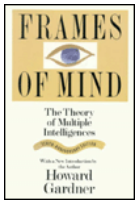


Chapter Four: Multiple Intelligences

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 Frames of Mind, 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. Frames of Mind, 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 - http://www.pz.harvard.edu/PIs/HG.htm)


Verbal - Linguistic


Intrapersonal


Logical - Mathematical


Interpersonal


Visual - Spatial


Musical - Rhythmic


Body - Kinesthetic


Naturalist

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 - http://www.pz.harvard.edu/PIs/HG_MI_after_20_years.pdf Project Zero website - http://www.pz.harvard.edu/Default.htm

Howard Gardner

"As a young person I was a serious pianist and enthusiastically involved with other arts as well. When I began to study developmental and cognitive psychology, I was struck by the virtual absence of any mention of the arts. An early professional goal was to find a place for the arts within academic psychology. I am still trying! In 1967 my continuing interest in the arts prompted me to become a founding member of Project Zero, a basic research group at the Harvard Graduate School of Education begun by a noted philosopher of art, Nelson Goodman. For 28 years, I was the co-director of Project Zero and I am happy to say that the organization continues to thrive"

(AERA, 2003)

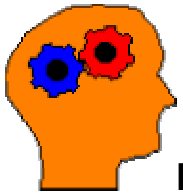
Research on Multiple Intelligences

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 - http://www.thomasarmstrong.com/
- David Lazear - http://www.davidlazear.com

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)
http://www.glef.org)

Howard Gardner on Multiple Intelligences and New Forms of Assessment

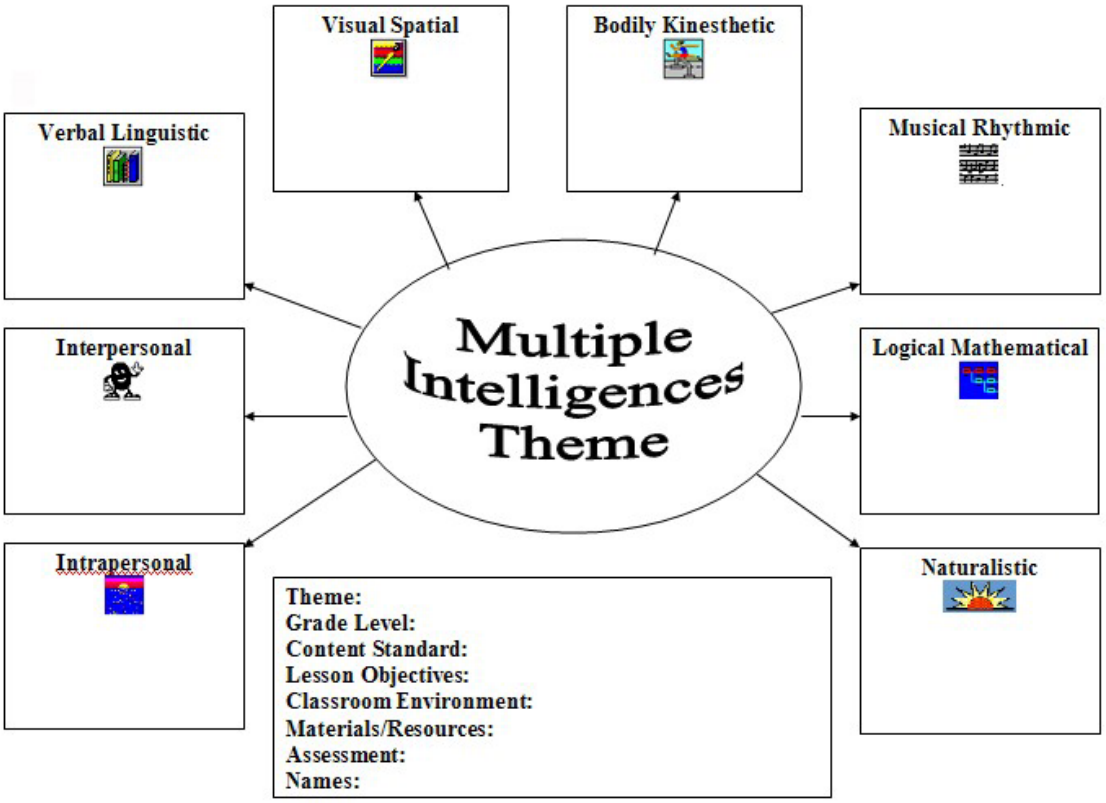
- On the importance of engaging students actively in what they are studying.
- On the characteristics of student-directed learning.
- On the theory of multiple intelligences.
- On technology and multiple intelligences.
- On the need for fundamental change in the curriculum.
- On how assessment in school 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.

Eight Intelligences and Multimedia Technology

INTELLIGENCE	MODIFY WITH TECHNOLOGY
Verbal Linguistic	
• Use words effectively and have highly-developed auditory skills • Enjoy reading, playing word games, and writing • Have good memory for verse, lyrics, or trivia	Learns best by saying, hearing, and seeing words 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, solving puzzles • Likes brain teasers, logical puzzles, and strategy games.	Learns best by categorizing and classifying, working with abstract patterns and relationships. Benefit from database, spreadsheet, problem-solving software, strategy game formats/simulations, calculators, multimedia authoring.

Bodily-Kinesthetic	
• Like movement and communicate well through body language and physical activity • Excel at hands-on learning • Process knowledge through bodily sensations – moving, touching, manipulation, role plays, creative movement	Learns best by touching, moving, interacting with space, processing knowledge through bodily sensations 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 • Learn best through drawings, designs, and imagery • Likes mazes, jigsaw puzzles, films, diagrams, maps, charts	Learns best by visualizing, dreaming, using the mind's eye, working with colors/pictures 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 • May study with music in the background, play an instrument, notice non-verbal sounds in the environment, learn more easily if sung or tapped	Learns best with rhythm, melody, and music. Programs combining stories with sound, reading programs associating letters/sounds/music, music composition software, multimedia presentations, karaoke
Interpersonal	
• Enjoy interacting with others • Learn best through group activities • Sensitivity to facial expressions, voice and gestures and has ability to respond effectively to those cues • Understand and care about people and like to socialize	Learns best by sharing, comparing, relating cooperating, interviewing 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 • Have an accurate picture of personal strengths and limitations and capacity for self-discipline • Learn best through independent study and introspection	Learns best by working alone on individualized projects, with self-paced instruction, and having own space 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 and ecological relationships. • Interacts effectively with living creatures • Sees patterns of life and natural forces.	Enjoys working with plants and animals, and observing nature 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 - http://www.ascd.org/cms/index.cfm?TheViewID=998.

- **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 - http://www.unex.ucr.edu/education/MI/reforming.html
- 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, A Nation at Risk, 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 Goals 2000: Educate America Act 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.

Multiple Intelligences Strategies for the Classroom Chart from Teachervision

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

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

MULTIPLE INTELLIGENCES: STRATEGIES IN THE CLASSROOM

Linguistic 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)

Logical-Mathematical Intelligence

- 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

Spatial Intelligence

- 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

- 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
- communicating with body language/ hand signals tactile materials

Musical Intelligence

- 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 imagery
- music software
- super memory music

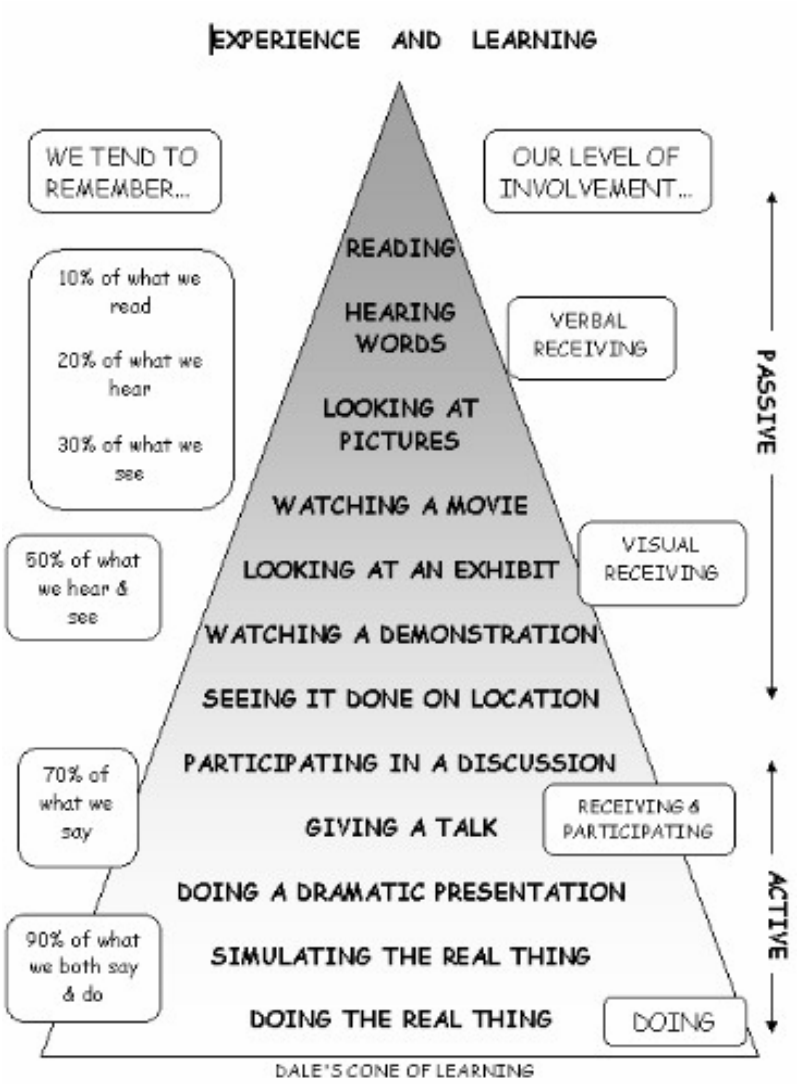
Interpersonal Intelligence

- 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

Intrapersonal Intelligence

- independent study
- feeling-toned moments
- self-paced instruction
- individualized projects and games
- private spaces for study
- one-minute reflection periods
- interest centers
- personal connections
- options for homework
- choice time
- self-teaching programmed instruction
- exposure to inspirational/ motivational curricula
- self-esteem activities
- journal keeping
- goal setting sessions

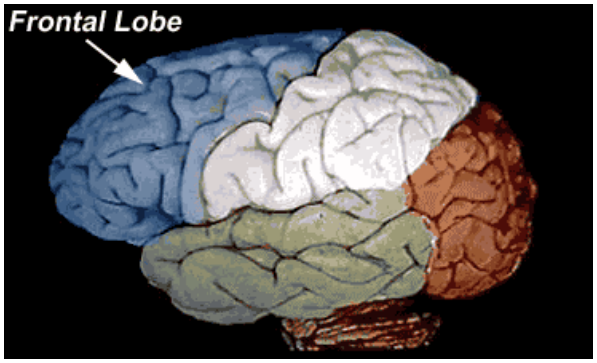
Some of these ideas a similar to the Teacher Vision Chart above. The following list provides a survey of the techniques and materials that can be employed in teaching through the multiple intelligences.
http://www.spannj.org/BasicRights/appendix_b.htm



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. We do know that students are most successful when all three traditional learning styles are used. (FamilyEducation.com - http://www.familyeducation.com/article/0,1120,3-605,00.html)

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.

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.
	2. 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.

A.	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 =		Linguistic
B =		Logical-Mathematical
C =		Visual-Spatial
D =		Bodily-Kinesthetic
E =		Musical
F =		Intrapersonal
G =		Interpersonal