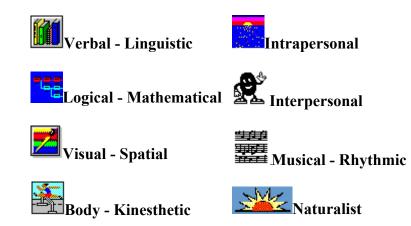


Chapter Six: Multiple Intelligences

The theory of multiple intelligences developed by Howard Gardner has significantly influenced education in the last few decades. Gardner refers to the intelligences as ways of knowing and understanding yourself and the world around you. In the introductory section of <u>Frames of Mind</u>, his first popular book on the subject, Gardner defines intelligence as "the ability to solve problems, or to create products, that are valued within one or more cultural settings" (1983). He explains that he was seeking to undermine the common notion of intelligences as a general capacity or potential which every human being possessed to a greater or lesser extent. He questioned the assumption that you could measure intelligence with standardized verbal instruments, such as the short answer, paper and pencil IQ test. He asks his readers to "perform two thought experiments." (Gardner, Howard. <u>Frames of Mind</u>, 1983)

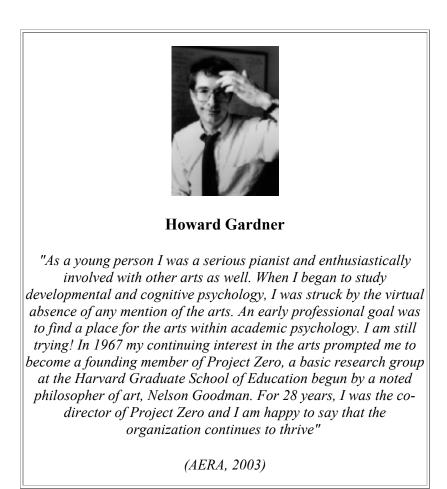
- Imagine you have never heard of the concept of intelligence as a single property of the human mind; or that an instrument called the intelligence test exists.
- "Cast your mind widely about the world and think of all the roles or "end states" vocational and avocational that have been prized by cultures during various eras (hunters, fishermen, farmers, shamans, religious leaders, psychiatrists, military leaders, civil leaders, athletes, artists, musician, poets, parents, and scientists)"

In Gardner's early research he discussed seven intelligences. Gardner later introduced an eighth intelligence: the naturalist intelligence. (Howard Gardner - <u>http://www.pz.harvard.edu/PIs/HG.htm</u>)



Gardner believes that everyone possesses some capacity in all intelligences, but these intelligences function together in ways unique to each person. He proposes that most people can develop each intelligence to an adequate level of competency. Gardner determined the validity of each intelligence by reviewing such factors as the potential impairment of the intelligence by brain damage, the existence of savants and prodigies, a definable set of expert "end-state" performances, an evolutional history and plausibility, support from psychological data, an identifiable set of operations, and the use of a symbol system.

For an update from Howard Gardner himself - Multiple Intelligences after Twenty Years - <u>http://www.pz.harvard.edu/PIs/HG_MI_after_20_years.pdf</u> Project Zero website - <u>http://www.pz.harvard.edu/Default.htm</u>





Research on Multiple Intelligences

Several major researchers in the area of multiple intelligences have websites with published materials and articles. These authors have published in popular magazines as well as peer-reviewed journals.

- Thomas Armstrong <u>http://www.thomasarmstrong.com/</u>
- David Lazear <u>http://www.davidlazear.com</u>

General Research Findings

- Intelligence is not fixed at birth. It changes and grows through life. It can be improved and expanded.
- Intelligence can be taught and improved by activating levels of perception.
- Intelligence is a multiple phenomenon that occurs in many different parts of the brain/mind/body system.
- A stronger, more dominant intelligence can be used to train (improve or strengthen) a weaker intelligence.



Multiple Intelligences and Multimedia Technology

Elements of Multi-Media

- Text
- Graphics
- Sound
- Video
- Animation
- Interactivity
- Global Communication

How do you learn most effectively? What are your dominant intelligences?

Take the quiz at the end of this chapter to explore your dominant intelligences.

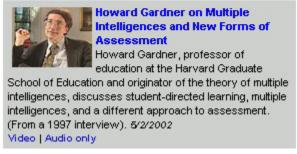
Modifying Learning Environments with Technology

The goal of the teacher is to meet the needs of students with diverse learning styles and preferences. Edwards referred to this as providing "pathways into and out of our students' brains." Gardner states that the "ways in which intelligences combine and blend are as varied as the faces and personalities of individuals." Genetics influences this development, but a nurturing, positive, and stimulating learning environment is also important. Intelligence is changeable – not stagnant. Gardner started with seven intelligences which he referred to as preferred modes of learning for individual students. He then expanded to eight independent means of information processing. The multiple intelligences theory was a result of years of scientific brain research. Howard Gardner is continuing to work in this area.

Listen to the Expert! Go to Edutopia (George Lucas Educational Foundation) <u>http://www.glef.org</u>)

Video Interviews on Assessment National Experts | Program Representatives | Expert Roundtable

National Experts



Howard Gardner on Multiple Intelligences and New Forms of Assessment

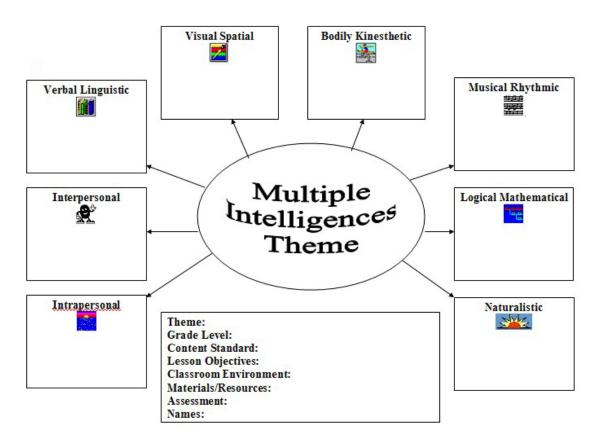
- On the importance of engaging students actively in what they are studying.
- On the characteristics of student-directed learning.
- On the theory of multiple intelligences.
- On technology and multiple intelligences.
- On the need for fundamental change in the curriculum.
- On how assessment in school differs from assessment in other arenas such as sports or music.
- On the need for a new approach to assessment in schools.
- On what needs to happen in order that long-standing change occurs in public education.

The following table summarizes each of the eight intelligences – including how each individual might learn best, and how multimedia technology might make connections.

	INTELLIGENCE	MODIFY WITH TECHNOLOGY				
	Linguistic					
•	Use words effectively and have highly-developed auditory skills	Learns best by saying, hearing, and seeing words				
•	Enjoy reading, playing word games, and writing Have good memory for verse, lyrics, or trivia	May benefit from word processors, desktop publishing, programs for creating poetry, multimedia authoring, tape recorders, telecommunications.				
	Logical-Mathematical					
•	Think conceptually, abstractly, and are able to see and explore patterns and relationships Enjoy reasoning, calculating, playing logic games,	Learns best by categorizing and classifying, working with abstract patterns and relationships.				
•	solving puzzles Likes brain teasers, logical puzzles, and strategy games.	Benefit from database, spreadsheet, problem-solving software, strategy game formats/simulations, calculators, multimedia authoring.				
	Bodily-K	inesthetic				
•	Like movement and communicate well through body language and physical activity Excel at hands-on learning	Learns best by touching, moving, interacting with space, processing knowledge through bodily sensations				
•	Process knowledge through bodily sensations – moving, touching, manipulation, role plays, creative movement	Benefit from use of joystick, mouse or touchpad; keyboarding, word processing, animation programs, programs that allow them to move objects around the screen (multimedia authoring)				
	Visual	-Spatial				
•	Think in terms of physical space and thinks in images and pictures	Learns best by visualizing, dreaming, using the mind's eye, working with colors/pictures				
•	Learn best through drawings, designs, and imagery Likes mazes, jigsaw puzzles, films, diagrams, maps, charts	Benefits from draw and paint programs, reading programs with visual clues, color coding, programs with maps, charts, diagrams, spreadsheets, multimedia				
	Musical-	Rhythmic				
•	Show sensitivity to rhythm, melody, and sound	Learns best with rhythm, melody, and music.				
•	May study with music in the background, play an instrument, notice non-verbal sounds in the environment, learn more easily if sung or tapped	Programs combining stories with sound, reading programs associating letters/sounds/music, music composition software, multimedia presentations, karaoke				
	Interp	ersonal				
•	Enjoy interacting with others Learn best through group activities Sensitivity to facial expressions, voice and gestures	Learns best by sharing, comparing, relating cooperating, interviewing				
•	and has ability to respond effectively to those cues Understand and care about people and like to socialize	Benefit from telecommunications, programs which include group presentation (multimedia presentations) or decision making, games with more than one player, group TV/video production				
	Intrapersonal					
•	Are in tune with their personal inner feelings, moods, and motivations	Learns best by working alone on individualized projects, with self-paced instruction, and having own space				
•	Have an accurate picture of personal strengths and limitations and capacity for self-discipline Learn best through independent study and introspection	Benefit from computer assisted instruction, instructional games, programs that build self-improvement skills and self-awareness, brainstorming or problem solving software				

	Naturalistic			
•	Understands the natural world including plants, animals and scientific studies. Is able to recognize and classify individuals, species	Enjoys working with plants and animals, and observing nature		
•	and ecological relationships. Interacts effectively with living creatures Sees patterns of life and natural forces.	Benefit from websites aimed at nature.		

Curriculum Planning for Multiple Intelligences



Variations on a Theme: How Teachers Interpret MI Theory

From Linda Campbell's Article in Education Leadership (ASCD) which is no longer available. See ASCD's Reading Room discussion of multiple intelligences - <u>http://www.ascd.org/cms/index.cfm?TheViewID=998</u>.

- Lesson design. Some schools focus on lesson design. This might involve team teaching ("teachers focusing on their own intelligence strengths"), using all or several of the intelligences in their lessons, or asking student opinions about the best way to teach and learn certain topics.
- Interdisciplinary units. Secondary schools often include interdisciplinary units.
- **Student projects.** Students can learn to "initiate and manage complex projects" when they are creating student projects.

- Assessments. Assessments are devised which allow students to show what they have learned. Sometimes this takes the form of allowing each student to devise the way he or she will be assessed, while meeting the teacher's criteria for quality.
- Apprenticeships. Apprenticeships can allow students to "gain mastery of a valued skill gradually, with effort and discipline over time." Gardner feels that apprenticeships "...should take up about one-third of a student's schooling experience."

Resources for Curriculum Planning with Multiple Intelligences

- The Seven Ways to Approach Curriculum Thomas Armstrong http://www.thomasarmstrong.com/articles/7_ways.htm
- The Renaissance Project <u>http://www.unex.ucr.edu/education/MI/reforming.html</u>
- ASCD's Reading Room discussion of multiple intelligences http://www.ascd.org/cms/index.cfm?TheViewID=998.



Education Reform and Standards

Public education reform was triggered a decade earlier by a report, <u>A Nation at Risk</u>, which claimed that U.S. students generally achieved at lower skill levels than those of other industrialized nations (National Commission on Excellence in Education, 1983). The <u>Goals 2000: Educate America Act</u> enacted by Congress in 1994 (United States of America 103rd Congress), provided the framework for education reform for the 21st Century. This legislation called for the establishment of high-quality, internationally competitive content and performance standards for all students, promoted the use of technology to enable all students to achieve national goals, and emphasized the need for teacher education and professional development. Teachers were to be given the opportunity to acquire the knowledge and skills needed to instruct and prepare students for the next century.

Education Reform focused on research to determine how students learn. The emphasis moved toward the cognitive sciences during the 1980s. Behaviorism had been the dominant theoretical focus of the 1960-1970s. Brain research was helping educators and researchers develop new ways of understanding how students learn. Education reform emphasized meaningful learning rather than rote memorization. The focus of education reform was on creating standards for each subject matter area and grade level determining what a student should know and be able to do. Teacher standards were developed as well. Teacher training emphasized pedagogically effective practices, as well as subject matter competence. Lesson planning objectives began to focus on meeting national or state subject matter content standards.

Musical	Interpersonal	Intrapersonal Naturalistic		
 humming rapping playing background music patterns form playing instruments tapping out poetic rhythms rhyming singing 	 classroom parties peer editing cooperative learning sharing group work forming clubs peer teaching social awareness conflict mediation discussing cross age tutoring study group brainstorming 	 personal response individual study personal goal setting individual projects journal log keeping personal choice in projects independent reading 	 reading outside cloud watching identifying insects building habitats identifying plants using a microscope dissecting going on a nature walk build a garden studying the stars bird watching collecting rocks making bird feeders going to the zoo 	
Verbal-Linguistic	Logical- Mathematical	Visual-Spatial	Bodily- Kinesthetic	
 choral speaking declarizing storytelling retelling speaking debating presenting reading aloud dramatizing book making nonfiction reading researching listening process writing writing journals 	 problem solving measuring coding sequencing critical thinking predicting playing logic games collecting data experimenting solving puzzles classifying using manipulatives learning the scientific model using money using geometry 	 graphing photographing making visual metaphors making visual analogies mapping stories making 3D projects painting illustrating using charts using organizers visualizing sketching patterning visual puzzles 	 hands on experiments activities changing room arrangement creative movement going on field trips physical education activities crafts dramatizing using cooperative groups dancing 	

Multiple Intelligences Strategies for the Classroom Chart from Teachervision

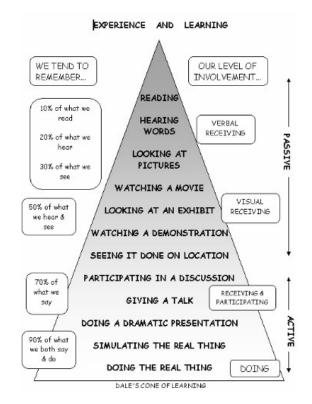
Musical Intelligence Activity Chart from Teacher Vision from - <u>http://www.teachervision.com/lesson-plans/lesson-2204.html</u>)

MULTIPLE INTELLIGENCES: STRATEGIES IN THE CLASSROOM

Linguistic Intelligence	Logical-Mathematical Intelligence	Spatial Intelligence		
 lectures, debates large- and small-group discussions books, worksheets, manuals brainstorming writing activities word games sharing time storytelling, speeches, reading to class talking books and cassettes extemporaneous speaking journal keeping choral reading individualized reading memorizing linguistic facts tape recording one's words using word processors publishing (e.g., creating class newspapers) 	 mathematical problems on the board Socratic questioning scientific demonstrations logical problem-solving exercises creating codes logic puzzles and games classifications and categorizations quantifications and calculations computer programming languages science thinking logical-sequential presentation of subject matter Piagetian cognitive stretching exercises Heuristic 	 charts, graphs, diagrams, and maps visualization photography videos, slides, and movies visual puzzles and mazes 3-D construction kits art appreciation imaginative storytelling picture metaphors creative daydreaming painting, collage, visual arts idea sketching visual thinking exercises graphic symbols using mind-maps and other visual organizers computer graphics software visual awareness activities optical illusions color cues telescopes, microscopes, and binoculars visual awareness activities draw-and-paint/computer-assisted-design software picture literacy experiences 		
Bodily-Kinesthetic Intelligence	Musical Intelligence	Interpersonal Intelligence		
 creative movement, mime hands-on thinking field trips the classroom teacher competitive and cooperative games physical awareness and relaxation exercises all hands-on activities crafts body maps use of kinesthetic imagery cooking, gardening, and other "messy" activities manipulatives virtual reality software kinesthetic concepts physical education activities 	 musical concepts singing, humming, whistling playing recorded music playing live music on piano, guitar, or other instruments group singing mood music music appreciation playing percussion instruments rhythms, songs, raps, chants using background music linking old tunes with concepts discographies creating new melodies for concepts listening to inner musical 	 cooperative groups interpersonal interaction conflict mediation peer teaching board games cross-age tutoring group brainstorming sessions peer sharing community involvement apprenticeships simulations academic clubs interactive software parties / social gatherings as context for learning people sculpting 		

 communicating with body language/ hand signals tactile materials and experiences body answers 	imagerymusic softwasuper memor		
Intrapersonal Intelligence independent study feeling-toned moments self-paced instruction individualized projects and games private spaces for study one-minute reflection periods interest centers 		 option choice self-te expos curric self-es journa 	aching programmed instruction ure to inspirational/ motivational

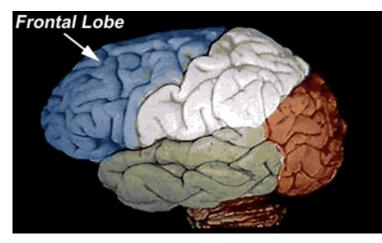
Some of these ideas a similar to the Teacher Vision Chart above. The following list provides a survey of the techniques and materials that can be employed in teaching through the multiple intelligences. <u>http://www.spannj.org/BasicRights/appendix_b.htm</u>



Dale Carnegie's Cone of Learning

How Do We Learn?

How can you involve the whole brain in learning?



Frontal Lobe - judgment, creativity, problem solving, and planning

> Parietal Lobe - higher sensory and language functions

Temporal Lobe - hearing, memory, meaning, and language

Occipital Lobe - vision

Medical research about how the brain functions has become much more sophisticated than the left brain/right brain discussions of the past. Psychologists, educators, and researchers have been examining how we learn and how we remember what we've learned. See Dale Carnegie's Cone of Learning above. We do know that students are most successful when all three traditional learning styles are used.

- Auditory learners: benefit most from traditional teaching techniques. Auditory learners succeed when information is presented and requested verbally.
- Visual learners: Some students rely upon a visual learning style: "Show me and I'll understand." Visual learners benefit from diagrams, charts, pictures, films, and written directions.
- Kinesthetic learners: Most students excel through kinesthetic means: touching, feeling, experiencing something with hands-on activities. "Children enter kindergarten as kinesthetic and tactual learners, moving and touching everything as they learn. By second or third grade, some students have become visual learners. During the late elementary years some students, primarily females, become auditory learners. Yet, many adults, especially males, maintain kinesthetic and tactual strengths throughout their lives." (Teaching Secondary Students Through Their Individual Learning Styles, Rita Stafford and Kenneth J. Dunn; Allyn and Bacon, 1993). Kinesthetic learners are most successful when totally engaged with the learning activity. They acquire information fastest when participating in a science lab, drama presentation, skit, field trip, dance, or other active activity. Because of the high numbers of kinesthetic learners, education is shifting toward a more hands-on approach; manipulatives and other "props" are incorporated into almost every school subject, from physical education to language arts. Hands-on teaching techniques are gaining recognition because they address the challenging needs of kinesthetic learners, as well as the diverse needs of auditory and visual learners. (From FamilyEducation.com - http://www.familyeducation.com/article/0,1120,3-605,00.html)

Multiple Intelligence Quiz

This quiz will help you identify your most effective learning styles. Read each statement. If it expresses some characteristic of yours and sounds true for the most part, jot down a "T." If it doesn't, mark an "F." If the statement is sometimes true, sometimes false, leave it blank.

1. I'd rather draw a map than give someone verbal directions.				
 If I am angry or happy, I usually know exactly why. 				
3. I can play (or used to play) a musical instrument.				
4. I can associate music with my moods.				
5. I can add or multiply quickly in my head.				
6. I can help a friend sort out strong feelings because I have successfully dealt with similar				
feelings myself.				
7. I like to work with calculators and computers.				
8. I pick up new dance steps fast.				
9. It's easy for me to say what I think in an argument or debate.				
10. I enjoy a good lecture, speech or sermon.				
11. I always know north from south no matter where I am.				
12. I like to gather together groups of people for parties or special events.				
13. Life seems empty without music.				
14. I always understand the drawings that come with new gadgets or appliances.				
15. I like to work puzzles and play games.				
16. Learning to ride a bike (or skates) was easy.				
17. I am irritated when I hear an argument or statement that sounds illogical.				
18. I can convince other people to follow my plans.				
19. My sense of balance and coordination is good.				
20. I often see patterns and relationships between numbers faster and easier than others.				
21. I enjoy building models (or sculpting).				
22. I'm good at finding the fine points of word meanings.				
23. I can look at an object one way and see it turned sideways or backwards just as easily.				
24. I often connect a piece of music with some event in my life.				
25. I like to work with numbers and figures.				
26. I like to sit quietly and reflect on my inner feelings.				
27. Just looking at shapes of buildings and structures is pleasurable to me.				
28. I like to hum, whistle and sing in the shower or when I'm alone.				
29. I'm good at athletics.				
30. I enjoy writing detailed letters to friends.				
31. I'm usually aware of the expression on my face.				
32. I'm sensitive to the expressions on other people's faces.				
33. I stay "in touch" with my moods. I have no trouble identifying them.				
34. I am sensitive to the moods of others.				
35. I have a good sense of what others think of me.				

Scoring Sheet

Circle each item that you marked "True" and tally from the list below. Add your totals. A total of four in any of the categories indicates strong ability.

А.	B.	C.	D.	E.	F.	G.
9	5	1	8	3	2	12
10	7	11	16	4	6	18
17	15	14	19	13	26	32
22	20	23	21	24	31	34
30	25	27	29	28	33	35

ADD TOTALS

Learning Styles				
A =	A = Linguistic			
B =	Logical-Mathematical			
C =	Visual-Spatial			
D =	Bodily-Kinesthetic			
E =	Musical			
$\mathbf{F} =$	Intrapersonal			
<u>G</u> =	Interpersonal			