CHAPTER II

MULTIPLE INTELLIGENCES - A REVIEW

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In the eighteenth century a person by name Francis Joseph Gall watched carefully a connection between some characteristics of the mind of schoolmates and shapes of their heads. Also he noted that boys with prominent eyes tended to have good memories. Alfred Binet explained intelligence as a complex set of qualities. This includes comprehension, judgment and reason. During the first part of the 20th century, Intelligent quotients were developed as a measure of intelligence.

Thorndike conducted experiments and found that humans posses some type of intelligence like social intelligence. Social intelligence is the capacity to understand and manage human relations. David Wechsler explained about both non-intellective and intellective elements of intelligence. He viewed intelligence as the aggregate capacity of the individual to act purposefully, to think rationally and to deal effectively with the environment. (Wechsler, 1944).

These finding leads him to place a discipline called ‘Phrenology’. Gall was the first person who stress that different parts of the brain mediates different functions. In 1960 a French Surgeon and anthropologist Pierre –Paul Broca demonstrated relationship between specific brain part and a particular cognitive brain impairment. Broca said that a lesion in a certain area of the left portion of the human cortex caused aphasia, the breakdown of linguistic capacities. Research in the subsequent years showed that various lesions in the left hemisphere could impair particular linguistic functions.

Many attempts were done for relating brain to mental functions in the nineteenth centaury. Also Hindu Upanishads described seven kinds of knowledge.
In 1967 Guilford proposed that intelligence is a combination of relatively independent multiple abilities. He presented a structure of intellect model for intelligence in three dimensions like content, operations and products.

A triarchic theory of intelligence is proposed by Sternburg (1985). He argued that “intelligent behavior arises from a balance between analytical, creative and practical abilities. Within a social context these abilities function collectively for the individual’s success”.

2.2 Psychology as a Science

Numerous efforts were began in the nineteenth century to setup psychology as a science by scholars like Wilhelm Wundt in Germany and William James in America through a rational way. First psychologists were eager to define their discipline as separate from physiology and neurology. Psychologists searched for the laws of mental faculties. One part of scientific psychology searched for most general laws of human knowing. An equally competent part searched for individual differences at the beginning of the twentieth century. Theodore Simon and Binet devised the first test of intelligence. They tried to place their children in different grade level. They conducted a series of classes all around the U.S.A called “Talks to Teachers about Psychology”. The themes of these classes included new information and information that a student already knew and project based learning. After this in 1910, the “Journal of Educational Psychology” was published. “The Journal of educational psychology” is now published quarterly. It gives a wide variety of research and publications in the world of Educational Psychology (James, 1983).
2.3 The Idea of Multiple Intelligences

The idea of multiple intelligences is not new. Different sides of the mind were recognized even in Greek times. According to famous Psychologists like Clark Hull, Kenneth Spence and B.F Skinner “the basic laws of sensation, perception, memory, attention and learning were assumed to work with language, music, visual and auditory stimuli”. Also, these basic laws work across the complex patterns and problems. The British experimental Psychologists D Allen Allport proposed that “the human mind contains large number of ‘independent production systems’. These computational units operate on specific kind of information. There are evidences for specialized neurons, responding selectively to particular properties of sensory input. This is a major feature of the central nervous system”.

The term Intelligence is a substitute for the phrases like. “Cognitive skills, Cognitive capacities, ‘forms of knowledge’, or any other cognitive-mentalistic terminology. The individuals have a number of domains of potentials which they have to develop according to the normal stimulating factors available.” As a normal individual we exploit these potentials in dealing with a range of materials and objects.

Howard Gardner studied about the developmental and cognitive Psychology. He tried to make a place for arts in the field of Psychology. In 1967 Howard Gardner become a member of a basic research group at Howard Graduate school of education. This group was called ‘Project Zero’. The coordinator of the Project Zero was Mr. Nelson Goodman. At first Gardner engaged in the neurological research with Norman Geschwind, an expert in the field of Behavioural Neurology. Gardner made numerous discussions with Norman Geschwind about the conditions of normal and gifted children who have the misfortune of sufferings from stroke, tumor and other
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brain damages. They found that patients who are alexic but not a graphic loses their ability to read numbers, name objects and normal writing. Gardner worked there for twenty years on a neuropsychological unit and he tried to comprehend the structure of human abilities in human brain.

In the year 1975 Gardner published the book ‘The shattered Mind’. In this book he described about how different parts of the brain are dominant for different cognitive functions. In 1976 he wrote an outline for a book with title ‘Kinds of Minds’. It described about different human faculties. Later this book was published by the name ‘Frames of Mind’. In 1979 the researchers of the Harvard School received a sizeable grant from a Dutch foundation, called Bernard Van Leer Foundation, a study proposed by that foundation. The members of the project on Human Potential were expected to work out on the nature of human potential and its peculiarities. At that time Gardner wrote a book about human cognition. This was based on the discoveries in the biological and behavioural sciences. This was the first research program that led to the theory of Multiple Intelligences.

Gardner and his colleague combined the literature from brain study genetics, anthropology and Psychology to make an optimal taxonomy of human capacities. Some psychologists criticized Gardner for using the term Multiple Intelligences instead of abilities or gifts. Gardner said about his colleague David Feldman’s words “selection of this name ‘Multiple Intelligences’ placed Gardner in direct confrontation with Psychological establishment that cherishes IQ tests. As a mission to the Van Leer Foundation Gardner had to say something about the educational implications of Multiple Intelligences theory. So in the concluding chapters he explained about educational implications of the theory. Gardner said “human beings possess not a
single intelligence but asset of relatively autonomous intelligences. Most writing about intelligence focuses on a combination of linguistic and logical-mathematical intelligence. A full appreciation occurs when considering spatial, bodily-kinesthetic, musical, interpersonal, and intrapersonal intelligence.”

The Frames of Mind was published in 1983. He was then called by others as the ‘Father of Multiple Intelligences’ or as ‘MI guru’. After one year, teachers from Indianapolis began a school and they used MI theory there. This was the first school which used the MI theory. He and his colleagues created a curriculum for a middle school called ‘Practical Intelligences for school’. They also developed the use of computers in education. In 1994-95 he reviewed the existence of a new intelligence as ‘Naturalistic Intelligence’. Also suggested possibility of an Existential Intelligence. (Gardner, 2004)

The first volume published under this project is Howard Gardener’s Frames of Mind which dealt with human intellectual potential, psychological research, biological sciences and development and use of knowledge in different cultures. (Gardner, 2004)

Howard Gardner considered intelligences as “the capacity to solve problems or to make new trend products that are evaluated in one or more cultural setting”. He recapitulated the theory of intelligence using eight criteria. According to Gardner, “there are biological and cultural bases for intelligences. Neurobiological research indicates that learning is an outcome of the modifications in the form of connections between cells. Primary elements of different types of learning are found in particular areas of the brain. The corresponding transformations occurring there.” (Gardner, 2004)
Various types of learning result in the cell connections among different areas of the brain. Different cultures result in various types of intelligences. Different culture and cultural context play good roles in the formation of intelligence. A child’s ability to perform certain tasks depends upon his cultural value.

This cultural value helps to get motivation for acquiring skills in concerned areas. Therefore, certain intelligences might be highly developed in people of one culture. The same intelligences might not be so well developed in the individuals of another culture. (Gardner, 2004)

At first Howard Gardner formulated a list of seven components of intelligences. It was only a provisional list. The first two components of intelligences have been typically valued in schools; the next three are associated with the arts. The final two are known by the name personal intelligences.

It was suggested further that intelligence comprises of ten distinct multiple intelligences. They are

1. Verbal/ Linguistic Intelligence,
2. Logical/ Mathematical Intelligence,
3. Visual/ Spatial intelligence,
4. Musical / Rhythmic intelligence,
5. Bodily-Kinesthetic Intelligence,
6. Interpersonal Intelligence,
7. Intrapersonal Intelligence
8. Naturalistic intelligence,
9. Existential intelligence and
Some research showed that multiple intelligences and achievement are related. (Gardner, 2004)

2.4 Theory of Multiple Intelligences by Gardner

The Theory of Multiple Intelligences is an idea proposed by Howard Gardner. In 1983 he published a book by name ‘Frames of Mind.’ In that it is said that all individuals have seven independent intelligences. These "intelligences" are:

1. Linguistic intelligence
2. Logical-mathematical intelligence
3. Musical intelligence
4. Spatial intelligence
5. Bodily kinesthetic intelligence
6. Interpersonal intelligence
7. Intrapersonal intelligence

Gardner recently has added three new intelligences, Naturalistic intelligence, Humanistic and Moral Intelligence. In the ancient times intelligence was used as a single capacity. Gardner identified these intelligences through a study on the development of cognitive skills of normal children, stroke patients and other brain damaged ones. (Gogabakan, 2003)

Gardner searched for the appropriate word for his findings. At first he decided to use the dignified term human faculties. Then he tried to use psychologists’ terms like skills, capacities, talents, gifts, or abilities. Gardner identified that each of this word has hidden meaning in mind. He finally accepted the name from psychology. He explained it in new ways. This word was ‘intelligence’. He defined intelligence as “the ability to solve problems or to create products that are valued within one or more
Gardner defined “intelligence as a bio-psychological potential”. This is used to handle information. This potential can be activated in different cultural settings to solve problems. This indicates that these intelligences are not simple abilities that can be seen or counted. These are potentials that will or will not be activated. The activation of potential depends upon the values of a particular culture. Also it depends up on the appropriate time available in that culture, and the personal decisions taken by individuals and their families. Capacity could be thought as intelligence. Gardner used 8 different criteria to understand it. Gardner (1999) made different groups in terms of their disciplinary roots. Gardner reviewed the studies using eight criteria or eight signs of Intelligence: (*Frames of Mind: The Theory of Multiple Intelligences*, Howard Gardner)

1. Potential isolation by brain damage: The intelligence of one candidate may or may not be the same as other candidate’s intelligence. “If a particular faculty of the brain is damaged or spared in isolation, the behaviour of individual is same as those others who have the same problem.” It is revealed from the evidence that one candidate’s intelligence could be dissociated from others. Either pattern increases the likelihood that an intelligence has been discovered. Thus, both the separation of language from other faculties and its essential similarity in oral, written, and sign forms point to a separate linguistic intelligence”.

2. An evolutionary history and an evolutionary plausibility: “All human beings display areas of intelligence and ignorance. Our current intelligence has its root from millions of years back in the history of species. Studies give new possibility to evolutionary accounts of such faculties as the intelligence. This scrutinizes the
world of plants and animals”. For example, the aspects of musical intelligence is appearing in several species but it appear jointly in human beings only.

3. An identifiable core operation or set of operations: “The existence of one or more basic operations is assumed to be the basis for human intelligence. We can define human intelligence as a neural mechanism activated by certain kind of internal or external information. The important thing is to find basic core operations which results in the development of human intelligences “There is an identifiable set of procedures and practices which are unique to each true intelligence. For instance linguistic intelligence includes core operation of phonemic discriminations command of syntax, sensivity to the pragmatic uses of language, and acquisition of word meanings.”

4. Susceptibility to encoding from a symbol system: “Our representation of knowledge and communication are through different symbol system. The symbol systems that are prevailing in human society are mathematics, language and pictures. This helps human survival and human productivity. Without a special symbol system human intelligence has no gravitation towards embodiment “. From developmental psychology there are two criteria came: There is a distinctive developmental history with a definite set of “end state” performance:

5. Intelligence does not develop in isolation. “There are situations in which intelligence has major roles. The levels of expertise in the development of intelligence is ranging from talent at the time of universal beginning to high levels of competences in the modern world. A predictable pattern of developmental history is there in the human mind. So it is important that situations are necessary for developing the particular intelligence. It means, intelligences have their own
developmental histories. Thus, people who have the desire to become a mathematician must develop their logical–mathematical abilities”.

6. The existence of idiot, savants, prodigies and other exceptional people: “People who have unusual profiles of intelligence may be without any particular signs of brain injury. “Consider for the case of savant, they exhibit an area of stunning strength along with other ordinary abilities. Autistic people- like individuals who suffer significant damage to the right hemisphere - may have an impairment in the brain area that governs the ability to understand other peoples intentions. Nature provides one other bounty to the student of multiple intelligences. People who, without any documented signs of brain injury, have unusual profiles of intelligence.”

The final two criteria are taken from Psychological research:

7. Support of experimental and Psychological task: “Psychologists can identify a relative autonomy of an intelligence. Also one can test the effect of one intelligence on another sets of tasks for different domains of human behavior. A true intelligence can be identified by specific tasks which can be carried out, observed and measured”.

8. Support from Psychometric findings: “ The use of psychometric instruments to measure intelligence have traditionally been used to measure only specific types of ability. However, these tests can be designed and used to identify and quantify true unique intelligences. The Multiple Intelligence theory welcomes psychometric testing for specific scientific study.” :*(Frames of Mind: The Theory of Multiple Intelligences, Howard Gardner)*
2.5 Linguistic Intelligence

Most societies use language not as a mere tool but as a means for accomplishing one’s business. Scholars treat language as a source of what they study. Also they consider language as a means for conveying their conclusions. “Linguistic intelligence is the ability to learn languages. It is the ability to speak language, the ability to write languages, and the capacity to use language to attain certain goals. This intelligence includes the ability to use language effectively to express oneself impressively and as a means to remember information”.

According to Howard Gardner, “Writers, poets, lawyers and speakers show high linguistic intelligence. Students who possess linguistic intelligence show good auditory abilities. They are usually showing interest in reading, writing, playing word games. They also are good at remembering names, dates, places and doing word
processing on a computer. They may have a developed vocabulary. They can speak fluently, accurately and phonetically” (Gardner, 1999).

Activities which are the implications of linguistic Intelligences may be as follows.

1. Reading and writing the important points of the unit.
2. Writing a short story about an event in the past, present or future.
3. A face to face interaction with students for finding their involvement and thoughts about a specific things.
4. Writing a script or narrative for a program, speech or a host for an art event.

“This intelligence involves the knowing which comes through language; through reading, writing and speaking. It involves understanding the order and meaning of words in both speech and writing and how to properly use the language. It involves understanding the socio-cultural nuances of a language, including idioms, plays on words, and linguistically-based humor”.

“If this is a strong intelligence for us, we have highly developed skills for reading, speaking, and writing and we tend to think in words. We probably like various kinds of literature, playing word games, making up poetry and stories, engaging in involved discussions with other people, debating, formal speaking, creative writing, and telling jokes. We like precise in expressing ourselves and are irritated when others are not! We love learning new words, we do well with written assignments, and our comprehension of anything we read is high”.

2.6 Logical-Mathematical Intelligence

The ability to make calculation rapidly is an advantage for Mathematicians. In Howard Gardner's words, “The Logical-mathematical intelligence is the ability to analyze problems logically, ability to carry out mathematical operations, ability to
investigate issues scientifically. It entails the ability to detect patterns, reason deductively and think logically. This intelligence is most often associated with scientific and mathematical thinking.” (Gardner, 1999).

Students with logical mathematical ability are able to explore patterns and relationships. They make connections between patterns and logics. “These students are keen on mathematical problems, experiments and problem solutions. They enjoy reasoning logically and scientifically. They need systematic and logical information and they enjoy working with data bases and spread Shedson computer”.

Activities which are implications of Logical-Mathematical intelligence may include several movements, as follows.

1. Construction of graphics, ability to organize, ability to compare, ability to contrast, and ability to observe things.
2. Finding relationships and patterns among the arts, artists, cultures, or artistic products.
3. Making graphics, collecting data, or analyzing data, attendance at arts events.
4. Establishing time lines for artistic inventions, artistic composers, artistic movements, or dance.
5. Creating a financial plan for exhibition or major productions.
6. Costumes, sets, rental fees, etc.

“This intelligence uses numbers, math, and logic to find and understand the various patterns that occur in our lives: thought patterns, number patterns, visual patterns, color patterns, and so on. It begins with concrete patterns in the real world but gets increasingly abstract as we try to understand relationships of the patterns we have seen”.
“If we happen to be a logical-mathematically inclined person we tend to think more conceptually. We try to think abstractly and are often able to see patterns and relationships that others miss. We probably like to conduct experiments, to solve puzzles and other problems, to ask cosmic questions, and analyze circumstances and people’s behavior. We most likely enjoy working with numbers and mathematical formulas and operations, and we love the challenge of a complex problem to solve. We are probably systematic and organized, and we likely always have a logical rationale or argument for what we are doing or thinking at any given time.”

2.7 Spatial Intelligence

“Spatial intelligence is the ability to recognize and use the patterns of wide space and more confined areas” (Gardner, 1999). “The ability to calculate adequate space for moving his own body, his car, his bus when driving, between two things or along the road, reading maps, charts and diagrams, thinking in images and pictures are the favorites of the students who have spatial intelligence”

According to Armstrong (1994) “these students have highly developed senses for color, line, shape, form, space. They also have the ability to visualize ideas”

Activities for spatial intelligence may include following things:
1. Design paintings, making sets, finding places in maps etc.
2. Illustration or creation of a three dimensional sculpture or visualization of a photograph or dance.
3. Creation of narrative murals for music, art and drama.
4. Choreographing a band set a performance of an art program or skit etc.

We often say “A picture is worth a thousand words!” or “Seeing believes!”

“This intelligence represents the knowing that occurs through the shapes, images,
patterns, designs, and textures we see with our external eyes, but also includes all of the images we are able to conjure inside our heads”.

“If we are strong in this intelligence we tend to think in images and pictures. We are likely very aware of object, shapes, colors, textures, and patterns in the environment around us. We probably like to draw, paint, and make interesting designs and patterns, and work with clay, colored markers, construction paper, and fabric. Many who are strong in visual-spatial intelligence love to work jigsaw puzzles, read maps and find their way around new places. We probably have definite opinions about colors that go together well, textures that are appropriate and pleasing, and how a room should be decorated. And, we are likely excellent at performing tasks that require “seeing with the mind’s eyes,” such as visualizing, pretending, imagining, and forming mental images”.

2.8 Musical Intelligence

Musical intelligence is the ability or skill in the performance in musical activities. “Those who possess musical intelligence may have composition, and appreciation of musical patterns. It covers the capacity to recognize and compose musical tones, pitches and rhythms. According to Howard Gardner, musical intelligence runs in an almost structural parallel to linguistic intelligence” (Gardner, 1999).

“The ones with musical intelligence like music. Sound in their surroundings affects them and they listen to music while studying or reading. These students are able to understand pitch, rhythm and timbre. These students can create music and enjoy singing songs. The structure of music and tonal sounds are familiar to them. The musical part of their brains can be motivated by clapping hands, snapping fingers,
chanting words or moving rhythmically. The ones in this category can even save and apply information by musical process.” (Teele, 2000).

Activities of Musical intelligence may include several activities, as follows.

1. Making a rhythmic tune always in lips.
2. Listening music actively.
3. Creating music and making new innovations in music for inclusion in play.
4. Studying about music of other languages, other time periods, and other cultures.
5. Composing music with the help of the computer.
6. Composing music through the use of instruments.
7. To find a tune in a poem or in any piece of literature.
8. Proper use of counting in drill and looking for analogous “Repetitive patterns in visual art, decorative schemes in architecture, or literary repetition. This is the knowing that happens through sound and vibration. In the original research on the theory of multiple intelligences this intelligence was called musical-rhythmic intelligence. However, it is not limited to music and rhythm so I’m calling it auditory-vibrational, for it deals with the whole realm of sound, tones, beats, and vibrational patterns as well as music.”

“If we are strong in this intelligence area, we likely to have a love of music and rhythmic patterns. We are probably very sensitive to sounds in the environment; the chirp of cricket, rain on the roof, varying traffic patterns. We may study and work better with music in the background. We can often reproduce a melody or rhythmic pattern after hearing it only once. Various sounds, tones, and rhythms may have a visible effect on us--others can often see a change in facial expressions, body movement, or emotional responses. We probably like to create music and enjoy
listening to a wide variety of music. We may be skilled at mimicking sounds, language accents, and others’ speech patterns, and we can probably readily recognize different musical instruments in a composition”

2.9 Bodily-Kinesthetic Intelligence

“Bodily-kinesthetic intelligence involves the ability of using one's whole body or parts of the body effectively. It is the ability to use mental capacities to coordinate bodily movements. Howard Gardner considers mental and physical activity as related” (Gardner, 1999).

“This intelligence (kinesthetic) enables the subjects to make use of their bodies in a unique and talented way. They can move and act, they are also able to achieve success in a class where physical activities and hands are provided “(Teele, 2000).

Activities for bodily-kinesthetic intelligence may include several activities, as follows

1. Miming.
2. Doing skit effectively.
3. Creation of mini-productions of plays films or dance.
4. Predictions of paintings related to life.
5. Doing imitation of a play.
6. Interpretation of sounds or moving visuals to produce a group event.
7. Use of mime to review a lesson.

“We often talk about “learning by doing.” This way of knowing happens through physical movement and through the knowing of our physical body. The body “knows” many things that are not necessarily known by the conscious, logical mind, such as how to ride a bike, how to parallel park a car, dance the waltz, catch a thrown
object, maintain balance while walking, and where the keys are on a computer keyboard”.

“If you have strength in this intelligence area you tend to have a keen sense of body awareness. You like physical movement, dancing, making and inventing things with your hands, and role playing. You probably communicate well through body language and other physical gestures. You can often perform a task much better after seeing someone else does it first and then mimicking their actions. You probably like physical games of all kinds and you like to demonstrate how to do something for someone else. You may find it difficult to sit still for long periods of time and are easily bored or distracted if you are not actively involved in what is going on around you”. (Gardner, 1999).

2.10 Intrapersonal Intelligence

“Intrapersonal intelligence includes the capacity to understand oneself, to appreciate one's feelings, fears and motivations. In Howard Gardner's view 'it involves having an effective working model of ourselves, and to be able to use such information to regulate our lives” (Gardner, 1999).

“These students enjoy if they are left alone. They may recognize their own powers, weaknesses and inner feelings. They like keeping a journal, they study in an atmosphere with no noise and they are usually self-reflective. Strong ideas on controversial topics often come from that kind of students” (Teele, 2000)

Some signs of intrapersonal intelligence may include several activities, as follows.

1. Contributing new ideas to the world
3. Use of reflective notes while and after a unit is taken.
4. Conducting difficult projects with new opinion about the research findings.

5. Critical evaluation of a production, evaluation field trip, or evaluation concert performed by others, or preparing a self evaluation about a personal performance.

6. Telling comments to the favorite actors or composers about their performance.

The key points of these intelligences are human self abilities. By this we can come outside of ourselves. “This is the introspective intelligence. It involves our uniquely human propensity to want to know the meaning, purpose, and significance of things. It involves our awareness of the inner world of the self, emotions, values, beliefs, and our various quests for genuine spirituality”.

“If this intelligence is one of our strong points we may like to work alone and sometimes we may shy away from others. We are probably self-reflective and self-aware and thus we tend to be in tune with our inner feelings, values, beliefs, and thinking processes. We are frequently bearers of creative wisdom and insight, highly intuitive, and we are inwardly motivated rather than needing external rewards to keep us going. We are often strong willed, self-confident, and have definite, well-thought out opinions on almost any issue. Other people will often come to us for advice and counsel”. (Gardner, 1999).

2.11 Interpersonal Intelligence

“Interpersonal intelligence is dealt with the capacity to understand the feelings, mind and desires of other people. It involves the ability of the people to work effectively with others. Educators, salespeople, religious and political leaders and counsellors all must have a well-developed interpersonal intelligence” (Gardner, 1999). (Gogabakan, 2003)
“Persons who have interpersonal intelligence prefer to be with other people. They are friendly and can get on well with others so they can easily take part in social activities. Cooperative and collaborative surroundings are best for their learning. The ones who can express empathy for others’ feelings, react to their moods and grasp other perspectives usually appear in this group. They like studying in groups and exchanging information with others”. (Teele, 2000)

The following activities are included with this interpersonal Intelligence.

1. Engaging in group works at every time
2. Use of cooperative learning for class activities.
3. Arranging peer coaching during the production of an artwork.
4. Creation of team contest for the review of facts about an art form.
5. Development of folk festivals, or congregation of famous artists from different time periods meeting for the first time.

This component of intelligence means person-to-person way of interaction. When we work with others or acting as a part of a team, this intelligence is in use. This type of knowing is used to develop social skills.

“If this person-to-person way of knowing is more developed in us, we learn through personal interactions. We probably have lots of friends, show a great deal of empathy for other people and exhibit a deep understanding of other points of view. We probably love team activities of all kinds and are a good team member—we “pull our own weight” and often much more! We are sensitive to other people’s feelings and ideas, and are good at piggybacking our ideas on others’ thoughts. And we are likely skilled at drawing others out in a discussion. We are also probably skilled in conflict resolution, mediation, and finding compromise when people are in radical opposition to each other”.

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2.12 Naturalist Intelligence

The 8th intelligence named, the Naturalistic Intelligence was introduced by Gardner (1996 as cited Teele, 2000). “A student with this kind of intelligence, he claims, has the skills to notice, group, classify flora and fauna and is able to listen and hear the environmental sounds. He adds that this group of students live in harmony with nature. The naturalist can feel the differences between plants and animals. They also can find out the relationship between nature and civilization. People with jobs such as farming, hunting, gardening and also biologists have this kind of intelligence” (Teele, 2000).

Naturalistic Intelligence contains several activities, as follows.

1. The use of nature for formal class, playing in ground etc.
2. Studying about animals and participating them also with art or production.
3. Studying about animal sounds and movements and making works of art.
4. The use and observation of plants to make or interpret texture and form in an art work.

“The naturalistic intelligence involves the full range of knowing that occurs in and through our encounters with the natural world including our recognition, appreciation, and understanding of the natural environment. It involves such capacities as species discernment, communion with the natural world and its phenomena, and the ability to recognize and classify various flora and fauna”.

“If the naturalist intelligence is one of our strengths we have a profound love for the outdoor animals, plants, and almost any natural object. We are probably fascinated by and noticeably affected by such things as the weather, changing leaves in the fall, the sound of the wind, the warm sun or lack thereof, or an insect in the room. At a young age we were likely nature collectors, adding such things as bugs,
rocks leaves, seashells, sticks, and so on to our collections. We probably brought home all manner and kinds of stray animals and today we may have several pets and want more. We tend to have an affinity with and respect for all living beings”.
(Gogabakan 2003, Morris 2004)

2.13 Existential Intelligence

“Existential intelligence composed of person’s ability to perceive and make vision about the world in a different way. People having this intelligence may become good leaders, philosophers etc”. (Tupper, 2002)

2.14 Moral /Spiritual Intelligence

Moral intelligence comprised of the ability in the preservation and transmission of moral or spiritual values. Persons having this intelligence may become priests, saints etc. (Wikipedia June 2010 steps to build a moral intelligence)

2.15 Interaction among Components of Multiple Intelligences

Peoples with good ability in one component of one intelligence can use it to a number of ends. A person having good spatial intelligence may be an architect or an artist. Consider the case of a lawyer. He will be an individual having outstanding linguistic intelligence like writing of briefs, convincing arguments and a well memory of facts from hundreds of cases. But as a lawyer in court room he must have highly developed interpersonal intelligence, ability to speak fluently in the court room, efficiently interview witness and fulfill the judges mind with his strong arguments. Also he should have the logical ability to analyzes the situation and follow chain of reasoning to reach ultimate conclusion.

A skilled politician uses linguistic intelligence and interpersonal intelligence in a high degree but little use of logical and kinesthetic intelligence.
A director of a film must have developed linguistic and interpersonal intelligence. An individual equipped with both linguistic and interpersonal intelligence will be a good administrator. So new roles of the persons need particular combinations of intelligences.

Numerous individuals are being born and grow according to prevailing norms, values and practices. Various training and education of intelligences is a necessity for the development of students.

2.16 Multiple Intelligence and Education

The curriculum to be followed by a student is determined by the concerned nation or authorities. It also depends upon the resources available and the capacity of the students as well as the overall goals of both the society and the individuals. In the case of each student, those who plan education must decide which means is the best to help him to attain a desired competence or skill. In the case of a highly talented student it is sufficient to enable him to work directly with materials that he can explore. In the case of a student who has less abilities, it will be necessary to device special methods, mechanisms and means to exploit the intellectual capacities he has.

The followers of Lev Vygosky believe “at each age children show different set of interests. At the age of infancy prime actions involves emotional connections with others. At the age of two the child shows more interaction with handling of objects its manipulation. During the age from three to seven they will engage in role play and symbolic activities. During the age from seven to eleven formal studies in school and in adolescences they engage in personal relations and carrier oriented activities. Educational program should keep these biases in mind. This profile of interest differs significantly across culture.” (Vygotsky, 1978).
Educational scholars cling to the vision of optimal match between student and material. Educational psychology is to be made finer for the practice of matching the student profile to the material and modes of instruction. Some expectations regarding future may be as follows. In the case of “learning computer a number of intellectual competencies are relevant. Logical mathematical intelligence may be a central point. Writing a program requires step by step clear and logical order. The computer language and manual language is also relevant here which shows the importance of linguistic intelligence. The intuitions of the student may help him in learning the program. A student with strong musical bent may attempt to make the program as a musical piece, so the use of musical intelligence. A student with strong spatial abilities may be begun through some form of computer graphics or the use of flowchart or other spatial diagrams for learning the program, so is using the spatial intelligence. The extensive planning of the program may forces the student to engage in intra-personal form of thinking. The cooperation from other students is necessary for carrying out complex task or new computational skills. This leads him towards interpersonal intelligence. The role of kinesthetic intelligence play a role when the student use the computer or the program involves subject demands the use of body. Ultimately the educational planned to be orchestrated across various interest of the society to achieve its larger goals. Culture decides the curriculum that involves its own blend of intelligences. Society has to find some way of training to inculcate those abilities that permit a vision of a large and complex whole in the minds of the people.
2.17 Conclusion

The review of related studies helped the investigator to formulate objectives and hypothesis and to select the variables under the study. The reviews showed that some studies based on Multiple Intelligences and mathematics have been conducted in different areas of the country. This helped the investigator to construct different tests based on the components of Multiple Intelligences for the present study.