Multiple Intelligence Scores of Science Stream Students and Their Relation with Reading Competency in Malaysian University English Test (MUET)

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Abstract

Many researches have shown that different approach needed in analysing linear and non-linear reading comprehension texts and different cognitive skills are required. This research attempts to discover the relationship between Science Stream students' reading competency on linear and non-linear texts in Malaysian University English Test (MUET) with Multiple Intelligence Theory as well as aims to reveal the prominent type of Multiple Intelligence that significantly predicts the Science Stream students' performance on the different texts of reading component. In collecting the data, the researcher used two instruments namely the Reading Comprehension of Malaysian University English Test (MUET) and Multiple Intelligence Questionnaire. The participants were 60 diploma students joining in UiTM Alor Gajah Melaka and they were chosen to represent the Science Stream group. Furthermore, the result of the correlation testing shown positive correlation of the total score in MUET reading component as well as in linear text section with Music-Rhythmic, Bodily-Kinaesthetic and Interpersonal Intelligence.

Keywords: reading competency, multiple intelligence, linear text, non-linear text, MUET

1. Introduction

Howard Gardner had developed Multiple Intelligence Theory in the early 1980s on the basis that the traditional notion of intelligence as measured by I.Q testing is far too limited due to the fact that people are different in their different aspect of intelligence that causes differences in people's performance on different tasks (Gardner, 1983, p. 51, cited in Javanmard, 2012, p. 61). Gardner has initially identifed 7 autonomous capacities namely Verbal-Linguistic Intelligence, Logical-Mathematical Intelligence, Visual-Spatial Intelligence, Music-Rhythemic Intelligence, Bodily-Kinesthetic Intelligence, Interpersonal Intelligence, and Intrapersonal Intelligence. It is also stated that Gardner has later added the eighth and the ninth intelligence known as Naturalist and Existential Intelligence respectively (Yi-an, 2010, p. 1). The seven types of intelligence are briefly explained in the following:

Bodily-Kinesthetic Intelligence- it refers to the expertise in using body to express ideas and feelings as in the specific physical skills such as coordination, balance, dexterity, strength, flexibility and speed (Javanmard, 2012).

Interpersonal Intelligence- the capability to collaborate and working cooperatively with others in which individuals with this intelligence tends to learn through interaction (Mckenzie, 2009).

Intrapersonal Intelligence- this intelligence includes the ability to learn through feelings, values and attitudes in a way that individuals place value on what they learn and take ownership for their learning (Mckenzie, 2009).

Logical-Mathematical Intelligence- it refers to the ability to use number effectively and to reason well (Javanmard, 2012).

Music-Rhythemic Intelligence- this intelligence promotes knowing which occurs through hearing, sounds, vibrational patterns, rhythm and tonal patterns (Lazear, 2004, cited in Karim Hajhashemi, Kourosh Akef, & Neil Anderson, 2012).

Verbal-Linguistic Intelligence- people with this intelligence have the sensitivity to the spoken and written

language and using the language to achieve goals (Garder, 1993, cited in Karim Hajhashemi, Kourosh Akef, & Neil Anderson, 2012).

Visual-Spatial Intelligence- it refers to ability to learn visually and organize ideas spatially as in seeing concepts in action in order to understand them (Mckenzie, 2009).

According to Malaysian Examinations Council (2013), matriculation students, diploma and pre-university students who wish to pursue a first degree programme in local universities have to sit for Malaysian University English Test (MUET) as the requirement. Reading Comprehension Test is the third paper in MUET which is coded 800/3 and it is weighted 40% of the total grade. According to Omar Abu Bakar (2006), in the reading component, candidates are assessed on their ability to comprehend various types of text of varying length and level of complexity in terms of language and content. So, in regards to the different types of reading comprehension texts involving linear and non-linear in MUET, it can be argued that Multiple Intelligence might have a role in determining language learners' performance due to the distinct format of the texts that requires different reading strategies. Thus, this research aimed to focus on the correlation of Multiple Intelligence and Science Stream students' competency in reading linear and non-linear texts and to reveal to what extent the prominent type of Multiple Intelligence of Science Stream students significantly predicts their performance on different texts in MUET reading component.

2. Literature Review

2.1 Mental Model: A Theory on Reading Comprehension Related to Learners' Performance in Learning Language

"The focus of all language teachers and linguists carrying research on reading performance should be on the reader's mental processes, rather than solely on processes which a text undergoes" (Magisterska, 2001). It is undeniable that readers who manage to comprehend a particular reading text will be able to perform better in the process of learning language. Hence, Magisterska (2001) also stated that the first stage of text comprehension comprises the learner's active selection of relevant information from a passage and construction of *mental representations* of its linguistic contents, which involves the interaction of linguistic features of the text and the reader's language proficiency.

Mental Model Theory proposed by Johnson-Laird (1983) is one of the theories which incorporate reading comprehension process that influence learners' performance in learning language. In fact, the term Mental Model has been related to many domains and it is believed that Johnson-Laird's (1983) fit in this research context as he suggested that mental models can be constructed from perception, imagination, or the comprehension of discourse. According to Johnson-Laird (1983), "in order to understand their world by comprehending what causes, influence, controls or prevents phenomena, humans construct models of it". Thus, the process of comprehending discourse in this research context is related to the understanding of Linear and Non-Linear Texts that exist in MUET reading component.

2.2 Review of Related Previous Studies

A research conducted by Karim Hajhashemi and Fatemeh Parasteh Ghombavani (2011) entitled *The Relationship* between Iranian High School Students' Multiple Intelligence Scores and their Use of Learning Strategies revealed that there is a low, positive correlation between Multiple Intelligence and different strategy types. Indeed, the study also exposed Verbal-linguistic, Visual-spatial and Logical-Mathematical Intelligence are significantly correlate with all learning strategies except memory strategy. In addition, Intrapersonal Intelligence in the study has shown no significant correlation with any learning strategies employed by the Science Stream students in reading with the Multiple Intelligence preference.

Apart from that, another research entitled *A Study of Relationship Between Iranian EFL Learners' Level of Spatial Intelligence and their Performance on Analytical and Perceptual Cloze Tests* has been carried out by Moussa Ahmadian and Vahid Jalilian (2012). The paper involved 41 male Iranian EFL learners focus on Spatial Intelligence which is believed to play a great role in reading, writing and literacy particularly in L2 learning. Indeed, significant correlation was found between variables and the findings emphasize to reconsider using cloze test in EFL contexts. The study also suggested that identifying learners' level of Spatial Intelligence can provide educators with a better opportunity to predict activities that are appropriate for both learners with higher and weaker levels of this intelligence.

Besides that, Ahmad Muhamed Al-Ghraibeh (2012) has conducted a research known as *Brain Based Learning* and its *Relation with Multiple Intelligences* involving two examinations which are, examination of the Multiple

Intelligences and examination of thinking and learning method based on both hemisphere of the brain. The result indicated that more repeated method of learning and thinking is based on the left hemisphere of the brain. Indeed, it as also discovered that there is an equal relation with a function of right hemisphere of the brain with Musical-Rhythmic and Visual-Spatial Intelligences while an equal relation with a function of the left hemisphere of the brain brain. Bodily-Kinaesthetic and Verbal-linguistic Intelligences.

Among the researches done on Multiple Intelligence, Karim Hajhashemi and Wong Bee Eng's (2012) paper entitled *MI as a Predictor of Students' Performance in Reading Competency* is the closest one with the present study. The research attempted to recognize the notion of MI that are associated with the achievement in reading and to verify the correlation between competency in reading and Multiple Intelligence. The result revealed no significant correlation on Multiple Intelligence towards reading scores of the participants. Besides that, the study also exposed a low significant, negative relationship between Musical-Rhythmic Intelligence and reading score. It has also been found that there are three intelligences namely Musical-Rhythmic, Bodily-Kinesthetic and Verbal-Linguistic serve as predictors of reading competency. Therefore, the study has led the researcher of the present paper to discover the correlation of MI scores with different texts in reading known as linear and non-linear as tested in MUET among a specific group of students in Science Stream.

2.3 Conceptual Framework

The framework was developed based on the combination of Howard Gardner's Multiple Intelligence Theory (1983) that involved 7 autonomous capacities of Intelligence and the Mental Model Theory proposed by Johnson-Laird in 1983. Both theories are the basis for the present research to determine the performance of the ESL learners on their competency in reading linear and non-linear texts.

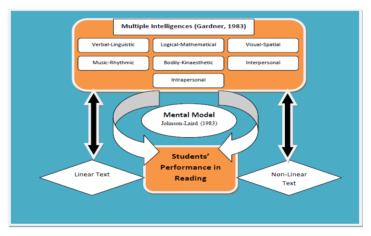


Diagram 1: The Relationship of Multiple Intelligence and Students' Performance on Linear and Non-Linear Reading Texts

Figure 1. Conceptual framework on the relationship of multiple intelligence and science stream students' performance in reading

3. Study

3.1 Research Questions

The present paper aimed to provide answers to these three research questions:

Q1. What is the relationship between types of Intelligence and Science Stream students' competency in reading test?

Q2. What is the relationship between types of Intelligence and Science Stream students' performance on linear and non-linear texts in reading?

Q3. To what extent the Science stream students' Multiple Intelligence significantly predicts their competency on different texts in MUET reading component?

3.2 Null Hypotheses

There are three hypotheses which were tested in this study:

Ho1. There is no relationship between types of Intelligence and Science Stream students' competency in reading test.

Ho2. There is no relationship between types of Intelligence and Science Stream students' performance on linear and non-linear texts in reading.

Ho3. There is no relationship between Science Stream students' Multiple Intelligence as significant predictors on their competency in different texts in MUET reading component.

3.3 Participants

The participants of this study were 60 Diploma students in the second semester from Faculty of Computer Science and Mathematics studying in UiTM Alor Gajah Melaka to represent the Science Stream. The rationale of choosing the Science Stream students is because of their great involvement in analysing scientific data as well as in using numbers with English as the medium of instruction that tend to affect their intelligence preferences. In addition, the second semester is especially for a course known as BEL260 or Intermediate English Language that preparing them for Malaysian University English Test (MUET). Thus, the term linear and non-linear texts are considered familiar among the students. As pointed out by Karim Hajhashemi & Wong Bee Eng (2012), the most essential criteris of a sample is its representiveness of the population which should be the prime consideration in selecting the sample.

3.4 Instruments

The instruments used in this study consist of two different formats of reading texts namely Linear and Non-Linear as well as a Multiple Intelligent questionnaire. The texts for Reading Comprehension were selected from Federal Malaysian University English Test Model Papers. There are six texts in MUET Reading Comprehension Test comprises Non-Linear and Linear texts which consist of 45 items in the form of Multiple Choice Question.

A Multiple Intelligent questionnaire were also administered to the participants in this study which is adopted from Alan Chapman's (2006) version based on Howard Gardner's MI Model (1983). There are 35 items in the questionnaire pertaining to the seven Multiple Intelligence proposed by Gadner (1983).

3.5 Data Collection Procedure

The data were collected from the participants in two sessions in which the Multiple Intelligent was the first administered by the researcher. For collecting the data, the students were acknowledged on their important role to respond to the instruments and to follow the instructions. The MI questionnaire was answered by them in 15 minutes. The reading comprehension tests were distributed to students in the next class to be accomplished by them in 90 minutes. The rationale of carrying out the instruments in different sessions is to avoid any interference that might influence students' preference in MI questionnaire and their performance in reading comprehension test.

3.6 Statistical Analysis

The first and second research questions are concerned with the relationship between intelligence preferences and performance of Science Stream students on reading tests. The scores for the reading test as a whole and in each text type were converted into Z score to be compared with the score for Multiple Intelligence. Therefore, the correlation between Multiple Intelligence score and Reading Comprehension performance once as a whole and the score on the Linear and Non-Linear format respectively were calculated using Bivariate Pearson-correlation in SPSS 16.0. The third question aims to find out which intelligence type serves as the best predictor of the performance on different reading comprehension texts for the Science Stream students. In this regard, Multiple Linear Regression Enter Method Output analysis is run to determine which intelligence type scored by participants in Science Stream contributes to better performance on the Science Stream students' reading comprehension tests.

4. Results and Discussions

Three research questions for this study are stated in the following:

4.1 Research Question No. 1

The first research question attempts to find out the relationship between Multiple Intelligence and the performance of Science Stream students on MUET reading component as a whole. Indeed, it is stated by Karim Hajhashemi and Wong Bee Eng (2012) that readers' comprehension as in the process of reading tend to be influenced by a person's cognitive ability including intelligence. Thus, in order to disclose this research question,

a Pearson-correlation analysis was carried out between the Multiple Intelligence scores of the Science Stream students and their reading competency scores which have been converted into Z score for standardization. The results are presented in Table 1.

		Z score: Total Score of MUET Reading Test of Science Stream Students
	Pearson Correlation	070
Verbal-Linguistic Intelligence	Sig. (2-tailed)	.593
Intelligence	Sig. (2-tailed) N Pearson Correlation Sig. (2-tailed) N Pearson Correlation Sig. (2-tailed) N Pearson Correlation	60
	Pearson Correlation	038
Logical-Mathematical Intelligence	Sig. (2-tailed)	.773
Intelligence	Ν	60
	Pearson Correlation	.149
Music-Rhythmic Intelligence	Sig. (2-tailed)	.256
Intelligence	Ν	60
Bodily-Kinaesthetic Intelligence	Pearson Correlation	.000
	Sig. (2-tailed)	.995
Intelligence	Ν	60
	Pearson Correlation	119
Visual-Spatial Intelligence	Sig. (2-tailed)	.364
Intelligence	Ν	60
T	Pearson Correlation	.049
Interpersonal Intelligence	Sig. (2-tailed)	.712
intenigence	Ν	60
.	Pearson Correlation	115
Intrapersonal Intelligence	Sig. (2-tailed)	.380
intenigence	Ν	60

Table 1. Correlation analysis of multiple intelligence and MUET reading total score

The data in Table 1 revealed that amongst the 7 intelligences, only three of them namely Music-Rhythmic (r = 0.149, n = 60, p > 0.05), Bodily-Kinaesthetic (r = 0.000, n = 60, p < 0.05) and Interpersonal Intelligence (r = 0.049, n = 60, p > 0.05) showed positive correlation between Multiple Intelligence and reading competency on MUET while the others show low negative correlation. Indeed, the data also revealed that Bodily-kinaesthetic with r = 0.000 has no correlation with the Science Stream students' performance on MUET reading component. The positive correlation indicates that Science stream students' competency in reading tends to increase with the increment of their scores in Music-Rhythmic and Interpersonal Intelligence. Therefore, the first research question is supported and the first null hypothesis is rejected. The findings of the correlation analysis (as presented in Table 1) agree with Karim Hajhashemi and Wong Bee Eng (2012) who also revealed significant relationship of Musical Intelligence towards the students' performance on reading.

4.2 Research Question No. 2

The second research question intended to find the relationship between the Science stream students' scores in Multiple Intelligence and their performance in different types of reading skills which involved the linear and non-linear texts. Thus, the same method used for research question 1 was applied for this research question which involved Z scores in the linear and non-linear sections respectively. Results are revealed in Table 2.

		Z score: MUET Linear Text Science Stream Students' Score	Z score: MUET Non-Linear Text Science Stream Students' Score
	Pearson Correlation	009	187
Verbal-Linguistic Intelligence	Sig. (2-tailed)	.946	.152
Intelligence	Ν	60	60
	Pearson Correlation	003	115
Logical-Mathematical Intelligence	Sig. (2-tailed)	.980	.382
Intelligence	Ν	60	60
	Pearson Correlation	.196	114
Music-Rhythmic Intelligence	Sig. (2-tailed)	.133	.386
Intelligence	Ν	60	60
	Pearson Correlation	.025	194
Bodily-Kinaesthetic Intelligence	Sig. (2-tailed)	.850	.137
Intelligence	Ν	60	60
	Pearson Correlation	121	.027
Visual-Spatial Intelligence	Sig. (2-tailed)	.355	.835
Intelligence	Ν	60	60
	Pearson Correlation	.023	.073
Interpersonal Intelligence	Sig. (2-tailed)	.864	.582
Internation	Ν	60	60
.	Pearson Correlation	136	098
Intrapersonal Intelligence	Sig. (2-tailed)	.300	.458
memgenee	Ν	60	60

Table 2. Correlation analysis of multiple intelligences and each test score

Table 2 shows the relationship between Multiple Intelligence scores and the Science Stream students' performance on the linear text section, it can be seen that all of the intelligence are not statistically significant with p value > 0.05. In addition, the data surprisingly revealed that Science stream students' competency in linear texts involved the same types of Intelligence that have positive correlation with the total score in MUET reading component which are, Music-Rhythmic (r = 0.196), Bodily-Kinaesthetic (r = 0.025) and Interpersonal Intelligence (r = 0.023). On the other hand, the other four types of Intelligence namely Verbal-linguistic (r = -0.009), Logical-Mathematical (r = -0.003), Visual-spatial (r = -0.121) and Intrapersonal Intelligence (r = -0.136) correlate negatively with Science stream students' performance in reading linear text.

In referring to the relationship between Multiple Intelligence and the performance of the Science stream students in non-linear text section, the data revealed that almost all intelligence correlate negatively except for Visual-spatial Intelligence (r = 0.027) and Interpersonal Intelligence (r = 0.073). The result also revealed that the scores in Multiple Intelligence and performance on MUET non-linear text section were not statistically significant. Indeed, the positive correlation indicates that Science stream students' performance in the non-linear text section is influence by their scores in Visual-spatial and Interpersonal Intelligence. Therefore, the result in Table 2 supports the second research question and rejects the second null hypothesis.

The results of the correlation testing (as presented in Table 2) for the relationship between Multiple Intelligence and competency in dealing non-linear reading text is in contrast with Karim Hajhashemi and Fatemeh Parasteh Ghombavani's (2011) that reveal no significant correlation with any learning strategy. In addition, the fact that Visual-spatial correlate positively with skill in reading non-linear text agree with the research done by Moussa Ahmadian & Vahid Jalilian (2012) that revealed Spatial Intelligence as a great role in determining the performance in reading.

4.3 Research Question No. 3

The third research question determined to discover the Multiple Intelligence that serves as the best predictor of Science stream students' performance in MUET reading component as a whole as well as on their performance in the linear and non-linear texts section respectively. In order to get the data, a Multiple Regression Enter Method output analysis was performed on the Z scores of each performance as the standard variable and the seven categories of Multiple Intelligence as predictor variables.

Table 3. Model summary of multiple regression analysis

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.276 ^a	.076	048	1.02373081

b. Dependent Variable: Z score: Total Score of MUET Reading Test of Science Stream Students

Table 3 shows a very low degree of correlation between Multiple Intelligence and Art Stream students' competency in MUET reading component with 7.6% only.

Table 4. Multiple regression analysis of multiple intelligence on MUET reading performance

Co	Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
		В	Std. Error	Beta			
	(Constant)	.734	1.500		.489	.627	
	Verbal-Linguistic Intelligence	058	.056	153	-1.033	.306	
	Logical-Mathematical Intelligence	010	.051	027	193	.848	
	Music-Rhythmic Intelligence	.067	.048	.204	1.399	.168	
1	Bodily-Kinaesthetic Intelligence	019	.049	061	386	.701	
	Visual-Spatial Intelligence	045	.059	106	764	.449	
	Interpersonal Intelligence	.056	.064	.136	.865	.391	
	Intrapersonal Intelligence	057	.061	128	942	.351	

a. Dependent Variable: Z score: Total Score of MUET Reading Test of Science Stream Students

Multiple Regression coefficient reported in Table 4 imply that none of the Multiple Intelligence is statistically significance in predicting the performance of the students in MUET reading component. In order to find out the most related intelligence on the performance of Science stream students in reading linear text as well as non-linear text, Multiple Regression analysis was run with the outcome in Table 5 and 6.

Coe	fficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B Std. Error Beta				
	(Constant)	.408	1.497		.273	.786
	Verbal-Linguistic Intelligence	032	.056	085	571	.570
Intellig Music- Intellig 1 Bodily- Intellig Visual- Intellig Interpe Intellig Intrape	Logical-Mathematical Intelligence	.010	.051	.027	.187	.852
	Music-Rhythemic Intelligence	.077	.048	.232	1.597	.116
	Bodily-Kinesthetic Intelligence	011	.049	037	235	.815
	Visual-Spatial Intellligence	048	.059	114	821	.415
	Interpersonal Intelligence	.029	.064	.071	.452	.653
	Intrapersonal Intelligence	065	.061	144	-1.063	.292

Table 5. Multiple regression analysis of multiple intelligence and linear text performance

a. Dependent Variable: Z score: MUET Linear Text Science Stream Students' Score

Table 6. Multiple r	• •		1 1 1 11	1 1	C
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Table 0. Multiple in	cgression anai	ysis or mun	pic internet and	i non-inicai text	periornance

Co	oefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B Std. Error Beta				
	(Constant)	1.693	1.446	239	1.171	.247
	Verbal-Linguistic Intelligence	090	.054	127	-1.668	.101
	Logical-Mathematical Intelligence	046	.049	005	932	.356
1	Music-Rhythemic Intelligence	002	.047	249	033	.974
	Bodily-Kinesthetic Intelligence	076	.047	.070	-1.623	.111
	Visual-Spatial Intellligence	.030	.057	.267	.524	.603
	Interpersonal Intelligence	.109	.062	123	1.761	.084
	Intrapersonal Intelligence	055	.059	239	943	.350

a. Dependent Variable: Z score: MUET Non-Linear Text Science Stream Students' Score

Table 5 and Table 6 show that all independent variables coefficient revealed no significant different between the Multiple Intelligence score of the students and their achievement in both linear and non-linear text. Even though

Interpersonal Intelligence with non-linear text performance shows the closest significant data with 0.084, the third null hypothesis is still accepted.

The findings of the current study (as presented in Table 4, 5 and 6) have the same view with Karim Hajhashemi and Wong Bee Eng's (2012) that revealed no significant correlation between Multiple Intelligence and reading achievement of the students. Besides that, in terms of the predictor on the performance of students in reading, the present research is in constrast with Karim Hajhashemi and Wong Bee Eng's (2012) as none of the Intelligence serves as the best predictor for this study whereas there are three intelligences namely Musical-Rhythmic, Bodily-Kinesthetic and Verbal-Linguistic serve as predictors of reading competency in Karim Hajhashemi and Wong Bee Eng's (2012) study.

5. Conclusion

In conclusion, the science stream students' competency in reading skill correlates with their dominant intelligence as the results portrayed positive relationship among Music-Rhythmic, Bodily-kinaesthetic, Visual-spatial and Interpersonal Intelligence with their performance on reading component as a whole as well as in linear and non-linear reading text respectively. On the other hand, it was interesting to discover that none of the Multiple Intelligence can possibly predict the science stream students' competency in reading skill. This might be due to individual differences in learning styles instead of their intelligence preferences.

This study provided an initial view of the personality and quality of science stream students' notion of Multiple Intelligence and their relation to skills as ESL readers. Indeed, it is considered as the basis on determining students in science stream potential in dealing with English Language skills including writing, speaking and listening in relation to their intelligence preference. Based on the results discussed, it is crucial for educators as well as learners in the science domain to be aware of their dominant intelligence in order to suit their learning styles for optimum effects. Therefore, it is recommended for future research to use different methodological approach as in by involving larger sample of participants from a predetermined population. Thus, this research is hoped to contribute to a better understanding of the notion of Multiple Intelligence and its roles in learners' cognitive process as it is in learning language.

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