding of that topic; those whose understanding is limited to a single instantiation have a fragile grasp.

THE MI MEME

But of course I do not own MI theory. To use Richard Dawkins's term, MI is a meme—a unit of meaning, created at a certain place and time, that has spread widely in the past quarter-century. Initially it spread around educational circles in the United States. But soon it ventured abroad, and it became an item of discussion and application not only in schools, but in homes, in museums and theme parks, places of worship, the workplace, and the playground.

The goal of this book is to examine the way in which the "MI meme" has been apprehended and applied in a number of countries around the world. In 2006 Branton Shearer organized a symposium on multiple intelligences in global perspective at the American Educational Research Association meeting in San Francisco. In the wake of that symposium, the editors decided to invite individuals, most of whom were educators, to write about how MI ideas had been understood and applied in their school, community, region, or nation. To our pleasure, nearly everyone who was invited accepted our invitation. Lesley Iura, an editor at Jossey-Bass, lent her enthusiastic support to the project. Then in March 2008, a majority of the authors journeyed to New York City to discuss the ideas that they were developing in their papers. The papers were completed by the summer of 2008, and this resulting book followed shortly after.

THE GENERATION AND SPREADING OF A MEME

Once the "meme" of MI was created and began to spread in the United States, the question was whether it would be short-lived, like so many educational fads, or whether it would have a longer half-life, and if so, how broadly and in what forms.

I was both surprised and gratified to see the extent to which the meme spread. The MI meme was probably spread chiefly by books—translations of my books and more practically oriented books like those authored in English by Thomas Armstrong, David Lazear, Linda and Bruce Campbell and many others, ultimately appearing in several languages. In my 1999 book *Intelligence Reframed,* the list of primary secondary sources took over thirty-five pages, and today, even with powerful search engines, it would not be possible to list all of the works spawned in the "MI industry."

In 1995 the publication of Daniel Goleman's book *Emotional Intelligence* (1995) catalyzed an unexpected turn of events. Goleman's book, which generously cited my work, had a worldwide influence unequaled by any similar work in recent memory and qualitatively greater than any of my writings. His ideas were more accessible than mine, and often our works were confused with one another. In fact, sometimes we ourselves were confused with one another. In Latin America, I was frequently asked to sign copies of Dan's book. A whole industry developed around the assessment and training of what came to be called emotional intelligence, or EQ. In the subsequent decade, the writings about multiple intelligences were complemented by books on a dizzying array of candidate intelligences: sexual intelligence, business intelligence, spiritual intelligence, and financial intelligence, to name just a few. Indeed, once the MI and EQ genies had been let out of the bottle, there was no way in which to limit the written works, training sessions, and media presentations done under the umbrella of a pluralistic view of intelligence. (If you doubt this claim, test it out on a search engine.)

Going beyond the United States, an indigenous coterie of authors arose. In China, for example, there are dozens of books about multiple intelligences by persons unknown to me. Other writings, such as popular articles in journals

and, eventually, doctoral theses (by 1999, according to Clifford Morris, a Canadian scholar and archivist, there were over two hundred theses), also spread the wisdom. Note that there was discussion in psychology and other scholarly disciplines, but by far the bulk of the dissemination occurred in educationally oriented writings, even as criticism was heavily skewed to academics, such as John White in the United Kingdom, who seems to have devoted a sizable proportion of his career over the past decade to inveighing against MI. We might credit White and a few other authors with putting forth a meme to counter the MI meme, whether that meme be a reversion to a single intelligence or a proposal for another way of thinking about a plurality of intelligences.

Individuals can be very important in spreading ideas. Zhilong Shen was a big force in popularizing the ideas in China. My own trips to China over the years, and presentations by other colleagues like Jie-Qi Chen and Happy Cheung, also played a role. In 2003, a major conference on MI in Beijing attracted thousands of participants and hundreds of papers. In addition to the influential MI school that she founded, Mary Joy Abaquin presided over a huge conference in Philippines in 2005 that honored individuals who had deployed their intelligences in ways that benefited the broader society.

Sometimes MI ideas were introduced along with other complementary ideas and practices. In Ireland, Áine Hyland and her colleagues combined the perspectives of MI and a Project Zero initiative called "teaching for understanding," and these efforts exerted influence at both the secondary and tertiary educational levels. In Scotland, Brian Boyd, Katrina Bowes, and the Tapestry group have been catalytic in linking the arts and creativity using the MI framework. Through contact with present and future teachers, the development of curricula and assessments, and the conduct of empirical research, Myung-Hee Kim and her associates in South Korea have familiarized much of the educational world (and many outside it) with the ideas of multiple intelligences.

Those who embraced MI were not always as successful in their home territory. Tim Brighouse featured MI ideas in the educational authority of Birmingham, England, but the ideas rarely traveled to other jurisdictions. The MI Society of Japan has been active for a decade and has warmly greeted my family and me in Japan on a number of occasions. But in comparison to Korea and China, Japan has proved quite uncongenial to the MI meme. I cannot know why, but I suspect that as a whole, the Japanese population is reluctant to think psychologically (as opposed to sociologically) and to recognize and honor individual differences. Also, the Japanese educational system has been seen as excellent for many years, and that consensus may have reduced the temptation to tinker with it. My books are translated into French, but to my knowledge, there has never been a strong advocate of these ideas in France, let alone an MI society or MI school. It is relevant to mention that the IQ test was developed in France and that this nation, more so than any other developed country, has long been organized around an elite set of schools that select attendees on the basis of measures of linguistic and logical intelligences. The possibility that MI ideas may be of help in dealing with individuals who are not smart in the traditional sense has not been widely embraced—at least not yet!

Although I used to think that the idea did not take hold in the Soviet Union because of economic reasons, there is so far little evidence of interest in the post-Communist Russia. I think that, like some of "old Europe," Russians think that they have education pretty well worked out and may see little reason to consult an American psychologist-turned-educationalist (and perhaps they are right). If it were not for the heroic advocacy of Michaela Singer, it is unlikely that my books would be available in Romania, and so far as I know, they are only rarely available in other former members of the Soviet bloc. My writings are widely available in Scandinavia and the Netherlands, in the Swedish and Danish languages, as well as in English. Individuals in these northern European societies seem to accept the idea of multiple intelligences, but a sense of stretch and discovery is less evident, perhaps because promoting MI ideas in a progressive educational terrain is akin to pushing a door that was already ajar.

In the past few years, I have noted two phenomena. One is that many educators in India are discovering MI ideas and are seeking to implement them. I suspect that as with China, the increasing affluence of the country and the opening of many for-profit schools has catalyzed interest in ideas that have already become trendy in the more developed countries. I also note a steady stream of people writing from the Middle East, including from Iraq and Iran, but not much interest at the ministry or publication level except in Israel. (Note, however, Thomas Armstrong's report of Islamic madrases that embrace MI ideas [see Chapter Two].)

In addition to the influence of authors or individual promoters, memes can be spread by charismatic institutions or powerful practices. Self-declared MI schools in the United States and abroad can prove to be a powerful Petri dish for spreading the ideas. In their twenty years of existence, the Key Learning Community in Indianapolis and the New City School in St. Louis have had thousands of visitors, many from abroad. These visits can have a powerful effect. When visitors from Norway attended the opening of the MI Library at the New City School, they pledged to open an MI library in their country and have just carried through on their pledge. Media that carry MI stories can exert great influence. When *ABC-TV News* and *Newsweek* featured the Key Learning Community, millions of persons learned about MI educational experiments. Happy Cheung's publications and broadcast have had similar reverberations in China. The existence of institutions based on MI ideas, such

as the Explorama in Danfoss Universe, has exposed families and businesspeople to MI ways of thinking, even if these individuals never encounter the "MI meme" per se. Assessment instruments—qualitative ones, like Spectrum in Scandinavia, and quantitative ones, like the MIDAS in East Asia—spread the MI meme as effectively as books or soapbox speakers. Similarly, instruments designed for special populations, like the DISCOVER approach of June Maker and colleagues, introduce MI ideas beyond mainstream circles.

It is relatively straightforward to do a travelogue, to mention the places where MI ideas have taken hold and where they have not, and to speculate about the carriers of the ideas. But this *tour de horizon* raises two related and more searching questions: Why are certain regions more receptive than others? and What messages is MI bringing to these disparate soils?

The Nature of the Soil

It is useful to think of MI as a new plant (all the while being careful not to stretch the analogy too far). Having blossomed on its home soil, its seeds are now borne to distant terrains. The new soil, however, can be so resistant, so alien, that the seed cannot take hold, and it simply dies.

It may be that the soil is already so stocked with other seeds and plants that there is no room for any additional flora. Often schools and institutions are so busy, or so self-confident, or so beleaguered, that they show no interest in any new ideas or practices.

Or the soil may be so impoverished, so lacking in nutrients, that it cannot absorb any new living matter. I suspect that there are some institutions, regions, and even entire societies that lack resources to attempt anything new, to attend to any new ideas or practices.

At the opposite end of the continuum, some seeds grow naturally and easily in a rich but hitherto sparsely stocked terrain. An MI seed has little trouble in sprouting in a well-resourced environment that has long been receptive to ideas like individual differences, teaching in multiple ways, a focus on arts and creative activities, and so on. These institutions can embrace MI ideas, but they may not be much affected by them. They can rightly say, "We are already doing this, we are happy to wear the MI banner, but [to coin a phrase!] you have simply brought tulips to Holland.

Of course, there are also false positives. As Mindy Kornhaber and colleagues have observed, many places claim to be carrying out MI practices and may even feature banners, slogans, and the like. And yet shorn of the appurtenances, such institutions look indistinguishable from ones that have never heard of MI and ones that are in effect uniform schools (featuring a single way of teaching and assessing). These places may believe that the soil is receptive, but in fact the soil cannot, for whatever reason, actually absorb the seed. So to speak, the seed dies on the vine but continues to cling there, deceiving those who cannot see the difference between pseudo- and genuine MI practices.

Of most interest are those places, institutions, and leaders who initially offer resistance to MI or initially understand MI in the most superficial way. Using our analogy, these places at first prove quite resistant to the MI seed. And yet, over time either the ground becomes friendlier to the seed, or a mutant version of the MI seed is able to take hold and eventually flourish in the initially hostile environment. I am reminded of a poignant anecdote featuring Pat Bolaños, the charismatic founder of the Key Learning Community. At the fifteenth anniversary of the school, she addressed a large supportive audience gathered in a concert hall in downtown Indianapolis. After thanking the many who had supported Key over the years, she declared, "And finally, I'd like to thank the six superintendents who have been in Indianapolis since we first thought of the school. Without your steadfast opposition, we would never have achieved anything!"

Why MI Takes Hold in Certain Soils

As the progenitor of the idea of multiple intelligence, I'd like to think that its intrinsic power, beauty, and truth have accounted for its success in various venues. And in fact, I think that many advocates of MI are attracted to the idea on the basis of its merits. Yet for an idea like MI to spread in various regions, to go beyond the advocacy of a precious few, there have to be reasons that appeal to a wider group. In reviewing my own experiences and observations over the past twenty-five years, I have identified four factors that stand out.

Rediscovery of Traditions In some cultures, there is a belief that certain norms or practices, valued in the past, have been ignored or minimized in recent years. In Japan, for example, the formal schools and apprenticeships of an earlier era featured many practical arts and crafts (see Chapter Seven). By the same token, the Confucian tradition in China recognized a whole gamut of competences that distinguished the educated person (see Chapters Four through Six). The Diné group in the American Southwest used to honor various craft traditions, and approaches like the DISCOVER method devised by Maker allow a recognition of these practices and their associated cognitive and sensory faculties.

Sometimes this renewed embracement of traditional values can lead to unexpected and even humorous effects. In China in 2004, I attempted to discover the reasons that MI theory had taken such hold. The mystery was cleared up by a journalist in Shanghai who said to me, "Dr. Gardner, in the West, when people hear about the idea of multiple intelligences, they go directly to what is special about *their* child, to discover his or her 'unique genius.' In China, by contrast, the multiple intelligences are simply eight talents that we must nurture in every child."

A Desire to Broaden Curricula, Pedagogy, and Assessments In many regions of the world, there has been a steady narrowing of the curriculum, so that it highlights the STEM subjects (science, technology, engineering and mathematics), while giving short shrift to the arts, physical education, and certain of the humanities and social sciences. MI can be a useful vehicle for broadening the remit of education: to include subjects that address the several intelligences and ways of thinking, as well as teaching methods that speak to individual differences, and assessments that go beyond standard, short-answer language-and-logic instruments (see Chapters Eight, Twelve, Fourteen, Fifteen, Twenty-Four, Twenty-Five, and Twenty-Nine). Even when the focus remains on science and mathematics, an MI approach can open new possibilities for mastery (see Chapters Fourteen and Nineteen).

A Desire to Reach Underserved Students Even as the curriculum has tended to narrow in recent years, so too in many regions, curricula are addressed to average or typical students; there has been relatively little effort to help students who fall outside the mainstream. Accordingly, MI ideas have been used widely in special education (Chapter Eleven), gifted education (Chapter Twenty-Seven), and the education of traditionally underserved students (Chapters Thirteen, Sixteen, Eighteen, Twenty-Three, and Twenty-Six). Alas, this laudable aim can be abused. Too often have I heard a specific ethnic or racial group described as "having" certain intelligences and "lacking others." There is no scientific warrant for such a statement, and considerable damage can be done in its wake.

An Affirmation of Democratic Practices and Values Nowadays, few if any countries in the world would declare that they are opposed to democratic values. Even the most authoritarian of countries call themselves democracies, indeed even incorporate the word *democracy* into the country's current name. And yet truly democratic practices are often elusive. Schools are often authoritarian institutions that stifle debate, controversy, and individual points of view—light-years away from democratic communities whose members participate in decision making and governance. In several of the chapters in this book, we see clear indication that those involved in MI education are dedicated to providing a model of a democratic institution in a soil that has been hostile to these ideas—for example, in Argentina (Chapter Twenty-One), Colombia (Chapter Twenty-Two), the Philippines (Chapter Nine), and Romania (Chapter Nineteen).

THE POLICY LEVEL

Many times these goals are put forth by individuals or single institutions that simply want to make changes at the local level. But as some of the chapters document, more ambitious efforts have been launched to alter practices on a wider scale. In England, Scotland, China, and Norway, for example, MI approaches are explicitly promoted as an alternative to practices that are currently regnant but are seen by some as shortsighted, counterproductive, or even destructive. At times, even in the these countries, policies are announced that seem more congenial to MI approaches. Not surprisingly, supporters of MI are quick to embrace these reformist inclinations (China, Korea, Scotland, Turkey). So long as ministers of education around the world are focused largely on the comparative performance of countries on the Programme for International Student Assessment (PISA)[1] examinations, we can expect that supporters of MI will mount counterefforts. And in the event that these supporters find themselves in policymaking positions, they will attempt to institute policies that are more "MI friendly."

I am still mystified by one development. A few years ago, a colleague visited Pyongyang, the capital of North Korea. In a major library there, he saw only two books in English. One was Michael Moore's *Stupid White Men.* The other was *Frames of Mind: The Theory of Multiple Intelligences.* I cannot help wondering how these two memes managed to plant themselves in such seemingly resistant soil.

CONCLUDING NOTE: THE PERSONAL AND THE POLITICAL

The theory of multiple intelligences was developed by a psychologist; it was initially a proposal of how we should think of individual minds. This way of thinking initially proved most congenial to individuals who themselves have a psychological perspective on the world and who are excited rather than threatened by the idea of a plurality of individual differences.

I was surprised to see how this "inside psychology" meme spread quickly to education, first in the United States and then abroad. I was surprised by the staying power of the meme. And I am surprised that this meme has begun to be of interest to those in the policy realm, thus melding the personal and the political. It is striking that an idea that arose as an account of how the human brain/mind evolved and how it is organized today could end up joining forces with movements that give more voice to individuals and promote more democratic classes, schools, and perhaps even societies. I would like to think that this combination would please John Dewey, an American philosopher and psychologist who was perennially rooted in both the personal and the political.

Still, it is salutary to remember that the idea of multiple intelligences remains a minority view in psychology and that most schools around the world remain uniform schools, where a narrow group of topics is taught in the same way to all children and where modes of assessment are unadventurous, to say the least. My own view—or perhaps, to be more accurate, my own hope—is that the new digital media will allow much individualized education in the future that the meme of multiple intelligences will be taken for granted. Should that be the case, the authors in this book will deserve considerable credit for sustaining and enriching MI ideas and practices in the interim.

Note

1. A triennial worldwide test of fifteen-year-old schoolchildren's scholastic performance for the purpose of crosscultural school learning comparison.

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