The Theory of Multiple Intelligences and Its Applications in Science Classroom

Ong Eng Tek
The Inspectorate of Schools,
Ministry of Education Malaysia, Putrajaya

Yeam Koon Peng
Maktab Perguruan Persekutuan, Pulau Pinang

Abstract:
This article aims to give an overview on the Theory of Multiple Intelligences – a theory that was propounded by Howard Gardner in his widely cited books, "Frames of Mind" (Gardner, 1983) and "Intelligence Reframed" (Gardner, 1999). A Multiple Intelligences Profile Assessment is provided to help teachers gauge "where their students are", thus providing them information on every student intelligence profile, which in turn, serves to inform them the best way forward to personalise and maximise learning. This article ends with some lesson ideas on teaching primary school students various parts of the body.

Introduction

It has been 20 years since the conceptualisation of multiple intelligences by Howard Gardner in 1983. This article aims to contrast Gardner's (1983, 1999) notion of multiple intelligences to that of traditionalists view on general intelligence. An overview of each of Gardner's multiple intelligences is provided. While acknowledging the availability of differing versions in evaluating the profile of intelligences, the version by Thomas Armstrong (1994) is presented with the hope that teachers could use it (or any other version) with their students and thereafter, as feedback that informs their lesson planning. The final section provides some lesson ideas, which could serve as springboard for teachers to mobilise the theory of multiple intelligences in generating better innovative teaching ideas within their respective areas of specialisation.

Singular Versus Pluralistic View of Intelligence

Intelligence is often associated with how well one scores on tests or what grades one obtains in school. Early in the 20th century, Spearman (1904), who developed the technique of factor analysis, produced extensive statistical evidence for the predominance of general ability or intelligence. At about the same time, Alfred Binet, a French psychologist, and his colleague, Théodore Simon, developed the first satisfactory scale for assessing differences in intelligence among children, purportedly to predict the success or failure of those children in the primary grades of schools (Binet & Simon, 1908). The result was the forerunner of the standard Intelligence Quotient (IQ) test we use today. Most mainstream psychologists who supported such measure of intelligence were formidable advocates of the existence of "g", or general intelligence – the basic ability that affects performance on all cognitively oriented tasks. They hold on to the belief that we do differ in intelligence and this difference can be scrupulously measured.

The traditionalists view intelligence as a uniform cognitive capacity people are born with and this capacity can be psychometrically evaluated using short-answer tests. In contrast to this view, Howard Gardner, a psychologist at Harvard Graduate School of Education, takes a pluralistic stance and argues that human beings are better described as having a set of relatively autonomous intelligences instead of a single or general intelligence. In his ground breaking book, *Frames of Mind* (1983), Gardner defines seven intelligences, namely (1) Linguistic Intelligence, (2) Logical-Mathematical Intelligence, (3) Spatial Intelligence, (4) Musical Intelligence, (5) Bodily-Kinaesthetic Intelligence, (6) Interpersonal Intelligence, and (7) Intrapersonal Intelligence with two more additional intelligences theorised in *Intelligence Reframed* (Gardner, 1999), namely (8) Naturalist Intelligence, and (9) Existential Intelligence. A review of each of the intelligences will be offered in subsequent section.

Most lay and scholarly writings about intelligence focus on a combination of linguistic and logical intelligences, which according to Gardner (2003), characterises "the intellectual strengths…of a law professor" (p.4). Gardner's (1983, 1999) notion of multiple intelligences, on the other hand, proposes a fuller appreciation of human beings, reflecting different ways of our interaction with the world. More importantly, this theory of multiple intelligences is defended by evidence from the study of neuropsychology for the existence of different mental faculties.

While traditionalists believe that people are born with a fixed amount of intelligence and that the intelligence level does not change significantly over a lifetime, Gardner (2003), by contrast, claims that we all possess these intelligences which could be nurtured and strengthened, or ignored and weakened, and that the profile (or unique combination) of intelligences is a dimension on which we differ by virtue of the fact that "no two people – not even identical twins – possess exactly the same profile of intelligences" (p.8).

Multiple Intelligences Defined

This section gives an adapted overview to Gardner's (1983, 1993, 1999) nine intelligences. The adaptation involves, among others, expansion of Gardner's concepts of spatial and musical intelligences to include visual and rhythmic respectively, in light of the works done by Lazear (1991, 1994) who, with other many other authors, have made valuable contributions to the field of multiple intelligences.

1. Verbal-Linguistic Intelligence

This is the capacity to use language (words), one's native language, and perhaps other languages, effectively, either orally or in writing, to express what is on one's mind and to understand people. A well-developed verbal-linguistic intelligence shows itself in attention to word, syntax and style. Though poets truly specialise in linguistic intelligence, any kind of writer, orator, speaker, lawyer, or a person for whom language is an important stock in trade highlights verbal-linguistic intelligence. Students with a high degree of verbal-linguistic intelligence think in words, learn by listening, reading and verbalising. They enjoy reading, writing, telling stories, poetry, books, records, tapes and the like. They learn best by saying, hearing and seeing words.

2. Logical-Mathematical Intelligence
This is the ability to mentally process and comprehend the underlying principles of some kind of a causal system, the way a scientist or a logician does; or the capacity to manipulate numbers, quantities, operations, and mathematical equations, the way a mathematician does. Logical-mathematical intelligence often does not require verbal articulation. However, mathematicians, for example, are able to not only reason precisely, but also write down their proofs, either inductively or deductively, with precision. Students gifted with this intelligence will enjoy intellectual puzzles and intellectual discovery.

3. Visual-Spatial Intelligence
This refers to the ability to represent the spatial world internally in one's mind – the way a sailor or an aeroplane pilot navigates the large spatial world, or the way a designer, sculptor, architect or engineer represents a more circumscribed spatial world. In essence, it is the capacity to comprehend three-dimensional shapes and images, and to recognise objects, faces and details. Visual-spatial intelligence can be used in the arts (i.e., painting, sculpture, or architecture) or in the sciences (i.e., anatomy or topology). A sharp distinction can be discerned between visual acuity and spatial ability. For instance, a blind person may feel and identify shapes with ease, but is unable to see them.

4. Musical-Rhythmic Intelligence
This is the capacity to think in music, hear the musical-rhythmic patterns, recognise them, remember them, and perhaps manipulate them. Equally, it is the capacity to compose, discern, transform and express musical forms such as rhythm, pitch, harmony or timbre. Musically intelligent children do not just remember music easily; in fact, the melody keeps ringing in their minds. They can also be excellent mimics and can easily discern differences in speech patterns or accent.

5. Bodily-Kinaesthetic Intelligence
This is the expertise in using one's whole body or parts of one's body (i.e., face, hands, fingers, and/or arms) to express ideas, feelings, solve a problem, make something, handle objects or even to put on some kind of a production. Bodily-kinaesthetic intelligence involves the control of movement to display fine motor skills, characterised by grace, balance and agility. This intelligence involves a natural sense of how one's body acts and reacts in a demanding physical situation, including a sense of timing and rhythm, a clear sense of goal, and the ability to train responses to the level of automation. The most evident examples are people in athletics and performing arts (i.e., actors and dancers).

6. Interpersonal Intelligence
This is the ability to understand and interact with other people, making sense of their moods, intentions, motivations, behaviours, and feelings. Equally, it is the ability to see things from other people's point of view to understand and, consequently, to respond to how they feel and think. This ability is at premium for teachers, clinicians, politicians, salespersons and anyone who deals with people.

7. Intrapersonal Intelligence
This refers to having an understanding of oneself, including one's own needs, desires, fears and capacities. Equally, it is the ability to self-reflect and to be aware of one's own inner state of being, one's relationships with others, and one's own strengths and weaknesses. Consequently, one is able to use such information effectively in regulating one's own life.

8. Naturalist Intelligence
This designates the human ability to recognise and categorise all variety of flora and fauna as well as other features of the natural world (i.e., clouds and rock configurations). Additionally, it includes the ability to recognise cultural artefacts like automobiles, sneakers and the like. As such, the naturalist intelligence in a child is exhibited in many ways, such as his/her fascination with, and predisposition to, explore the world of nature, and the propensity to identify, classify and interact with the flora and fauna given one's in-built pattern-recognising talents.

9. Existential Intelligence
This intelligence reflects the human proclivity for pondering big questions, like who are we, where do we come from, what's going to happen to us, why do we die? From childhood, humans ask these questions, and across cultures we create art, science, philosophy and religion to help us answer these questions. However, Gardner (2003) seems to be uncertain about this 9th intelligence when he maintains that he is sticking to his "8½ intelligences" (p.10) and foresees the list of his multiple intelligences to either grow or to be reconfigured. Furthermore, from his online chat about this intelligence, Gardner attributes this uncertainty to the absence, thus far, of evidence about brain regions dedicated to existential thinking.

Profile of Intelligences
Having conceptualised the theory of multiple intelligences, it is therefore natural to wonder how the intelligences of our students (or even ourselves) could be gauged with the view of knowing "where they are". Such information on individual student intelligence profile will serve to inform educators the best way forward to personalise and maximise learning.

There are a number of well-designed and psychometrically sound instruments to objectively measure the multiple intelligences by means of rating scale on the basis of one's (and/or significant other's) experiences and perceptions. For example, Multiple Intelligences Development Assessment Scales (MIDAS), designed in five different age-band versions by Dr. Charles Branton Shearer for the use of adults/college students, teens and kids, could give a reasonable estimate of one's intellectual disposition in each of the eight Gardner's (1983, 1999) intelligence constructs. Interested readers could contact Dr. Shearer directly at sbranton@kent.edu (URL: http://www.miresearch.org) for additional information pertaining to MIDAS.

While MIDAS is available commercially, the "Multiple Intelligences Profile Assessment" version by Armstrong (1994) is adapted and presented in Appendix so that readers get an idea as to how the profile of intelligences could be measured and assessed. It must be stressed that there are many ways to be intelligent within each category of intelligence constructs, and that the profile assessment by Armstrong

(1994) does not claim to present the standard set of attributes one must have in order to be considered intelligent in a specific area. A person may not be engaged in at least one sport or physical activity on a regular basis, yet possess superior bodily-kinaestatic intelligence when s/he weaves a carpet or carves a sculpture. In other words, the Multiple Intelligences theory underscores the rich diversity of ways in which students show their abilities within intelligences as well as between intelligences.

Science Lesson Ideas

Gardner (2003) reckons that "no direct educational implications follow from this psychological theory [of multiple intelligences]; but if individuals differ in their profiles, it makes sense to take this fact into account in devising an educational system" (p.5). On pedagogical note, Gardner (ibid) advocates deep probing in smaller number of topics to enhance understanding instead of the quest to cover much material that sets to doom achievement of understanding.

Once a teacher has decided to "uncover" rather than "cover", it is then possible to capitalise the notion of multiple intelligences by approaching topics in a number of ways, making use of analogies and comparisons drawn from a range of domains, and expressing the key concepts in a number of different symbolic forms. Therefore, this section delineates how the first learning objective in Year 1 Science can be possibly achieved by mobilising the theory of multiple intelligences. The action verbs in the activities are italicised to show their relations to the intelligences. It must be stressed that similar action verb in an activity could be used to match and/or stretch more than one of the intelligences by virtue of the premise that the intelligences, located in different areas of the brain, may operate either independently or together.

Learning Objective 1.1:
Pupils should learn names of different parts of the body.
(MoE, 2002, p.1).

(1) Verbal-Linguistic Intelligence

- Students *look* at the books about our bodies, which are available in the library.
- Students *discuss* with their friends about different body parts.
- Students *draw* the body and *label* the parts.
- Students *present* their labelling to the class.

(2) Logical-Mathematical Intelligence

- Students *count* and *write* the number of body parts on a picture of a body, which is either supplied by the teacher or drawn by the students.
- Students *invent* a new body part and *rationalise* its look and use.
- Students *arrange* the body parts according to their perceived importance, and *explain* their reasons for such arrangement.

(3) Visual-Spatial Intelligence

- Students *draw* the life-size body outline of another student who lie on a big white 'mahjong' paper.
- In small groups, students take turn to *label* the body parts.
- Students *make* body parts out of plasticene.

(4) Musical-Rhythmic Intelligence

- Students *sing* a song on body parts to a familiar tune.
  For example (Sing to the tune of 'London Bridge is Falling Down'):

  Head and body, arms and legs, arms and legs, arms and legs
  Head and body, arms and legs
  Eyes, ears, nose, mouth.

  Hair and neck and hands and feet, hands and feet, hands and feet
  Hair and neck and hands and feet
  Fingers and toes.

(5) Bodily-Kinaesthetic Intelligence

- While singing, students *point* or *touch* or *wave* the specific body part in tandem with the lyrics.
- Students *make* body parts out of plasticene.
- A student *points* to different body parts while others *name* them accordingly.
- Each group of students *simulate* the action of different body part.

(6) Interpersonal Intelligence

- In groups of 4, students *create* a class poster on a body and take turn to *name* and *label* each part.
- The suggested activities elsewhere such as those in Verbal-Linguistic and Logical-Mathematical could be applied here within a cooperative group setting.

(7) Intrapersonal Intelligence

- Students do individual project: *draw* body parts and *dictate* what they are.
- Individually, students complete the following sentence:
  "I want to be a/an _____ (select a favourite body part) because ___ (give simple reason for the choice)"
- Students *reflect* on their own, the various body parts that they have learnt in the lesson.

(8) Naturalist Intelligence.

- In groups or pairs, students *look* at various body parts and *suggest* the similarities and differences (i.e., length, size and shapes).
- Students *visit* a farm or *watch* a video that depicts other animals (i.e., cat, cow, monkey, butterflies, etc.) and i*dentify* the similarities and differences between human and those animals.

References

Armstrong, T. (1994). Multiple intelligences in the classroom. Alexandria, VA: ASCD.

Binet, A., & Simon, T. (1908). The development of intelligence in the child. Anneé Psychology, 14, 1-90.

Gardner, H. (1983). Frames of mind: the theory of multiple intelligences. New York: Basic Books.

Gardner, H. (1993). Frames of mind: the theory of multiple intelligences (2nd ed.). London: Fontana Press.

Gardner, H. (1999). Intelligence reframed: Multiple intelligences for the 21st century. New York: Basic Books.

Gardner, H. (2003). Multiple Intelligences after twenty years. Paper presented at the American Educational Research Association (AERA), Chicago, Illinois, April 21, 2003.

Lazear, D. (1991). Seven ways of teaching: the artistry of teaching with multiple intelligences. Palestine, IL: Skylight Publishing.

Lazear, D. (1994). Seven pathways of learning: teaching students and parents about multiple intelligences. Tucson, AZ: Zephyr Press.

Ministry of Education. (2002). Curriculum Specifications: Science Year 1. Kuala Lumpur: Pusat Perkembangan Kurikulum.

Spearman, C.E. (1904). "General intelligence" objectively determined and measured. American Journal of Psychology, 15, 72-101.

Appendix

Multiple Intelligences Profile Assessment
Adapted from Armstrong (1994)

Directions:
(1) Place a '2' in the box if the statement is a lot like you, '1' if it is somewhat like you, and '0' if it is not like you at all.
(2) Fill up the summary sheet for total of each section; and
(3) Draw a graph, chart, drawing, or whatever to represent your totals.

Verbal-Linguistic Intelligence	0, 1 or 2
I write well and enjoy putting thoughts on paper (or in the computer).	
I enjoy telling stories or jokes.	
I enjoy word games like Scrabble or Anagrams.	
I enjoy reading books and magazines.	
I have a good vocabulary.	
I enjoy communicating by talking or writing.	
Malay/English and histories were among my favourite subjects in school.	
When I walk down the pathway in town, I pay more attention to the words on billboards than to the people around.	
I enjoy entertaining others or myself with tongue twisters, nonsense rhymes, limericks, or puns.	
I get more out of listening to the radio or a spoken-word cassette than I do from television or films.	
Total	

Logical-Mathematical Intelligence	0, 1 or 2
I ask questions about how things work.	
I can easily compute numbers in my head	
Mathematics and science were among my favourite subjects in school.	
I am interested in new developments in science.	
I enjoy chess, checkers, or other strategy games.	
I enjoy solving brainteasers that require logical thinking.	
I am good at thinking on an abstract or conceptual level.	
I feel more comfortable when something has been measured, categorised, analysed, or quantified in some way.	
I believe almost everything has a logical explanation and like to analyse situations and try to figure them out.	
I like to set up little "what if" experiments (for example, "What if I double the water I give to my orchid plants?").	
Total	

Visual-Spatial Intelligence	0, 1 or 2
I like maps, charts and diagrams better than words.	
I often daydream and/or have vivid dreams at night.	
I am good at drawing things.	
I like movies, pictures and other visual presentations.	
I enjoy mazes, jigsaw puzzles, and Rubik's Cubes	
I can manipulate three-dimensional drawings in my head.	
I frequently doodle or sketch.	
I care about the décor (design, decorations, style) of rooms and buildings.	
I enjoy creating designs on paper or by computer.	
I can comfortably imagine how something might appear if it were looked down from directly above in a bird’s eye view.	
Total	

Bodily-Kinaestatic Intelligence	0, 1 or 2
I engage in at least one sport or physical activity on a regular basis.	
I find it difficult to sit still for long periods of time.	
I am good at mimicking others' gestures.	
I enjoy being on the go: running, jumping, or moving.	
I enjoy daredevil amusement rides or similar thrilling physical experiences.	
I enjoy expressing myself through movement such as in play or dance.	
I frequently use hand gestures or other forms of body language when expressing myself.	
My best ideas often come when I am out for long walk or jog, or when I engage in another kind of physical activity.	
I need to practice a new skill myself rather than reading about it or seeing someone else do it.	
I like working with my hands at concrete activities such as sewing, weaving, carving, carpentry, or model building.	
Total	

Musical-Rhythmic Intelligence	0, 1 or 2
I have a good singing voice.	
I can tell when a musical note is off-key.	
I know the tunes to many different songs or musical pieces.	
I can play a musical instrument.	
I often hum, tap, or sing little melodies to myself while working, or studying.	
My life would be poorer if there were no music in it.	
I frequently listen to music on radio, records, cassettes, or compact discs.	
I can easily keep time to a piece of music with a simple percussion instrument.	
I sometimes catch myself walking down the street with a television jingle or other tune running through my mind.	
If I hear a musical selection once or twice, I am usually able to sing it back fairly accurately.	
Total	

Interpersonal Intelligence	0, 1 or 2
I enjoy socializing.	
I have at least three very close friends and acquaintances.	
I enjoy clubs, committees, and organizations.	
I like teaching things to others.	
I consider myself a leader (or others have called me that).	
I am good at seeing another person's point of view.	
I enjoy doing things in groups.	
I enjoy exchanging ideas with others.	
I am the sort of person that people come to for advice and counsel at work or in my neighbourhood.	
When I have a problem, I am more likely to seek out another person for help than attempt to work it out on my own.	
Total	

Intrapersonal Intelligence	0, 1 or 2
I am comfortable with myself and enjoy my own company.	
I feel good about who I am and what I stand for.	
I stand up for my beliefs, regardless of what others say.	
I keep a personal diary or journal to record the events of my inner life.	
I am not much concerned about fads, fashion, or what the in-thing is.	
I am always honest and up front about how I am feeling.	
I almost never feel bored or "down".	
I know some important goals for my life that I think about on a regular basis.	
I have a realistic view of my strengths and weaknesses (borne out by feedback from other sources).	
I would prefer to spend time alone in a cabin in the woods rather than a fancy resort with many people around.	
Total	

Naturalist Intelligence	0, 1 or 2
I like to be outside and do activities like gardening and nature walks.	
I enjoy television shows, videos, or books about nature.	
I enjoy keeping scrapbooks and other collections of objects from nature.	
I like to record my observations, in writing or on video/camera.	
I recognize patterns, similarities, differences, or anomalies**.**	
I like to have pets.	
I have keen sensory skills - sight, sound, smell, taste, and touch - and notice things that others often miss.	
I protect the environment by recycling, reducing the amount I use, buying green products, and trying to influence others.	
I easily learn characteristics, names, categorizations, and data about objects or species.	
I enjoy learning about famous naturalists such Charles Darwin and E.O. Wilson.	
Total	

Summary Sheet	
Intelligences	**Total**
Verbal-Linguistic Intelligence	
Logical-Mathematical Intelligence	
Visual-Spatial Intelligence	
Bodily-Kinaestatic Intelligence	
Musical-Rhythmic Intelligence	
Interpersonal Intelligence	
Intrapersonal Intelligence	
Naturalist Intelligence	