CHAPTER IV

FINDINGS

Chapter Four presents the results of the data analysis in four parts. The first part, the descriptive statistics of each group of samples are presented. The second part deals with the correlation coefficients of each group. The results that are obtained from the multiple regression analysis are demonstrated in the third part. Finally, the last part covers the findings from the open-ended question in the questionnaire.

Descriptive Statistics

Descriptive statistics of the computer attitudes, computer anxiety, computer familiarity, and the CBT scores of the high language ability group are presented in Table 6. The mean of the high language ability group of students is 22.17 on CBT scores, 33.30 on computer attitudes, 20.17 on computer anxiety, and 28.60 on computer familiarity scores. Computer attitudes and computer familiarity have more or less the same variability from the central point in their distributions, 4.32 and 4.31 respectively. The standard deviations of computer anxiety and CBT scores are 3.70 and 2.95 respectively. This implies that 68.30% of the high language ability group of students gets CBT scores between 19.23 and 25.12. The number of participants is 30 and therefore there is no missing value in the study.

Table 6. Descriptive Statistics of the High Language Ability Group

Variables	Mean	SD	Max	Min
CBT Scores	22.17	2.95	27	17
Attitudes	33.30	4.32	39	21
Anxiety	20.17	3.70	31	14
Familiarity	28.60	4.31	38	20

N = 30

Descriptive statistics of the three computer related variables and the CBT scores of the average ability group are presented in Table 7. The mean of the average ability group of students is 18.00 on CBT scores and the means of the computer attitudes, computer anxiety, and computer familiarity scores are 32.43, 20.57, and 29.63 respectively. Computer familiarity had the greatest standard deviation of 3.80. The standard deviations of computer anxiety, computer attitudes and CBT scores are 3.46, 3.20, and 3.10 respectively. About 68.30% of the average language ability group of students obtain CBT scores between 14.91 and 21.10. Again as the total number of the participants is 30 there is no missing value.

Table 7. Descriptive Statistics of the Average Language Ability Group

Variables	Mean	SD	Max	Min
CBT Scores	18.00	3.10	23	12
Attitudes	32.43	3.20	40	27
Anxiety	20.57	3.46	28	15
Familiarity	29.63	3.80	36	20

N = 30

Table 8 presents the descriptive statistics of each variable of the low language ability group. On average, the mean of the low language ability group of students is 13.07 on CBT scores, and the means of computer attitudes, computer anxiety, and computer familiarity scores are 32.30, 19.70, and 28.40 respectively. The standard deviations of computer attitudes, computer anxiety, and computer familiarity are 4.63, 4.49, and 4.07 respectively. The lowest standard deviation is from CBT which is 2.97. Approximately 68.30% of the students with the low language ability group obtain CBT scores between 10.70 and 16.04. Once again there is no missing value.

Table 8. Descriptive Statistics of the Low Language Ability Group

Variables	Mean	SD	Max	Min
CBT Scores	13.07	2.97	18	7
Attitudes	32.30	4.63	40	23
Anxiety	19.70	4.49	26	10
Familiarity	28.40	4.07	37	22

N = 30

Table 9 presents descriptive statistics of each variable of the combined language ability group. On average, the mean of the combined language ability group of students is 17.74 on CBT scores. The means of computer attitudes, computer anxiety, and computer familiarity scores of this group of students are 32.68, 20.14, and 28.88 respectively. The standard deviations of CBT score, computer attitudes, computer anxiety, and computer familiarity are 4.78, 4.07, 3.88, and 4.06 respectively. Approximately 68.30% of the students of the combined language ability group obtain CBT scores between 12.96 and 22.52. There is no missing value.

Table 9. Descriptive Statistics of the Combined Language Ability Group

Variables	Mean	SD	Max	Min
CBT Scores	17.74	4.78	27	7
Attitudes	32.68	4.07	40	21
Anxiety	20.14	3.88	31	10
Familiarity	28.88	4.06	38	20

N = 90

Comparisons of means were conducted on the four variables of the high, average, and low language ability groups in order to obtain a better understanding and interpretation of the relationships among them. The results indicated that the mean

CBT scores of the high, average, and low language ability groups are significantly different at the .05 level. The difference between the sample CBT mean scores of high and average language ability group was 4.17, with a 95% confidence interval from 2.60 to 5.73 and the t-test statistic was 5.34, with 58 degrees of freedom and an associated p value of $p = .00$. The difference between the sample CBT mean scores of high and low language ability group was 9.10, with a 95% confidence interval from 7.57 to 10.63 and the t-test statistic was 11.91, with 58 degrees of freedom and an associated p value of $p = .00$. Finally, the difference between the sample CBT mean scores of average and low language ability group was 4.93, with a 95% confidence interval from 3.37 to 6.50; the t-test statistic was 6.30, with 58 degrees of freedom and an associated p value of $p = .00$.

However, the mean scores of computer attitudes, computer anxiety, and computer familiarity among the high, average, and low language ability groups are not significantly different at the .05 level. (See Appendix K).

Correlational Analysis

The relationships among the three independent variables are investigated to find answers to the research questions that are (1) "What are the relationships among computer familiarity, computer anxiety, and computer attitudes of test-takers with high, average, and low language ability?" and (2) "What is the relationship between each of the variables and the reading comprehension CBT scores of test-takers with high, average, and low language ability?" Both research questions correspond to Hypothesis 1 and Hypothesis 2.

Hypothesis 1 Testing

In order to test the first hypothesis, linearity of the relationship is investigated by the scatterplots. Then Pearson product-moment correlation coefficients were calculated to indicate the relationships among the three independent variables of all three groups.

H 1.1: There are significant relationships among the three variables of test-takers with high language ability at the .05 level ($H_{1.1}$: $r \neq 0$).

Table 10 shows the intercorrelations among the three variables of the high language ability group. The relationship between computer attitudes and computer anxiety is highly and negatively correlated ($r = -.710$, $p < .05$). There is a moderate positive relationship between computer attitudes and computer familiarity ($r = .461$, $p < .05$) and there is a moderate negative relationship between computer anxiety and computer familiarity ($r = -.573$, $p < .05$). Therefore, Hypothesis 1.1 is accepted. There are significant relationships among the three variables of test-takers with high language ability at the .05 level.

Table 10. Correlation Matrix of the High Language Ability Group

	Attitudes	Anxiety	Familiarity
Attitudes	1.000	-.710*	.461*
Anxiety		1.000	-.573*
Familiarity			1.000

* Correlation is significant at the .05 level (2-tailed).

H 1.2: There are significant relationships among the three variables of test-takers with average language ability at the .05 level ($H_{1.2}$: $r \neq 0$).

Table 11 illustrates the intercorrelations among the three variables of the average language ability group. There is a moderate negative relationship between computer attitudes and computer anxiety ($r = -.558$, $p < .05$). Computer attitudes and computer anxiety are not significantly correlated with computer familiarity. Thus, hypothesis 1.2 is partially accepted.

Table 11. Correlation Matrix of the Average Language Ability Group

	Attitudes	Anxiety	Familiarity
Attitudes	1.000	-.558*	.098
Anxiety		1.000	-.330
Familiarity			1.000

* Correlation is significant at the .05 level (2-tailed).

H 1.3: There are significant relationships among the three variables of test-takers with low language ability at the .05 level ($H_{1.3}$: $r \neq 0$).

Table 12 presents the intercorrelations among the three variables of the low language ability group. There is a rather strong negative relationship between computer attitudes and computer anxiety ($r = -.690$, $p < .05$). The relationship between computer anxiety and computer familiarity is moderately and negatively correlated ($r = -.533$, $p < .05$) while there is a moderate positive relationship between computer attitudes and computer familiarity ($r = .446$, $p < .05$). Hypothesis 1.3 is, thus, accepted. Therefore, there are significant relationships among the three variables of test-takers with low language ability at the .05 level.

Table 12. Correlation Matrix of the Low Language Ability Group

	Attitudes	Anxiety	Familiarity
Attitudes	1.000	-.690*	.446*
Anxiety		1.000	-.533*
Familiarity			1.000

* Correlation is significant at the .05 level (2-tailed).

H 1.4: There are significant relationships among the three variables of test-takers of the combined language ability group at the .05 level ($H_{1.4}$: $r \neq 0$).

Table 13 presents the intercorrelations among the three variables of the combined language ability group. There is a relatively strong negative relationship

between computer attitudes and computer anxiety (r = -.655, p < .05). The relationship between computer anxiety and computer familiarity is moderately and negatively correlated (r = -.469, p < .05) while there is a mild positive relationship between computer attitudes and computer familiarity (r = .355, p < .05). Hypothesis 1.4 is, thus, accepted. Therefore, there are significant relationships among the three variables of test-takers of the combined language ability at the .05 level.

Table 13. Correlation Matrix of the Combined Language Ability Group

	Attitudes	Anxiety	Familiarity
Attitudes	1.000	-.655*	.355*
Anxiety		1.000	-.469*
Familiarity			1.000

* Correlation is significant at the .05 level (2-tailed).

It can be concluded that computer attitudes and computer anxiety are significantly and negatively correlated in all groups. There is a strong relationship between the two variables for high and low language ability groups (r = -.710, -.690, p < .05) and a relatively strong relationship for the combined language ability group (r = -.655, p < .05). In addition, there is a moderate relationship for the average language ability group (r = -.558, p < .05). There is a moderate positive relationship between computer attitudes and computer familiarity in the high and low language ability groups (r = .461, .446, p < .05) and a mild positive relationship in the combined language ability group (r = .355, p < .5), but there is no significant relationship in the average language ability group. The relationship between computer anxiety and computer familiarity is moderately and negatively correlated for the high, low, and combined language ability groups (r = -.573, -.533, -.469, p < .05), but there is no significant relationship in the average language ability group. Hypotheses 1.1, 1.3, and 1.4 are thus accepted at the significant level of .05 while hypothesis 1.2 is partially accepted at .05 level.

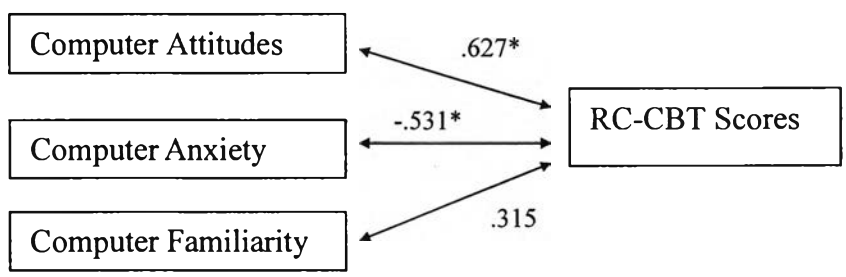
Hypothesis 2 Testing

In an attempt to test the second hypothesis, linearity of the relationships is investigated by the use of scatterplots. Then the relationships between the three independent variables and the reading comprehension CBT scores of each group of participants were then examined.

H 2.1: There is a significant relationship between each variable and the reading comprehension CBT scores of test-takers with high language ability at the .05 level ($H_{2.1}$: $r \neq 0$).

Figure 9 represents the relationship between the independent variables and the reading comprehension CBT scores of the high language ability group.

The correlation between computer attitudes and reading comprehension CBT scores is .627 ($p < .05$). Therefore, they are significantly correlated with each other at a moderate level. As expected computer anxiety correlates negatively with CBT scores. The correlation coefficient is -.531 ($p < .05$). The relationship between computer familiarity and CBT score is not significant. Therefore, Hypothesis 2.1 is partially accepted.



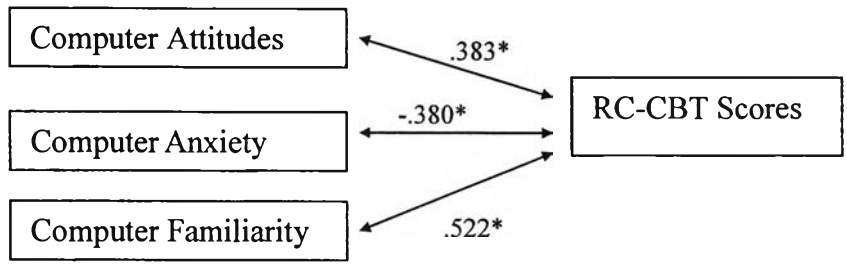
* Correlation is significant at the .05 level (2-tailed).

Figure 9. The Relationship between each Test-Takers' Variable and the RC-CBT Scores of the High Language Ability Group

H 2.2: There is a significant relationship between each variable and the reading comprehension CBT scores of test-takers with average language ability at the .05 level ($H_{2.2}$: $r \neq 0$).

Figure 10 represents the relationship between the independent variables and the CBT reading comprehension scores of the average language ability group. The

strength of the relationship between computer attitudes and CBT scores is weak (r = .383, $p < .05$). This is similar to the correlation between computer anxiety and CBT scores (r = -.380, $p < .05$) although the direction of the relationship is different. There is a moderate significant relationship between computer familiarity and CBT score (r = .522, $p < .05$). Thus, Hypothesis 2.2 is accepted. There is a significant relationship between each variable and the reading comprehension CBT scores of test-takers with average language ability at the .05 level.

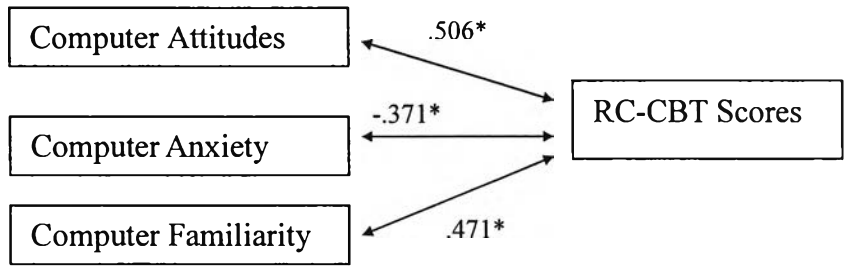


* Correlation is significant at the .05 level (2-tailed).

Figure 10. The Relationship between each Test-Takers' Variable and the RC-CBT Scores of the Average Language Ability Group

H 2.3: There is a significant relationship between each variable and the reading comprehension CBT scores of test-takers with low language ability at the .05 level ($H_{2.3}$: $r \neq 0$).

Figure 11 represents the relationship between the independent variables and the CBT reading comprehension scores of the low language ability group. The relationship between computer attitudes and CBT scores is moderate (r = .506, $p < .05$) which is similar to the relationship between computer familiarity and CBT scores (r = .471, $p < .05$). There is a weak negative relationship between computer anxiety and CBT score (r = -.371, $p < .05$). Thus, Hypothesis 2.3 is accepted. There is a significant relationship between each variable and the reading comprehension CBT scores of test-takers with low language ability at the .05 level.

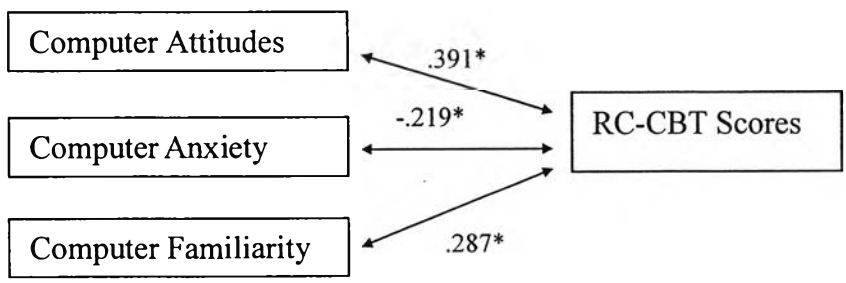


* Correlation is significant at the .05 level (2-tailed).

Figure 11. The Relationship between each Test-Takers' Variable and the RC-CBT Scores of the Low Language Ability Group

H 2.4: There is a significant relationship between each variable and the reading comprehension CBT scores of test-takers of the combined language ability at the .05 level ($H_{2.4}$: $r \neq 0$).

Figure 12 represents the relationship between the independent variables and the CBT reading comprehension scores of the combined language ability group. The relationship between computer attitudes and CBT scores is mild ($r = .319$, $p < .05$) which is similar to the relationship between computer familiarity and CBT scores ($r = .287$, $p < .05$). There is a mild and negative relationship between computer anxiety and CBT score ($r = -.219$, $p < .05$). Thus, Hypothesis 2.4 is accepted. There is a significant relationship between each variable and the reading comprehension CBT scores of test-takers of the combined language ability at the .05 level.



* Correlation is significant at the .05 level (2-tailed).

Figure 12. The Relationship between each Test-Takers' Variable and the RC-CBT Scores of the Combined Language Ability Group

In summary, the computer attitudes are correlated with CBT scores at the moderate level for the high and low language ability groups (r = .627, .506, $p < .05$). Those of the average and combined groups are weaker correlated (r = .383, .391, $p < .05$). There is a moderate negative relationship between computer anxiety and CBT scores of the high language ability group (r = -.531, $p < .05$) while there is a weaker relationship for the average, low, and combined language ability groups (r = -.380, -.371, -.219, $p < .05$). Finally, the correlation coefficients between computer familiarity and CBT scores show moderate relationship for the average and low language ability groups (r = .522, .446, $p < .05$) and show mild relationship for the combined language ability group (r = .287, $p < .05$). There is no significant relationship for the high language ability group. Therefore, Hypothesis 2.1 is partially accepted while Hypothesis 2.2, Hypothesis 2.3 and Hypothesis 2.4 are set out below.

Multiple Regression Analysis

In order to answer the third research question, "To what extent can the three variables individually or in combination predict the reading comprehension CBT scores of test-takers with high, average, and low language ability?", the best equation to predict the reading comprehension CBT scores for each group of students needs to be formulated. The multiple regression analysis with the "enter" method is used in this study where all independent variables are entered into the equation at the same time. Then the linearity is checked using partial residual plots. The results from the multiple regression analysis which answer the third research question are presented subsequently.

Hypothesis 3 Testing

H 3.1: The three selected variables can individually or in combination significantly predict the reading comprehension CBT scores of test-takers with high language ability at the .05 level ($H_{3.1}$: at least one $B \neq 0$).

Table 14 demonstrates the model summary of the high language ability group. The R coefficient value of .639 indicates that the relationship between the CBT score and the predictors is moderate and positive. R-Square is equal to .409 which means that 40.90% of the variation in the CBT score is accounted for by the independent

variables or predictors. The standard error of the estimate of 2.395 means that, on average, the predicted values of the CBT score could vary between ±2.395 about the estimated regression equation for each value of the independent variables.

The R-Square change is the improvement in R-Square when one additional predictor is added into the calculation. The R-Square change is tested with an F-test, which is referred to as the F-change. A significant F-change means that the variables added in that step significantly improved the prediction. Since the analysis employs the "enter" method where all predictors are entered into the equation at the same time, the value of R-Square change remains constant.

Table 14. Model Summary of the High Language Ability Group

					Change Statistics				
Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate	R-Square Change	F Change	df1	df2	Sig. F Change
1	.639	.409	.340	2.395	.409	5.987	3	26	.003

a Predictors: (Constant), Computer Familiarity Score, Computer Attitudes Score, Computer Anxiety Score

b Dependent Variable: CBT Score

The results from an analysis of variance (ANOVA) of the high language ability group are presented in Table 15. In ANOVA, the variation both within and between each group of the variables is analyzed, yielding an F value. This F value is then checked to see if it is statistically significant. The F test is used to test the significance of R coefficient which is the same as testing the significance of R^2 where the significance of the regression model as a whole is tested (Garson, 2004). In Table 13, the F value is 5.987 with p-value at .003. The full Linear Regression Model is statistically significant at the .05 significant level.

Table 15. ANOVA of the High Language Ability Group

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	103.031	3	34.344	5.987	.003
	Residual	149.136	26	5.736		
	Total	252.167	29			

a Predictors: (Constant), Computer Familiarity Score, Computer Attitudes Score, Computer Anxiety Score

b Dependent Variable: CBT Score

Table 16 demonstrates the coefficients of the high language ability group. The unstandardized coefficient B is the average amount of the dependent variable which increases when the independent increases by one unit and the other independents are held constant. T-tests are used to assess the significance of individual B coefficients. "Computer attitudes" is the only predictor variable that produces a t value that is statistically significant at the $\alpha = .05$ level ($B = .347$, $t = 2.358$, $p = .026$). The constant (the Y-intercept), computer anxiety, and computer familiarity are not significant at the .05 level and are thus dropped from the equation (Garson, 2004). The regression equation for the high ability group can therefore be written as

CBT Score = .347(Computer Attitudes Score).

It can be said that "computer attitudes" has a significant influence on CBT score. For every one unit increases in computer attitudes, the CBT score will increase by .347 with the standard error of .147. Therefore, Hypothesis 3.1 which states that the three selected variables can individually or in combination significantly predict the reading comprehension CBT scores of test-takers with high language ability at the .05 level ($H_{3.1}$: at least one $B \neq 0$) is accepted.

When the predictors are highly correlated among themselves which is called multicollinearity, though the estimates of the coefficients do not change, the reliability does. It becomes difficult to assess the relative importance of the independent variables using beta weights. Garson (2004) mentioned that it is a rule of thumb that

if the tolerance is less than .20 or the Variance Inflation Factor (VIF) is equal or more than 4, a problem of multicolinearity is indicated. The collinearity statistics in Table 14 show no indication of such a multicollinearity problem. More collinearity diagnostics and residual statistics of the high language ability group are presented in Appendix G.

Table 16. Coefficients of the High Language Ability Group

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	14.106	9.010		1.566	.130		
	ATTI	.347	.147	.507	2.358	.026	.492	2.034
	ANXI	-.148	.186	-.185	-.795	.434	.419	2.388
	FAMI	-1.731E-02	.126	-.025	-.137	.892	.665	1.503

Dependent Variable: CBT Score

ATTI: Computer Attitudes Score

ANXI: Computer Anxiety Score

FAMI: Computer Familiarity Score

H 3.2: The three selected variables can individually or in combination significantly predict the reading comprehension CBT scores of test-takers with average language ability at the .05 level ($H_{3.2}$: at least one $B \neq 0$).

The model summary of the average language ability group is presented in Table 17. The R coefficient value of .620 indicates that the relationship between the CBT score and the predictors is moderate and positive. R-Square equals .384 which means that only 38.40% of the variation in the CBT score is explained by the independent variables or predictors. The standard error of the estimate is 2.565. Thus, on average, the predicted values of the CBT score could vary between ±2.565 about the estimated regression equation for each value of the independent variables.

Table 17. Model Summary of the Average Language Ability Group

Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Change Statistics				
					R-Square Change	F Change	df1	df2	Sig. F Change
1	.620	.384	.313	2.565	.384	5.413	3	26	.005

a Predictors: (Constant), Computer Familiarity Score, Computer Attitudes Score, Computer Anxiety Score

b Dependent Variable: CBT Score

Table 18 presents the results from an analysis of variance (ANOVA) of the average language ability group. From the ANOVA table, the F coefficient is 5.413 with p-value at .005. The full Linear Regression Model is statistically significant at the .05 level.

Table 18. ANOVA of the Average Language Ability Group

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	106.884	3	35.628	5.413	.005
	Residual	171.116	26	6.581		
	Total	278.000	29			

a Predictors: (Constant), Computer Familiarity Score, Computer Attitudes Score, Computer Anxiety Score

b Dependent Variable: CBT Score

Table 19 demonstrates the coefficients of the average language ability group. Computer familiarity is the only predictor variable that produces a statistically significant t value at the $\alpha = .05$ level (B = .386, t = 2.892, $p = .008$). The constant, computer attitudes, and computer anxiety are not significant at the .05 level, so they

are therefore not used in the equation. The regression equation of the average language ability group can be written as

CBT Score = .386(Computer Familiarity Score).

Computer familiarity has a significant influence on CBT score. For every unit increases in computer familiarity, the CBT score will increase by .386 with the standard error of .134. Hypothesis 3.2 which states that the three selected variables can individually or in combination significantly predict the reading comprehension CBT scores of test-takers with average language ability at the .05 level ($H_{3.2}$: at least one $B \neq 0$) is thus accepted at the $\alpha = .05$.

Collinearity statistics show no indication of the multicollinearity problem. More collinearity diagnostics and residuals statistics of the average language ability group are presented in Appendix H.

Table 19. Coefficients of the Average Language Ability Group

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-2.103	10.072		-.209	.836		
	ATTI	.297	.180	.307	1.644	.112	.680	1.470
	ANXI	-4.673E-02	.176	-.052	-.266	.793	.612	1.633
	FAMI	.386	.134	.474	2.892	.008	.881	1.135

a Dependent Variable: CBT Score

ATTI: Computer Attitudes Score

ANXI: Computer Anxiety Score

FAMI: Computer Familiarity Score

H 3.3: The three selected variables can individually or in combination significantly predict the reading comprehension CBT scores of test-takers with low language ability at the .05 level ($H_{3.3}$: at least one $B \neq 0$).

The model summary of the low language ability group is presented in Table 20. The R coefficient value of .579 indicates that the relationship between the

CBT score and the predictors is moderate and positive. R-Square is equal to .336 which means that only 33.60% of the variation in the CBT score is explained by the independent variables or predictors. The standard error of the estimate is 2.557.

Table 20. Model Summary of the Low Language Ability Group

					Change Statistics				
Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate	R-Square Change	F Change	df1	df2	Sig. F Change
1	.579	.336	.259	2.557	.336	4.377	3	26	.013

a Predictors: (Constant), Computer Familiarity Score, Computer Attitudes Score, Computer Anxiety Score

b Dependent Variable: CBT Score

The results from an analysis of variance (ANOVA) of the low language ability group are presented in Table 21. From the ANOVA table, the F value is 4.377 with the p-value at .013. The full Linear Regression Model is statistically significant at the .05 level.

Table 21. ANOVA of the Low Language Ability Group

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	85.864	3	28.621	4.377	.013
	Residual	170.003	26	6.539		
	Total	255.867	29			

a Predictors: (Constant), Computer Familiarity Score, Computer Attitudes Score, Computer Anxiety Score

b Dependent Variable: CBT Score

Table 22 demonstrates the coefficients of the low language ability group. None of the predictor variables can statistically significantly predict the reading comprehension CBT scores of the test-takers with low language ability at the $\alpha = .05$ level. The hypotheses, $H_{3.3}$: at least one $B \neq 0$, is rejected at the .05 level.

Collinearity diagnostics and residuals statistics of the low language ability group are presented in Appendix I.

Table 22. Coefficients of the Low Language Ability Group

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-4.044	8.199		-.493	.626		
	ATTI	.274	.143	.426	1.916	.066	.516	1.939
	ANXI	6.732E-02	.156	.102	.432	.669	.461	2.170
	FAMI	.244	.139	.335	1.759	.090	.705	1.419

a Dependent Variable: CBT Score

ATTI: Computer Attitudes Score

ANXI: Computer Anxiety Score

FAMI: Computer Familiarity Score

H 3.4: The three selected variables can individually or in combination significantly predict the reading comprehension CBT scores of test-takers of the combined language ability group at the .05 level ($H_{3.4}$: at least one $B \neq 0$).

The model summary of the combined language ability group is presented in Table 23. The R coefficient value of .436 indicates that the relationship between the CBT score and the predictors is relatively mild and positive. R-Square is equal to .190 which means that only 19.00% of the variation in the CBT score is explained by the independent variables or predictors. The standard error of the estimate is 4.374.

Table 23. Model Summary of the Combined Language Ability Group

Model	R	R-Square	Adjusted R-Square	Std. Error of the Estimate	Change Statistics				
					R-Square Change	F Change	df1	df2	Sig. F Change
1	.436	.190	.162	4.374	.190	6.715	3	86	.000

a Predictors: (Constant), Computer Familiarity Score, Computer Attitudes Score, Computer Anxiety Score

b Dependent Variable: CBT Score

The results from an analysis of variance (ANOVA) of the combined language ability group are presented in Table 24. From the ANOVA table, the F value is 5.715 with the p-value at .000. The full Linear Regression Model is statistically significant at the .05 level.

Table 24. ANOVA of the Combined Language Ability Group

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	385.501	3	128.500	5.715	.000
	Residual	1645.621	86	19.135		
	Total	2031.122	89			

a Predictors: (Constant), Computer Familiarity Score, Computer Attitudes Score, Computer Anxiety Score

b Dependent Variable: CBT Score

Table 25 demonstrates the coefficients of the combined language ability group. "Computer attitudes" is the only predictor variable that produces a t value that is statistically significant at the $\alpha = .05$ level (B = .488, t = 3.231, $p = .002$). The regression equation for the combined ability group can be written as

CBT Score = .488(Computer Attitudes Score).

It can be said that "computer attitudes" has a significant influence on the CBT score. For every one unit increases in computer attitudes, the CBT score will increase by .488 with the standard error of .151. Therefore, Hypothesis 3.4 which states that the three selected variables can individually or in combination significantly predict the reading comprehension CBT scores of test-takers of the combined language ability group at the .05 level ($H_{3.4}$: at least one $B \neq 0$) is accepted.

Collinearity statistics in Table 25 show no indication of the multicollinearity problem. More collinearity diagnostics and residuals statistics of the combined language ability group are presented in Appendix J.

Table 25. Coefficients of the Combined Language Ability Group

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-9.188	8.702		-1.056	.294		
	ATTI	.488	.151	.416	3.231	.002	.568	1.760
	ANXI	.188	.168	.153	1.122	.265	.507	1.974
	FAMI	.249	.130	.211	1.917	.059	.776	1.289

a Dependent Variable: CBT Score

ATTI: Computer Attitudes Score

ANXI: Computer Anxiety Score

FAMI: Computer Familiarity Score

In conclusion, it can be seen that computer attitudes have a significant influence on CBT scores for the high language ability group ($R = .639$, $R^2 = .409$, $p = .003$; $B = .347$, $p = .026$) and for the combined language ability group ($R = .436$, $R^2 = .190$, $p = .000$; $B = .488$, $p = .002$). Hypothesis 3.1 and Hypothesis 3.4 are accepted. For students with the average language ability, computer familiarity has a significant influence on their CBT scores ($R = .620$, $R^2 = .384$, $p = .005$; $B = .386$, $p = .008$). Hypothesis 3.2 is accepted. However, none of the predictor variables can

significantly predict the reading comprehension CBT scores of the test-takers with low language ability. Thus, hypotheses 3.3 is rejected at the .05 level.

Analysis of the Answers of the Open-Ended Question

Apart from the quantitative analysis, the qualitative data are also investigated in this study. The answers from open-ended question of the questionnaire which asked participants to write their opinions, comments, or suggestions about the use of computer-based tests in language testing are analyzed in order to explore participants' ideas about the use of RC-CBT. The answers can be roughly categorized into three groups which are favorable answers, unfavorable answers, and answers with comments and suggestions. Favorable answers are those with direct or indirect expressions that indicate the preference towards the RC-CBT test and unfavorable answers are those on the opposite direction. While the neutral answers give only comments or suggestions without any expressions related to personal preferences towards the use of the CBT test.

Table 26 presents the frequency and percentage of the answers to the open-ended question in the questionnaire on the overall perspectives towards the use of computer-based language testing. The percentage of positive or favorable answers of students with high and average language ability towards the use of RC-CBT is 86.66% while that of the students with low language ability is 90%. The percentage of negative or unfavorable perspectives for students with high and average language ability is 6.66%, while that of low language ability group is 3.33%. The percentage of answers with neutral perspectives of all groups is 6.66%.

Therefore, it appears that the ratio of frequency and percentage of categories of the three groups is more or less the same. The majority of participants of all groups (87.77%) have favorable attitudes towards the use of RC-CBT language test. Only 5.55% of participants had unfavorable attitudes and only 6.66% of the participants were neutral towards the RC-CBT test.

Table 26. A Frequency and Percentage of the Overall Perspective towards CBT

Answers from the Open-ended Question	High Language Ability Group		Average Language Ability Group		Low Language Ability Group		All Groups
	Number of Answers	%	Number of Answers	%	Number of Answers	%	%
Favorable	26	86.66	26	86.66	27	90.00	87.77
Unfavorable	2	6.66	2	6.66	1	3.33	5.55
Neutral	2	6.66	2	6.66	2	6.66	6.66

N = 30 in each group

The answers are further explored to find participants' general ideas of the test. Table 27 presents the frequency of each favorable opinion of the participants. All groups agreed that the test was convenient. Other favorable items included time saving, easy application, feeling good or having fun while doing the CBT.

They also mentioned that the CBT is convenient because they did not need to bring stationery to the testing room. Furthermore, many participants mentioned that they did not need to waste their time shading the correct answer or erasing the shading when they wanted to change the answer which would have been required in a paper-and-pencil test. Many of them liked the features provided by the CBT application. They liked the way CBT accommodated them in the way that was similar to the paper-and-pencil test. This is because they could easily go back to the specific item instantly and change the choice of answers that they had chosen. One participant even said that, "marking the word in the passage with red font helps test-takers easily identify the point in the passage where the question addresses, very useful feature." Furthermore, they also perceived CBT as a trendy application. They mentioned that they felt good and had fun trying this test.

Table 27. The Frequency of the Favorable Opinions

Favorable Opinions	Frequency			
	High	Average	Low	Total
It is very convenient. (No pen, no eraser, etc.)	10	13	7	30
It is time saving (testing time and scoring time).	5	7	4	16
It is easy to do. (Users friendly application)	5	3	6	14
I feel good., I have fun., I feel relaxed.	1	4	5	10
It is trendy., It is advanced technology.	1	5		6
It enhances students' computer skill.			4	4
It is very useful.		1	2	3
The use of CBT saves paper.		1	2	3
The scoring is more accurate.		1	1	2
Total	22	35	31	88

In sum, most participants liked the CBT because of the computer's and the application's features.

Table 28 presents a frequency of unfavorable opinions of the participants. The majority of the participants agreed that the main drawback is the problem with the eyes. Others negative attitudes included having less computer skills, fear of making errors, feeling bored while doing CBT, and problems with font type and size.

They mentioned that if it was a longer test and they had to look at the computer screen for a longer period of time it might cause eye problems. A few of them also reported that they had symptoms of sore eyes while taking the CBT test. This is probably due to the quality and size of the computer screens at the computer laboratory which was conventional CRT. Some of them mentioned that they were not skillful in using a computer and few of them admitted that they were afraid of making errors on the computer sets and their applications.

When reviewing the negative opinions expressed by the participants, it appeared that most of the negative comments were made from participants who did not like the computer sets and their applications.

Table 28. The Frequency of the Unfavorable Opinions

Unfavorable Opinions	Frequency			
	High	Average	Low	Total
Staring at the monitor causes eyesore, tired/irritated eyes.	4	1	3	8
I am not skillful on computer and/or CBT.	1	2	1	4
I am afraid of errors caused by human or computer failure.	1	2		3
The font is difficult to read and too small.	1			1
It is boring.		1		1
Total	7	6	4	17

Table 29 presents the comments and suggestions given by the participants of the study. Most commented that the use of the CBT test should be applied to all subject courses and not just computer and language courses. They also supported the use of CBT and mentioned that it should have been used long time ago. Two of them suggested the use of the Internet-based instruction and testing where they can study on the Internet from anywhere and can review the lessons anytime and as much as possible. Using Internet testing would also allow the test-takers to carry out the test at a time and place convenient to them. Two of them mentioned that test-takers of CBT should have some basic computer knowledge. One of them mentioned that the basic computer course should be a prerequisite for those who wish to take courses that have CBT exams. One of them suggested adding pictures to the CBT test while another suggested the use of CBT writing test.

Table 29. Summary of Comments and Suggestions

Comments and Suggestions	Frequency			
	High	Average	Low	Total
CBT should be applied to all courses.	2	3	2	7
CBT should have been used long ago.		2	1	3
Internet-based test and exam is very useful too.		1	1	2
CBT is for ones with at least some basic computer knowledge.	1		1	2
It will be more interesting if graphic is added to the CBT.		1		1
Writing test by typing should be convenient.		1		1
Total	3	8	5	16

In sum, most of the comments dealt with the use of CBT. Other suggestions included the application of CBT to other subject courses, the use of the Internet testing, and that basic computer courses should be a prerequisite for students that must study courses that have CBT.

The previous section deals with the analysis of the data. The findings include descriptive statistics of the variables, the results from correlational analysis and multiple regression analysis, and the results from the analysis of the written answers to the open-ended question of the questionnaire. The next section of this chapter presents a discussion of the findings in relation to the theoretical aspects presented in Chapter Two.

Discussions

This study aims to examine the relationships among selected variables which may predict the ability of the test-takers to do a reading comprehension computer-based test. The specific areas of investigation in this study include (1) the relationships among computer attitudes, computer anxiety, and computer familiarity of the test-takers, (2) the relationship between each of the computer related variables

and the reading comprehension CBT scores, and (3) the extent to which the three variables individually or in combination predict the reading comprehension CBT score of the test-takers.

In accordance with the purposes of this study, three main hypotheses were set for four groups of students of high, average, low, and combined language ability groups making a total of twelve hypotheses. Research instruments which are the Computer Attitudes, Familiarity, And Anxiety Rating Scale (CAFARS) and the Reading Comprehension Computer-Based Test (RC-CBT) were used to collect data. The correlational study was conducted and the findings have already been presented earlier in this chapter. The factual information from the findings are discussed in the following sections.

1. The Relationships among the Independent Variables

The relationships among the three variables of test-takers of the four groups of the sample is discussed according to each bivariate relationship and each pair of independent variables at a time.

1.1 The Relationship between Computer Anxiety and Computer Attitudes

The results of the correlational analysis revealed that computer attitudes and computer anxiety were significantly and negatively correlated with the computer-based test scores for all four groups. There was a strong and negative relationship between the two variables for high, low, and combined language ability groups ($r = -.710, -.690, -.655, p < .05$). The average language ability group is the only group that was found to have a moderate and negative relationship between the two variables ($r = -.558, p < .05$).

The negative relationship found between the two variables is consistent with the findings of previous studies (Bradley and Russell, 1997; Whitley, 1997). Furthermore, the strong negative relationship between the two variables was also reported in Hong and Koh's study (2002). It can be said that the students who had low computer anxiety also had positive attitudes towards computers and vice versa. This information is important since the performance of tasks on the computer by students with high computer anxiety might be poorer than those with little or no

computer anxiety (Heinssen et al., 1987; King, et al., 2002; Barbeite and Weiss, 2004). Implementing measures promoting positive computer attitudes among students may reduce the negative effects of their computer anxiety.

Although the significant correlation coefficients may suggest a cause-and-effect relationship, such relationship may not occur (Gay, 1996). This study does not conclude that "computer attitudes" causes computer anxiety and vice versa because it is a correlational study. To obtain a causal relationship, an experimental research design must be conducted.

Furthermore, though this study defined computer anxiety and computer attitudes as two different constructs and the results demonstrated that the relationship between the two variables is apparent, it is worth noticing that previous findings and theories about the constructs of these two variables are relatively contradictory. Some of the previous studies indicated that they are parts of the same construct (Loyd and Gressard, 1984; Colley et al., 1994) while others have mentioned that although they are related, they have separate constructs (Bradley and Russel, 1997; Whitley, 1997). Further investigation on this issue may shed more light on these test-taker computer related variables.

1.2 The Relationship between Computer Attitudes and Computer Familiarity

The results from the analysis show that there is a moderate positive relationship between computer attitudes and computer familiarity in the high and the low language ability groups ($r = .461, .446$, $p < .05$). Furthermore, there is a mild positive relationship between computer attitudes and computer familiarity in the combined language ability group ($r = .355$, $p < .05$). This positive correlation implies that more computer familiarity results in more positive computer attitudes. However, there is no significant relationship between computer attitudes and computer familiarity in the average language ability group.

The correlations found in the high, low, and combined language ability groups which demonstrate links between the computer attitudes and computer familiarity are consistent with previous studies (Busch, 1995; Levine and Donitsa-Schmidt, 1998; Mizrachi and Shoham, 2004). However, the strength of the relationship found in this study is moderate while some of previous studies found that

familiarity strongly affects computer attitudes (Shashaani, 1994; Woodrow, 1994). The linkage found is crucial since encouraging students to familiarize themselves with computers can promote positive computer attitudes and so reduce the computer anxiety of students and so result in better performance on computer tasks and computer based tests.

However, it is important to mention that not all computer familiarity produces positive attitudes. For example, some computer experiences like the loss of data while working on the computer might produce negative attitudes towards using the computers.

Interestingly, there is no significant relationship between computer attitudes and computer familiarity in the average language ability group because the mean comparison analysis of the three independent variables indicates no significant differences among all groups. (See Appendix K.) Information from the descriptive statistics showed that the distribution of the computer attitude scores among the sample of the average language ability group is relatively small compared to that of the other groups. This may be the cause of the insignificant relationship between computer attitudes and computer familiarity in the average language ability group. In-depth investigation might shed light on what are the causes of this phenomenon.

1.3 The Relationship between Computer Anxiety and Computer Familiarity

Regarding the relationship between computer anxiety and computer familiarity, the results indicated moderate and negative correlations for the high, low, and combined language ability groups ($r = -.573, -.533, -.469$, $p < .05$). This demonstrates that sufficient computer familiarity does lead to positive attitudes with slightly different magnitudes. On the contrary, the finding in the average language ability group demonstrated no significant relationship between the two variables.

This study produced results that confirm previous theories and findings (Maurer, 1994; Chua et al., 1999; Yang, Mohamed, and Beyerbach, 1999; Bozionelos, 2001a; Becker and Schmidt, 2003; Wilfong, 2004) in that computer familiarity is linked to computer anxiety. However, only positive and subjective computer experience or familiarity demonstrated a significant relationship with computer anxiety. Previous studies demonstrated that computer familiarity such as better and

more diversified computer skills and more time working with computers leads to better computer attitudes (Beckers and Schemidt, 2003). If a student just sits idly behind a computer monitor spending hours and not accomplishing anything, this is not a positive computer experience or familiarity with the computer. Neither it is related to better computer attitudes. This may explain why there is no relationship between computer familiarity and computer anxiety in the average language ability group.

However, the relationship found in this study does not indicate that the students with high levels of computer anxiety will decide to use a computer less. Such a conclusion would need some confirmations from causal relationship studies.

The fact that there is no significant relationship between computer anxiety and computer familiarity in the average language ability may be explained by the narrower range and standard deviation of the computer anxiety scores of this group. The distribution of the computer anxiety scores among the students of the average language ability group is relatively small compared to the distributions of computer anxiety of the other groups. An in-depth investigation might provide more information on the causes of this phenomenon.

2. The Relationship between Three Independent Variables and RC-CBT scores

This section discusses the relationship between each independent variable and the RC-CBT scores of the four sample groups. The bivariate relationship is discussed below.

2.1 The Relationship between Computer Attitudes and RC-CBT scores

In examining the strength of the relationship of the three variables and the RC-CBT scores, the findings show that the relationship between RC-CBT scores and computer attitudes of the high and low language ability groups are correlated significantly at the moderate level ($r = .627, .506, p < .05$) while the relationship of the average and combined groups are significant but lower than the previous groups ($r = .383, .391, p < .05$). Thus, test-takers who have higher computer attitudes scores can do the RC-CBT test significantly better than those with lower computer attitudes scores.

The results of this study contradict those reported by Fulcher (1999) who found that attitudes towards computers have no significant effect on test scores. Nevertheless, the finding of this study is consistent with Russell's (1999) study which found a significant relationship between the two variables. The linkage between the computer attitudes and students' performances on computers as found in this study suggests an immediate need for computer orientation. For example, positive attitudes towards computer should be promoted by employing different methods like informing students of the many advantages of computers.

2.2 The Relationship between Computer Anxiety and RC-CBT scores

There is a moderate negative relationship between RC-CBT scores and computer anxiety of the high language ability group ($r = -.531$, $p < .05$) while there is a weak relationship for the average, low, and combined language ability groups ($r = -.380, -.371, -.219$, $p < .05$). Hence, test-takers with higher computer anxiety tended to have significantly lower CBT scores while test-takers with lower computer anxiety tended to have significantly higher RC-CBT scores.

The results from this study are slightly similar to the results of Chou's (2001) study which suggests that there is a significant relationship between computer anxiety and performance. However, Chou shows the relationship between the two variables with respect to gender of the participants while this study does not separate the participants and results by gender.

The relationships found between computer anxiety and RC-CBT scores demonstrated that the group with higher language ability has a stronger relationship between the two variables and the relationships between the two variables are milder in the lower language ability groups. The in-depth study should provide more information on this matter.

2.3 The Relationship between Computer Familiarity and RC-CBT scores

The findings of this study show that there is a moderate significant relationship between RC-CBT scores and computer familiarity for average and low language ability groups ($r = .522, .446$, $p < .05$) and a mild relationship for the combined language ability group ($r = .287$, $p < .05$) while there is no significant relationship between the two variables for the high language ability group.

The significant relationship found in average and low language ability groups confirms Lee's (1986) findings while the results of the high language ability group which indicate no significant relationship between the two variables is consistent with the studies of Taylor et al. (1999) and Sawaki (2001).

The fact that there is no significant relationship between computer familiarity and the RC-CBT scores of the high language ability group might be caused by the difference in the distribution of the two variables. The distribution of the CBT scores among the students of the high language ability group is relatively small compared to the distribution of the computer familiarity scores among the students of the high language ability group which is relatively large. The rather low distribution of CBT scores of this group may be due to their language ability which is very much at the same level. However, the largest distribution of the familiarity scores may be caused by their different computer backgrounds.

3. The Prediction of RC-CBT scores

The significant predictors of the CBT scores of students of high, average, low, and combined language ability groups are discussed below.

3.1 Significant Predictors of the High Language Ability Group

The results from multiple regression analysis indicate that "computer attitudes" is the only significant predictor of the reading comprehension RC-CBT scores for the students with the high language ability ($R = .639$, $R^2 = .409$, $p = .003$; $B = .347$, $p = .026$). Though the bivariate correlation between the independent variables and the RC-CBT scores demonstrates a significant relationship for both computer attitudes and computer anxiety with the RC-CBT scores ($r = .627, -.531$, $p < .05$), the multivariate analysis points out that computer anxiety is not a significant predictor of the RC-CBT scores for the students with the high language ability. Again the results from multivariate analysis confirm Russell's (1999) study which found the relationship between computer attitudes and test scores. However, the results contradict Fulcher's (1999) findings which reported that attitudes towards computers have no significant effect on test scores.

Since computer anxiety and computer familiarity are not predictors of the computer-based test scores of this group and computer attitudes explain just

40.9% of the variation in the RC-CBT score, there must be other predictors that account for the remaining portion of the variation in the RC-CBT score. Further studies may investigate other potential predictors of the computer-based test performance. Those variables might help explain the remaining portion of the variation in the CBT score.

3.2 Significant Predictors of the Average Language Ability Group

The multiple regression analysis for data collected from students with the average language ability indicates that computer familiarity is the only significant predictor of the RC-CBT scores ($R = .620$, $R^2 = .384$, $p = .005$; $B = .386$, $p = .008$). Though the correlational analysis between the independent variables and the RC-CBT scores of the average language ability group demonstrates a significant relationship for all three variables (computer attitudes, computer anxiety, and computer familiarity) and the RC-CBT scores ($r = .383$, $-.380$, $.522$, $p < .05$), the multiple regression analysis demonstrates that computer anxiety and computer attitudes are not significant predictors of the RC-CBT scores for the students with average language ability. The results from the multivariate analysis are consistent with Lee's (1986) study which found computer experience affected computerized test scores.

Since the predictor for the students with average language ability group is only the computer familiarity which explains only 38.4% of the variation in the RC-CBT score. Other predictors which are not included in this study might explain the remaining portion of the variation in the RC-CBT score. There might be other computer-related variables which can be potential predictors of the computer-based test performance of the students with average language ability. In-depth studies might provide more information on this matter.

3.3 Significant Predictors of the Low Language Ability Group

The results from the multiple regression analysis indicate that all three variables are not significant predictors of the RC-CBT scores for the students with low language ability. This finding is consistent with Taylor et al.'s (1999) finding which demonstrated that computer familiarity does not play a major role in the performance on RC-CBT language tests. It also confirms Fulcher's (1999) findings that computer attitudes have no significant effect on test scores. However, it is

contradictory to Chou's (2001) finding that computer anxiety is a significant predictor of students' performance.

Comparisons of mean indicated that the means of the three independent variables of high, average, and low language ability groups are not significantly different while the means of the RC-CBT scores of the three groups are significantly different. The mean of the low language ability group is a score of 4.93 lower than the mean of the average ability group and a score of 9.10 lower than the mean of the high language ability group. This indicates that on average the students of the low language ability group got a much lower RC-CBT score than the other groups. Furthermore, the low language ability group might also have less computer knowledge and skill than the other groups. This may be the explanation for the results of the multiple regression analysis of this group. In addition, the limitation of the number of students might also be the cause of such results. Further investigations using a larger number of students to explore other potential independent variables that can account for the significant amount of variation of the RC-CBT scores of the students with the low language ability are needed.

3.4 Significant Predictors of the Combined Language Ability Group

The results from multiple regression analysis indicate that "computer attitudes" is the only significant predictor of the RC-CBT scores for the combined language ability group ($R = .436$, $R^2 = .190$, $p = .000$; $B = .488$, $p = .002$). Though there are significant relationships among the independent variables (computer attitudes, computer familiarity, and computer anxiety) and the RC-CBT scores ($r = .391, -.219, .287$, $p < .05$), the multivariate analysis points out that computer anxiety and computer familiarity are not significant predictors of the reading comprehension CBT scores for the students with the high language ability. Similar to the high language ability group, the results from multivariate analysis confirm Russell's (1999) study which found a relationship between computer attitudes and test scores and the results contradict Fulcher's (1999) findings which reported that attitudes towards the computer have no significant effect on test scores.

"Computer attitudes" explains only 19% of the variation in the RC-CBT scores. Therefore, other predictors that account for the remaining portion of the variation in the RC-CBT scores should be identified. Further studies may investigate

other computer-related predictors of the computer-based test performance which might help explain the remaining portion of the variation in the RC-CBT scores.

4. The Attitudes and Comments towards the Computer-Based Test

The results of the analysis of answers to the open-ended question in the questionnaire demonstrate that the ratio of percentage with respect to their classified categories (which are favorable, unfavorable, and neutral) of each group is more or less the same. The majority of the combined sample group (87.77%) have favorable attitudes towards the use of the CBT language test. 5.55% have unfavorable attitudes while 6.66% are neutral.

The reasons supporting their positive attitudes are the features of the computer and the CBT application such as convenience and time saving. Some are related to test-takers' positive feelings while doing the CBT. On the other hand, unfavorable attitudes are related to eyesores, font size, and lack of computer skills. As for comments and suggestions, some participants suggest the use of the CBT in other subject courses and the use of the Internet in testing, as well as some basic computer knowledge before taking the CBT. The following are discussions with respect to the feedback from the sample group.

4.1 The features of the computer

Many of the answers from the students mentioned the advantages of using a computer as a mode of language testing. The students spent no time writing and erasing the answers. They just clicked the answer and re-clicked the new choice if they changed their mind. Generally, many useful features of the computer facilitated test-takers in their testing session. The mode of testing is a factor in the "task characteristics" which is a crucial factor in the practicality of designing and developing language tests (Bachman and Palmer, 1996). The feedback from the students thus confirms that the computer is a preferred mode of language testing.

4.2 The advantages of the CBT application

It is important in the design of the CBT application that the program should facilitate the test-takers and promote the positive testing experience. The poorly designed CBT application might threaten the construct validity of the test (Bachman, 1990). The reading comprehension CBT in this study was thus designed

to be a user's friendly one. Some of the features facilitating test-takers such as going back to the selected item and changing the choice within a click are included in the program. The sample of this study also reported many advantages of the CBT application they have tried. Some of the advantages include less scoring time, more accurate scoring, etc. The advantages reported by the sample in this study confirm the list of CBT advantages provided by Cohen (1994).

4.3 The "liking" of the test-takers

"Liking" is an "affective construct" which is one of the three constructs of the computer attitudes (Triandis, 1971). These attitudes towards the computer significantly correlate with their performance on the computer tasks (Russell, 1999). The majority of the sample of this study reported positive attitudes indicating the affective feeling towards the CBT. They wrote that they liked CBT because it was trendy, and technologically advanced. They described the experience as feeling good and relaxed while some of them mentioned having fun doing the CBT. In general, the sample preferred language testing on the computer.

4.4 The wider use of CBT

The sample suggested that CBT should be also employed in other subject courses. Furthermore, they mentioned that testing via the Internet is very useful since it breaks down the barrier of space and time in language testing. This demonstrated their preference towards CBT and also the use of new technology in language testing. Computer anxious or anxiety seems not to be the problem of this sample group. This might be due to their computer familiarity and positive attitudes towards the computer.

4.5 Some drawbacks of the CBT

Though the majority of the sample reported positive attitudes towards the use of the computer in language testing, there were a couple of students who reported some negative perspectives which should not be ignored. These include eyesores, small font size, and lack of computer skills. The problems with eyesores were reported to have been caused by staring at the computer monitor for a long time. This problem might also occur when staring at the paper-and-pencil test for a long time. However, eye problems like this can be solved by suggesting that test-takers rest their eye muscles by looking at far objects for a short while. Small font size is

another problem of the computer interface. CBT applications might include the magnifying features or allow the test-takers to enlarge or reduce the font size to suit their preferences. Finally, the problem of the students who lack computer skills can be solved by providing them with basic computer knowledge courses and encouraging them to use the computer more often.

Summary

Data gathered from the participants through research tools, namely the Computer Anxiety, Familiarity, and Attitudes Rating Scale (CAFARS) and the Reading Comprehension Computer-Based Test (RC-CBT), are statistically analyzed and used to test the hypotheses. The results of the data analysis are presented in four parts which are descriptive statistics, correlational analysis, multiple regression analysis, and analysis of the answers of the open-ended question. The first part (descriptive statistics) presents basic information about the data collected. The second part (correlational analysis) describes the results of Hypothesis 1 and Hypothesis 2 testings. The third part (multiple regression analysis) demonstrates the results of Hypothesis 3 testing. The last part presents findings from the written section of the questionnaire. Then, the findings are discussed in detail. The next chapter presents a summary of the first three chapters and the findings from this chapter together with conclusions, implementations, and recommendations for future research.