CHAPTER II
THEORETICAL FRAMEWORK

This chapter is of the explanation of the theory I took in building the conception of MI (multiple intelligences) tendency. It involves the overview of intelligence definition; the explanation of MI theory including its concept, aspect, key point, and application; the construction of MI Inventory; gender differences; and review of related study. This chapter illuminates where the position of mine, as the researcher take place.

2.1 The Overview of Intelligence Definition

On Oxford Advanced Learner’s Dictionary (1995, p. 620) an “intelligence” entry means “the power of learning, understanding and reasoning; mental ability.” However, an exact definition of intelligence cannot only be taken by its lexical meaning. In psychology, there still much confusion or even debate of what intelligence is. Moldoveanu and Langer in Sternberg (2002, pp. 228-229) make a comparison between the word “intelligent” and “stupidity” which is put as the antonym. Being “intelligent” then is defined that someone is not stupid when facing or solving the problem. Meanwhile, Fleetham (2006, p. 19) summarizes definition of intelligence as ability or talent as the process of turning the thought into action. It reflects a manifestation of hidden brain process into real-life practice.

Psychologist or theorist could be having own definition about intelligence. The debate is more about the existence and cause of intelligence in brain. Because
intelligence is abstractly existing in human brain, and because brain works more mysterious than another organ in a human body, it is difficult to determine an exact definition of intelligence (Roach, January 7, 2011, p. 1)

It is difficult to define what exactly intelligence is. Intelligence can only be the ability of handling the complexity such as mathematical equation or solving a common problem in daily life such as refill printer ink (Yam, 1998; Gardner, 1993; & Wittig, 1984)

The other debates regarding intelligence definition is concerning whether it existed in brain as single capacity only or multiple capacities. If intelligence considered as single capacity, it could be generalized as single term affecting human way of thinking. Afterwards, if intelligence is considered as having many capacities, it indicates that it cannot be generalized as the one which represented by the single-term test score. Representation of intelligence by single test score such as IQ test, then, has been argued by some expert as the theory of intelligence developed. Gardner (as cited in Armstrong, 2003, p. 12) agrees that human brain works broader than what IQ test measures. It has many capacities because all people in the world have different proclivities, abilities, cultures, and behaviors. They cannot only be measured by a single-term intelligence test.

The word “smart or intelligent” gives multiple sensations when it stands on different situation/context. Gardner (2006, p. 48) gives an example of this case in his book *The Developmental and Education of Mind* as follows:

“Think, for example, of sailors in the South Seas, who find their way around hundreds, or even thousands, of islands by looking at the constellations of stars in the sky, feeling the way a boat passes over the water, and noticing a few scattered landmarks. A word
for intelligence in a society of these sailors would probably refer to that kind of navigational ability. Think of surgeons and engineers, hunters and fishermen, dancers and choreographers, athletes and athletic coaches, tribal chiefs and sorcerer. All of these different roles need to be taken into account if we accept the way I define intelligence – that is, as the ability to solve problems or to fashion products that are valued in one or more cultural settings”

Definitions of intelligence are also affected by general opinion that intelligence has more to do with heredity. Someone can be called as smart, average, or stupid by looking into his or her parents’ intelligence. It is contrasted to Lucas and Claxton (2010, pp. 35, 177-178) stating that there are genetic influences toward intelligence, but experiences take more part in developing intelligence. Then intelligence is not only considered as potential, which is inherited from parents, but also as the one we expand by the experiences we got over time.

Multiplicity in defining what intelligence is, motivated many psychologists to create the theory that could explore how intelligence existed and works in human brain. It began in 1904 when Sir Francis Galton and Theodore Simon create mental ability test by the control of Ministry of Public Instruction of France, to measure or predict people intelligence in Paris (Virgolim in Kerr, 2009, p. 474). Lately, the concept of mental ability test was widely develop which, then, is well known as Intellectual Quotient (Gottfredson, 1998; Virgolim in Kerr, 2009, p. 474; Sternberg, 1998; & Jensen, 2008) that IQ test is the most effective predictor known of school and job performance, and student selection at school. As the test being developed by Alfred Binet, which included test of vocabulary
mastering, comprehension, and verbal relation; it can predict many more aspects like person’s chances of divorcing, dropping out of high school, being unemployed or having illegitimate children.

As forerunner theorist, Sir Francis Galton, then, inspired Charles E. Spearman (1990’s) who conceptualized two-factors theory or *g and s factor theory*. The *g* is general ability of human, including how human thinks, focuses an attention, perceives, uses the language, and solves problems. It is more likely to be an overall component of human cognitive. Then the *s* is more likely to be the specific aspect of human ability related to performances (Makel & Plucker in Kerr, 2009, p. 481 and Jensen, 2008, p. 27)

Over time, the theory, then, developed by other theories to introduce a new way of conceptualizing intelligence. Many other theories which were formulated still regarding of the existence of intelligence, whether it is single or multiple capacity. *Thurstone’s Primary Mental Abilities, Fluid-Crystallized Ability Theory of* Raymond Cattell in 1971, Gardner’s *Multiple Intelligence Theory* in 1983, Robert Sternberg’s *Successful Intelligence* in 1980s, Perkins’ *True Intelligence*, and Goleman’s *Emotional and Social Intelligence* in 1995, were the proof of how intelligence was defined in different and even contrastive ways one another (Wittig & William, 1984; Gardner, 2006; Goleman, 1997; Webb in Kerr, 2009, p. 360; Sternberg in Sternberg, 2004, pp. 418-434; Virgolim in Kerr, 2009, p.476; Moseley et al. 2005; Sternberg & Grigorenko, 2010); Sternberg et al., 2011; Deutschendorf, 2009; Bowdon, 2007; Makel & Plucker in Kerr, 2009, p. 483; and Jensen, 2008).
Henceforth, to unite the conception of intelligence in this study, I use definition stated by Gardner (as cited in Gardner, 1993, pp. 60-61) Armstrong (2009, p. 6), Campbell & Campbell (1999, p. 4), McKenzie (2005, p. 5) Burnett (2002, p.103) and Fleetham (2006, p.19) that intelligence deal with the ability to (1) solve a problem; and (2) fashion a product which are valued at one or more cultural and environmental setting. Everyone can be intelligent and have more than one aspect of intelligence.

2.2 Multiple Intelligence (MI) Theory

2.2.1 Concept of MI Theory

“As we all look different and have unique personalities and temperaments, we also have different profiles of intelligences” was what Gardner claimed about the multiplicity of human intelligences as he proposed his MI Theory in Frames of Mind (1983). Gardner continues that human at least has eight kinds of intelligence which Armstrong (2005, pp.19-23) simplifies as Word Smart (Verbal Linguistic Intelligence), Number Smart (Logical Mathematical Intelligence), Picture Smart (Visual Spatial Intelligence), Body Smart (Bodily Kinesthetic Intelligence), Music Smart (Musical Rhythmic Intelligence), Self Smart (Intrapersonal Intelligence), People Smart (Interpersonal Intelligence), and Nature Smart (Natural Intelligence) that will be discussed in the next part.

Gardner (1993, pp.60-61) puts two prerequisites of an intelligence, namely (1) Problem solving; and (2) Product fashioning. As in Sternberg’s Successful Intelligence, Human Intelligence in Gardner’s MI theory is concerning more in
terms of the skill in identifying, analyzing, processing, solving or even creating problems.

2.2.2 **The Key Points of MI Tendency**

In order to prevent misconception of tendency in MI Theory, here are the key points that is stated by Armstrong (2000, pp.8-9): (1) each person possesses all eight intelligences; (2) most people can develop each intelligences through encouragement, enrichment, and instruction; (3) even though some of the eight intelligences could work dominantly than the others, it is impossible to label someone as, for instance, *word smart* or *body smart* only, because intelligences usually work together in complex ways; and (4) there are many ways to be intelligent within each category.

2.2.3 **MI Theory in Practice**

MI Theory has been used by several schools in USA as a learning strategy. They are: (1) New City School; (2) Russell Elementary School in Lexington, Kentucky; (3) EXPO for Excellence Elementary Magnet School in St. Paul, Minnesota; (4) Skyview Junior High School in Bothell, Washington; (5) Key Learning Community in Indianapolis, Indiana; (6) Mountlake Terrace High School in Mountlake Terrace, Washington; and (7) Lincoln High School in Stockton, California.

As Reardon in Hoerr et al. (2010, p. 260) stated, “*Using MI is natural for us at New City School in many ways, because it validates that we are all different, and that these differences are more than acceptable—they’re wonderful. Multiple Intelligence helps us tap into a range of student potentials and diversities*”
2.2.4  The Eight Intelligences

2.2.4.1 Verbal Linguistic Intelligence (Word Smart)

The one who has verbal linguistic intelligence can be good in using language as a tool of communicating with others, expressing the idea and understanding others (Baum et al. 2005, p.14). Armstrong (2009, p. 6) states that “This intelligence includes the ability to manipulate the syntax or structure of language, the phonology or sounds of language, the semantics or meanings of language, and the pragmatic dimensions or practical uses of language.”

The end-states of verbal linguistic (word smart) can be a debater, negotiator, interpreter, TV or Radio Presenter, or even a poet. Armstrong (2009 & 2005) and Prasetyo (2009, pp. 44 & 47) suggested the checklist for the characteristic of the Word Smart learner as follows:

- Writes better than average for age.
- Spins tall tales or tells jokes and stories.
- Has a good memory for names, places, or trivia
- Enjoys listening to the spoken word (stories, commentary on radio)
- Is good in discussion, speech, or debate.
- Finds it easy to learn language or social subject than science subject
- Enjoys word games
- Enjoys reading books.
- Communicates to others in a highly verbal way.
- Makes note when reading
2.2.4.2 Logical Mathematical Intelligence (Number Smart)

Logical-Mathematical Intelligence relates to the use of logical thinking, whether in simple or even in a complex way, including reasoning and understanding the cause and effect of events (Hoerr, 2000, p. 4).

The ability of using number, reasoning, putting things in order and applying logical thinking are always required at school practice. This is the intelligence which is possessed by mathematician, scientist, computer programmer, tax accountant, or statistician (Armstrong, 2009, p. 6). The characteristic of the one who have this intelligence can be observed as on the following checklist which is suggested by Armstrong (2005, pp. 26-27); Armstrong (2009, p.35); Kirby & McDonald (2009, p. 42) and Prasetyo (2009, p. 51):

- Enjoys strategy games
- Shows interest in science-related subjects
- Enjoys putting things in categories, hierarchies, or other logical patterns
- Asks a lot of questions about how things work
- Enjoys working on logic puzzles
- Is neat and orderly
- May be frustrated by disorganized people and place
- Has a good understanding of relationship of cause and effect
- Is good in mental arithmetic (calculate number in head)
- Asks a lot about logical matter such as “why the sky is blue?” etc.
2.2.4.3 Visual Spatial Intelligence (Picture Smart)

In the study by Gardner (1993, p. 173) Visual-Spatial Intelligences has more to do with “The capacities to perceive the visual world accurately, to perform transformations and modifications upon one's initial perceptions, and to be able to re-create aspects of one's visual experience, even in the absence of relevant physical stimuli.” Meanwhile, Armstrong (2009, p. 7) agrees that this intelligence involved sensitivity to color, line, shape, form, space, and the relationships that exist between these elements.

In this term, the intelligence is connected to sense of picturing in mind, which is possibly possessed by all humans even the unsighted one. The unseeing man can understand and manipulate the visual-spatial form by using tactual sensation such as recognizing and understanding tactual alphabet in reading activity.

Here is a checklist of the picture-smart learner which is suggested by Armstrong (2009, pp. 36 & 162); Armstrong (2005, p. 28); Prasetyo (2009, p.58) Kirby and McDonald (2009, p. 43) and Smith in Hoerr et al. (2010, p.200):

- Has good memory for faces
- Daydreams a lot
- Prefers learning through picture to word
- Is able to make picture, sketch, or painting
- Navigates well
- Likes watching TV, slideshow, photo etc.
- Makes graph or mind mapping to help learning process
- Always doodles
- Sees picture in head
- Understands graph, table or map easily.

2.2.4.4  Bodily Kinesthetic Intelligence (Body Smart)

Bodily kinesthetic intelligence (body smart) is the capacity of using body to think. Gardner (1993, p. 205) puts two capacities he is concerning in bodily kinesthetic intelligence namely, controlling bodily motion and handling object skillfully. The one who has this kind of intelligence can easily use body to express the idea such as dancer, athlete, or actor. Besides, they can also maximize the ability of handling object to be a capacity of creating or transforming things to be a product such as sculptor, mechanic or carpenter (Armstrong, 2009, p. 7). Meanwhile, Nuernberger et al. (in Hoerr et al. 2010, p. 77) stated, “B-K students tend to have a keen sense of body awareness; they like physical movement, dancing, making and inventing things with their hands, and expressive role-playing. Some students exhibit their B-K Intelligence by communicating well through body language and other physical gestures”

The characteristic of body-smart learner can be observed on this checklist suggested by Armstrong (2009, pp. 36 &162); Prasetyo (2009, p. 64); Armstrong (2005, p. 30); Kirby and McDonald (2009, p. 43) as follows:
- Finds it easy to remember dance step
- Excels in one or more sports
- Finds it easy to adjust moves with rhythm
- Moves, twitches, taps, fidgets while seated for a long time in one spot
- Cleverly mimics other people’s gestures and mannerisms
- Often uses hand to illustrate points
- Shows skill in a craft
- Loves to take things apart and put them back together again
- Prefers paying attention toward the acting of actors when watching movie
- Uses finger to point out words, sentences, or lines when reading or writing.

2.2.4.5 Musical Rhythmic Intelligence (Music Smart)

Music Smart is the capacity of perceiving musical and rhythmical pattern in mind. In some person like the music critics, it can be a capacity of discriminating, meanwhile composer or singer/music performer it can be the capacity of transforming and expressing the musical and rhythmic patterns (Armstrong, 2009, p. 7)

There are ways a person might exhibit Musical Intelligence beyond performing, including composing music for others to play, identifying patterns in sounds, recognizing subtle inflection in language, reviewing music others have produced, or simply selecting music for enjoyment. (Griffiths in Hoerr et al. 2010, p. 173).

In classroom, music can be helpful for teaching-learning process either for those who tend to be music smart or the others. The music-smart students can be observed based on how they behave or misbehave in the classroom such as
suggested by Armstrong (2009, p. 37); Armstrong (2005, p. 31); Prasetyo (2009, pp. 68-69) and Kirby and McDonald (2009, p. 42) as follows:

- Can play musical instrument.
- Has a good singing voice and melodies memory
- Taps rhythmically on the table or desk as he/she works
- Learns best with music background
- Gives reaction toward some kind of music
- Is sensitive to environmental noises
- Enjoys listening to and identifying rhyming pattern in poetry
- Has a hard time concentrating if there is background noise
- Is able to memorize song lyrics
- Uses song or music to remember information

2.2.4.6 Intrapersonal Intelligence (Self Smart)

Intrapersonal intelligence is the capacity of knowing one’s feeling, emotion, and recognizing the strengths and weaknesses. The one who has this intelligence has pleasurable self-regulation, confidence and good decision in real-life practice. (Gardner, 2006, p. 48) and (Armstrong, 2005, p. 22)

In classroom, self-smart students tend to do the task alone. They prefer being independent of involving in a group of people, whether in happiness or even sadness. The high ability of self-regulation made these students tend to have a good self-confidence in solving their own problem.

Having Intrapersonal intelligence—knowledge of one’s own strengths and weaknesses—is the key, the starting point, the most important intelligence.
Possessing a strong *Intrapersonal Intelligence* means that we know our strengths and weaknesses and how we are perceived by others. (Hoerr in Hoerr et al. 2010, p. 44)

The self-smart student can be observed based on following checklist as suggested by Armstrong (2009, p. 38); Armstrong (2005, p. 35); and Prasetyo (2009, p. 80):

- Keeps a personal diary
- Prefers working alone to working with others
- Accurately expresses how he/she is feeling
- Is able to learn from his/her failures and successes in life
- Displays a sense of independence or a strong will
- Prefers playing game alone.
- Makes regular activity schedule
- Thinks and solves her/his own problem before asks to others
- Has a realistic sense of his/her abilities and weaknesses
- Gives strong reaction towards sensitive topic

### 2.2.4.7 Interpersonal Intelligence (People Smart)

In MI theory, the ability to perceive and understand other's emotion and feeling (including facial expression, voice and gestures) in context of social relationship is called as Interpersonal Intelligence (Armstrong, 2009, p. 7; & Falk in Hoerr et al., 2010, p. 9)
Here is a checklist for the characteristic of *people-smart* learner as suggested by Armstrong (2009, p. 37); Prasetyo (2009, pp. 29-31); Armstrong (2005, p. 33) and Kirby and McDonald (2009, p. 42):

- Gives advice to friends who have problems
- Enjoys socializing with peers
- Likes being involved in community
- Finds it easy to socialize with new friend
- Becomes a good listener. Does not want to interrupt conversation
- Finds it easy to learn in group
- Can tell how someone feels just by looking at them
- Seems to be a natural leader
- Enjoys team games
- Seems to know her/his environment well

2.2.4.8 *Naturalist Intelligence (Nature Smart)*

Naturalist Intelligence is the capacity of recognizing natural environment involving animals, plants or other environmental conditions (Armstrong, 2009, p.7). This is the intelligence that is possessed by human in earlier age to determine what food to eat or how to use natural cures. It is the ability for observing climate and weather changes that farmer use to decide the right time for planting; or the sailors use for observing star constellation for their navigation. The intelligence relates to the ability of observing, investigating, and experimenting. (Eskelsen, 2010, p. 227).
The following checklist which is suggested by Armstrong (2009, p. 38); Armstrong (2005, p. 36) and Kirby and McDonald (2009, p. 42) will help teachers for observing *Nature Smart* student:

- Talks a lot about favorite pets, or preferred spots in nature, during class sharing.
- Likes field trips in nature
- Gets excited when studying about ecology, nature, plants or animal
- Has sensitivity towards animals and plants preservation
- Speaks out in class for the right of animals
- Enjoys caring for and interacting with pets and animals
- Has ecological awareness (i.e: recycling trash)
- Enjoys working outdoors
- Has sensitivity towards climate or natural changes.
- Likes watching plant and animal TV program.

### 2.2.5 MI Domains

The eight intelligences can be classified into broader category/domain based on its identical characterization as suggested by McKenzie (2005, p. 25) below:

a. **Analytic.** Consist of *Logical mathematical, musical, and naturalist intelligence*. It involves the capacity of analyzing the data and knowledge. Number smart analyzes the number, sequence or cause-and-effect well. Music smart analyzes the pattern of musical sequence and harmony. Nature smart tends to be good in analyzing, observing, investigating and experimenting in nature.
b. **Interactive.** It relates to the skill of expressing feeling, exploring environment, and making contact or interacting with others. It consists of *interpersonal*, *bodily kinesthetic* and *verbal linguistic intelligence*.

c. **Introspective.** The skill of looking inward of personal experiences, knowing or controlling one’s emotion and the like which is related to affective process, are categorized to Introspective domain. It consists of *intrapersonal* and *visual intelligence*.

In this study, the domains are used in order to know the collaborative way of students’ MI. After inventing their strength in the eight intelligences, students’ brain performance can be determined; whether they think analytically, interactively, or introspectively.

### 2.3 MI Inventory

MI Inventory is a survey which is conducted to invent students’ Multiple Intelligence. It provides a questionnaire stimulating its respondents to give a response toward the most appropriate statement that describes them. The items in the questionnaire contain statements about activity, opinion, habit, and experience based on the checklist that was elaborated previously.

MI Inventory describes, not measures. Hence, it does not label or rank students from the smartest, average to disable. It is the instrument which helps teachers to know what their students’ strength that is brought to their learning table. Based on the key points in previous part of this writing, MI Theory believes that intelligence develop and change over time, the single and best way to know it is by observing the development of performances through tasks, activities and
experiences associated with the eight intelligences. MI Inventory is not a test. *Its purpose is to begin to connect students to their own life experiences with the eight intelligences* (Armstrong, 2009, p. 21).

In this study, it is important to inform teachers not to consider MI Inventory as the instrument that gives a precise score to categorize students. As McKenzie (2005, p. 16) stated that it helps teachers to appreciate how intelligences work uniquely in every student. When teachers understand how their students use their brain to learn, it means that they can be easily engaging students in classroom activities.

In this survey research, I decide to build a self-developed MI Inventory by considering the characteristics involved at the eight intelligences described previously. By having this in mind, the construction of my MI Inventory should be fulfilling the prerequisites of validity and reliability terms. The validity values are following Pearson’s Product moment values by observing *r table*, to ensure whether or not my MI Inventory measures what it should do. Meanwhile, the reliability values are following the Cronbach’s alpha values of Internal Consistency to check whether or not MI Inventory produces the similar responses at subsequent administration (Morissan et al., 2012, pp. 99-108).

2.4 Gender Differences on the Intelligences

Gender differences are common issue of perceiving the capacity of male and female. It is still, as usual, comparing the the position of male and female in various aspects of life. Indeed, it is difficult to determine one whose capacity take more place in those aspects. It is important in this writing to state this issue in
relation to the research question formulated previously, that my MI Inventory is developed and addressed to determine not only the MI tendency of every single student of the first grader of SMA N 1 Paguyaman, but also determine and describe how male and female are different.

In the study by Rhoads (2004) the so-called gender differences are “socially constructed”, where Rhoads believe that social backgrounds of us shape the perception of how male and female should behave in their life. He gives the instance of toy choice coming from our social, or might be cultural, expectation that male should dominantly choose the “ball” and female should choose “doll” as the representation of being masculine and feminine.

Other studies (Dixon & Kurpius, 2009; Neihart & Huan, 2009; and Reis & Renzulli, 2009) conclude that females are better than male on the aspect of verbal ability, honesty, peer relation, reading test and creative productivity. Meanwhile males are better on math, physical performance, science related subject, athletic and skill expectation.

Those information are helpful in determining the characteristic differences between male and female. However, intelligence as Gardner said, is beyond it where ‘no two people, even identical twins have same characteristic’. Therefore, the intention of mine of putting the gender differences as one of research objective, is only to describe, if any, the difference of learning characteristic of male and female students. By having such kind of informations, which are engaged to the MI tendency, the teachers will get the in-depth information about their students’ learning characteristics.
2.5 Review of Related Study

The related studies regarding MI Inventory have ever been conducted by students of Malang State University namely Afifah (2009) “Pengembangan Inventori Persepsi Multiple Intelligence Untuk Siswa SMA” and Elfira (2009) "Pengembangan Inventori Multiple Intelligence Berbasis Komputer dengan Menggunakan Software bagi Siswa SMA."

Afifah (2009) created self-developed instrument of MI Inventory, which is qualified in terms of validity and reliability value. The result showed a high value of the correlation coefficients $R_{xy} = 0.309-0.638$ and $\alpha = 0.958$ with 95% of significance degree, which means that the instrument is qualified to be used to invent students’ MI strength. Elfira (2009) did such study by developing the computer-based instrument at SMA N 2 Lamongan, which showed reliability value per intelligence aspects in range of 0.421 to 0.737.

Both study is focused on the validity and reliability value in pilot-test. Meanwhile, in this study MI Inventory which has been pilot-tested will be used to collect the data of students’ MI tendency/strength.

What can be concluded from theoretical framework above is that, the intelligence stated by Gardner emphasized the problem solving and product fashioning. It indicates that every single student in this study is considered different in terms of learning characteristic. Meanwhile, the information gained from the review of related study helps me in identifying the unexplored terms of MI Inventory development and also deciding the methodology chosen in my own study.