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The Relationship between Multiple Intelligences and L_2 Reading Skill among Iranian EFL University Students

Saber Khooei Oskooei (Corresponding author)
Department of Foreign Languages and Literature, Islamic Azad University – Tabriz Branch, Tabriz, Iran
E-mail: saberkh1983@gmail.com

Farzad Salahshoor
Azarbaijan Shahid Madani University, Tabriz, Iran
E-mail: farzad.salahshoor@gmail.com

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Abstract

The purpose of the present study was to investigate the relationship between multiple intelligences (MI) and foreign language (L2) reading skill among Iranian EFL sophomores. Multiple intelligences and L2 reading measurements of participants – 29 males and 69 females who were selected from four intact classes – were obtained through McKenzie's (1999) Multiple Intelligences Inventory and reading part of a Preliminary English Test PET, respectively, and then Pearson's correlation analysis was run to determine the degree of the relationship between each component of multiple intelligences and L2 reading skill. Afterwards, through a multiple regression analysis those components of multiple intelligences which acted as the predictors of L2 reading skill were identified and the power of each predictor was calculated. The results of the correlation analyses revealed that linguistic-verbal, logical-mathematical, spatial, and interpersonal intelligences were significantly correlated with reading skill. In addition, the results showed that linguistic-verbal, interpersonal, and logical-mathematical intelligences were the best predictors of L2 reading skill scores of the participants. The results of the study can help coursebook designers, educational planners, foreign language institutes, teachers, learners and their parents to provide and use different methods of teaching and learning.

Keywords: multiple intelligences, general intelligence, reading comprehension, university students, EFL

1. Introduction

The notion of individual differences is what most English as a Foreign Language (EFL) teachers are familiar with. Learners bring many individual characteristics to the learning process. One such characteristic is "intelligence". Kornhaber and Gardner (1993) define intelligence as a biological potential to process information in certain ways, in order to solve problems or fashion products that are valued in a culture or community. Intelligence, on the other hand, is not a singular phenomenon as it was supposed before the emergence of the Multiple Intelligences Theory (MIT), but rather a plurality of capacities. And it was based on this assumption and a critique of standard view of intelligence that Gardner (1983) advanced the idea of Multiple Intelligences, claiming that everyone has at least seven intelligences that are independent of one another, and that they can be combined in a multiplicity of adaptive ways by individuals. Paying attention to students' individual differences in the classroom may thus make the difficult task of teaching a foreign language easier in a non-native context.

In most foreign language classes, textbooks play an important role in educational programs, but unfortunately, most teachers use a similar method for teaching these materials to all of the students regardless of their differences. Learners are different and learn differently. Therefore, it seems necessary to take into account individual differences in lesson plans, curriculums and teaching methods.

Some efforts have been made to integrate the promotion of thinking skills and intelligence into language curricula. The studies conducted by Shearer (2006), Hashemi (2007), and Saricaoglu and Arikan (2009) are some instances of such works. Various English language teaching programs have been implemented to facilitate language learning and cognitive development in a complementary manner and research findings have shown that many aspects of reading are pertinent to important thinking skills.

2. Review of Literature

Iranian mystic poet, Molavi, in his famous book Masnavi e Ma'navi stated that three blind men, who have never seen an elephant, have touched different parts of it and have tried to guess what it is. The first one has touched its thick leg and called it tree. The second blind man has touched its trunk and called it snake. The elephant was like a wall for the third one who was touching its hard side.

Like Molavi's anecdote, those who study about the nature of intelligence are unable to see the object of their study and for this reason everyone explains it according to his understanding. Up to now, much is known about human intelligence and much more is being discovered every day.

Human intelligence has inspired much public debate in psychology. It has always been a matter of controversy whether intelligence testing is useful to assess people on the basis of their cognitive competence. Neisser et al. (1996) believe that because there are many ways to be intelligent, there are also many conceptualizations of intelligence. Every theorist, who is asked to define the concept of intelligence, has provided a diverse definition of this entity.

Cianciolo and Sternberg (2004) declare that philosophers, rather than psychologists or educators, were the first people who explored into the nature of intelligence. They refer to Plato who drew an analogy between people's intelligence and blocks of wax which were different in size, hardness, moistness, and purity. They have predicted intellectual deficits for a person whose block of wax was so much hard or soft and muddy or impure. Since then, some other philosophical explorations of intelligence have been done, which there is no need to be mentioned here. From the middle of eighteenth century new ideas established and many psychologists tried to understand and define intelligence and classify its different types.

In the latter part of the eighteenth century Gall (as cited in Gardner, 1983) invented the science of 'phrenology'. The central idea of phrenology was determining the strengths, the weaknesses, and the idiosyncracies of human mental profile from the size and the shape of his or her skull. He also proposed the existence of different forms of perception, memory, and attention for each of intellectual faculties rather than a general mental power. Gall was one of the first scientists to propose that each part of the brain is responsible for specific functions.

As individuals differ from one another in their abilities, at the beginning of the nineteenth century, Alfred Binet in 1904 was authorized by the French government to find an appropriate way for distinguishing between uneducable or mentally disordered students and others. To do so, he devised the intelligence test and through its results he differentiated the two groups. He, collaborating with Simon invented and administered a series of questions. The higher a person's score was he was assumed more intelligent (Becker, 2003; Gardner, 1983).

2.1 The Origin and Development of Intelligence

The differences between individuals in their abilities force us to think about the origin of these differences. There are various views about the origin of intelligence and manner of intellectual development. The followings are the views of some well-known theorists:

Gottfredson (1998) distinguishes between a deeply felt ideal and a stubborn reality. The ideal is that all people are born equally able and that social inequality results only from the exercise of unjust privilege. On the other hand, the reality is that people are unequal in intellectual potential as they are unequal in height, physical attractiveness, artistic flair, athletic prowess and other traits.

Neisser et al. (1996) believe that variations in humans' abilities may be rooted in genetics or environmental conditions such as social variables, occupation, schooling, and family.

Vygotsky (as cited in Neisser et al., 1996) argued that all intellectual abilities are social in origin. Language and thought first appear in early interactions with parents, and continue to develop through contact with teachers and others.

Piaget (1947/1950) was not so much interested in individual differences. He stated that development of intelligence in all children was through progressive shift between assimilation and accommodation. Through assimilation children take in new information and match it to their previous knowledge. During accommodation they form new blocks of knowledge to absorb newly learned materials. He also believes that human's intellectual development completes by the age of 16 through four stages. He classifies these stages to sensorimotor, preoperational, concrete operations, and formal operations stages.

Gardner (1983) asserts that heritability of intelligence is a matter of controversy. Galton (1865) in his papers about the hereditary transmission of intelligence, talent, and character, concluded that the origin of high abilities including intelligence was natural and they could be transmitted from one generation to another. Galton developed some statistical methods to rank human beings regarding their physical and intellectual powers. By means of these methods he verified a link between 'genealogical lineage' and 'professional accomplishment' (Gardner, 1983). In other words, he found that one's success in professional activities, to a large extent, is genetic and heritable.

Armstrong (2009) claims that three main factors affect the development of intelligence:

1. *Biological endowment* – including hereditary or genetic factors and insults or injuries to the brain before, during, and after birth;
2. *Personal life history* – including experiences with parents, teachers, peers, friends, and others who awaken intelligences, keep them from developing, or actively repress them.
3. *Cultural and historical background* – including the time and place in which people have born and rose and the nature and state of cultural or historical developments in different domains.

2.2. Theories of Intelligence

There are two opposite schools of thought on the nature of intelligence, one of which is 'general intelligence' theory and the other is 'multiple intelligences' theory. According to proponents of the former, the origin of all intelligence is a common factor, but supporters of the latter believe that each person possesses different types of intelligences.

2.2.1. General Intelligence

According to Hewstone, Fincham, and Foster (2005) Spearman in 1904 administered various types of intelligence tests, which included different cognitive abilities. After analyzing the results of the tests, he found a positive correlation between these various tests. The positive correlation between ability tests was called *positive manifold*. By positive manifold he meant that when a certain person had a good performance in one of the tests, his scores on the other tests were also high. This positive correlation which was indicator of a general function or 'pool' of mental energy was called 'general intelligence' or '*g* factor'. He considered general intelligence as a "unitary, biological and inherited determinant of measurable intellectual differences" (p. 271). Each person's intellectual ability could be demonstrated in most areas, but variation of conditions will influence the form of its expression.

Binet (as cited in Hewstone et al., 2005) concentrated on the universalities of human intellect and developed tests for identifying children who needed special education. These tests were invented to differentiate children by ignoring subjective ideas of their parents and teachers.

Jensen (1997) states "the positive correlation between all cognitive test items is a given, an inexorable fact of nature. The all-positive inter-item correlation matrix is not an artifact of test construction or item selection, as some test critics mistakenly believe" (p. 223) and through this statement, he accepted the concept of general intelligence.

According to Gottfredson (2004), intelligence testing is based on the idea of all-embracing single intelligence, referred to as '*g* factor'. He claims that:

> The *g* factor was discovered by the first mental testers, who found that people with high scores on one type of mental test tended to score well on all of them. Regardless of their contents (words, numbers, pictures, shapes), how they are administered (individually or in groups; orally, in writing, or pantomimed), or what they're intended to measure (vocabulary, mathematical reasoning, spatial ability), all mental tests measure mostly the same thing. This common factor, *g*, can be distilled from scores on any broad set of cognitive tests, and it takes the same form among individuals of every age, race, sex, and nation yet studied. In other words, the *g* factor exists independently of schooling, paper-and-pencil tests, and culture. (p. 35)

The proponents of general intelligence believe that the differences among people reside on the application of a *general mental* facility and not on different types of intelligence (Hewstone et al., 2005).

2.2.2. Multiple Intelligences

After Spearman, many psychologists disagreed with his view of intelligence. One of them was Thomson (as cited in Brody, 2000) who argued that "the appearance of a general factor was a consequence of the overlap existing among discrete elements that are used to solve various intellectual tasks. Thus, the positive manifold is a consequence of relationships among discrete elements combined according to the laws of chance" (p. 30). The proponents of the multiplicity of intelligence themselves do not agree on the number of intelligences. The followings are brief reviews of various ideas about the number and nature of different intelligences:

Thurstone's Theory of Multiple Intelligences

Thurstone (as cited in Gardner, 1983) disagreed with spearman's idea and believed on the existence of a small set of separated but interrelated *primary mental faculties* such as verbal comprehension, word fluency, numerical fluency, spatial visualization, associative memory, perceptual speed, and reasoning. Thurstone (as cited in Brody, 2000) believes that an individual has a profile of strengths or weaknesses which describes his abilities.

Cattell and Horn's Fluid and Crystallized Intelligences

Cattell and Horn (as cited in Cianciolo & Sternberg, 2004) divided spearman's general intelligence into fluid and crystallized intelligences. They stated that fluid intelligence refers to the abilities of reasoning and problem solving whereas crystallized intelligence is the knowledge that every person acquires over the years.

Carroll's Three-stratum Theory of Intelligence

Carroll (1993) divides human's cognitive abilities into three hierarchical strata. These strata are named as narrow (stratum I), broad (stratum II), and general (stratum III). The third-stratum abilities have been put at the top of the hierarchy and they are referred to as general intelligence. The second-stratum abilities represent moderate specialization of abilities into fluid intelligence (reasoning), crystallized intelligence (acquisition of knowledge), learning and memory, visual and auditory perception, and different concepts of speed, such as speed of response, speed in information processing, and speed in psychomotor movements. In contrast to the previously mentioned strata, first-stratum abilities refer to higher specializations of abilities in quite specific ways, considering the impact of learning and experience, or taking certain performance strategies such as induction and visualization respectively as specific aspects of fluid intelligence and processes for handling shapes and forms.

Sternberg's Triarchic Theory of Intelligence

Sternberg (as cited in Neisser et al., 1996) proposes a triarchic theory of intelligence which includes *analytic* or *academic*, *creative*, and *practical* aspects and claims that common tests of intelligence are able to measure just the first aspect. He also points to the need for a balance between analytic intelligence, on the one hand, and creative and practical intelligences on the other hand. Sternberg, Wagner, Williams, and Horvath (1995) make a distinction between academic and practical intelligences. In their idea, conventional psychometric intelligence tests (e.g., IQ) which work well in predicting school success are not so much predictive in out of school situations. In the most generous condition, about three fourths of the variance in real-world situations is not justified by the results of conventional intelligence tests. They draw the concept of "common sense" or "practical intelligence" for predicting people's performance on real world criteria. Neisser et al. (1996) state the characteristics of analytic problems as "(a) have been formulated by other people, (b) be clearly defined, (c) come with all the information needed to solve them, (d) have only a single right answer, which can be reached by only a single method, (e) be disembedded from ordinary experience, and (f) have little or no intrinsic interest" (p. 79) and the characteristics of practical problems, in contrast, as "(a) require problem recognition and formulation, (b) be poorly defined, (c) require information seeking, (d) have various acceptable solutions, (e) be embedded in and require prior everyday experience, and (f) require motivation and personal involvement" (p. 79).

Gardner's Theory of Multiple Intelligences

Gardner (1983), in his prominent book, *Frames of Mind,* defined an intelligence as "the ability to solve problems, or to create products, that are valued within one or more cultural settings" (p. x) and proposed his theory of multiple intelligences. At first, Gardner devised following eight criteria to be met by each factor to be considered as intelligence:

1. *Potential isolation by brain damage:* individuals, whose specific areas of brain have been affected through an accident or illness, lose one type of intelligence, while other intelligences work properly.
2. *The existence of idiots, savants, prodigies, and other exceptional individuals:* savants – individuals demonstrating superior abilities in one intelligence, but low in some others – prove the existence of various intelligences.
3. *An identifiable core operation or set of operations:* like computers, each intelligence has a core operation or set of operations which drive different activities of these intelligences.
4. *A distinctive developmental history along with definable set of expert "end-state" performances:* each activity has a unique developmental trajectory. The time of arising, getting to peak point, and declining is different for each intelligence.
5. *An evolutionary history and evolutionary plausibility:* each intelligence has its own historical root. Some of intelligences were more important in past than are now. Some others become more important by passing of time.
6. *Support from experimental psychological tasks:* by looking at certain psychological studies, different levels of proficiency in eight intelligences could be observed.
7. *Support from psychometric findings:* existing standardized tests such as I.Q. tests include subtests that try to measure different aspects of intelligence.
8. *Susceptibility to encoding in a symbol system:* each intelligence has a unique symbol system. For example, spoken and written languages such as English or Spanish are the symbols of linguistic intelligence.

Based on the above mentioned criteria, Gardner (1983) classified this multiplicity to linguistic-verbal, musical, logical-mathematical, spatial, bodily-kinesthetic, intrapersonal and interpersonal intelligences. The followings are brief explanations of these components:

1. *Linguistic-verbal intelligence:* Gardner (1983) defines linguistic intelligence as the ability of human being to use language both in oral and written forms. He believes that linguistic tetrad of *semantics* (universal and central meaning of language), *phonology* (the sounds of words and their musical interaction with each other), *syntax* (the rules of word order and inflection), and *pragmatics* (various uses of language) are essential for effective progress in the world. Syntax and phonology are near the core of linguistic intelligence while semantics and pragmatics may have common sources with logical-mathematical and personal intelligences. Four aspects of linguistic knowledge as *rhetoric* (the ability of using language for convincing others about a specific course of action), *mnemonic* (remembering information), *explanatory* (providing information for others), and *metalinguistic* (potential of language to explain its own activities) that have noticeable significance in the society are singled out.
2. *Musical intelligence:* Gardner (1983) clarifies musical intelligence as the ability of human being to compose, perform, capture, and distinguish musical operations. He also differentiates composition and language from each other and states that language plays no role in the act of composition. Stravinsky (as cited in Gardner, 1983) claims that composing is a natural act and it does not occur through thought or will. Central constituents of music are *pitch* or melody, *rhythm* (sounds emitted at certain auditory frequencies and grouped according to a prescribed system), and *timber* (characteristic qualities of a tone) and musical intelligence is the sensitivity of human to these components. Gardner proposes the mechanisms by which musical patterns are perceived. In the

bottom-up approach the ways of processing building blocks of music such as single tones or elementary rhythmic patterns are examined. In the *top-down* approach reactions to the more global properties of music like rate and loudness and also metaphoric characterizations such as heaviness and crowdedness are under scrutiny. Yet, there is a middle-ground approach that has recently been noticed. In this approach sample musical entities are large enough to resemble the genuine musical entities to bear both bottom-up and top-down approaches of examination.

3. *Logical-mathematical intelligence:* Gardner (1983) explains logical-mathematical intelligence as the ability of logical analysis of problems and issues, high level of proficiency in mathematical operations and doing scientific investigations. He points to the Piaget's sequence of development and asserts that infants by passing through the stages of their growth gain the ability of doing sensori-motor actions, concrete operations, and formal operations. Humans during their childhood make use of the processes of classification, inference, exploring relationships and implications, testing hypotheses, and calculation which are indicators of their logical-mathematical intelligence. By this intelligence, people become sensitive to functions, logical patterns, and statements. The ability to use numbers effectively is the product of this intelligence because as Rotman (as cited in Gardner, 1983) indicates "the whole of contemporary mathematics takes for granted and rests on the notion of counting … on the interpretation that occurs in the message 1, 2, 3" (p. 135).
4. *Spatial intelligence:* Gardner (1983) describes spatial intelligence as the capacities of perceiving visual world accurately, performing transformations and modifications upon one's initial perceptions, and being able to recreate the aspects of one's visual experience, even in the absence of relevant physical stimuli. He believes that spatial intelligence would be developed even in a blind individual who has not access to the visual world. So, he prefers to use spatial intelligence without linking it to visual modality. Spatial intelligence entails some abilities such as recognizing instances of the same elements, transforming or recognizing the transformed versions of the same element, and producing the graphic form of a spatial object. Piaget (as cited in Gardner, 1983) introduces two types of knowledge, that both of them were related to the spatial intelligence. 'Figurative knowledge' was the ability of the individual to retain the configurations of an object and 'operational knowledge' was the ability of the individual to transform those configurations.
5. *Bodily-kinesthetic intelligence:* Gardner (1983) defines this intelligence as the skill of using body for functional or expressive purposes. Bodily-kinesthetic intelligence is the result of a harmony between mind and body. The 'mental' and the 'physical' activities are of the same importance and there is no privilege for reflective activities. He believes that the ability of using body in skilled ways and the capacity to work skillfully with objects, involving both fine motor and gross motor movements are the outstanding characteristics of this intelligence. One may use his whole body to do certain kind of activity. On the other hand, one may use just his hands or fingers for controlling something precisely. This intelligence works both as object and subject: it is limited to one's own body as an object and involves physical actions on the objects out of the body as a subject. The base of physical skills like balance, flexibility, speed, agility, and power is the bodily-kinesthetic intelligence.
6. *Intrapersonal intelligence:* Gardner (1983) asserts that intrapersonal intelligence is the capacity of human being to "access to one's own feeling life" (p. 239). It is the capacity which has influence on the discrimination of inner feelings of a person and labeling, symbolizing, and using them as a means of understanding. Intrapersonal intelligence is the knowledge of self. It helps the individuals to have an accurate picture of themselves. By means of this intelligence people become aware of their own moods, motivations, and desires. Intrapersonal intelligence develops through different stages of life. At the elementary levels it includes the ability to distinguish pleasure from pain. At the advanced stages, it involves examples such as introspective writing of one's own feelings.
7. *Interpersonal intelligence:* Gardner claims that the interpersonal intelligence is "the ability to notice and make distinctions among other individuals" (p. 239). It looks outward, to others rather than self, to their intentions, moods, behaviors, and motivations. Interpersonal intelligence like intrapersonal intelligence develops through different stages of life. At the earliest stages, it involves the ability of a child to distinguish different individuals and their moods. In the advanced forms, it helps the individuals to discover both clear and hidden desires and intentions of others. It's through this ability that people are able to respond pragmatically to others behaviors and actions. Political and religious leaders possess a highly developed amount of interpersonal intelligence.
8. *Naturalist intelligence:* After about sixteen years from the publication of *Frames of Mind*, Gardner in his book, *Intelligence Reframed* (1999) proposed the existence of the eighth intelligence which he calls *naturalist intelligence*. He believes that in terms of eight criteria, the naturalist's intelligence has the requisite capacities to be counted as intelligence. Gardner defines naturalist intelligence as the capacity of human being to recognize and classify different species of plants and animals in the environment. Those people who possess extensive knowledge of the living world are called *naturalist*. Naturalist's capacities could be generalized to artificial items. The child who is able to distinguish between plants or animals is also able to discriminate sneakers, marbles, and sound systems. Naturalist intelligence is not exclusive to human being; some other animals (for example birds) also have this capacity. Naturalist intelligence could be applied both by sighted

and blind people and it does not require visual sense. At the early stages, formal instruction is not needed, but by the development of naturalistic skills it will be essential.

Gardner (1999) proposed the possibility of the existence of other intelligences, including *existential* and *spiritual* intelligences. He accepted that existential intelligence has the possibility of existence, but despite its attractiveness he has not added it to the list of intelligences because of its perplexity. He has not accepted the spiritual intelligence, as it has not fulfilled the requirements of being intelligence.

3. Method

3.1 Research Questions and Hypotheses

The present study tried to find answers for the following research questions:

1. Is there any relationship between each component of multiple intelligences and L_2 reading skill among Iranian EFL university students?
2. Which components of the multiple intelligences act as the predictor of L_2 reading skill among Iranian EFL university students?

Based on the above-mentioned research questions, the following research hypotheses were proposed:

1. There is no significant relationship between each component of multiple intelligences and L2 reading skill among Iranian EFL university students.
2. None of the multiple intelligences act as the predictor of L2 reading skill among Iranian EFL university students.

3.2 Participants

Participants of this study were 98 (29 males and 69 females) EFL sophomores of Islamic Azad University – Tabriz Branch majoring in English language who were selected from early total of 137 (41 males and 96 females) students after taking the reading part of a PET as an English language proficiency test. They were students of four intact classes and all of them had passed reading course at the university. The age range of participants was 18 to 27.

3.3 Instrumentation

Two different instruments were used to conduct this study. Both instruments had a section for gathering participants' personal information. The first instrument was the reading part of a PET which was used both as a selection test of the participants of the study and an instrument for measuring participants' level of reading skill. In reading part of the PET, which consisted of 35 items, participants were supposed to select the correct answer out of provided choices and every correct answer received one point.

The second instrument was the self-report Multiple Intelligences Inventory developed by McKenzie (1999) which originally was composed of 90 statements but as Gardner's possible *existential intelligence* was not taken into account in this research, the number of statements was reduced to 80 (i.e., 10 statements for each intelligence). This questionnaire is structured in *true-false* format. The reason for the use of this type of questionnaire was Dornyei's (2007) idea that "some personality test items … follow a true-false rating to ensure reliability in domains where the respondent may not be able to properly evaluate the degree to which a particular feature is present/true or not" (p. 106). Subjects were supposed to indicate their agreement with each item by putting "1" next to each statement they feel accurately describes them or their disagreement by leaving the provided space blank. The sum of "1"s in each section will be the participants' score in that intelligence.

3.4 Procedure

Before starting the main study a pilot study was conducted to observe how participants understand the items in the questionnaire and to reveal the probable problems that subjects may encounter during administration of the test. Twenty-five students similar to the participants of the main study participated in the pilot study. From the results of the pilot study the Cronbach's alpha reliability for each section of McKenzie's (1999) Multiple Intelligences Inventory was calculated. The amount of alpha for each section was more than 0.70 which indicated an acceptable internal consistency of items.

The main phase of the study began with the administration of reading part of a PET to all 137 initial students for the purpose of homogenizing participants. All necessary instructions were given to them. The time allotted to the test was 90 minutes. After scoring the answer sheets, 98 students whose scores were between one standard deviation minus and plus the mean were selected as the participants of the main study and the others were left out. The use of PET was two-folded. In addition to homogenizing participants of the study it was used to measure participants' reading skill which was considered as the dependent variable of this study.

Afterwards, McKenzie's (1999) Multiple Intelligences Inventory was distributed to the participants and they asked to put "1" next to each statement they feel accurately describes them and leave the provided space blank for their disagreement.

3.5 Design

The researcher in this study did a descriptive correlational research to observe whether there was any correlation between independent and dependent variables. Independent variables of this study were each of multiple intelligences

and dependent variable was reading skill of the participants. Also, it was examined whether any of multiple intelligences predicted the participants' reading scores or not. To do that, the levels of multiple intelligences of the participants were taken out. In addition, the reading scores of them were extracted. As the participants of the study were EFL sophomores of Islamic Azad University – Tabriz Branch majoring in English language, selected from four intact classes, the sampling design of the study was *convenience non-probability*.

4. Results

This part presents the analysis of the results of the PET both as an English language proficiency test and an instrument for measuring participants' level of reading skill, McKenzie's (1999) Multiple Intelligences Inventory, and the relationship between each component of the multiple intelligences and reading skill.

As stated earlier, Cronbach Alpha for each section of McKenzie's (1999) Multiple Intelligences Inventory was calculated that their results are provided in Table 1.

Table 1. Cronbach Alpha Reliability for Each Section of McKenzie's (1999) Multiple Intelligences Inventory

Multiple Intelligences Inventory	Cronbach Alpha
Linguistic-verbal	0.75
Musical	0.75
Logical-mathematical	0.78
Spatial	0.76
Bodily-kinesthetic	0.76
Intrapersonal	0.78
Interpersonal	0.75
Naturalist	0.77

The amount of Alpha for each section was more than 0.70 which indicated an acceptable internal consistency of items.
In order to investigate the first research hypothesis, Pearson's correlation analysis was run. The results of this analysis are presented in Table 2.

Table 2. Pearson's Correlation between Multiple Intelligences and Reading Skill

		Linguistic-Verbal	Musical	Logical-Mathematical	Spatial	Bodily-Kinesthetic	Intrapersonal	Interpersonal	Naturalist
Reading	Pearson Correlation	.657**	.037	.221*	.259**	-.012	-.175	.649**	.071
	Sig. (2-tailed)	.000	.720	.029	.010	.907	.084	.000	.488
	N	98	98	98	98	98	98	98	98

As it is obvious in Table 2, among different components of multiple intelligences of EFL sophomores of Islamic Azad University – Tabriz Branch, majoring in English language, just linguistic-verbal, logical-mathematical, spatial, and interpersonal intelligences have statistically positive relations with the level of their reading skill. In other words, it can be inferred that those students who have stronger linguistic-verbal, logical-mathematical, spatial, or interpersonal intelligences may get higher scores in reading skill tests.
In order to investigate the components of multiple intelligences that act as predictors of L_2 reading skill scores of Iranian EFL university students, a multiple regression analysis has been done. The results of the multiple regression analysis are introduced in Table 3.

Table 3. Multiple Regression Analysis between Multiple Intelligences and L2 Reading Skill

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	14.593	1.673		8.722	.000
	Linguistic-Verbal	1.190	.188	.566	6.318	.000
	Musical	-.070	.150	-.035	-.469	.641
	Logical-Mathematical	.224	.084	.166	2.657	.009
	Spatial	-.479	.245	-.187	-1.954	.054
	Bodily-Kinesthetic	-.083	.088	-.059	-.953	.343
	Intrapersonal	.019	.086	.014	.222	.825
	Interpersonal	.899	.137	.474	6.547	.000
	Naturalist	.141	.090	.099	1.559	.123

a. Dependent Variable: Reading

The Standardized Beta Coefficients give a measure of the contribution of each variable to the model. A large value indicates that a unit change in this predictor (independent) variable has a large effect on the criterion (dependent) variable. The t-value and p-values give a rough indication of the impact of each predictor variable – a big absolute t-value and a small p-value suggests that a predictor variable is having a large impact on the criterion variable. As it is indicated in Table 3, only the p-value observed for linguistic-verbal (t-value = 6.318, Beta = 0.566), interpersonal (t-value = 6.547, Beta = 0.474), and logical-mathematical (t-value = 6.657, Beta = 0.166) intelligences were smaller than the level of significance selected for this study and just these intelligences could significantly predict the students' L_2 reading skill scores and others did not have a significant role in prediction of the L_2 reading scores.

Furthermore, as the general form of regression equation is:

$Y=\beta_1(X_1) + \beta_2(X_2) + \beta_3(X_3) \ldots$

the regression equation for L_2 reading skill scores of Iranian EFL university students is as follow:

Reading Score = 14.593 + Reading = 0.57 (linguistic-verbal intelligence) + 0.47 (interpersonal intelligence) + 0.17 (logical-mathematical intelligence)

It means that the participants' L_2 reading scores can be predicted through putting their linguistic-verbal, interpersonal, and logical-mathematical intelligences scores in the above formula.

5. Discussion

As it was indicated above, the statistical analysis of the first research question revealed that linguistic-verbal, logical-mathematical, spatial, and interpersonal intelligences were correlated with L_2 reading skill. It is clear from the results regarding the second research question that linguistic-verbal, interpersonal, and logical-mathematical intelligences were the predictors of L_2 reading skill of the EFL university students.

As its name indicates, linguistic-verbal intelligence is generally related to reading skill of language learners. Linguistic-verbal intelligence with the emphasis on shades of meaning, sounds of words, mastery of syntax, and fascination with language is the most important intelligence which influences reading skill. But from the results of this study it could be inferred that other intelligences are also related to reading skill of language learners.

Reading about another person necessitates the ability "to notice and make distinctions among other individuals" (Gardner, 1983, p. 239). For good reading, the reader should put himself in another persons' situation to understand his ideas and characteristics. So, having a high interpersonal intelligence can lead to high abilities of reading about other individuals.

As the order, shape, and direction of characters may alter the meaning extracted from the text, reading comprehension could be related to spatial intelligence. For example, the difference between the words 'live' and 'evil', 'ton' and 'not' or 'ban' and 'nab' is a matter of letter order and the difference between letters 'p' and 'q' or 'b' and 'd' is just a matter of shape and direction. Spatial intelligence also may influence the grammatical understanding of the text. For example, when the reader wants to locate the antecedent of a pronoun in a sentence, up to some extent, he may resort to his spatial intelligence.

In top-down processing readers make use of their intelligence and experience to get the meaning of the text (Brown, 2001). In bottom-up processes the reader extracts meaning from the signals provided by the text (Chastain, 1988). Therefore, top-down and bottom-up processes are possibly related to logical-mathematical intelligence. It is through logical-mathematical intelligence that the reader reaches the final meaning of the text. By the way, the most important duty of the reader in reading process is guessing the meaning of unknown words through the context. It seems that logical-mathematical intelligence is the main apparatus of the reader to guess the meaning of these words and there is an interface between logical and critical thinking and reading comprehension.

Those components of multiple intelligences that did not show a significant correlation with reading skill in this study could be highly related to them in other similar studies that would be done in different contexts with different participants. The possible reasons for the lack of the relationship between some components of multiple intelligences and the reading skill could be taken into account.

Apparently, the relationship between musical intelligence and reading skill significantly exists during the process of reading aloud. When taking part in PET, it seems that there was no need for incorporation of musical intelligence by the learners.

Intrapersonal intelligence which is the source of "emotional reactions to the material" (Armstrong, 2003, p. 19) being read can be related to the reading skill when facing with a passionate text. The low coefficient of correlation between intrapersonal intelligence and reading skill could have roots in the type of the reading materials presented in PET.

Bodily-kinesthetic intelligence which is associated with body movements for functional or expressive purposes (Gardner, 1983) has a basic role in the process of reading. When the reader turn pages of the exam paper, he resorts to his bodily-kinesthetic intelligence, but in the case of the present study, concerning the appropriate time provided for taking PET, it seems that the degree of bodily-kinesthetic intelligence is not so much important.

As stated earlier, literacy is a representation of the human struggle to control and overcome nature (Armstrong, 2003). But, in this study, it seems that there is not much need to high scores of naturalist intelligence for obtaining high scores in reading tests. Perhaps, naturalist intelligence will be more important when reading a text about the nature.

Although Armstrong (2003) states that all components of multiple intelligences affect the reading skill, the results of this study indicate that in spite of the positive contributions of these intelligences to reading skill, only linguistic-verbal, logical-mathematical, spatial, and interpersonal intelligences are significantly correlated with reading skill.

There were a number of notable limitations during this study. A major limitation was the unwillingness of the university teachers to permit the researcher to conduct the desired survey. Second limitation arose due to the length of the time which was needed for the participants to answer the multiple intelligences inventory and reading test; a significant number of respondents were reluctant to participate in these tests. The generalizability of the findings of the study due to the small sample size was another limiting factor.

The results of the study can be useful for EFL learners and teachers. Multiple intelligence-based models have provided us with the opportunity to look differently at curriculum, instruction, and assessment. Moreover, any indication of the relationship between each of the multiple intelligences and L_2 reading skill can help the teachers and those who are involved in the process of teaching foreign languages. Through incorporating MIT to foreign language teaching, EFL teachers can take advantage of human differences to devise appropriate teaching techniques through which they have the opportunity to construct varied teaching curriculums. "MI pedagogy focuses on the language class as the setting for a series of educational support systems aimed at making the language learner a better designer of his/her own learning experiences" (Richards & Rodgers, 2001, p. 118).

Like other studies and based on the findings of this study, it is hoped that teachers become more aware of the differences among students. Thus, teachers can take into account these differences and the skills can be taught in different ways; in this case students have more opportunities to learn and to understand the material being taught.

The outcome of the present study can also contribute to coursebook designers, educational planners, and foreign language institutes. They may take advantage of the findings of this study for providing the activities, lesson plans, and curricula which are most likely to be relevant to the different types of the students' intelligences.

Armstrong (2009) believes that "each person possesses all eight intelligences" (p. 15) and "most people can develop each intelligence to an adequate level of competency" (p. 15). So, teachers and parents, after determining the low-ranking intelligences of the students, can devise activities for improving their weak intelligences.

Differentiated instruction for learning reading skill often involves the use of "high interest" reading materials. In an attempt to activate alternative, perhaps stronger thinking skills, multiple intelligences-inspired instructions, however, go beyond mere "interest". For example, the reader who has high spatial intelligence would be encouraged to visualize and then sketch a difficult reading passage in order to facilitate comprehension. The theory is that using one's strongest intelligence will not only hold, for example, the reader's interest, but also can promote greater cognitive engagement with specific tasks of reading, e.g., word recognition and meaning, understanding content, self-questioning, and thematic comprehension.

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