Chapter 2

THEORETICAL OVERVIEW

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THEORETICAL OVERVIEW

At the heart of MI theory is the belief that each individual has a rich and differentiated mind; that no two persons have exactly the same cognitive configuration; and that education is most likely to be successful if it pays attention to these individual differences in the course of fashioning curriculum, pedagogy, and assessment (Gardner, 2004a, p.13).

Multiple Intelligences (MI) refers to a learner-based philosophy that characterizes human intelligence as having multiple dimensions that must be acknowledged and developed in education. Gardner regarded it “as a pluralistic view of mind which recognizes many different and discrete facets of cognition and acknowledges that people have different cognitive strengths and contrasting cognitive styles” (Cahill, 1999, p.2). According to Gardner

I argue that there is persuasive evidence for the existence of several relatively autonomous human intellectual competencies, abbreviated hereafter as “human intelligences.” These are the “frames of mind” of my title. The exact nature and breadth of each intellectual frame has not so far been satisfactorily established, nor has the precise number of intelligences has been fixed. But the conviction that there exist at least some intelligences, that these are relatively independent of one another and that they can be fashioned and combined in a multiplicity of adaptive ways by individuals and cultures, seems to me to be interestingly difficult to deny (Gardner, 2004, p.8).

In 1983, when Gardner first published his theory of multiple intelligences (MI theory) in his book Frames of Mind: The theory of multiple intelligences, he
had no idea of the tremendous impact it was to have on the field of education (Gardner, 2004). Written primarily for psychologists as a critique of standard intelligence theory, the book was provocative and, as expected, generated criticism, particularly from the psychometric community (Fasko, 2001; Klein, 1997; Willingham, 2004). What was not expected, however, was that MI theory struck a chord with teachers across the world. Twenty years later, *Frames of Mind* had been translated into 13 languages, with over 300,000 copies sold world-wide (Viadero, 2003).

Although it included virtually nothing about school curriculum, teaching strategies or teacher development, MI theory provided a philosophical framework that helped teachers make sense of the vast range of individual differences that they encounter daily in their classrooms, as well as a structural framework to help them develop programmes which might better meet the diverse needs of students. Since then, educators have become so interested to apply this theory as a means through which they can improve teaching and learning in a multiplicity of ways. The theory represents a new orientation towards the nature of intelligences (Goodnough, 2000).

### 2.1 Theories of Intelligence

Theories of intelligence, as is the case with most scientific theories, have evolved through a succession of models.

> For well over two thousand years, at least since the rise of the Greek city-state, a certain set of ideas has dominated discussions of the human condition in our civilization. This collection of ideas stresses the existence and the importance of mental powers – capacities that have been variously
termed rationality, intelligence, or the deployment of mind (Gardner, 2004, p.5).

Gardner in his book, *The Frames of Mind* says that “Early in the medieval period, St. Augustine, the very father of faith, declared: The prime author and mover of the universe is intelligence. Therefore, the final cause of the universe must be the good of the intelligence and that is the truth” (Gardner, 2004, p.5).

In the wake of the Darwinian evolution, when scientific psychology in its inception, many scholars became interested in the development of intelligence across species. Francis Galton (cousin of Charles Darwin) was perhaps the first psychologically oriented scientist to try to measure the intelligence directly. Though Galton had a theoretical interest in the concept of intelligence, his work was by no means unrelated to practical issues. As a committed eugenicist, he sought to measure intelligence and hoped, through proper ‘breeding’, to increase the overall intelligence of the population.

During the following half century, many of the most gifted and influential psychologists concerned themselves with the nature of human intelligence. Four of the most influential paradigms in this field have been psychological measurement, also known as psychometrics; cognitive psychology, which concerns itself with the processes by which the mind functions; cognitivism and contextualism, a combined approach that studies the interaction between the environment and mental processes; and biological science, which considers the neural bases of intelligence.
2.1.1 General intelligence.

Psychometric theories are based on a model that portrays intelligence as a composite of abilities measured by mental tests. This model can be quantified. One of the earliest of the psychometric theories came from the British psychologist Charles E. Spearman (1863–1945), who published his first major article on intelligence in 1904. He noticed that people who did well on one mental-ability test tended to do well on others, while people who performed poorly on one of them also tended to perform poorly on others. To identify the underlying sources of these performance differences, Spearman devised factor analysis and concluded that just two kinds of factors underlie all individual differences in test scores. The first and more important factor, which he labelled the ‘general factor,’ or ‘g’, pervades performance on all tasks requiring intelligence. The second factor is a group of specific ability or ‘s’ factor, specifically related to each particular test (Spearman, 1927).
The American psychologist Louis L. Thurstone (1887-1955) disagreed with Spearman’s theory, arguing instead that there were seven factors, which he identified as the ‘primary mental abilities’. These seven abilities were verbal comprehension, verbal fluency, number, spatial visualization, inductive reasoning, memory, and perceptual speed (Thurstone, 1938).

Although the debate between Spearman and Thurstone has remained unresolved, other psychologists have suggested that both were right in some respects. Vernon and Cattell viewed intellectual abilities as hierarchical, with ‘g’,...
or general ability, located at the top of the hierarchy. But below ‘g’ are levels of gradually narrowing abilities, ending with the specific abilities identified by Spearman. Cattell, for example, suggested in *Abilities: Their Structure, Growth, and Action* (1971) that general ability can be subdivided into two further kinds, ‘fluid’ and ‘crystallized’. Fluid abilities are the reasoning and problem-solving abilities measured by tests such as analogies, classifications, and series completions. Crystallized abilities, which are thought to derive from fluid abilities, include vocabulary, general information, and knowledge about specific fields. The American psychologist John L. Horn suggested that crystallized abilities more or less increase over a person’s life span, whereas fluid abilities increase in earlier years and decrease in later ones (Horn & Cattell, 1967).

Most psychologists agreed that Spearman’s subdivision of abilities was too narrow, but not all agreed that the subdivision should be hierarchical. The American psychologist Joy Paul Guilford proposed a structure-of-intellect theory, which in its earlier versions postulated 120 abilities. In *The Nature of Human Intelligence* (1967), Guilford argued that abilities can be divided into five kinds of operation, four kinds of content, and six kinds of product. These facets can be variously combined to form 120 separate abilities. Guilford later increased the number of abilities proposed by his theory to 150.

2.1.2 Measuring intelligence.

The modern study of intelligence can be traced to Alfred Binet, whose research was conducted at the end of the 19th century and the beginning of the 20th century. This was the time that the study of psychology moved away from pre-scientific understandings to more empirical investigations (Corno et al., 2002).
Binet, collaborating with Theodore Simon, believed that intelligence was measurable. Binet (Binet & Simon, 1916) and Terman (1916) developed the first general purpose intelligence tests in their respective countries; Yerkes (Yerkes, Bridges, & Hardwick, 1915) and Wechsler (1939) created their own influential instruments. They proposed a series of questions that could be quickly administered and scored. The higher a person scored, it was assumed, the more intelligent the person.

Although psychometricians continued to perfect the instruments that purported to measure human intellect, some new tests were also introduced (Guilford, 1967). The divorce between mainstream research psychology and the ‘applied area’ of intelligence might have continued indefinitely, but, in fact, by the late 70s, there were signs of a reawakening of interest in theoretical and research aspects of intelligence. With his focus on the information-processing aspects of items in psychological tests, Sternberg (1977, 1982, 1985) was perhaps the most important catalyst for this shift, but researchers from a number of different areas of psychology have joined in this rediscovery of the centrality of intelligence (Baron, 1985; Brown & Campione, 1986; Dehn & Schank, 1982; Jensen, 1986; Laboratory of Comparative Human Cognition, 1982; Scarr & Carter-Salzman, 1982; Snow, 1982).

2.2 Theory of Multiple Intelligences

In 1983 Gardner added to the general upheaval in scientific thinking about human cognition by advancing his theory of multiple intelligences. Gardner (1983) was dissatisfied with the unitary concept of intelligence and the various attempts psychometricians made to measure it. Intelligence is more than a score on a typical
standardized paper-pencil test used to predict success in school. Such traditional intelligence tests do not measure the ability of a chess player, an athlete, or a master violinist. Gardner (1999) opines that these individuals, as well as many others, exhibit intelligences that are not measured by these tests. Gardner advocates a move away from evaluative tests and correlation of tests to look at more natural sources of information relating to how people develop skills that are important to their culture and way of life (Gardner, 1999).

Gardner defines intelligence as the “ability to solve problems or to create fashion products that are valued within one or more cultural settings” (Gardner, 1983, p.81). This definition challenged the traditional psychological view of intelligence as a single capacity that drives logical and mathematical thought. In the same direction, Gardner (1999) redefined intelligence as, “a biopsychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture” (Gardner, 1999, p.34).

Gardner (1999) emphasizes the impact which the cultural forces have on the human intellect. That is why some intelligences are developed in some person, while others are not developed in the same person. The environment, in which the individual lives, and the culture which he acquires, and the surrounding people, with whom he interacts, play a great role in shaping his intelligences: “Every society features the ideal human being. The ancient Greeks valued the person who displayed physical agility, rational judgement, and virtuous behaviour. The Romans highlighted manly courage” (Gardner, 1999, p.1).

Gardner’s work argues that general intelligence theory is based on many false assumptions, including the premise that intellectual ability does not change with age,
training, life experience, social and cultural background or context (Gardner, 1993). He proposes that the variant of intelligence relies on personal context, as well as biological and psychological potentials based on the interaction of individual genetics, life experience and cultural circumstances (Gardner, 2003). His assumption is that if information can be represented in ways that suit the specificity and diversity of intelligence, it is possible for individuals to express their intellectual strengths completely.

*Human cognitive competence is better described in terms of a set of abilities, talents or mental skills, which we 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 (Walters & Gardner, 1995).*

Gardner (1983) has also challenged the cognitive development work of Jean Piaget. Bringing forward evidence to show that at any one time a child may be at very different stages for example, in number development and spatial/visual maturation, Gardner has successfully undermined the idea that knowledge at any one particular developmental stage hangs together in a structured whole (Smith 2002, 2008). Further to this there is a general agreement that there are different levels of intelligence, and that different individuals have different capacities of intelligence. In other words individuals differ from one another in their ability to understand complex ideas, to adapt effectively to the environment, to learn from experience, to engage in various forms of reasoning, to overcome obstacles by taking thought.
According to Gardner (1999), all human beings possess all different intelligences in varying degrees and each individual manifests varying levels of these different intelligences and thus each person has a unique ‘cognitive profile’; that is, a) all human beings possess all different intelligences in varying amounts; b) each individual has a different composition; c) different intelligences are located in different areas of the brain and can either work independently or together; d) by applying MI we can improve education; and e) these intelligences may define human species. Gardner clearly states that,

*Just as we all look different and have different personalities and temperaments, we also exhibit different profiles of intelligences. No two individuals, not even identical twins or clones, have exactly the same amalgam of intelligences, foregrounding the same strengths and weaknesses. This is because, even in the case of identical genetic heritage, individuals undergo different experiences and also seek to distinguish their profiles from one another (1999, p.35).*

The comparison of the traditional views of intelligence and MI is shown in Table 2.1
### TABLE 2.1
Comparison of Traditional Views of Intelligence and MI

<table>
<thead>
<tr>
<th>Traditional View of Intelligence</th>
<th>Multiple Intelligences Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligence can be measured by short-answer tests, Stanford-Binet Intelligence Quotient, Wechsler Intelligence Scale for Children etc.</td>
<td>Assessment of an individual's MI can foster learning and problem-solving styles. Short answer tests are not used because they do not measure disciplinary mastery or deep understanding. They only measure rote memorization skills.</td>
</tr>
<tr>
<td>People are born with a fixed amount of intelligence.</td>
<td>Human beings have all of the intelligences, but each person has a unique combination, or profile.</td>
</tr>
<tr>
<td>Intelligence level does not change over a lifetime.</td>
<td>We can all improve each of the intelligences, though some people will improve more readily in one intelligence area than in others.</td>
</tr>
<tr>
<td>Intelligence consists of ability in logic and language.</td>
<td>There are many more types of intelligence which reflect different ways of interacting with the world.</td>
</tr>
<tr>
<td>Teachers teach the same material to everyone.</td>
<td>Teachers teach and assess differently based on individual intellectual strengths and weaknesses.</td>
</tr>
<tr>
<td>Teachers teach a topic or subject.</td>
<td>Teachers develop strategies that allow for students to demonstrate multiple ways of understanding and value their uniqueness.</td>
</tr>
</tbody>
</table>

Gardner (1999) carefully differentiates between intelligence and learning or working styles by describing a style as “a general approach that an individual can apply equally to an indefinite range of content” (pp.83-84). Gardner’s definition of learning or working styles is equivalent to the definition of an ‘Approach to
Learning’ as proposed by Bowles (2004). Approaches to Learning are the ways that people acquire and maintain their intelligence while talents are the ways in which intelligence is expressed (Bowles, 2004).

2.2.1 Pre-requisites of intelligence.

Because Gardner’s definition for intelligence includes both divergent and convergent thinking abilities that cannot be assessed by the standard paper and pencil tests, it is necessary to examine the adequacy of candidate intelligences by some means other than correlations among a standard battery of test scores as has traditionally been employed in IQ-related research. Gardner decided that intelligence was too broad of a concept to limit its definition to purely psychological evidence and research methods (Gardner, 1999).

To challenge the traditional concept of intelligence, Gardner looked for evidence of diverse cognitive abilities from evolutionary biology, anthropological studies, psychometrics, neuroscience, cognitive science, developmental, experimental and psychometric psychology and made use of cross-cultural comparisons. This included studies of prodigies, gifted individuals, brain-damaged patients, idiot savants, normal children and adults, experts in different lines of work, and individuals from diverse cultures (Gardner, 1983, 1993).

According to Gardner (1993),

*To proceed from an intuition to a definition to a set of human intelligences,*

*I developed a set of criteria. These criteria were drawn from several sources:*
**Psychology:** the existence of a distinct developmental history for a capacity; the existence of correlations (or lack of correlations) between certain capacities;

**Observations:** of unusual human beings: individuals who were prodigies, idiot savants, or who exhibited learning disabilities;

**Anthropology:** ethnographic records of how different abilities are developed, ignored, or prized in different cultures;

**Cultural studies:** the existence of symbol systems that encode certain kinds of meanings;

**The biological sciences:** evidence that a capacity is represented in particular neural structures; evidence of a distinct evolutionary history for a particular capacity (p.36).

MI theory originated from Gardner’s work with brain damaged patients at the Boston hospital, where he noted that injury to different parts of the brain resulted in different types of impairment. At the same time he was researching the cognitive development of gifted and non-gifted children at Project Zero, a Harvard University research programme. His work led him to question the limitations of the existing psychometric view of intelligence, which held that individuals had a genetically-based, single, fixed ‘general intelligence factor’ (g), which could be numerically measured and ranked by IQ test scores. Building on the earlier work of Thurstone, who first proposed a pluralist theory of intelligence in the 1930s, positing seven ‘vectors of the mind’, Gardner’s research led him to propose that the human brain is in fact a series of relatively independent faculties.
The daily opportunity to work with children and with brain-damaged adults impressed me with one brute fact of human nature: People have a wide range of capacities. A person's strength in one area of performance simply does not predict any comparable strength in other areas (Gardner, 1999, p.31).

Gardner's clinical work with brain-damaged patients led him to see that the different forms of human intelligence operated independently, suggesting the existence of multiple intelligences. For example, patients who had lost visual and spatial thinking could not recognize the faces of people but could still read and talk. They could name the parts of the face as eyes, nose and mouth but could not put the actual features of a human face together visually to recognize a friend or relation. Such individuals even used details of clothes or voice to know whether a person was a man or woman (Gardner, 1983, 1993).

For Gardner, the example of prodigies, and idiot-savants demonstrated that intelligence was not a single entity. Prodigies show extraordinary talent at a very early age in particular areas but are often quite average in other areas of intelligence. Idiot-savants show remarkable ability in areas such as drawing, music or memory but have only limited language or social skills (Gardner, 1983, 1993). Gardner argues that from an evolutionary perspective it makes more sense to see humans as having multiple, relatively autonomous mental faculties.

2.2.2 Criteria of intelligence.

Gardner decided upon eight criteria that would provide rigor as well as a breadth so that unqualified abilities would not be designated as an intelligence and
yet there was sufficient cultural range so that no important set of abilities would be overlooked.

The eight criteria that a candidate’s intelligence must largely meet in order to be included on the list of intelligences are as follows:

1. Potential isolation by brain damage,

2. The existence of idiots-savants, prodigies and other exceptional individuals,

3. An identifiable core operation or set of operations,

4. A distinctive developmental history along with a definable set of expert ‘end-state’ performances,

5. An evolutionary history and evolutionary plausibility,

6. Support from experimental psychological tasks,

7. Support from psychometric findings,

8. Susceptibility to encoding in a symbol system (Gardner, 1999).

1. Potential isolation by brain damage:

   There are specific neural structures that are closely linked to the core components of each intelligence, however, these are not necessarily contiguous cerebral structures linked to one intelligence only. It is better to think of the brain as having sets of ‘cerebral systems’ that are primarily responsible for processing the specific contents associated with each intelligence.

   Here is a brief list first cited by Gardner in 1983 that makes few of these links:

   **Kinaesthetic:** Cerebral motor strip, Thalamus, Basal ganglia and Cerebellum
Musical: Right anterior temporal, Frontal lobes

Spatial: Right hemisphere, Parietal, Posterior and Occipital lobe

Logical-mathematical: Left parietal lobes & adjacent temporal & occipital association areas, Left hemisphere for verbal naming, Right hemisphere for spatial organization, Frontal system for planning and goal-setting

Linguistic: Left hemisphere, temporal & frontal lobes

Intra and Interpersonal: Frontal lobes as integrating station between internal and external states

Naturalistic: Left parietal lobe (discriminating living from non-living things)

2. Existence of idiots-savants, prodigies and other exceptional individuals:

The human brain is capable of a wide range of abilities. Each person has his/her unique profile of abilities and some people have a greater range than others. Autistic individuals have severely limited communication skills, but might also display outstanding performance in areas such as drawing, calculations or memorization. In daily life we generally use the intelligences in combination to solve problems and complete tasks, but the extreme differences in individuals helps to clarify the operations of each intelligence and its relationship with other intelligences.

3. An identifiable core operation or set of operations:

Gardner describes each intelligence as a neural mechanism or computational system. Each intelligence possesses a specific set of basic information-processing operations or mechanisms that process specific kinds of information. To qualify as an intelligence the core cognitive components and their
neural substrates must be clearly described in order to establish that it is a coherent, unique and separate capacity.

4. **A distinctive developmental history along with a definable set of expert ‘end-state’ performances:**

Each of the intelligences has its own distinctive sequence of ability levels culminating in master level performance. Each intelligence also has a developmental path through which human beings pass across the lifespan. For example, Piaget mapped in detail how the logical-mathematical intelligence evolves through stages beginning with sensory-motor in infancy and culminates with the formal operations in late adolescence or adulthood (Piaget, 1970).

5. **Evolutionary history and evolutionary plausibility:**

Insights from evolutionary psychology provide understanding for the development of particular cognitive faculties and cerebral structures. This research examines both human and non-human development over time. For example, Gardner cites the development of musical abilities in birds and the spatial skills of early humans.

6. **Support from experimental psychological tasks**

Evidence from experimental studies of various cognitive functions provides insight for the relationship among specific sets of skills. For example, findings confirm there is a stronger relationship among specific linguistic skills than their relationship with visual abilities. These findings support the relative autonomy of each of the multiple intelligences.
7. Support from psychometric findings:

Educational psychologists have amassed a large body of data regarding academic skills over the past 100 years. These data provide a window into understanding some of the relationships among the skills required for success in school, but require careful interpretation for understanding underlying cognitive functions. MI theory includes general intelligence (g) which is correlated academic success and is comprised primarily of the convergent aspects of the linguistic and logical-mathematical intelligence.

8. Susceptibility to encoding in a symbol system:

The computational capacity of each intelligence gets expressed and shared in various cultures by way of a ‘symbol system’. These communication systems (such as words, images, musical notations, numerical systems) are culturally created in order to convey meaning and information among people.

It is also worth noting that the movement towards multiple intelligence is quite consistent with trends in related sciences. Neuroscience recognises the modular nature of the brain; evolutionary psychology is based on the notion that different capacities have evolved in specific environments for specific purposes; and artificial intelligence increasingly embraces expert systems rather than general problem-solving mechanisms.

2.2.3 Delimiting the concept of intelligence.

Armstrong (1999), in his book *Seven Kinds of Smart: Identifying and Developing Your Multiple Intelligences*, lends support to Gardner’s theory because the theory encompasses research from a wide range of fields, including
anthropology, cognitive psychology, developmental psychology, psychometrics, biographical studies, animal physiology and neuroanatomy.

From an understanding of intelligence as contextual and cultural, Gardner proposes that individuals perceive the world through at least eight different intelligences. His work demonstrates that each person possesses each of these intelligences but they differ in their degree, creating the variety of intelligence, which he describes as being as diverse in its composition as the human face.

Gardner (1983) initially proposed there were seven intelligences that in combinations enable people to understand and to perceive the world and to express themselves: Verbal/Linguistic, Logical/Mathematical, Visual/Spatial, Bodily/Kinesthetic, Musical/Rhythmical, Interpersonal and Intrapersonal. In 1997, Gardner added an eighth intelligence type to the list; that is, Naturalistic intelligence. Moreover, two years later a ninth type, namely existential intelligence or spiritual intelligence, was added to the list which refers to the human desire to understand and pursue the ultimate questions, meanings, and mysteries of life (Gardner, 1999). The ninth intelligence, the existential intelligence, even though meeting most of the criteria, has not yet been endorsed due to a lack of empirical psychological and neurological evidence (Gardner, 1999; Viens & Kallenbach, 2004). Gardner sees that the existential and the spiritual are similar, with existential being more narrowly defined and spiritual being more broadly defined. Because he has not yet affirmed that existential is a ninth intelligence, it is not considered as one on the intelligences in this study.
Intrapersonal
Having an understanding of yourself, of knowing who you are, what you

Interpersonal
The ability to understand other people.

Verbal/Linguistic
The capacity to use language to express what’s on your mind and to understand other people.

Visual/Spatial
The ability to present the spatial world internally in your mind

Bodily/Kinesthetic
The capacity to use your whole or parts of your body, to solve problems, make something, or put one production.

Logical/Mathematical
The ability to understand the underlying principles of some kind of causal system.

Naturalist
The ability to discriminate among living things as well as sensitivity to another feature of the natural world

Musical/Rhythmic
The capacity to think in music, to be able to hear patterns, recognize them, and perhaps manipulate them.

FIGURE 2.2 Gardner’s Categories of Intelligence
2. 2.4 Gardner’s Categories of Intelligence.

1) Verbal/Linguistic Intelligence

**Meaning:** “Verbal/linguistic intelligence involves sensitivity to spoken and written language, the ability to learn languages, and the capacity to use language to accomplish certain goals” (Gardner, 1999, p.37).

*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 humour. Some of this material survives and it displays the talent of the poet (Gardner, 1993, p.21).*

Research indicates that “verbal/linguistic intelligence starts developing while a foetus is still in the womb and that babies who have been read to, sung to, and talked to before birth have a head start in this area” (Campbell et al., 1996, p.2). This intelligence continues to develop in children as they listen to others and are included in discussion. Perhaps even more important to this development is their interaction with others as they formulate sentences to express their opinions and feelings and make choices and decisions. Thus developing verbal/linguistic intelligence is not a passive activity but demands involved active participation and curiosity about the world in which we live.

2. Logical/Mathematical intelligence

**Meaning:** “It entails the ability to reason either deductively or inductively, recognizes and manipulates abstract patterns and relationships” (White et al., 1995,
Barbara McClintock, who won a Nobel Prize in 1983 for her work in microbiology, studied pollen sterility in corn as a researcher at Cornell in the 1920s. Theory predicted 50 percent pollen sterility, but tests in the cornfield showed only 25 to 30 percent sterility. What was the difference? Sitting in her office thinking, she suddenly had the answer. She rushed back to the cornfield where her assistants were working and with a paper bag and pencil went through the detailed steps for them, coming to the same conclusion she had reached in her mind at the office (Gardner, 1993, pp.19-20).

3. Visual/Spatial intelligence

**Meaning:** “It is the ability to create visual/spatial representations of the world and transfer those representations either mentally, or concretely. It features the potential to recognize and manipulate the patterns of wide space as well as the patterns of more confined areas” (Gardner, 1999, p.43). The concrete example comes from Gardner in this sailing vignette:

The positions of the stars, as viewed from various islands, the weather patterns, and water colour are the only sign posts. 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 envision mentally a reference island as it passes under a particular star and from that 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 (1993, p.21)

4. Bodily/Kinaesthetic intelligence

Meaning: “It entails the potential of using one’s whole body or parts of the body (like the hand or the mouth) to solve problems or fashion products” (Gardner, 1999, p.42). In other words, “it involves using the body to solve problems, create products, and convey ideas or emotions” (White, et al., 1995, p.181). Gardner cites the story of ;

Babe Ruth, who at fifteen, never having pitched before, was called to the pitching mound by his coach because Ruth had been loudly criticizing the pitcher. Ruth later said that at the very moment he took the pitcher’s mound, he knew he was supposed to be a pitcher and that it was ‘natural’ for him to strike people out (Gardner, 1993, p.21).

5. Musical/Rhythmical intelligence

Meaning: “It entails skill in performance, composition, and appreciation of musical patterns” (Gardner, 1999, p.42). It includes sensitivity to pitch, timbre, and rhythm of sounds, as well as responsiveness to the emotional implications to these elements.

Gardner’s research provides empirical evidence that certain parts of the brain play an important role in musical ability, and it is legitimate to consider this ability as a specific form of intelligence. “Child prodigies and studies of autistic
children who cannot speak but who can play a musical instrument beautifully underscore the independence of musical intelligence” (Gardner, 1993, p.17).

6. Interpersonal intelligence

**Meaning:** “It denotes a person’s capacity to understand other people (i.e., their intentions, motivations, desires, hidden goals, etc.) and consequently to work effectively with others” (Gardner, 1999, p.43).

Of teacher Anne Sullivan’s relationship with student Helen Keller, Gardner says, "The key to the miracle of language was Anne Sullivan’s insight into the person of Helen Keller" (Gardner, 1993, p.23). This story indicates that interpersonal intelligence is not dependent upon language.

7. Intrapersonal Intelligence

**Meaning:** “It involves the capacity to understand oneself: (i.e., one’s own desires, fears, and capacities). It also involves using such information effectively in regulating one’s own life” (Gardner, 1999, p.43).

8. Naturalistic Intelligence

Gardner (1999) described a naturalist as one who is able to recognize and classify objects. According to Gardner, hunters, farmers, and gardeners would have high levels of naturalistic intelligence, as would artists, poets, and social scientists, who are also adept at pattern-recognition. He stated that a marketing professional who promotes the small differences between competing products is applying naturalistic intelligence, as is the individual who can recognize cars from the sounds of their engines.
As described above, a central element of Gardner's naturalistic intelligence is the capacity to categorize objects according to salient similarities and differences among them. This ability is critically involved in the generation of meaningful taxonomies of both living and non-living objects. Therefore, categorization tasks of this kind would appear to be ideal measures of the naturalistic domain. It is worth noting that these tasks also appear to demand a high level of logical reasoning, which suggests that cognitive demands for this domain might in fact be similar to those for Gardner's logical/mathematical intelligence, despite being applied to the realm of semantically meaningful stimuli rather than to the domain of symbolic, quantitative concepts.

**TABLE 2.2**

**Summary of MI and their Characteristics**

<table>
<thead>
<tr>
<th>Intelligence</th>
<th>Description</th>
<th>Core Operations</th>
<th>Expert end state</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal/ Linguistic</td>
<td>Sensitivity to the meaning and order of words</td>
<td>Syntax, phonology, semantics, pragmatics</td>
<td>Poet, writer, debater, public speaker, etc.</td>
</tr>
<tr>
<td>Logical/ Mathematical</td>
<td>Ability to handle chains of reasoning and to recognise patterns and order</td>
<td>Number, categorization, relations</td>
<td>Mathematician, scientist, philosopher, computer programmer, logician, etc.</td>
</tr>
<tr>
<td>Musical/ Rhythmical</td>
<td>Ability to create, communicate and understand meanings made out of sound</td>
<td>Pitch, rhythm, timbre</td>
<td>Composer, musician, conductor, choreographer, etc.</td>
</tr>
</tbody>
</table>
### Visual/ Spatial Ability
- Ability to perceive visual or spatial information, and to re-create or transform aspects of that information from memory
- Accurate mental visualization, mental transformation of images
- Artist, sculptor, photographer, architect, designer, inventor, etc.

### Bodily/ Kinaesthetic Ability
- Ability to use the body to communicate and solve problems, and to handle objects skilfully
- Control of one’s own body, control in handling objects
- Athlete, actor, dancer, surgeon, craftsperson, etc.

### Naturalistic Ability
- Ability to distinguish among, classify, and use features of the environment
- Recognition and classification of objects in the environment
- Farmer, geologist, gardener, botanist, zoologist, meteorologist, archaeologist, etc.

### Interpersonal Ability
- Ability to understand people and relationships
- Awareness of others’ feelings, emotions, goals, motivations
- Counsellor, teacher, salesperson, politician, etc.

### Intrapersonal Ability
- Self-understanding, and ability to draw on self-knowledge to make sound decisions
- Awareness of one’s own feelings, emotions, goals, motivations
- Therapist, entrepreneur, goal setter, reflective thinker, spiritual leader

(Adapted from Chalfen, 1997; Viens & Kallenbach, 2004)

## Conclusion

“I want my children to understand the world, but not just because the world is fascinating and the human mind is curious. I want them to understand it so that they will be positioned to make it a better place” (Gardner, 1999, p.180).

Traditionally education has focused and, indeed, values the first two intelligences: linguistic and logical/mathematical. Students who are talented or ‘intelligence’ in other areas may be recognised in school but not in teacher’s
assessment. Applying Gardner’s MI to learning activities allows students to learn through a variety of unique experiences enabling them to better understand themselves as lifelong learners.

As noted by Gardner (2003)

*Even though our efforts to understand intelligence have been advancing, we still know very little about how to nurture intelligence, be it conceptualized in unitary or pluralistic fashion, in individual-centred, contextualized, or distributed form. Yet surely our efforts to understand intelligence as scientists can best be crowned by a demonstration that intelligence can be nurtured in particular educational settings, using strategic pedagogical or facilitating techniques. Here lies one important challenge for the future (p.4).*