CHAPTER III

METHODOLOGY

This chapter deals with the procedures of the research to determine the relationships among the three variables (computer familiarity, computer anxiety, and computer attitudes) and the reading comprehension CBT scores of a sample of fourth-year EFL university students in Bangkok. The relationships among three variables and one predictive variable are:

1. the magnitude of the relationships,

2. the direction of the relationship, and

3. the hypothesized causal relationships.

In the study, the level of computer familiarity, computer anxiety, and computer attitudes are drawn from a constructed rating scale that is relevant to each variable. In addition, the reading comprehension scores are calculated from the sample' raw scores of a constructed reading comprehension CBT.

Research Approach

This study is a correlational research which aims to determine the relationships among three test-takers' variables and the reading comprehension CBT scores of students with high, average, low, and combined language ability. In order to do so, correlational analyses are employed to calculate the correlational coefficients. Subsequently, multiple regression analysis with the "enter" method is used to assess the extent to which the three test-takers' factors can predict the reading comprehension CBT scores of the sample with high, average, low, and combined language ability.

Research Design

There are four variables investigated in this study. Three of them are independent or predictor variables which consist of computer attitudes, computer

anxiety, and computer familiarity. The fourth variable is a dependent or criterion variable which is the reading comprehension computer-based test scores.

Pilot Studies

Three pilot studies were carried out in this study. The purpose of the pilot studies was to test and evaluate the data collection techniques to be used and to develop and verify the instruments.

The first pilot study was conducted with thirty-two third-year accounting students of Chulalongkorn University. The second pilot study was conducted with thirty-five third-year business administration students of Rajamangala University of Technology Phra Nakhon, North Bangkok Campus. The first and second pilot studies were carried out mainly for the purpose of testing the data collection techniques and improving the reading comprehension CBT program.

The third pilot study was conducted with thirty fourth-year communication arts students of Dhurakij Pundit University. This group of students possessed the same characteristics as the students in the main study that was carried out later. They were randomly selected from the population of this study and were excluded from the main study. The purpose of the final pilot study was to fully collect statistical information on the tools and to fine tune them to be used in the main study. The instruments were calibrated according to the statistical analysis of the collected data and also according to the written and verbal feedback from the students.

Population and Sample

The scores from the "computer-based" TOEFL test are certainly one of the well-accepted indicators of English language proficiency for many graduate programs worldwide and for many workplaces. Fourth year students who nearly complete their studies at university are students who are highly likely to take the computer-based test.

Therefore, fourth year Thai university students were selected to be the sample of the study and only those students who majored in Communication Arts were included because they were likely to use both computer and English language in their

future careers. The target population of this study was the fourth-year EFL Thai university students who majored in communication arts.

Dhurakij Pundit University (DPU) was selected because of the following reasons. Firstly, it offers a four-year bachelor's degree in communication arts. Secondly, the selected Dhurakij Pundit University which is one of the famous private universities in Thailand agreed to participate in the research. Finally, the university provided the facility of 50-station computer laboratory to be used for collecting data of this study.

In determining sufficiency of the sample size for correlational research, different opinions are given by statisticians and researchers. A large sample is usually preferred over a smaller one because statistical power is improved by increasing the sample size (Martin and Bateson, 1986; Roscoe, 1975). However, an indefinite collection of data must be weighed up against the budget and time. In addition, when sufficient results have been acquired, according to Martin and Bateson (1986), additional results may add little to the conclusions to be drawn. The minimum number of sample in multivariate research (e.g. multiple regression) is suggested differently e.g. five times as many participants as predictor variables (Brace et. al., 2000), ten times larger than the number of variables being considered (Roscoe, 1975). This study adopted Gay and Diehl's (1992) suggestion that for correlational research the acceptable sample size should be 30 samples.

In the process of sample selection, 120 fourth-year EFL Thai students from the university were randomly selected using simple random technique. Given that some studies confirmed a significant relationship between reading achievement tests and proficiency tests (Kato et al., 2004; Vander Meer, Lentz, and Stollar, 2005), the samples were grouped according to their average grade points of Foundation English (FE) courses which are achievement tests. It is one of the assumptions of this study that from the time the students took the last foundation English course and the time that the data were collected the students' language ability is more or less the same. The students with higher average grade points were placed at the top of the list, while those with lower average grade points were at the bottom of the list. Thirty students were selected from the top of the list and assigned to the high language ability group. The next fifteen students were excluded from the study. After that, the next thirty

students were assigned to the moderate ability group. Then, another fifteen students were excluded from the study. Finally, thirty students at the bottom of the list were assigned to the low ability group. Altogether ninety students participated in this study. In addition, all of them were assigned to a combined language ability group which is the fourth group of the sample in this study. The demographic data of the sample is presented in Table 1.

Table 1. Demographic Data of the Sample

Student Groups	Male	Female	Age Range
High Ability	14	16	20-26
Average Ability	12	18	20-27
Low Ability	15	15	20-28
Combined Ability	41	49	20-28

Research Instruments

The instruments employed in the study are:

1. A Computer Anxiety, Familiarity, and Attitudes Rating Scale (CAFARS)

The CAFARS questionnaire consists of three parts. The first part asks the participants to fill in their general demographic information which are name, identification number, sex, and age.

The second part is designed to determine the participants' computer anxiety, computer familiarity, and computer attitudes in the form of Likert-type scales. The scale, which aimed to elicit the responses concerning computer anxiety, computer familiarity, and computer attitudes, was developed based on previous studies (Loyd and Gressard 1984; Loyd and Loyd, 1985; Eignor et al., 1998; Rosen and Weil, 1995a; Schumacher and Morahan-Martin, 2001; Selwyn, 1997; Stricker, Wilder, and Rock, 2004). The first ten items are about the participants' computer familiarity. The

following twenty items concern computer attitudes and computer anxiety of the participants. Altogether, there are 30 items (see Table 2).

Table 2. Components of CAFARS Scales

Subscales	Constructs/Components	Item Number
Familiarity	Frequency of use	
	- access places	1, 2, 3
	- purpose	4, 5, 6
	Ability and skills	
	- perceived ability	8, 9
	- computer related skills	7, 10
Anxiety	Fear of computer	
	- when interacting (use)	12, 14*, 18*
	- when anticipating (about to use)	16, 24
	Self-confidence	
	- ability to use	20, 22*, 28,
	- ability to learn	26*, 30*
Attitudes	Affective Component (liking)	17*, 19, 25*
	Behavioral Component (responses)	11, 13*, 23, 29*
	Cognitive Component (useful perception)	15, 21*, 27

Item with (*) were coded in "unfavorable" statements.

The last part is an open-ended question inviting students to give their opinions, comments, and suggestions about the use of the computer-based test in language testing. The time to complete all three parts of the questionnaire is 20 minutes.

The scoring for the scale consists of two parts. The first part includes questions 1–10 and the second part covers questions 11-30. For questions 1-10 which are about computer familiarity, the scoring is as follows:

the highest frequency or ability = 4

the high frequency or ability = 3

the less frequency or ability = 2

the least frequency or ability = 1

Participants with higher scores indicate the higher level of computer familiarity than participants with lower scores.

For questions 11-30, which are about computer attitudes and computer anxiety, the scoring depends on each coded question. The twenty items, with equal numbers of positive and negative statements, are selected from the pool of statements of previous studies. The items are randomly ordered in the questionnaire with columns headed "strongly agree", "slightly agree", "slightly disagree", and "strongly disagree".

Ten questions which are coded in favorable perspectives are scored as follows:

Strongly agree = 4

Slightly agree = 3

Slightly disagree = 2

Strongly disagree = 1

Two other groups of ten questions which are coded in unfavorable perspectives are scored as follows:

Strongly agree = 1

Slightly agree = 2

Slightly disagree = 3

Strongly disagree = 4

Participants with higher scores indicate a higher level of computer attitudes or computer anxiety than participants with lower scores.

The CAFARS went through a validation process. It was firstly checked by three content specialists. Their comments and suggestions were discussed with the research advisor before adjustments on the instrument were made. The tool was primarily tried out with thirty two third-year accounting students of Chulalongkorn University and thirty five third-year business administration students of Rajamangala University of Technology Phra Nakhon ,North Bangkok Campus. Afterwards, the questionnaire was piloted with thirty fourth-year communication arts students of Dhurakij Pundit University. This group of students were excluded from the main

study. The reliability was assessed by using Cronbach's alpha formula via SPSS 11.0 for Windows and the calculated reliability coefficient of the CAFARS is .648. Finally, the comments from the participants on the questionnaire were discussed with the research advisor before adjustments were made again to improve the instrument. The reliability coefficient of the revised version obtained from the main study is .863.

2. A Reading Comprehension Computer-Based Test (RC-CBT)

The computer-based reading comprehension test contains 36 multiple-choice questions with four passages ranging from about 200 to about 500 words. The RC-CBT is scored by giving 1 point to each item with the correct answer. The item with the wrong answer gets no score. The test takes 60 minutes.

This reading comprehension computer-based test went through the validation process. Ten passages of about 200 to about 500 words were selected from magazines, journals, textbooks, and newspapers. Topic areas include general interest issues, economics, business, and social issues in general. The language in the tests, thus, includes both academic language and general language.

Therefore the readability of the texts was calculated with Flesch Reading Ease formula via Microsoft Word 2000 for Windows. Then, the four passages were approved by the research advisor and the content specialists. Based on Schnelbach and Wyatt (2005), the four passages are classified difficult and are considered the college level. Therefore, the four passages were arranged according to their length. (See the section on Text Readability of Chapter II for more details.) Table 3 illustrates the readability of the RC-CBT passages.

Table 3. Readability of the RC-CBT Passages

Passages	N. Words	N. Sentences	Flesch Index	Grade Level	Difficulty Level
1	260	12	30.0	College	Difficult
2	307	14	44.8	College	Difficult
3	338	17	46.9	College	Difficult
4	478	22	47.7	College	Difficult

Forty two multiple-choice questions were constructed to be included in the reading comprehension test that was used for the pilot study. The items were constructed based on the selected reading subskills of previous studies (Clapham, 1996; Munby, 1978; Phakiti, 2003). Reading subskills and test items are presented in Table 4. The test was validated by three reading experts and their comments and suggestions on the test were discussed with the research advisor and revisions were then made to improve the test. Afterward, the test was put into a linear computer-based test format by a computer programmer.

Table 4. Reading Subskills and Test Items

Reading Subskills	Item Number	Total
-Identifying word meaning	5, 7, 13, 14, 17, 23, 25, 26, 32, 33, 34, 39	12
-Identifying explicit information, opinions, definition, facts,	2, 6, 9, 18, 19, 22, 29, 35, 36, 37, 40	11
-Analyzing reference words	3, 12, 24, 28, 38	5
-Drawing inferences from content	4, 8, 15, 16, 27, 41	6
-Finding main idea, topic	1, 11, 21, 31	4
-Understanding writer's intention, attitudes	10, 20, 30, 42	4
Total		42

RC-CBT was first tested in two pilot studies. The first study was carried out with thirty two third year accounting students of Chulalongkorn University and the second study was with thirty five third year Business Administration students of Rajamangala University of Technology Phra Nakhon, North Bangkok Campus. Afterwards, the test was piloted with thirty fourth-year students of Dhurakij Pundit

University. This group of students was excluded from the main study. An item analysis was conducted and the Cronbach's alpha reliability was calculated on the data gathered from the piloted participants by using CTIA/Grading 7.0, a program developed by Dr. Suphat Sukamolson of Chulalongkorn University. With the suggestions of the research advisor, 36 items were selected to be used in the main study. Item numbers 6, 12, 19, 23, 37, 40 were eliminated. The calculated Cronbach Alpha reliability coefficient of the RC-CBT is .893.

Data Collection

The data collection sessions were carried out in July 2005 in a computer laboratory on the campus of Dhurakij Pundit University. Both instruments were administered to the participating students within the same session.

In the process of data collecting, all computers were checked for readiness. Each computer was equipped with a diskette for recording the answers of RC-CBT. When all students were in their seats, the researcher explained the objectives and significance of the study as well as the reasons for using the instruments, the RC-CBT and the CAFARS. Both instruments were briefly described and the students were reassured that their personal information would not be disclosed. Then the RC-CBT was administered to the students. The time allowed to complete the RC-CBT is 60 minutes. Diskettes were collected from each student for data analysis. Subsequently, the paper-and-pencil CAFARS was distributed to the students and the time period of 20 minutes was allowed to complete this. The CAFARS that were completed by the students were collected for further analysis.

Data Analysis

1. Validation of the Instruments

The research instruments in this study were approved by three content specialists and piloted with thirty one students who had similar characteristics with the sample of the main study. An item analysis was carried out using the CTIA/Grading 7.0 program (สุพัฒน์ สุกมลสันต์, 2542). Finally, the reliability

coefficients of both instruments were assessed using Cronbach's alpha formula as mentioned previously in the research instruments section.

2. Testing of the Hypotheses

In order to test the hypotheses, the data were analyzed in three steps for each of the four groups of students.

2.1 Descriptive statistics including mean, standard deviation, and range of scores for each variable was carried out.

2.2 Pearson product-moment correlation coefficients were calculated to indicate the relationships among the scores from the CAFARS, and the scores from the RC-CBT.

In this study, there are six pairs of variables which can be divided into two groups. They were analyzed by correlational analysis. The first group comprises three pairs which are the relationships among the three test-takers' variables as shown in Table 5. After the relationships among the three independent variables were examined, the first hypothesis was tested. The significant level was set at .05.

Table 5. The Relationships among the Test-Takers' Variables.

	Computer Anxiety	Computer Familiarity	Computer Attitudes
Computer Anxiety			
Computer Familiarity			
Computer Attitudes			

The other three pairs of variables that were then analyzed were the relationships between each test-takers' variable and the CR-CBT scores as shown in Figure 8. The second hypothesis was then tested and again, the significant level was set at .05.
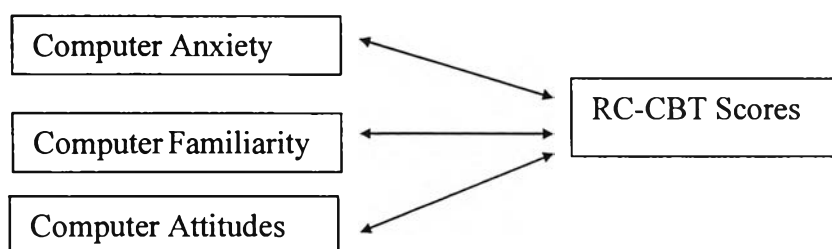
Figure 8. The Relationship between Each Test-Takers' Variable
and the CR-CBT Scores

2.3 Multiple regression was used to indicate the best equation to predict the CBT reading comprehension of the students. The "enter" method of multiple regression analysis was used because the sample size of this study was relatively low in the number of cases (Gay and Diehl, 1992; Brace et al., 2000). In the multiple regression analysis of this study, all variables were entered into the equation at the same time. The best equation to predict the CBT reading comprehension suggested by the SPSS program was then formulated. The percentage of the variance of the students' performance is shown in the following formula.

$$Y' = a + b_1x_1 + b_2x_2 + b_3x_3$$

Y' = predicted RC-CBT scores

a = a formulated constant

b = formulated constant of each variable

x = any given raw score on each test-takers' variable

In addition, the information from the open-ended question of the questionnaire was analyzed, classified, and discussed by the researcher.

Summary

Chapter Three deals with the research approach together with the population and sample of this study. The construction of the two instruments used in this study has been described in detail and the process of data collection has been explained. Finally, statistics used in the process of validation of the instruments and the process

of analyzing the data from the main study have been reviewed. The results of the analyses that were obtained in this study are presented in Chapter Four.