

## **CHAPTER FOUR**

### **RESULTS**

In this chapter, the researcher presents the results by responding to the research questions sequentially. The data gathered from the MI inventory and English reading proficiency test were analyzed by descriptive and inferential statistics.

To answer the first research question, the researcher reports the distribution of elementary school students' multiple intelligences and English reading proficiency, and then reveals the correlation between multiple intelligences and English reading proficiency.

Secondly, the researcher responds to the second research question by making the comparison in elementary school students' multiple intelligences and English reading proficiency between high and low achievers.

Next, the researcher answers the third research question by comparing the distribution of elementary school students' multiple intelligences and English reading proficiency between different genders.

In the final part, the researcher offers the answer to the fourth research question: Whether boys and girls have the same dominant multiple intelligences in English reading proficiency.

#### **4.1 Correlation between Multiple Intelligences and English Reading Proficiency**

In this section, the researcher answers the first research as below:

##### *Research Question 1*

*Are students' multiple intelligences significantly correlated with their English*

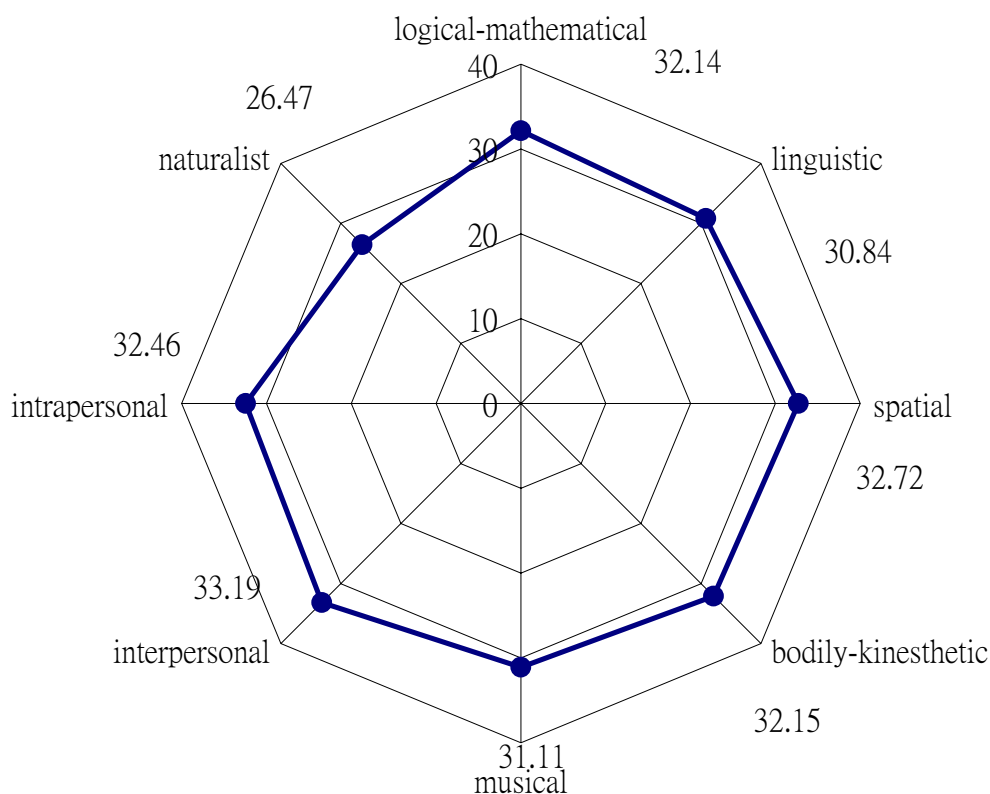
*reading proficiency? If the answer is positive, then what are the dominant multiple intelligences in English reading proficiency?*

#### **4.1.1 Distribution of Students' Multiple Intelligences**

The result of the MI Inventory indicated the distribution of students' multiple intelligences. As shown in Table 3, the ranked multiple intelligences of students were as follows: interpersonal intelligence (M= 33.19), spatial-visual intelligence (M= 32.72), intrapersonal intelligence (M= 32.46), bodily-kinesthetic intelligence (M= 32.15), logical-mathematical intelligence (M= 32.14), musical intelligence (M= 31.11), linguistic intelligence (M= 30.84) and naturalist intelligence (M= 26.47). The results suggested that students have stronger intelligences in interpersonal, spatial-visual, intrapersonal, as well as bodily-kinesthetic aspects, but weaker intelligences in naturalist, linguistic, and musical aspects as can be seen in Figure 2. The findings of this research happened to coincide with those of Wu's (2002) as well as Hsieh and Yeh's (2000) studies, both of which investigated elementary schools students' distribution of multiple intelligences.

***Table 3. Descriptive Statistics of Students' Multiple Intelligences***

MI	N	M	SD	Ranking
Naturalist	257	26.47	8.09	8
Linguistic	257	30.84	7.63	7
Musical	257	31.11	9.61	6
Logical-mathematical	257	32.14	7.40	5
Bodily-kinesthetic	257	32.15	7.25	4
Intrapersonal	257	32.46	7.60	3
Spatial-visual	257	32.72	7.67	2
Interpersonal	257	33.19	8.24	1



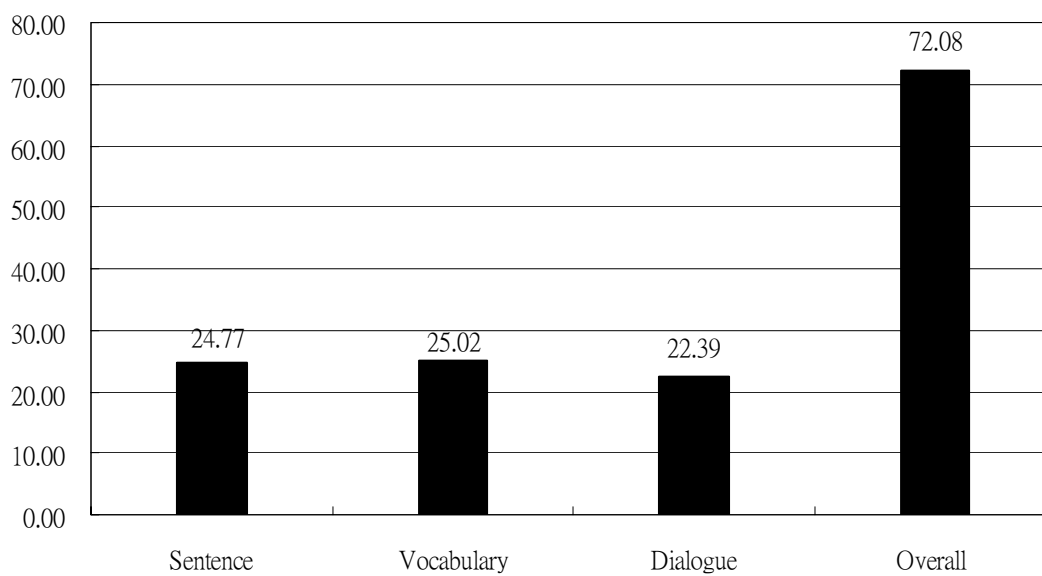
**Figure 2. Distribution of Students' Multiple Intelligences**

#### **4.1.2 Students' English Reading Proficiency**

Table 4 displays students' mean scores and standard deviations of students' English reading proficiency based on the English reading proficiency test. Students' overall mean scores of English reading proficiency was 72.08, and the mean scores of the three sections, i.e. sentence, vocabulary, and dialogue were 24.77, 25.02, 22.39, respectively (see Figure 3). The biggest standard deviation among the three sections was dialogue section (SD = 13.06), second, sentence section (SD = 10.68), and the smallest, vocabulary section (SD = 7.06). It is likely that the degree of the differences in English reading proficiency increases from vocabulary, then to sentence, and last to dialogue. To put it another way, as far as elementary school students' English reading proficiency is concerned, the greatest difference exists in students' dialogue ability, yet the least difference in students' vocabulary ability.

**Table 4. Descriptive Statistics of Students' English Reading Proficiency**

English Reading Proficiency Test	N	M	SD
Sentence	257	24.77	10.68
Vocabulary	257	25.02	7.06
Dialogue	257	22.39	13.06
Overall	257	72.08	27.37

**Figure 3. Students' English Reading Proficiency**

#### 4.1.3 Correlation between Multiple Intelligences and English Reading

##### Proficiency

To explore the correlation between multiple intelligences and English reading proficiency, multiple regression analysis was done by the researcher.

As Table 5 demonstrates, the eight variables accounted for 19.5% of the shared variance of students' overall English reading proficiency ( $R^2 = .195$ ). It is worthy noting that English reading proficiency was positively correlated with logical-mathematical intelligence and musical intelligence whereas negatively correlated with naturalist intelligence. Among the eight multiple intelligences, logical-mathematical intelligence significantly contributed to  $R^2$  the most ( $r^2 = .072$ ),

then musical intelligence ( $r^2 = .017$ ), and naturalist ( $r^2 = .015$ ). To put it more specifically, when students gained one more point in logical-mathematical intelligence under the condition that the other seven variables, i.e., other seven intelligences, kept the same, they gained 1.432 points in the English reading proficiency test; when students gained one more point in musical intelligence under the condition that the

**Table 5. Analysis of Multiple Regression on the Correlation between Multiple Intelligences and English Reading Proficiency**

Predictable Variables	B	Std. Error	$\beta$	t-Value	r	$r^2$
Constant	26.376	8.294		3.180**		
Logical-mathematical	1.432	.305	.387	4.702***	.268	.072
Linguistic	.285	.360	.079	.792	.045	.002
Spatial-visual	-.046	.375	-.013	-.123	-.007	.000
Bodily-kinesthetic	-.353	.355	-.094	-.997	-.057	.003
Musical	.535	.237	.188	2.260*	.129	.017
Interpersonal	-.308	.284	-.093	-1.083	-.062	.004
Intrapersonal	.391	.319	.109	1.227	.07	.005
Naturalist	-.581	.273	-.172	-2.217*	-.121	.015
			R= .441	R <sup>2</sup> = .195		

*Note.*

1. B = unstandardized regression coefficients;  $\beta$  = standardized regression coefficients.
2. r = multiple correlation coefficient between each intelligence and English reading proficiency;  $r^2$  = squared multiple correlation coefficient between each intelligence and English reading proficiency.
3. R = multiple correlation coefficient between the eight multiple intelligences and English reading proficiency;  $R^2$  = squared multiple correlation coefficient between the eight multiple intelligences and English reading proficiency.
4. \*  $p < .05$  , \*\*  $p < .01$  , \*\*\*  $p < .001$ .

other seven variables, i.e., other seven intelligences, kept the same, they gained 0.535 points in the English reading proficiency test; as students gained one more point in naturalist intelligence under the condition that the other seven variables, i.e., other seven intelligences, kept the same, they lost 0.581 points in the English reading proficiency test. The results didn't show that the other five intelligences have obvious correlation with English reading proficiency. To conclude, only these three intelligences, i.e., logical-mathematical intelligence, musical intelligence, and naturalist intelligence are significantly correlated with English reading proficiency, especially the logical-mathematical intelligence. The result is line with the findings of McMahon and Rose (2004) that logical-mathematical intelligence contributes to students' English reading proficiency the most.

## **4.2 Comparison between High and Low Achievers**

This section answers the second research question.

### *Research Question 2*

*Are high and low achievers in English reading proficiency significantly different in their distribution of multiple intelligences and English reading proficiency?*

### **4.2.1 Comparison between High and Low Achievers in Multiple Intelligences**

Next, the researcher compared the distribution of multiple intelligences between high and low achievers by means of descriptive statistics and inferential statistics. As mentioned in Chapter 3, high achievers refer to those scored at the upper 33 percent in the English proficiency test while the low achievers refer to those scored at the bottom 33 percent in the English proficiency test. The results of distribution of multiple intelligences are summarized in Table 6.

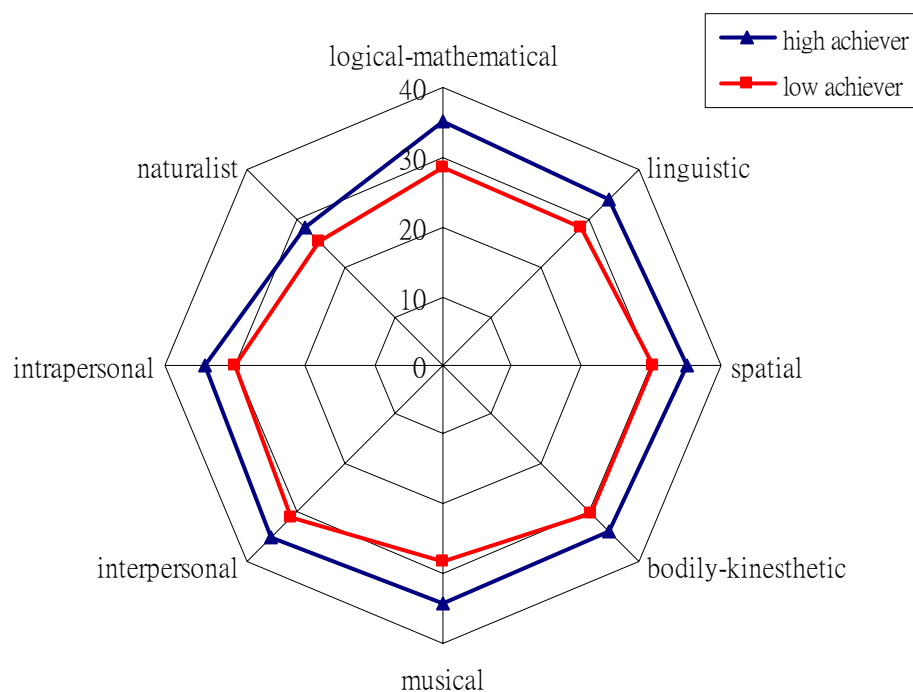
By descriptive statistics, the mean scores of all eight multiple intelligences of high achievers were higher than those of their counterparts. But, the standard deviations of the eight intelligences for high achievers were lower than those of their counterparts. Regarding the differences in the mean scores between high and low achievers, it is obvious in Figure 4 that high achievers generally had much stronger multiple intelligences, especially in logical-mathematical intelligence, musical intelligence, and linguistic intelligences whereas low achiever had stronger multiple intelligences in interpersonal intelligence, bodily-kinesthetic intelligence, and spatial-visual intelligence. In addition, the ranking of the multiple intelligences between high and low achievers was similar in linguistic intelligence, spatial-visual intelligence, interpersonal intelligence, intrapersonal intelligence, and naturalist intelligence, while the ranking was dissimilar in logical-mathematical intelligence, musical intelligence, and bodily-kinesthetic intelligences. Overall, there were some discrepancies in the distribution of multiple intelligences between high and low achievers.

After performing T-tests, high and low achievers displayed significant differences in all of the eight intelligences as shown in Table 6. The findings of the present research do not coincide with those of Chen's study (2004), which indicated significant differences between high and low achievers only existed in logical-mathematical intelligence, spatial intelligence, and naturalist intelligence. The discrepancy might be due to differences in subjects' age, gender, residential area, and goal of learning English. The subjects of Chen's study were 107 tenth-grade female students from one of the private high schools in Taipei City while the subjects of the present study were 139 male and 118 female sixth-graders from two urban and two rural elementary schools in Taipei County. Furthermore, the goal of English learning

**Table 6. Distribution of Multiple Intelligences for High and Low Achievers**

MI	Level	N	M	SD	Ranking	t-value	df
Logical-mathematical	High	83	34.98	6.50	2	6.07***	167
	Low	86	28.60	7.13	5		
Linguistic	High	83	33.76	7.00	7	5.01***	167
	Low	86	28.16	7.51	6		
Spatial-visual	High	83	35.17	6.49	1	4.35***	159.51
	Low	86	30.16	8.39	3		
Bodily-kinesthetic	High	83	34.02	7.13	6	3.28***	167
	Low	86	30.31	7.57	2		
Musical	High	83	34.37	8.31	4	4.475***	167
	Low	86	28.15	9.69	7		
Interpersonal	High	83	34.93	7.58	3	3.14**	167
	Low	86	31.02	8.54	1		
Intrapersonal	High	83	34.33	6.42	5	3.63***	156.63
	Low	86	30.07	8.67	4		
Naturalist	High	83	28.19	6.90	8	2.44*	160.25
	Low	86	25.21	8.82	8		

Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

**Figure 4. Comparison between High and Low Achievers in Multiple Intelligences**



in high schools, with its emphasis on the memorization of vocabulary, may lessen the interests of learners while the goal of English learning in elementary school, focusing on the development of interests, may be fun and motivating for learners. As a result, the distribution of multiple intelligences for high and low achievers may be different in these two studies.

#### **4.2.2 Comparison between High and Low Achievers in English Reading**

##### **Proficiency**

Based on the results of English reading proficiency test, the comparisons in English reading proficiency between different proficiency levels are presented in Table 7 and Figure 4. As the statistical data showed in Table 7, the mean scores of high achievers greatly exceeded those of low achievers in the English reading proficiency test. The standard deviations of low achievers were much higher than those of high achievers. In addition, high achievers outperformed low achievers greatly, especially in the dialogue section, subsequently in the sentence section, and last in the vocabulary section based on the differences of the mean scores between these two groups. This result may be caused by the increasing difficulty of each section in the English reading proficiency test from vocabulary section, to sentence section, and last to dialogue section.

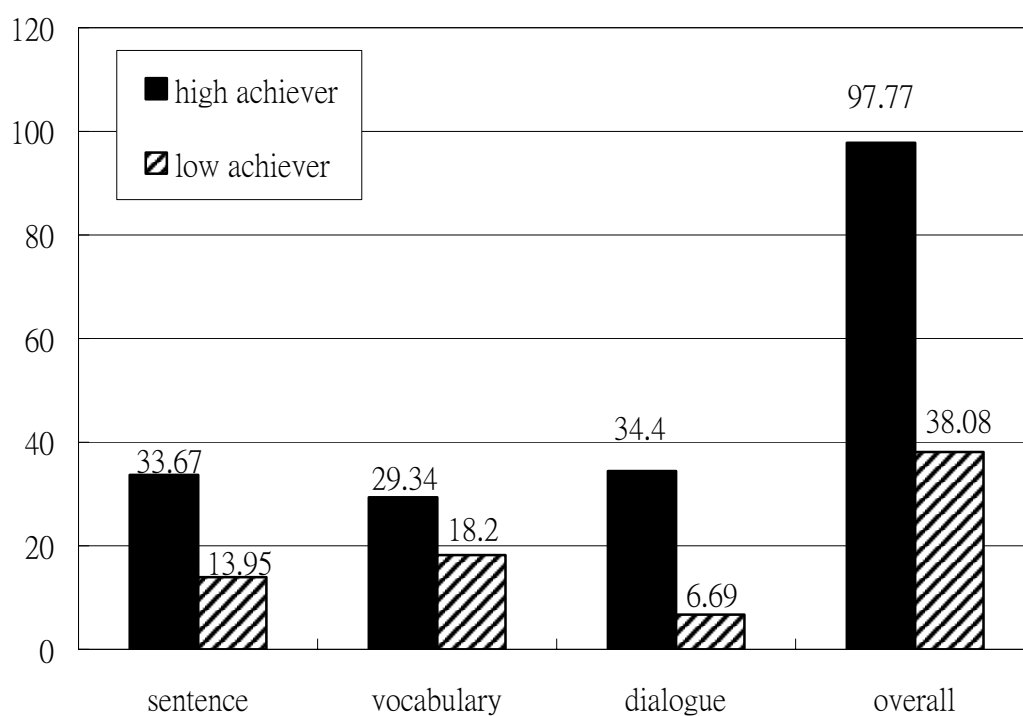
What's more, the results of the T-test analysis showed that high and low achievers had significant differences in the English reading proficiency test ( $t = 32.67$ ,  $p < .001$ ). More scenically, the significant differences existed in sentence section ( $t = 17.69$ ,  $p < .001$ ), vocabulary section ( $t = 13.39$ ,  $p < .001$ ), and dialogue section ( $t = 36.71$ ,  $p < .001$ ). It showed an evident gap in English reading proficiency between high and low achievers, which may be caused by the so-called "twin-peak

phenomenon” of English learning in Taiwan (Chou, 2002; Lin, 2003).

**Table 7. English Reading Proficiency for High and Low Achievers**

English Reading Proficiency Test	Level	N	M	SD	t-value	df
Sentence	High	83	33.67	2.22	17.69***	93.50
	Low	86	13.95	10.09		
Vocabulary	High	83	29.34	1.303	13.39***	89.88
	Low	86	18.20	7.82		
Dialogue	High	83	34.40	1.638	36.71***	95.17
	Low	86	6.69	6.80		
Overall	High	83	97.77	2.50	32.67***	88.92
	Low	86	38.08	16.75		

Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .



**Figure 5. Comparison between High and Low Achievers in English Reading Proficiency**

### 4.3 Comparison between Different Genders

This section deals with the third research question.

### *Research Question 3*

*Are boys and girls significantly different in the distribution of multiple intelligences and English reading proficiency?*

#### **4.3.1 Comparison between Different Genders in Multiple Intelligences**

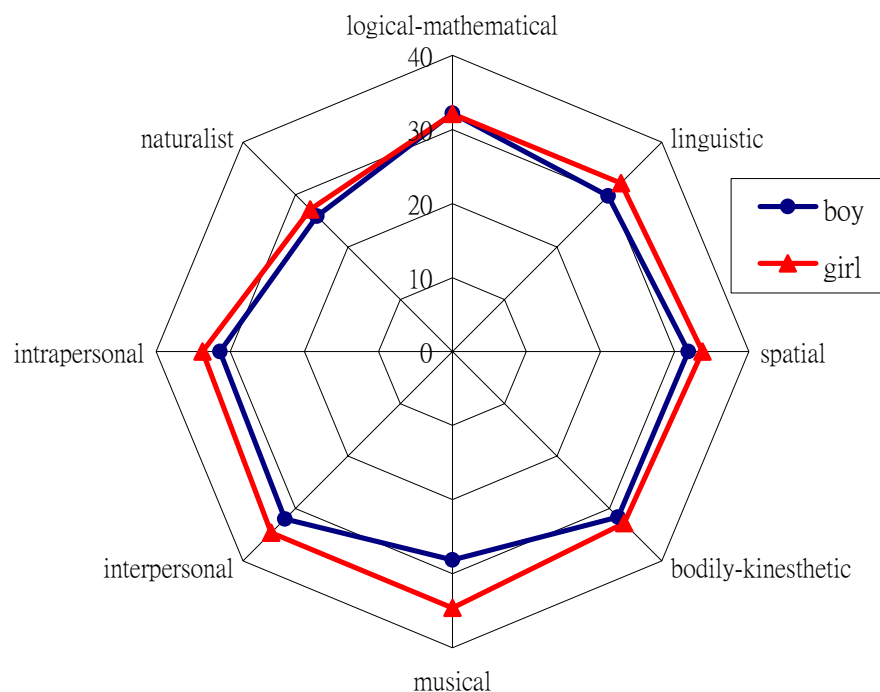
Table 8 presents the statistical results of comparison in students' multiple intelligences between different genders. As shown in Table 8, the results indicated that except for the logical-mathematical intelligence, girls got higher mean scores in the other seven intelligences than boys. Additionally, the rankings of boys' and girls' multiple intelligences were not totally similar. It is noted that boys' logical-mathematical intelligence ranked the highest while the girls' logical-mathematical intelligence ranked the final second. Girls' musical intelligence ranked the second while boy's musical intelligence ranked the final second. To sum up, girls had higher mean scores in the multiple intelligences, except for the logical-mathematical intelligence (see Figure 6).

To examine whether significant differences in multiple intelligences exist between different genders, the researcher conducted T-test to yield the results. As shown in Table 8, boys and girls had significant differences in linguistic intelligence ( $t = -2.54, p < .05$ ), musical intelligence ( $t = -5.7, p < .001$ ), interpersonal ( $t = -2.6, p < 0.1$ ), as well as intrapersonal intelligence ( $t = -2.51, p < .05$ ). That is to say, girls performed much better in the above four intelligences than boys. It appears that the distribution of multiple intelligences between boys and girls are different, especially in linguistic, musical, interpersonal and intrapersonal intelligences. The results are consistent with those of previous studies on investigation of elementary school students' multiple intelligences between different genders (Wang, 2003; Wu, 2002).

**Table 8. Distribution of Multiple Intelligences for Different Genders**

MI	Gender	N	M	SD	Ranking	t-value	df
Logical-mathematical	Boy	139	32.18	7.89	1	0.85	255
	Girl	118	32.10	6.80	7		
Linguistic	Boy	139	29.73	8.03	6	-2.54*	255
	Girl	118	32.14	6.94	6		
Spatial-visual	Boy	139	31.86	8.09	3	-1.96	255
	Girl	118	33.73	7.05	4		
Bodily-kinesthetic	Boy	139	31.63	7.25	4	-1.246	255
	Girl	118	32.76	7.23	5		
Musical	Boy	139	28.14	9.74	7	-5.7***	255
	Girl	118	34.61	8.19	2		
Interpersonal	Boy	139	31.97	8.58	2	-2.6**	255
	Girl	118	34.62	7.60	1		
Intrapersonal	Boy	139	31.37	8.05	5	-2.51*	255
	Girl	118	33.74	6.86	3		
Naturalist	Boy	139	25.90	8.49	8	-1.24	255
	Girl	118	27.15	7.58	8		

Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

**Figure 6. Comparison between Boys and Girls in Multiple Intelligences**

### 4.3.2 Comparison between Different Genders in English Reading Proficiency

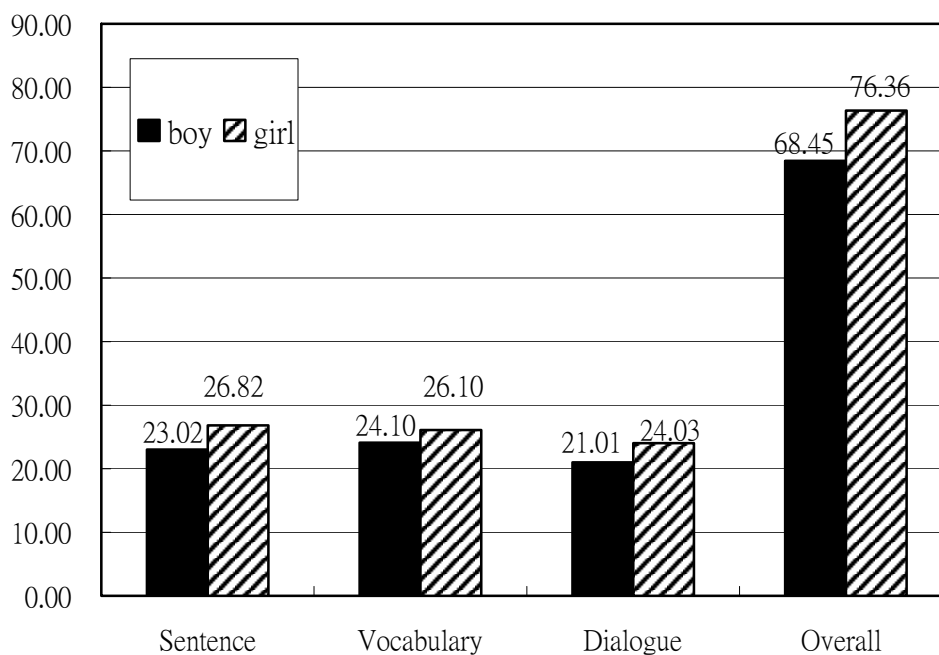
Table 9 displays the statistical results of students' English reading proficiency between different genders. First, girls got higher mean scores of English reading proficiency ( $M= 76.36$ ) than those of boys ( $M= 68.45$ ) and the standard deviations of girls' English reading proficiency were all smaller than those of boys'. As for the results in the three sections of the English reading proficiency tests, girls performed better than boys, which could be detected clearly in Figure 2. It appears that girls had better English reading proficiency than boys.

What's more, the researcher adopted T-test to ascertain whether boys and girls have significant differences in their English reading proficiency. The result showed that significant difference indeed existed between different genders in their English reading proficiency ( $t = -2.373$ ,  $p < .05$ ). Namely, boys and girls had different performances in vocabulary section ( $t = -2.37$ ,  $p < .05$ ) and sentence section ( $t = -2.94$ ,  $p < .01$ ), but not in dialogue section ( $t = -1.86$ ,  $p < .05$ ). Compared with boys, girls seem to have better English reading proficiency, especially in sentence reading and vocabulary.

**Table 9. English Reading Proficiency for Different Genders**

English Reading Proficiency Test	Gender	N	M	SD	t-value	df
Sentence	Boy	139	23.02	11.51	-2.94**	254.23
	Girl	118	26.82	9.24		
Vocabulary	Boy	139	24.10	8.30	-2.37*	232.86
	Girl	118	26.10	5.07		
Dialogue	Boy	139	21.01	13.53	-1.86	255
	Girl	118	24.03	12.34		
Overall	Boy	139	68.45	29.96	-2.373*	253.27
	Girl	118	76.36	23.38		

Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .



*Figure 7. Comparison between Boys and Girls in English Reading Proficiency*

#### **4.4 Correlation between Multiple Intelligences and English Reading Proficiency for Different Genders**

In the final section, the researcher targets at the fourth research question.

##### *Research Question 4*

*Do different genders lead to the same dominant multiple intelligences which are significantly correlated with their English reading proficiency?*

##### **4.4.1 Correlation between Multiple Intelligences and English Reading Proficiency for Boys**

Table 10 displays the result of multiple regression analysis about boys' multiple intelligences correlated with English reading proficiency. The results showed that the eight variables accounted for 24.3% of the shared variance of boys' English reading proficiency ( $R^2 = .243$ ). Among the eight multiple intelligences, only

logical-mathematical intelligence was significantly correlated with boys' English reading proficiency ( $r^2 = .123$ ,  $p < .001$ ). When boys gained one more point in logical-mathematical intelligence under the condition that other seven variables, i.e., other seven intelligences, kept the same, they gained 2.127 points in the English reading proficiency test. Namely, logical-mathematical intelligence significantly contributed to boys' English reading proficiency.

**Table 10. Analysis of Multiple Regression on the Correlation between Multiple Intelligences and English Reading Proficiency for Boys**

Predictable Variable	B	Std. Error	$\beta$	t-Value	r	$r^2$
Constant	18.676	11.380		1.641		
Logical-mathematical	2.127	.463	.560	4.594***	.351	.123
Linguistic	.133	.531	.036	.250	.019	.000
Spatial-visual	-.122	.535	-.033	-.228	-.017	.000
Bodily-kinesthetic	-.708	.578	-.171	-1.225	-.093	.009
Musical	.454	.352	.148	1.290	.098	.010
Interpersonal	-.011	.460	-.003	-.023	-.002	.000
Intrapersonal	.282	.459	.076	.613	.047	.002
Naturalist	-.681	.422	-.193	-1.614	-.123	.015
$R = .493$		$R^2 = .243$				

Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

#### 4.4.2 Correlation between Multiple Intelligences and English Reading Proficiency for Girls

As shown in Table 9, the researcher did the analysis of multiple regression about girls' multiple intelligences correlated with English reading proficiency. The findings demonstrated that the eight variables could explain 15.6% of the shared variance of girls' English reading proficiency ( $R^2 = .156$ ). Besides, girls' English reading

proficiency was positively correlated with logical-mathematical intelligence ( $r = .175$ ,  $p < .05$ ), but negatively correlated with interpersonal intelligence ( $r = -.175$ ,  $p < .05$ ).

When girls gained one more point in logical-mathematical intelligence under the condition that other seven variables, i.e., other seven intelligences, kept the same, girls gained .816 points in the English reading proficiency test. On the contrary, when girls gained one more point in interpersonal intelligence under the condition that the other seven variables, i.e., other seven intelligences, kept the same, girls lost English reading proficiency test .738 points. That is to say, girls with higher logical-mathematical intelligence are better at English reading proficiency while girls with higher interpersonal intelligence are weaker at English reading proficiency. It is interesting to find that the moderate negative correlation between the interpersonal intelligence and English reading proficiency ( $r = -.175$ ,  $p < .05$ ) is similar to the findings of previous studies, which reported that English reading is positively correlated to Field Independent students who are considered to have lower

**Table 11. Multiple Regression Analysis on the Correlation between Multiple Intelligences and English Reading Proficiency for Girls**

Predictable Variable	B	Std. Error	$\beta$	t-Value	r	$r^2$
Constant	45.471	12.464		3.648***		
Logical-mathematical	.816	.411	.238	1.987*	.175	.031
Linguistic	.633	.488	.188	1.297	.114	.013
Spatial-visual	-.121	.530	-.037	-.229	-.020	.000
Bodily-kinesthetic	.192	.445	.060	.432	.038	.001
Musical	.397	.385	.139	1.030	.091	.008
Interpersonal	-.738	.371	-.240	-1.991*	-.175	.031
Intrapersonal	.384	.443	.113	.867	.076	.006
Naturalist	-.700	.370	-.227	-1.893	-.167	.028
$R = .395$		$R^2 = .156$				

Note. \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .



interpersonal and social orientation (Bialystok & Frohlich, 1978; Seliger, 1977).

To conclude, the researcher discovered that regardless of gender, logical-mathematical intelligence was the dominant intelligence correlated with English reading proficiency. The result is consistent with the earlier finding of the present research, i.e., logical-mathematical intelligence contributed to students' English reading proficiency the most.