กลวิธีการอ่านภาษาอังกฤษของนักศึกษาระดับปริญญาตรี
สายวิทยาศาสตร์ในมหาวิทยาลัยของรัฐ

นางสาวรักชนก แสงภักดีจิต

ENGLISH REEDING STRATEGIES EMPLOYED BY

SCIENCE-ORIENTED UNDERGRADUATE STUDENTS

IN PUBLIC UNIVERSITIES

Rakchanok Saengpakdeejit

A Thesis Submitted in Partial Fulfillment of the Requirements for

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ENGLISH READING STRATEGIES EMPLOYED BY SCIENCE-ORIENTED UNDERGRADUATE STUDENTS IN PUBLIC UNIVERSITIES

Suranaree University of Technology has approved this thesis submitted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy.

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รักชนก แสงภักดีจิต : กลวิธีการอ่านภาษาอังกฤษของนักศึกษาระดับปริญญาตรีสาย
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327 หน้า

การวิจัยครั้งนี้มีวัตถุประสงค์ เพื่อสำรวจการใช้กลวิธีการอ่านภาษาอังกฤษเชิงวิชาการของ
นักศึกษาสายวิทยาศาสตร์มหาวิทยาลัยของรัฐ ในประเทศไทย และศึกษาความสัมพันธ์ระหว่าง
ความถี่ของการใช้กลวิธีการอ่านภาษาอังกฤษเชิงวิชาการกับตัวแปร 5 ตัว ได้แก่ เพศ (ชายและหญิง)
ที่ตั้งของมหาวิทยาลัย (กรุงเทพและปริมณฑล หรือส่วนภูมิภาค) สาขาวิชาที่กำลังศึกษาอยู่ (สาขา
วิทยาศาสตร์สุขภาพ และสาขาวิทยาศาสตร์และเทคโนโลยี) ระดับความสามารถทางการอ่านภาษา
อังกฤษเชิงวิชาการ (ระดับสูง กลาง และต่ำ) และประเภทของโรงเรียนมัธยมศึกษาตอนปลายที่ได้
ศึกษาก่อนเข้าเรียนในระดับมหาวิทยาลัย (โรงเรียนรัฐบาล และโรงเรียนเอกชน) กลุ่มตัวอย่างใน
การวิจัยครั้งนี้ประกอบด้วยนักศึกษาจำนวน 1,096 คน ได้จากการสุ่มตัวอย่างแบบเฉพาะเจาะจง
(purposive sampling method) จากมหาวิทยาลัยรัฐบาลจำนวน 10 แห่ง ในปีการศึกษา 2551 การเก็บ
ข้อมูลแบ่งเป็น 2 ช่วง ได้แก่ ช่วงที่ 1) การเก็บข้อมูลจากการสัมภาษณ์ และช่วงที่ 2) การสร้าง
แบบสอบถามโดยการวิเคราะห์ข้อมูลที่ได้จากการสัมภาษณ์ในช่วงที่ 1

แบบสอบถามที่ผู้วิจัยสร้างขึ้นเพื่อใช้เป็นเครื่องมือในการเก็บรวบรวมข้อมูลนั้น ได้ทำการ
ตรวจสอบความเที่ยงตรงภายในด้วยค่าสัมประสิทธิ์อัลฟาร์หรือครอนบัค ซึ่งมีค่าความเชื่อมั่นของ
แบบสอบถามจากกลุ่มตัวอย่างของนักศึกษาจำนวน 1,096 คนที่ระดับ .95 สำหรับการวิเคราะห์
ข้อมูลทางสถิติ ได้นำสถิติเชิงบรรยายมาวิเคราะห์ระดับความถี่ของการใช้กลวิธีการอ่านภาษาอัง
กฤษเชิงวิชาการของนักศึกษา และใช้การวิเคราะห์ความแปรปรวน (ANOVA) การทดสอบ
ไคสแควร์ ($\chi 2$) และการวิเคราะห์ปัจจัย (Factor Analysis) ในการหาค่าความสัมพันธ์ระหว่างการใช้
กลวิธีการอ่านภาษาอังกฤษเชิงวิชาการของนักศึกษากับตัวแปรทั้ง 5 ตัว

ผลการวิจัยครั้งนี้พบว่า โดยภาพรวมแล้ว นักศึกษารายงานความถี่การใช้กลวิธีการอ่าน
ภาษาอังกฤษเชิงวิชาการในระดับปานกลางใน 2 กลวิธีหลัก ได้แก่ 1) กลวิธีการอ่านเพื่อความเข้าใจ
ในการอ่าน และ 2) กลวิธีเพื่อเพิ่มพูนความเข้าใจในการอ่าน ผลการวิเคราะห์ข้อมูลแสดงให้เห็นว่า
ความถี่ของการใช้กลวิธีการอ่านภาษาอังกฤษเชิงวิชาการของนักศึกษามีความสัมพันธ์อย่างมีนัยสำคัญ
กับเพศของนักศึกษา สาขาวิชาที่นักศึกษากำลังศึกษาอยู่ และระดับความสามารถในการอ่าน
ภาษาอังกฤษเชิงวิชาการ ส่วนการวิเคราะห์ปัจจัยพบว่า ปัจจัยที่ถูกสกัดออกมาทั้ง 6 ปัจจัยมี

ความสัมพันธ์อย่างมากกับตัวแปร 4 ตัว ได้แก่ เพศของนักศึกษา ที่ตั้งของมหาวิทยาลัย สาขาวิชาที่
กำลังศึกษาอยู่ และระดับความสามารถทางการอ่านภาษาอังกฤษเชิงวิชาการ แต่ไม่พบว่าความสัมพันธ์
ระหว่างตัวแปรในด้านประเภทของโรงเรียนมัธยมศึกษาตอนปลายที่ได้ศึกษาก่อนเข้าเรียนในระดับ
มหาวิทยาลัยกับการเลือกใช้กลวิธีการอ่านภาษาอังกฤษเชิงวิชาการของนักศึกษา

สาขาวิชาภาษาอังกฤษ   ลายมือชื่อนักศึกษา _____

ปีการศึกษา 2552   ลายมือชื่ออาจารย์ที่ปรึกษา_____

RAKCHANOK SAENGPAKDEEJIT : ENGLISH READING STRATEGIES
EMPLOYED BY SCIENCE-ORIENTED UNDERGRADUATE STUDENTS
IN PUBLIC UNIVERSITIES. THESIS ADVISOR : ASSOC. PROF.
CHANNARONG INTARAPRASERT, Ph.D., 327 PP.

ACADEMIC READING STRATEGIES/ PUBLIC UNIVERSITIES

The present investigation has been designed to explore types of reading
strategy use of science-oriented undergraduate students, and examine the relationships
as well as patterns of variations in frequency of students' reported reading strategy
use with reference to the five variables (i.e. gender, location of university, field of
study, level of reading proficiency, and high school background). The participants in
the study were 1,096 science-oriented students selected through the purposive
sampling method, from 10 limited-admission public universities in Thailand, in
Academic Year 2008. There were two main phases of the data collection. Semi-
structured interviews and a strategy questionnaire were used as the main methods for
the first and second phases, respectively.

The Alpha Coefficient (α) or Cronbach Alpha was employed to check the
internal consistency of the research-constructed questionnaire. The reliability estimate
based on a 1,096-student sample is .95. The simple descriptive statistics was used to
describe levels of frequency of strategy use, while an Analysis of Variance
(ANOVA), the Chi-square tests ($\chi2$), and the Factor Analysis were used to find out
the relationship between the frequency of strategy use and the five variables.

The findings show that, on the whole, the students reported medium frequency
of strategy use in the two main reading strategy categories: 1) Strategies for

comprehending reading texts, and 2) Strategies for enhancing textual comprehension. The results of the study reveal that the students' reported use of strategies varied significantly in terms of genders, fields of study, and levels of reading proficiency. Six extracted factors were found to be strongly related to four variables, i.e. genders, locations of universities, fields of study, and levels of reading proficiency, whereas, no factors were found to be related to students' high school background.

School of English   Student's signature_____

Academic Year 2009   Advisor's signature_____

ACKNOWLEDGEMENTS

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
EAP	English for Academic Purposes
EFL	English as a Foreign Language
ESP	English for Specific Purposes
ESL	English as a Second Language
FL	Foreign Language
GE	General Education
Health-Sci	Health Science
Hi	High
L2	Second language
Lo	Low
Metro BKK	Bangkok and the Metropolitan Areas
Mo/Mod	Moderate
n.d.	No Date
N.S.	No Significance
RSI	Reading Strategy Inventory
RSQ	Reading Strategy Questionnaire
Sci-Tech	Science and Technology
SCT	Strategies for comprehending reading texts

SCTAAR	To comprehend reading texts after having done the actual reading
SCTBAR	To comprehend reading texts before doing the actual reading
SCTWAR	To comprehend reading texts while doing the actual reading
SETC	Strategies for enhancing textual comprehension
SETCRV	To enhance textual comprehension by retaining knowledge of newly-learned vocabulary items
SETCUV	To enhance textual comprehension by solving problems dealing with unknown vocabulary items
S.D.	Standard Deviation
SILL	Strategy Inventory for Language Learning
SPSS	Statistical Package of the Social Sciences
SORS	Survey of Reading Strategies

CHAPTER 1

BACKGROUND OF THE STUDY

1.1 Introduction and Purpose of the Chapter

This chapter is an introduction to the present study providing background of the study. The subsequent sections cover the terms used in the study; formal educational system in Thailand; English language teaching and learning in Thai context; research objectives; the benefits of the present study, and finally the expected outcomes.

Since the 1970s, reading skills have received increased interest in terms of both research and their applications to the foreign language classroom (Gascoigne, 2005). Since then, many researchers in the field of foreign language reading have begun to focus on readers' reading strategy use. Based on many research works on reading strategies (e.g. Barnett, 1990; Oxford, 1992; Carrell, 1998; and Brantmeier, 2002), we may conclude that students have used different strategies while they are reading in order to comprehend the reading texts; moreover, good readers use reading strategies more often than the poor ones (Lau and Chan, 2003; Lau, 2006).

Strategies can be defined as learning techniques, behaviors, problem-solving, study skills or specific attacks that learners employ when facing with problems and can make learning more effective and efficient (Oxford and Crookall, 1989 cited in Singhal 2001, and Brantmeire 2002). Many scholars, e.g. Tarone (1983); O'Malley and Chamot (1990); Oxford (1990); and Williams and Burden (1997) point out that

strategies are essential tools for developing language competence. In terms of reading strategies, Block (1986) proposes that reading strategies can indicate how readers deal with reading tasks, what cues should be used, how readers can understand what they read, and what they do when they encounter the problems in reading. It can be said that researchers in this area have concentrated on various reading strategies used by FL students in order to improve their reading comprehension ability (Singhal, 2001).

It is generally acknowledged among language teachers and learners that the ability to read in a foreign language is one of the most important skills required of students; moreover, it is one of the skills that are difficult to develop to a high level of proficiency (Grabe, 2002). According to Anderson (1999), reading is an essential skill for students learning English as a foreign language (EFL); and for many, reading is the most important skill to master. Adamson (1993) suggests that in language learning, the most important language skill for academic achievement is reading, followed by listening comprehension and then writing. Since many universities benefit from academic materials written in English, English proficiency has become an extremely important requirement for the students. The students are expected to understand what they read regardless of the subject matter they study. Therefore, reading skills are of significant importance in such environments (Ozek, 2006). With strengthened reading skills, EFL readers will make greater progress and attain greater development in academic areas.

An increase of interest in the importance of reading skills among language educators has led to investigating students' reading strategies and their relationship with the achievement in reading a foreign language. Many researchers (e.g. Block, 1986; Anderson, 1991; Song, 1998; and Dreyer and Nel, 2003) have started to pay

attention to the importance of strategies foreign language students use while reading texts in a foreign language. Several investigations have been conducted on students' reading strategies and their relationship with the successful and unsuccessful students, in language reading. Researchers in foreign language reading (e.g. Hosenfeld, 1977; Kim, 1989; and Kletzien, 1991) have demonstrated that strategies used between more proficient readers and less proficient ones are different. The more proficient readers are more aware of different types of strategies they use than are the less proficient ones and that the more proficient ones are able to use the strategies more flexibly and efficiently (Song, 1998).

Since reading is a part of language learning and teaching, it is worth mentioning in the present study that reading strategies should be indispensable parts of learning and teaching reading. In learning how to read, it is necessary for language learners to be taught reading strategies in order to indicate how readers conceive a task, how they make sense of what they read, and what they do when they do not understand. However, in terms of learning reading, especially for foreign language reading tasks, it is not easy for all language learners to learn, understand what they read clearly, or solve all the problems they encounter while reading. Therefore, in order to help learners to read successfully and be able to understand what they read, they should be taught and trained various reading strategies. Precisely, while reading, learners should be able to identify their reading problems and apply strategies to solve those problems (Singhal, 2001). According to Anderson (1991, p. 76), strategic reading is not only a matter of knowing what strategies should be used, but in the meantime, the readers must know how to apply those strategies appropriately.

As discussed earlier, in language learning and teaching environments, it is unavoidable for both language learners and language teachers to deal with reading and reading strategies. Through an initial review of related literature and research works on reading strategies, it appears that many research works have been carried out on these areas (e.g. Hosenfeld, 1977; Sheorey and Mokhtari, 2001; Pool, 2005). On the other hand, to date very few research works have been carried out with Thai students in terms of reading strategies. In the context of EFL education in Thailand, a small number of those research works have been conducted to investigate reading strategies employed by Thai students studying at the tertiary level. There might be researchers who have carried out research on reading strategies at the tertiary level in Thailand, but only a few empirical research works have been found (e.g. Apasara Chinwonno, 2001; and Kanchana Prapphal, n.d.). Additionally, a small amount of research has been carried out with a very large number of participants as the present study (n=1,096). For example, Apasara Chinwonno (2001) studied Thai and English reading comprehension strategies employed by 170 students while Kanchana Prapphal (n.d.) carried out a study on the use of reading strategies with 40 students. Apart from Apasara Chinwonno and Kanchana Prapphal, Jaruwan Wirotanan (2002) conducted her research work with 40 graduate Thai students with different reading proficiency levels at the University of Pittsburg exploring reading strategies in reading both Thai and English texts.

To fill the gap, the researcher for the present investigation has intended to examine reading strategies employed by science-oriented undergraduate students learning English in public universities. The science-oriented students were sampled as the subjects under the present study because from the researcher's own experience, she found that most of the science-oriented students have low reading proficiency

level comparing with those from the field of social sciences. This is consistent with Prakongchati (2007) and Siriwan (2007) who found that the university students with high proficiency were only 2.39% and 8.64% respectively. Further, only a third of the subjects of the study by Intaraprasert (2000) were high proficiency engineering students. In addition, the study has been designed to examine overall strategy use, the use of two reading strategy categories as well as the relationships between students' use of reading strategies and five variables: gender of students (male and female), location of institutions (Bangkok and metropolitan; and regional areas), field of study (Science-oriented: Health Science; and Science and Technology), level of reading proficiency (high, moderate, and low) and students' high school background (state-run, and private-run high schools). The main purpose of the study primarily aims at exploring reading strategies employed by science-oriented undergraduate students, and examining the relationships between the five variables and reading strategy use.

In conclusion, many other variables or factors, such as age, motivation, class size, may affect or relate to the use of reading strategies. However, it is impossible for the researcher for the present study to investigate all the variables mentioned in relation to the choice of reading strategies used by science-oriented undergraduate students. As a result, the variables in the present study have been carefully selected.

1.2 Terms Used in the Present Study

The following is the terms most frequently used throughout the study.

1.2.1 Reading Strategies

In the present study, the term 'reading strategies' has been defined as learning processes or learning techniques employed by the learners in comprehending an

English text. These techniques may be employed before, while, or after they do the actual reading. These techniques may also be employed when the learners are facing with difficulty in understanding new vocabulary items in the reading texts or retaining the newly-learnt vocabulary items.

1.2.2 Science-oriented Students

The term 'Science-oriented students' for the present study refers to the Thai undergraduate students whose major field of study is science-oriented in either Health Science (e.g. the Faculty of Public Health, the Faculty of Medicine, the Faculty of Dentistry, the Faculty of Pharmaceutical Science, the Faculty of Veterinary Medicine, and the Faculty of Nursing), or Science and Technology (e.g. the Faculty of Engineering, the Faculty of Technology, the Faculty of Agriculture, and the Faculty of Science) studying at the public universities. These students are those who may have already taken an EAP course (English for Academic Purposes) or ESP course (English for Specific Purposes); or those who were taking the EAP or ESP courses at the time the data were being collected. These students were selected as the subjects of the study because the researcher would like to ensure that these students were familiar with reading English academic texts from either EAP or ESP course.

1.2.3 Students' Reading Proficiency Level

'Students' reading proficiency level' refers to the students' language proficiency in reading, which has been rated as 'high', 'moderate', and 'low' based on their reading test scores obtained through the researcher-constructed reading proficiency test.

1.2.4 Location of Universities

The location of the participating universities have been classified into two

main groups: the universities located in Bangkok and the metropolitan areas (Metro-Bangkok); and those located in the regional areas i.e. the North, the East, the Northeast, and the South. They were referred to as 'regional'.

1.2.5   Thai Public Universities

The term 'Thai public universities' in this study refers to the 22 limited-admission universities which are run by the governemt excluding Rajabhat Universities, Rajamangala Universities of Technology, Mahachulalongkorn-rajavidyalaya University, Mahamakut Buddhist University, and National Institute of Development Administration (NIDA).

1.3 English Language Teaching and Learning in the Thai Contexts

The basic educational system aims to improve learners' imagination, abilities, creative thought, and humanity in order to develop the learners having enough potential for living and create creative work (Ministry of Education, 2002). Learning contents are classified into eight subject groups, namely, Thai language, mathematics, science and technology; social studies; religions and culture; health and physical education; visual arts; music and performing arts; work and vocation; and foreign languages (Ministry of Education, 2008). According to The Office of the National Education Commission (2000), since foreign language study is one of the core subject groups of the basic Thai educational system, English is generally a compulsory subject in almost every educational level. The curriculum spans 12 years with 4 grade intervals before higher-education (Ministry of Education, 2002; The Office of the National Education Commission, 2002; and Ministry of Education, 2008), namely, grades 1-3, grades 4-6 (primary school), grades 7-9 (lower secondary school), and

grades 10-12 (Upper secondary school or high school). In other words, the English subject in the basic education has been offered from the first year of primary education until the last year of the upper secondary education.

The structure of basic educational system in Thailand can be classified into 3 levels before studying in the tertiary level: primary level (Grades 1-6); lower secondary level (Grades 7-9); and upper secondary level (Grades 10-12) (Ministry of Education, 2008).
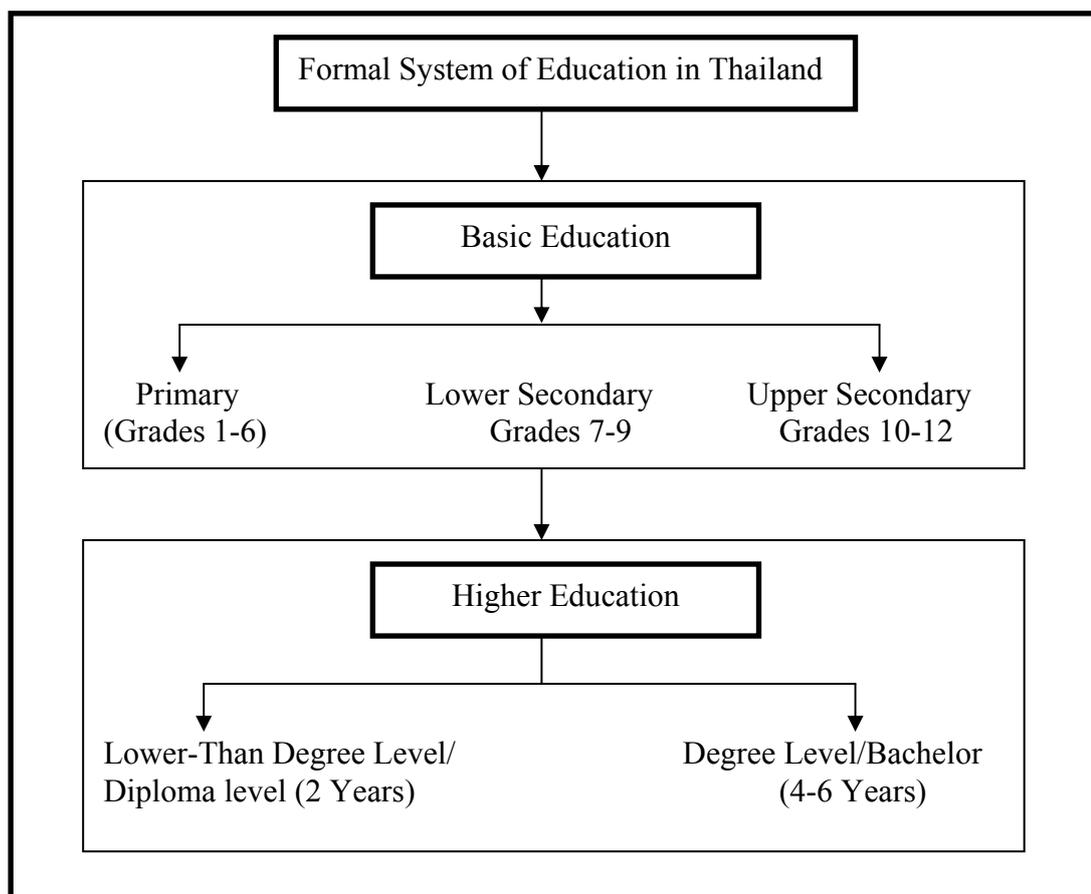
(Adapted from Ministry of Education, 2008)

Figure 1.1 The Formal System of Education in Thailand

At the tertiary level, English may be part of the Faculties of Arts, Humanities, Social Sciences depending on the organizational arrangements in each institution (Intaraprasert, 2000). Regarding English learning and teaching at the tertiary level, English as a foreign language is provided for students learning English as both compulsory and elective courses for both English major and non-English major students. Many institutions provide their students other additional English programmes, such as Business English, English for Tourism, etc. As a result, in each institution, English can be provided for students in many courses, namely English as fundamental courses in general education (GE), English as elective courses, English for academic purposes (EAP), and English for specific purposes (ESP). According to Intaraprasert (2000), English is one of the foreign courses offered at each institution differing in content and areas of skills. However, English courses can be classified as one of the following categories.

- General English skill courses dealing with general content of English in daily life for non-science oriented students, for example, educational and social science students;
- Advanced English skill courses emphasizing those specializing in English for academic purposes (EAP) or English for specific purposes (ESP) for science-oriented students, for example, medicine, engineering, pharmacy students.

According to the official announcement regarding the policy of English teaching and learning at the tertiary level (Ministry of Education, 2001), students studying at the tertiary level are required to take at least four English courses (12 credits in total). The first two English courses are English foundation courses, and the latter two courses are either EAP or ESP. The main goal of these four English courses

is to develop students' communicative competence in English both in social language and academic language. In other words, the main purpose of all English courses taught in the tertiary level is to enhance the use of English for both social and academic contexts.

English for Academic Purposes (EAP) is a recognised branch of English for Specific Purposes (ESP) (Bell, 1998). English for Specific Purposes (ESP) is known as a learner-centered approach to teaching English as a foreign or second language. It meets the needs of (mostly) adult learners who need to learn a foreign language for use in their specific field, such as science, technology, medicine, leisure, and academic learning (Yildiz, 2004). Gatehouse (2001) proposes that ESP consists of English language teaching which is:

- designed to meet specified needs of the learner;

- related in content (i.e. in its themes and topics) to particular disciplines, occupations and activities;

- centred on the language appropriate to those activities in syntax, lexis, discourse, semantics, etc., and analysis of this discourse;

- in contrast with General English.

According to Anthony (1997), ESP includes the following characteristics:

- being defined to meet specific needs of the learner;

- making use of the underlying methodology and activities of the discipline it serves;

- being centred on the language (e.g. grammar, lexis) skills, discourse and genres appropriate to these activities.

- being related to or designed for specific disciplines;

- using, in specific teaching situations, a different methodology from that of general English;

- being designed for adult learners, either at a tertiary level institution or in a professional work situation. It could, however, be for learners at secondary school level;

- being generally designed for intermediate or advanced students.

If language in different situations for different students varies, then tailoring language instruction to meet the needs of the students in specific contexts is also different. In other words, EAP and ESP courses are learner-centred in terms of course material and teaching methodology and the design of such courses is based on the specific professional or academic needs of learners. The focus of this study is on the English courses (EAP or ESP) the science-oriented students have already taken, or may be taking at the time the data were collected.

1.4 Research Objectives

The present study aims at examining types of reading strategies which science-oriented undergraduate students reported employing in reading English academic texts and also exploring how five variables, which are 1) gender of students, 2) location of institutions, 3) field of study, 4) level of reading proficiency, and 5) high school background relate to the use of reading strategies. To be specific, the purposes of the present study are:

1) to explore types of reading strategies which science-oriented undergraduate students (Health Science, and Science and Technology) studying at the public universities generally report employing to comprehend their reading texts;

2) to investigate overall use of reading strategies as well as the relationships between frequency of students' use of reading strategies and the five variables; and

3) to examine patterns of significant variation in the frequency of students' report of reading strategy use at different levels with reference to the five variables mentioned in (2) above, if any at all.

1.5 Benefits of the Present Study

Brantmeier (2002) has found that most of the researchers only focused on one or two variables in the studies, such as proficiency level and text types, which may affect strategy use and comprehension. However, there are many other variables, such as social factors, learners' individual characteristics, motivation, etc. which may also affect students' reading strategy use. According to Green and Oxford (1995, p. 289), "the strategy use is a complex phenomenon, related to a number of variables including but not limited to only one variable". Therefore, it is important for the researcher to work on the study of types of reading strategies science-oriented undergraduate students employing in foreign language reading texts, and to clarify how the five variables relate to such reading strategies students reported employing in their English academic reading texts.

The results obtained and the conclusion of this study may be useful for both language teachers and learners because the usefulness of the reading strategies is highlighted. They may also provide some useful implications for both teachers and

learners. For example, teachers can make use of the results as a guideline to improve their teaching techniques. This study may also help teachers to select the appropriate reading strategies for their students. Moreover, the result of the study will be helpful for teachers when designing courses that include foreign language reading. For learners, the result of this study may help them to consider which strategies are appropriate for their reading texts, so that this may help them to improve their reading comprehension abilities.

1.6 The Outline of the Thesis

In order for the researcher to achieve the research objectives, the researcher first focuses on the related literature, followed by past research works on reading strategies, and finally the research methodology which contributes to the present investigation. This can be seen in Chapter 2 which includes the review of related literature on reading along with some significant issues of reading, reading strategies as well as reviewing the available research works on reading strategies. The chapter summarises reading strategies employed by foreign or second language learners in the past, as well as showing how reading strategies have been defined and classified by different researchers such as Paris, Lipson, and Wixson (1983); Block (1986); Barnett (1989); Anderson (1991); Pressley and Afflerbach (1995); Jiménez, García, and Pearson (1996); Aebersold and Field (1997); Ghonsooly (1997); Tang (1997); Sheorey and Mokhtari (2001); Brantimeier (2002); Salataci (2002); Anderson (2003); Willingham (2006); and Zhang and Wu (2009). Finally, some research works on reading strategies which contribute to the present study are presented.

Chapter 3 discusses some general principles of research design which apply to the present investigation. The chapter focuses on research methodology, methods for researching in language learning strategies, theoretical framework and rationale for selecting and rejecting variables for the present study, as well as the research questions. This is followed by the discussion about sampling and rationales for choice of subjects, as well as characteristics of the research population. This is followed by framework of data collection methods for the present study, and methods for data collection. The last part of this chapter deals with how the data obtained are analysed, interpreted, and reported.

Chapter 4 deals with the reading strategy inventory which emerged from the data obtained through students oral interviews conducted with 39 science-oriented undergraduate students at public universities. The chapter starts with the procedures of eliciting information from the 39 students in the first phase of data collection. This is followed by a report of how the preliminary reading strategy inventory was generated based on the interview data. Then, the method of how to group the reading strategies into two main strategy categories, and the method of how to validate the reading strategy inventory are discussed. The chapter ends with the process used to generate the reading strategy questionnaire which was used as the main instrument for the second phase of data collection.

Chapter 5 describes and discusses the results of the research findings of the present study in terms of students' overall strategy use, use of strategies in the two main categories, as well as use of individual reading strategies. In this chapter, significant variations in use of reading strategies are not taken into consideration.

Chapter 6 examines the relationship of reading strategy use by 1,096 students to their gender, location of universities, field of study, level of reading proficiency, and high school background. The chapter explores the variation in students' overall reported reading strategy use, students' strategy use in the two main categories, and use of strategies in each purpose of the two categories through the use of analysis of variance (ANOVA). Then, the chapter examines variation of the students' individual strategy use according to the five variables through the use of chi-square tests. The chapter ends with the factor analysis and six extracted factors with strong relation to each of the variables.

Chapter 7 demonstrated the research findings of the study in response to research questions 1-7 presented in Chapter 3, including discussions of the research findings and implications for the teaching and learning of English for science-oriented students. The contributions of the present study are followed by the presentation of the limitations of the present study and proposals for future research.

1.7 Summary

In this chapter, the researcher has given a description of the background of the present study in an attempt to put the study in a proper context. This is followed by the definition of terms used for the study. Then, the brief overview of the Thai educational system, and English language teaching and learning in Thailand are presented. This is followed by the research objectives, and the benefits of the present study. Finally, this chapter ends with the expected outcomes.

CHAPTER 2

REVIEW OF RELATED LITERATURE

AND RESEARCH WORKS ON READING STRATEGIES

2.1 Introduction and Purpose of the Chapter

This chapter mainly focuses on the review of related literature on reading strategies. First, the researcher starts off with the discussion of how language researchers define the term 'reading'. This is followed by the importance of reading, reading purposes, reading theories, reading process, and reading models. Then language learning strategies and reading strategies are discussed. Finally, a review of previous research works on reading strategies that have been conducted either in Thailand or foreign countries with the focal points of the studies, participants, methods of data collection and analyses, and results are presented respectively.

Reading comprehension has become an essence of reading, essential not only to academic learning in all subject areas but also to success in future career, and to lifelong learning (Pritchard, Romeo, and Muller, 1999; and Rings, 1994). To be efficient in reading is very important for students, especially in the higher educational level. Regarding university students, they require a lot of independent learning; therefore, reading comprehension is essential to academic learning areas (Tercanlioglu, 2004). Levine, Ferenz and Reves (2000) state that the ability to read academic texts is considered as one of the most important skills that university students of English as a Second Language (ESL) and English as a Foreign Language

 (EFL) need to acquire. Therefore, the study of literary texts is a significant feature of most university undergraduate programmes in any language department (Bouvet, 2002).

However, a number of students who have successfully entered the higher education are still without enough reading skills. When they are asked to read, they often select ineffective and inefficient strategies in reading (Dreyer and Nel, 2003). Many researchers have been seeking ways to help learners become successful in their L2 reading. A number of previous studies show that second language and/or foreign language researchers in reading began to focus on reading strategies in the late 1970s in order to identify relationships between reading strategies and successful second language reading (Carrel, 1998).

Since 1970s, reading skills have received increased attention in terms of both research and their applications to the foreign language classroom (Gascoigne, 2005). Over the last three decades, many of the research works conducted in the field of reading comprehension have concentrated on the knowledge and control of reading strategies (Kletzien, 1991). As a result, numerous research works on reading strategies have been conducted and a number of articles have been published.

To have a better understanding of reading strategies in language teaching and learning, it would be useful to know the general information about reading. The subsequent sections cover the definition of reading, the importance of reading, reading theories, reading process, and reading models.

2.2 Reading and Foreign Language Learning

2.2.1 Definitions of Reading

For a better understanding about how to succeed in reading, it should be made clear about the terms 'reading' by studying various definitions of reading proposed by some scholars before discussing the importance and purposes of reading and other issues concerning reading. Generally, reading has been seen as the ability of a person who looks at the written or printed page, and then tries to interpret or understand the meaning of the text. Therefore, it is useful to comprehend what 'reading' is. Some scholars have defined the term 'reading' as follows:

- Brumfit (1980, p. 3) defines reading as "an extremely complex activity involving a combination of perceptual, linguistic and cognitive abilities."

- Grellet (1981, p. 3) defines reading as "the process of extracting the required information from a written text as efficiently as possible."

- McWhorter (1990, p. 4) defines reading as "an active process of identifying important ideas and comparing, evaluating and applying them."

- Badrawi (1992, p. 16) defines reading as "a process to bring an individual's life experience and thinking powers to bear to understand what the writer has encoded."

- Goodman (1995, p. 11) has seen reading as "a psycholinguistic guessing game". He defines reading as "a communication between the reader and the writer."

- Pikulski (1997, p. 2) defines reading as "the process of constructing meaning through the dynamic interaction among: (1) the reader's existing knowledge;

(2) the information suggested by the text being read; and (3) the context of the reading situation."

- Anderson (1999, p. 1) defines reading as "an active and fluent process which involves the reader and the reading material in building meaning."

- Alderson (2000, p. 3) defines reading as "the interaction between a reader and the text."

- Grabe (2002, p. 51) defines reading as "the ability to derive understanding from written text."

- Grabe and Stoller (2002, p. 17) define reading as "the ability to understand information in a text and interpret it appropriately."

Based on the definitions of 'reading' proposed by the scholars mentioned above, we can see that reading is the ability of an individual to bring an existing knowledge, the information suggested by the text, the context of reading situation and thinking processes to construct the meaning from the writer's ideas presented in the written form. Although many scholars have seen reading as a process of constructing the meaning from the written or printed page, Badrawi (1992) points out that the meaning of reading does not stick only on the printed page but in the mind of the person who wrote the words. As a result, comprehension will not be found on the printed page, but in the mind of the reader who reads those words. If the reader's background, training, attitude, and so on, are similar to or shared with those of the writer's, the reader is likely to interpret and understand the text more easily.

For the definitions of reading defined by many scholars mentioned earlier, 'reading' can be generally defined as the active process of using one's own prior

experience, the language knowledge, and writer's cues to identify the important ideas and understand what the writer has encoded. Additionally, for the present study, 'reading' refers to the active processes which the university students take in order to understand the required information from the written or printed text.

2.2.2 The Importance of Reading

Of all the language skills, it is accepted that reading is the most important skill for academic achievement, comparing to other language skills, i.e. listening comprehension, speaking and then writing (Adamson, 1993). According to Anderson (1999), reading is an essential skill for both ESL and EFL students; and for many other field of study students, reading is also the important skill to master in order to ensure success in language learning. With strengthened reading skills, ESL/EFL learners will make greater progress and attain greater development in other academic areas (Anderson, 2003). Based on Sugirin (1999), reading is also one of the most important language skills university students should be equipped with. Consequently, the main objectives of this section are to study the importance of reading.

At the higher educational level, reading has become the university students' own best teacher (Gillet and Temple, 2000). In other words, in an independent learning environment, the ability in reading enables the students to be autonomous learners who can learn and understand information in many areas of study without much help from teachers. According to Badrawi (1992, p.16), "reading is a helpful language skill needed for obtaining information, fostering and reacting to ideals, developing interests and, finally, deriving pleasure by reading through understanding or comprehension." Moreover, one reason for reading is to help students understand other people's ideas.

Carrell (1998) suggests that reading is an important skill not only for new information is learned, but also new language skills are acquired. In first language reading, even relatively advanced learners constantly acquire new vocabulary knowledge through reading. Similarly, in second language reading, learners are exposed to valuable second language input which they can use to advance their second language acquisition. Furthermore, reading is the primary source of new information about all sorts of topics in both first and second languages.

Reading may give the readers an expansion of vocabulary, familiarity with varied sentence structures, a broad knowledge of the forms of written language, and acquaintance with most of the topics that are likely to come across in print and this enables good readers to gain a wealth of information about the world and wealth of vocabulary (Gillet and Temple, 2000). In addition to this, Gillet and Temple (2000) propose the importance of reading as follows:

- Reading is functional; that is, it is useful and necessary every day to work at most jobs, raise children, keep ourselves safe, and exercise our citizenship.

- Reading is integral to development; that is, it is necessary to grow intellectually, to acquire new information and skills, to experience vicariously things and events that could not be experienced in reality, and to develop a sense of personal competence in a literate world.

- Reading is social; that is, it is a fundamental part of the culture of schooling, a basic expectation of the outcome of schooling, and a part of daily family life. It is also social in that literacy is, in effect, handed down in families from adults to children and in that literacy provides

common bonds and experiences among people who otherwise might have little else in common.

- Reading is enjoyable; that is, a source of pleasure, fun, recreation, relaxation, escape, and even adult-child bonding.

From the importance of reading mentioned earlier, we can see that reading plays a dominant role in learning, especially in the higher educational level because textbooks used in the higher level of study are often printed in English. To summarize, we can see that learners with good reading skill will contribute enormously to success in their study both inside and outside classroom as well as their acquisition of the target language, their social life, and their future career.

2.2.3 Reading Purposes

As mentioned in the previous section, reading plays an important role in our learning, especially for the higher educational level students. It is useful and helpful if students realise the purposes of their reading. This section specifically deals with the purposes of reading.

Reading purposes refer to readers' aims and objectives in reading texts. If we carefully think and consider the purposes of reading, we can find different purposes from different readers. Therefore, reading purposes are one of the important factors which can lead us to be successful readers. According to Ruiqi (2007), reader's reading purpose is an integral part of successful reading. Herri-Augstein, Smith, and Thomas (1982 cited in Ruiqi 2007) propose that reading purpose is important for two reasons: 1) the way one reads a text varies with purposes; and 2) the success for reading can only be checked against purposes. Knutson (1998 cited in Ruiqi 2007)

also points out that the nature of reading varies according to the reader's purpose and situation, and that reader's reading purpose inevitably determines his/her approach to the text, the amount of attention paid, the time spent, as well as what features of parts of the text are focused on.

Reading Objective

Casual

Purposeful

General

Specific

Direct

Transferred
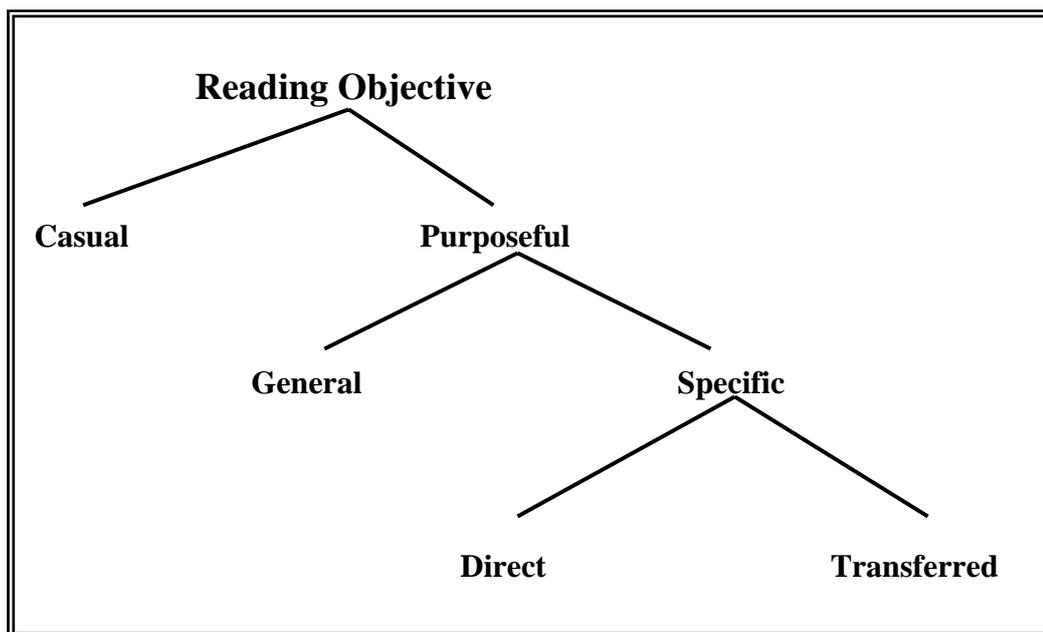
(*Source: Lucas 1990, p. 26*)

Figure 2.1 Reading Objectives

The scheme shown in Figure 2.1 is an attempt to show the variety of reading objectives. With regard to the reading objectives shown above, they can be classified into two groups as casual and purposeful objectives. The need to be amused or distracted, idle curiosity, and a general interest in a topic can be seen as casual objectives. In terms of the purposeful objectives, two sub-objectives can be grouped into general and specific objectives. The interest in an academic and professional topic is in the group of general objective. Additionally, the specific objectives can also be classified into two sub-objectives: direct and transferred objectives. The direct

objective refers to a definite need for some particular information as a need to check some knowledge or understanding of the facts. Besides, the transferred objective refers to the task of finding information for somebody else, or the command of a teacher to read a particular text. Obviously, reading objectives will differ in intensity from one potential reader to another, and often a potential reader will have a combination of objectives (Lucas 1990).

Grellet (1981) notes that there are two main purposes for reading: 1) Reading for pleasure and; 2) Reading for information (in order to find out about something or in order to do something with the information the reader gets). According to Ruiqi (2007), there are two major reading purposes: reading for getting information and reading for pure fun or enjoyment.

Additionally, Grabe and Stoller (2002) have classified the reading purposes under seven main headings as follows: 1) Reading to search for simple information; 2) Reading to skim quickly (Both reading to search and reading to skim are common reading abilities. Reading to search is used so often in reading tasks that it is probably best seen as a type of reading ability.); 3) Reading to learn from the text typically occurs in academic and professional contexts in which a person needs to learn a considerable amount of information from a text; 4) Reading to integrate information inevitably requires critical evaluation of the information being read so that the reader can decide what information to integrate and how to integrate it for the reader's goal; 5) Reading to write (or search for information needed for writing); 6) Reading to critique texts (Both reading to write and reading to critique texts require abilities to compose, select, and critique information from a text); 7) Reading for general comprehension is the most basic purpose for reading, underlying and supporting most other purposes for reading.

To summarise, many scholars such as Grabe, Stoller, Grellet, Lucas, and Ruiqi have recognized the importance of reading and demonstrated the reading purposes. Based on these scholars, reading purposes can be classified into two main purposes: reading for pleasure and reading for getting information. However, the reading purposes can also be categorised into many categories as suggested by Grabe and Stoller. As mentioned earlier, there are a number of different reading purposes; therefore, recognizing the reading purposes is one factor which can help the students succeed in their reading tasks. This may be because the reading purposes may be a rough guide to show the students the importance of their reading tasks. For the present study, only reading academic texts has been considered. Therefore, the main purpose of reading for this study is to read for getting the information.

2.2.4 Reading Theories

Having knowledge about theories on reading can help the readers understand the processes of reading better. While doing some reading, good readers often use their cognitive and/or metacognitive process to decode the linguistics for their comprehension in order to better understand the texts (Mokhtari and Reichard, 2004; Henia, 2003). Therefore, the cognitive theory and metacognitive theory will be reviewed in this study. Moreover, the existing knowledge is one factor that can help the reader to understand the text more easily. Hence, the schema is also an important factor in reading. In the following section, it discusses three reading theories which are the cognitive theory, the metacognitive theory, and the schemata theory.

2.2.4.1 Cognitive Theory

The term "cognition" refers to variations among individuals in the preferred way of perceiving, organizing, or recalling information and experience

(Ghonsooly and Eghtesadee, 2006). The cognitive theory emphasizes the active mental processes involved in language learning, and not simply the forming of habits as the behaviorist views (Schmidt and Richards, 2002). According to Williams and Burden (1997), cognitive strategies are seen as mental processes directly concerned with the processing of information in order to learn, that is for obtaining, storage, retrieval or use of information.

Specifically in a reading aspect, a cognitive theory of reading assumes that an active reader integrates the existing knowledge and new information with some strategies to construct a meaning from the texts (Alvermann and Pheps, 2002). Furthermore, the cognitive theory has been seen as guiding procedures that students can use to help them complete their reading tasks (Rosenshine, 1997).

2.2.4.2 Metacognitive Theory

'Metacognition' refers to higher order thinking which involves active control over the cognitive processes engaged in learning (Livingston, 1997). Livingston (1997), and Alverman and Preps (2002) define metacognition as the awareness of students about the resources and strategies that they can use to complete tasks. Moreover, it enables learners to become successful learners, understand how to be strategic readers and when to evaluate their comprehension.

Carrell (1998) proposes that metacognition is a strategy which can help students to be consciously aware of what they have learned, recognize situations in which it would be useful, involve thinking about the learning process, plan for learning, monitor comprehension or production while it is taking place, and evaluate of learning after the language activity is completed. Flavell (1979) further divides metacognitive knowledge into three categories: knowledge of person variables, task

variables and strategy variables. Regarding metacognitive experience, it can be defined as a "stream of consciousness" process in which other information, memories, or earlier experiences may be recalled as resources in the process of solving a current-moment cognitive problem.

Activities such as planning how to approach a given learning task, monitoring comprehension, and evaluating progress toward the completion of a task are metacognitive in nature (Livingston, 1997). In addition to using background knowledge to construct the meaning of what they have read, readers must monitor their comprehension and know when the process is breaking down. This monitoring of comprehension is also metacognition (Heilman, Blair, and Rupley, 1994). For example, before reading a text book, the students might take a mental inventory of the information from their background knowledge they have had in that topic. They also assess their interest in pursuing the topic further, their ability in reading, and their understanding of the purpose of the reading task. Only developing this awareness is not enough. The students also need to monitor their reading involving evaluating the trustworthiness of assumptions or inferences readers make while reading. Students can move backward and forward in text searches or they can engage some appropriate strategies to complete reading tasks (Carrell, 1998).

2.2.4.3 Schema Theory

Schema theory can describe how knowledge is represented and how that representation facilitates the use of the knowledge (Heilman et.al, 1994). Schemata are the reader's pre-existing concepts about the world and about the text to be read (Barnett, 1988). According to Alvermann and Pheps (2002), schemata are fluid; they overlap and intertwine, and they are constantly modified to assimilate or accommodate new information.

Schemata are used by cognitive psychologists to describe how the readers organize the raw data of everyday experience into meaningful patterns. They enable the readers to draw generalizations, form opinions, and understand new experiences. They act as a kind of mental filing system from which the individual can retrieve existing knowledge and into which new information can be filed. While reading, the readers' schema for a topic helps them to anticipate, to infer, to decide what is or is not important, to build relationships between ideas, or to decide what information merits close attention. After reading, they use schema as a topic to help them recall what they have read and put it into their own words in order to make them understand what they have read better (Alvermann and Pheps, 2002). In other words, schemata play a large role in the reading process. They determine which of several interpretations of the text is the most probable.

In conclusion, three theories mentioned in this section can explain the reading process. While reading, the students need at least one of these theories (cognitive, metacognitive and schemata) to explain how to decode the meaning from the written or printed words for their comprehension. Readers use their cognition, metacognition, and/or schema to recall their existing experience or some information that they have learned, and then integrate the former knowledge with new information to understand the meaning of the texts.

2.2.5   Reading process

Reading is not merely a receptive process of picking up information from the page in a word-by-word manner. Rather, it is a selective process and characterized as an active process of comprehending (Gascoigne, 2005). As mentioned in Section 2.2.1, many scholars (e.g. Anderson, 2003; Grellet, 1981; Grellet, 1981; Badrawi,

1992; Pikulski, 1997; Grabe and Stoller, 2002) view reading as an active process in constructing the meaning of what has been read that involves the reader and the reading material. According to Heilman et.al (1994), the reading process is a dynamic one, requiring active, meaningful communication between the author and the reader. It might be useful to understand the process in reading, and this is what drives many researchers to attempt to understand and explain its process. Hence, this section specifically deals with the reading process.

As can be seen in 2.2.4.3 that schemata theory can describe how readers organize the data of background knowledge into meaningful patterns, Ruddell (2001) points out that there are two types of prior knowledge which are employed to explain the process in reading: world knowledge and text knowledge. The world knowledge is the total amount of information a person has accumulated through day-to-day living experience while the text knowledge is information accumulated from a reader's experiences with the text.

Leipzig (2001) notes that reading is a multifaceted process involving word recognition, comprehension, fluency, and motivation. While reading, the reader should be able to: 1) identify the words in print which is called word recognition; 2) construct an understanding from them which is called comprehension; and 3) coordinate identifying words and making meaning so that reading is automatic and accurate which is called fluency.

This is consistent with Roe, Smith, and Burns (2005) who propose that reading is an extremely complex process which include nine aspects:

1) Sensory aspect which is to perceive the symbols set while reading;

2) Sequential aspect which is to follow the linear, logical, and grammatical patterns of written words;

3) Perceptual aspect which is to interpret what the readers see;

4) Experiential aspect which is to relate words to direct experiences to give the words meaning;

5) Thinking aspect which is to make inferences from and evaluate the material;

6) Learning aspect which is to remember what they learned in the past and incorporate new ideas and facts;

7) Associational aspect which is to recognize the connections between symbols and sounds, between words and meaning;

8) Affective aspect which is to deal with personal interests and attitudes that affect t task of reading; and

9) Constructive aspect which is to put everything together to make sense of the material.

Not only one of the nine aspects of reading process works individually, but the whole aspects also work together. This process can be likened to a series of books, which each aspect represented by an important volume. A student would have to understand the information in every volume to have a complete grasp of the subject. Therefore, the student would have to integrate information from all of the volumes in order to perform effectively in the area of study. In other words, the series of the whole aspects of the reading process would be more important than any individual aspect.

Additionally, reading has been seen as a psycholinguistic process which starts with a linguistic surface representation encoded by a writer and ends with meaning

which the reader constructs (Goodman, 1995). There is thus an essential interaction between language and thought in reading. The writer encodes thought as language and the reader decodes language to thought. Goodman reveals that the brain is the organ of information processing. The brain seeks to maximize information it acquires and minimize effort and energy used to acquire it. There are five main reading processes proposed by Goodman (1995) which the students employ in reading as follows:

1. Recognition-information. The brain must recognize a graphic display in the visual field as written language and initiate reading. It is possible for reading to be interrupted by other activities, examining pictures, for example, and then to be reinitiated.

2. Pre-reading. The brain is always anticipating and predicting as it seeks order and significance in sensory inputs.

3. Confirmation. If the brain predicts, it must also seek to verify its predictions. So it monitors to confirm with subsequent input what it expected.

4. Correction. The brain reprocesses when it finds inconsistencies or its predictions are disconfirmed.

5. Termination. The brain terminates the reading when the reading task is completed, but the termination may occur for other reasons. For example, the task is non–productive, little meaning is being constructed, the meaning is already known, the story is uninteresting, or the reader finds it inappropriate for the particular purpose.

In summary, since reading is a very complex process, the information about reading process may help the students understand how their brains deal with reading tasks which will be particularly useful for them. From the information mentioned

above, it can be seen that many EFL and ESL language scholars (e.g. Goodman, Leipzig, and Ruddell) are interested in reading process. Furthermore, it would be useful to comprehend the models in reading in order to have a better understanding about reading process. Therefore, the following section deals with the reading models.

2.2.6   Reading Models

To study reading, it is inevitable to get involved with the models of reading. Models of the reading process often depict the act of reading as a communication event between the writer and the reader. Reading models have been developed to describe the way readers use language information to construct meaning from the written or printed texts (Vacca, Vacca, Gove, Burkey, Lenhart, and Mckeon, 2003). Barnett (1989) states that foreign language reading fall into one of three general models: bottom–up, top–down, or interactive.

1. Bottom–up Model. This process is initiated by decoding graphic symbols into sounds (Vacca et.al, 2003). Bottom–up models analyze reading as a process in which small chunks of text are adsorbed, analyzed, and gradually added to the next chunks until they become meaningful (Barnett, 1989). The reader first begins with the written text; identifies features of letters; links these features together to recognize letters; combines letters to recognize spelling patterns; links spelling patterns to recognize words; and then proceeds to the levels of sentence, paragraph, and text processing (Vacca et.al, 2003). This is consistent with Aebersold and Field (1997) who state that in bottom up, the reader constructs the text from the smallest units (letters to words to phrases to sentences, etc.).

In bottom-up models, the reading process is considered as a text-driven decoding process where in the sole role of the reader is to reconstruct meaning

embedded in the smallest units of text. The text can be seen as a chain of isolated words, each of which is to be deciphered individually, and the reader is as someone who approaches the text by concentrating exclusively on the combination of letters and words in a purely linear manner (Martinex-Lang, 1995 cited in Gascoigne, 2005).

2. Top–down Model. This model assumes that the process of translating print to meaning begins with the reader's prior knowledge (Vacca et.al, 2003). While the bottom-up model treats the reading process as a decoding activity with an emphasis placed on the structure of the text, the top-down model takes the opposite position and consider the readers and their interest, world knowledge, and reading skills as the driving force behind reading comprehension (Gascoigne, 2005). According to Aebersold, and Field (1997), top-down is the reading model which readers bring a great deal of knowledge, expectations, assumptions, and questions to the text and, given a basic understanding of the vocabulary the readers continue to read as long as the text confirms their expectations.

This model generally views reading as a linear process, i.e., it moves from the top, the higher–level mental stages, down to the text itself. In this process, the reader uses general knowledge to make intelligent guesses about what might come next in the text. Readers also use their knowledge of syntax and semantics to reduce their dependence on the print and phonics of the text and specify four processes in reading: predicting, sampling, confirming, and correcting (Barnett, 1989).
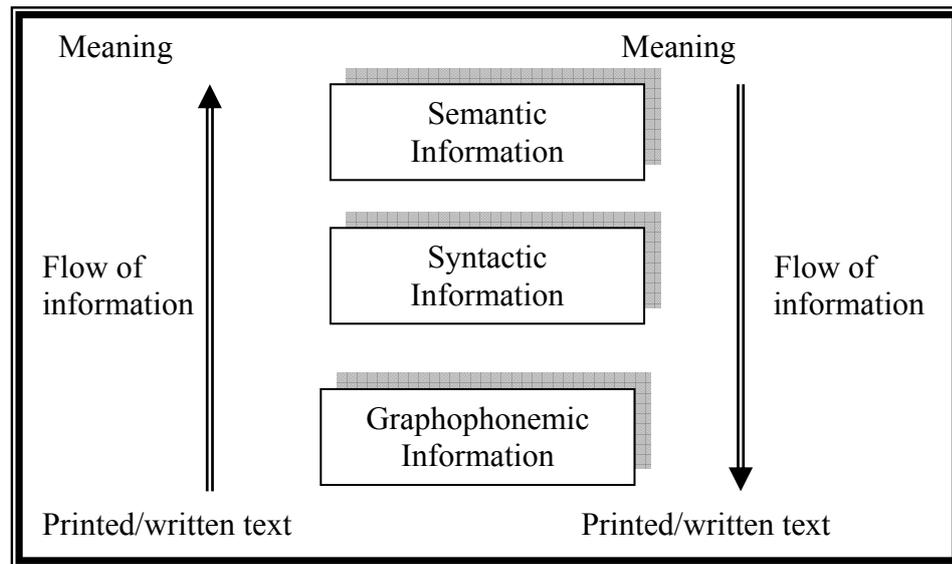
(Source: Vacca et.al, 2003, p. 24)

Figure 2.2 Bottom-Up and Top-Down Models

As illustrated in Figure 2.2, for bottom-up processing, the act of reading is triggered by graphophonemic information (e.g. letters, syllables, words) in order to construct meaning from printed/written text. On the contrary, for top-down processing, the act of reading is triggered by the reader's prior knowledge and experience in order to construct meaning (Vacca et.al, 2003).

3. Interactive Model. Interactive model assumes that the process of translating printed or written text to meaning involves making use of both prior knowledge and print (Vacca et.al, 2003). It is the most recent set of reading models, in which comprehension is considered the result of bottom-up and top-down elements; these models theorize an interaction between the reader and the written text (Aebersold and Field, 1997). Interactive model is also proposed by Aebersold and Field (1997) as the reading model which describes a process that moves both bottom-up and top-down, depending on the type of text as well as on the reader's background

knowledge, language proficiency level, motivation, strategy use, and culturally shaped beliefs about the reading. Likewise, Gascoigne (2005) indicates that interactive model places an emphasis on the interaction between the reader and the text. They are reader driven. They are not linear but rather cyclical views of the reading process in which textual information and the reader's mental activities have a simultaneous and equally important impact on comprehension.

In summary, from the discussion about reading models mentioned above, we can see the important role of reading models and can understand the reading process better. How the reader constructs the meaning from the printed/written text is the key issue in giving the explanation of the models of the reading process. From the discussion mentioned in this section, there are three main reading models: bottom-up, top-down, and interactive models, in which they vary in the emphasis placed on text-based variable and reader-based variable (Barnett, 1989). That is to say, bottom-up model is a text-based variable; on the contrary, top-down has been seen as a reader-based variable. In addition, interactive model is based on both text-based and reader-based variables.

2.3 Language Learning Strategies

As reading is one important aspect in language learning, before discussing reading strategies, it is worth mentioning in brief about language learning strategies (LLSs) in order to look back and review their background that may shed some light on the use of reading strategies.

2.3.1 Definitions of Language learning Strategies

It is useful to make clear about language learning strategies by studying several definitions of language learning strategies proposed by EFL/ESL researchers in order to understand how language learning strategies are related to the improvement of language learning. There have been many researchers trying to define the term of "language learning strategies", since this term has usually been mentioned in language teaching and learning. The sample definitions are provided below:

- Stern (1983, p. 405) defines language learning strategies as "particular forms of observable learning behavior, more or less consciously employed by the learner."

- Tarone (1983, p. 67) defines language learning strategies as "an attempt to develop linguistic and sociolinguistic competence in the target language -- to incorporate these into one's interlanguage competence."

- Ellis (1985, p. 166) defines language learning strategies as "plans for controlling the order in which a sequence of operations is to be performed."

- Weinstein and Mayer (1986, p. 315) define language learning strategies broadly as "behaviours and thoughts that a learner engages in during learning" which are "intended to influence the learner's encoding process."

- Chamot (1987, p. 71) defines language learning strategies as "techniques, approaches, or deliberate actions that students take in order to facilitate the learning and recall of both linguistic and content area information."

- O'Malley and Chamot (1990, p. 1) define language learning strategies as "the special thoughts or behaviours that individuals use to help them comprehend, learn, or retain new information."

- Oxford (1990, p. 8) defines language learning strategies as "specific actions taken by the learner to make learning easier, faster, more enjoyable, more self-directed, and more transferable to new situations."

- Nunan (1991, p. 168) defines language learning strategies as "the mental processes which learners employed to learn and use the target language."

- Cohen (1998, p. 25) defines language learning strategies as "learning processes which are consciously selected by the learner. The element of choice is important here because this is what gives a strategy its special character. There are also moves which the learner is at least partially aware of, even if full attention is not being given to them."

- Chamot (2001, p. 25) defines language learning strategies as "the techniques or procedures that facilitate a learning task."

Based on the samples of definitions of language learning strategies proposed by the scholars mentioned earlier, although most of these samples of definitions of language learning strategies show that no two researchers define language learning strategies in exactly the same way, they emphasize on a similar goal that learning strategies are used to facilitate the learners master or use the target language effectively and more comfortably. Additionally, from the definitions of learning strategies discussed earlier, we can see that language learning strategies are any sets of actions, plans, tactics, thoughts, or behaviors that language learners have made use of to help them comprehend the target language tasks.

2.3.2 The Characteristics of Language Learning Strategies

There are a number of basic characteristics in the generally accepted view of

language learning strategies (Clouston, 1997). First, language learning strategies are learner generated; they are steps taken by language learners. Second, language learning strategies enhance language learning and help develop language competence, as reflected in the learner's skills in listening, speaking, reading, or writing the second language (L2) or foreign language (FL). Third, language learning strategies may be visible (behaviours, steps, techniques, etc.), or invisible (thoughts, mental processes), or both. Fourth, language learning strategies involve information and memory (vocabulary knowledge, grammar rules, etc.).

Based on Oxford (1990), the characteristics of language learning strategies should allow learners to become more self-directed. Then the learners will be encouraged to be autonomous learners. Language learning strategies can be taught to the learners, and they are flexible. Therefore, one role of language teachers is to train the students the strategies in language learning. Table 2.1 illustrates the main characteristics of language learning strategies proposed by Oxford (1990).

Table 2.1 Characteristics of Language Learning Strategies

Language Learning Strategies:
1. Contribute to the main goal, communicative competence.
2. Allow learners to become more self-directed.
3. Expand the role of teachers.
4. Are problem-oriented.
5. Are specific actions taken by the learner.
6. Involve many aspects of the learner, not just the cognitive.
7. Support learning both directly and indirectly.
8. Are not always observable.
9. Are often conscious.
10. Can be taught.
11. Are flexible.
12. Are influenced by a variety of factors.

(Source: Oxford 1990, p. 9)

In conclusion, based on the characteristics of language learning strategies mentioned above, it can be noticed that language learning strategies have shared some

common characteristics: for example, language learning strategies have been used as tools to support the learners in language learning in order to help them to understand the language lessons; these strategies can be either observable or unobservable, or both. What follows is the discussion about the importance of language learning strategies of language learning and teaching.

2.3.3 The Importance of Language Learning Strategies for EFL Learning and Teaching

Past research works on language learning strategies employed by both second and foreign language learners learning a language, mainly English, have been conducted by many researchers. The results of these studies (e.g. Oxford, 1990; McIntyre and Noels, 1996) reveal that there are a variety of language learning strategies that have the potential to facilitate language learning. That is to say, language learning strategies have played an important role in language learning environment. Hence, this section deals with the importance of language learning strategies for EFL learning and teaching.

Since the number of research on language learning in a language classroom is increasing, it reveals that learners use different language learning strategies in performing the tasks and processing the new input they face. Language learning strategies are good indicators of how learners approach tasks or problems encountered during the process of language learning (Hismanoglu, 2000). According to Oxford (1990), language learning strategies are especially important for language learning because they are tools for active, self-directed involvement, which is essential for developing communicative competence. Then, appropriate language learning strategies result in improving proficiency and greater self-confidence.

Within communicative approaches to language teaching, a key goal is for the learner to develop communicative competence in the target language, and language learning strategies can help students to become successful in the target language (Clouston, 1997). In addition to developing students' communicative competence, language learning strategies are important because many researchers suggest that using language learning strategies can help the students become better language learners (e.g. O'Malley, Chamot, Stewner-Mazanares, Russo, and Küpper, 1985; Embi, 2001; Griffiths, 2003). Moreover, the results of many research works conducted by those researchers indicated that there is a positive relationship between language learning strategy use and language performance. Additionally, a study by O'Malley and Chamot (1990) suggests that effective language learners are aware of the language learning strategies they use and why they use them. It appears that language learning strategies can assist students both in learning the language and in becoming good language learners.

In summary, from the discussion mentioned in this section, the main aim for language learning strategy use is to help the students to become better language learners. For all EFL teachers who aim to help and develop their students' communicative competence and language learning, an understanding of language learning strategies in general is crucial.

2.4 Reading Strategies

Many researchers have hypothesized that the use of strategies is fundamental to successful reading (e.g. Kim, 1989; Kletzien, 1991; Swicegood, 1994; Jiménez, 1996; Song, 1998; Dreyer and Nel, 2003; Tercanlioglu, 2004). According to Song

(1998), reading strategies are important because they help learners to improve their reading comprehension, and to enhance efficiency in reading. In sum, reading is an important skill, especially for students studying in higher educational level; and it is also necessary for them to employ reading strategies while reading in order to comprehend the academic texts. Then, the aim of this section is mainly to study various strategies for reading. The subsequent sections deal with the definitions of reading strategies, and classifications of reading strategies.

2.4.1 Definitions of Reading Strategies

'Strategies' are the conscious actions that learners take to improve their language learning. Strategies may be observable, such as observing someone take notes during an academic lecture and then comparing the lecture notes with a chapter in a textbook in order to understand and remember information better, or they may be mental (unobservable), such as thinking about what one already knows on a topic before reading a passage in a text book (Anderson, 2003, p. 3).

Normally, when readers encounter comprehension problems, they use some strategies to overcome their difficulties. Different learners seem to approach reading texts in different ways, and some of which appear to lead to better comprehension (Tercanlioglu, 2004). The ways the readers use to overcome the reading difficulties are called 'reading strategies' and the term is used and defined differently by many researchers. Examples are:

- Paris, Lipson, and Wixson (1983, p. 293) define reading strategies as "deliberate cognitive steps that learners can take to assist in acquiring, storing, and retrieving new information and that therefore can be accessed for a conscious use."

- Garner (1987 cited in Kietzien, 1991, p. 69) defines reading strategies as "an action (or a series of actions) that is employed in order to construct meaning."

- Barnett (1989, p. 66) defines reading strategies as "the mental operations involved when readers approach a text effectively and make sense of what they read."

- Brantimeier (2002, p. 1) has defined reading strategies as "the comprehension processes that readers use in order to make sense of what they read."

Based on the definitions of 'reading strategies' proposed by the scholars mentioned in this section, reading strategies can be employed as a tool to help students to be better readers. This is consistent with Pearson and Gallagher (1983) who identify better readers as having ability and making use of the strategies to summarize and make effective use of background knowledge to comprehend the texts. The readers should also have an awareness of the strategies they employ to understand what they read. Good readers can also be the ones who try to keep the meaning of the passage in mind, read in chunks, ignore less important words, try to guess the meanings of unknown words using contextual clues, and have a good concept of themselves as readers.

A set of the sample definitions of reading strategies shown earlier has illustrated that researchers have seen reading strategies as useful techniques which readers employ when they face some difficulties in order to understand the text. Moreover, these definitions have also revealed that the goal of using reading strategies is to facilitate the learners' reading, and to improve the learners' comprehension ability.

2.4.2 Classification of Reading Strategies

The use of reading strategies is especially crucial for high educational level students in almost every academic field of study since academic materials written in English are widespread. Tercanlioglu (2004) has proposed that reading involves a variety of factors, which may have a negative impact on learners' target language reading ability such as learners' lack of target language proficiency and vocabulary, unfamiliarity with the context and/or formal schemata of the texts to be read, and inefficient reading strategies. According to Ward (1980), although in the mother tongue the students can read naturally because they have automatic control over the structures of the language and contents, the processes in reading in a foreign language are different because of many different factors such as new unknown words, different language structure, and different prior life experiences. As a result, reading strategies are needed to overcome the reading difficulties.

It is worth mentioning in brief about reading problems in order to look back and review the reasons of unsuccessful reading which may shed some light on the significance of reading strategies. According to Mei-yun (1989), in order to improve the students' reading skill, teachers should start with identifying their students' weaknesses or problems, and then implementing appropriate strategies for strengthening their reading skills. Through the classroom observation and the diagnostic test, Mei-yun (1989) has pointed out that the students have the following five major reading problems:

1. Reading word by word, relying too heavily on their visual information;
2. Focusing too much attention on form at the expense of meaning;

3. Paying too much attention to details, with the result that they often miss the main ideas;

4. Limited vocabulary and heavy reliance on the use of the dictionary for word meaning; and

5. Limited background knowledge about the text to be read.

As pointed out by Kim (1989), because the ESL/EFL students have not developed full linguistic competence in the target language, they may find it difficult to participate in the reading activities. That is to say, the students may understand all the lexical items in the passage and yet may not understand the passage, because the syntactic rules of their native languages differ from those of the target language and they therefore do not have adequate grammatical control of the language. Likewise, Sally (1989, p. 40) has asserted that "a difficult reading problem lies in the language itself, with structural features such as complicated sentences, inter-sentence relationships, and stylistic devices making reading difficult."

To classify learning strategies, different scholars have different ways of classifying language learning strategies (Intaraprasert, 2004). These classification systems give a crucial contribution to the knowledge of reading strategies. What follow are a summary, brief discussion as well as consideration of the classification systems of reading strategies which have been identified in different contexts by different scholars. These include the classification systems by Block (1986), Anderson (1991), Pressley and Afflerbach (1995), Jiménez, García, and Pearson (1996), Aebersold and Field (1997), Ghonsooly (1997), Tang (1997), Sheorey and Mokhtari (2001), Salataci (2002), Anderson (2003), Ozek (2006), Willingham (2006), and Zhang and Wu (2009).

2.4.2.1 Reading Strategy Classification by Block (1986)

Block (1986) has classified the strategies that deal with reading into

two main categories as follows:

Category 1: General Strategies
- Anticipating content;
- Recognizing text structure;
- Integrating information;
- Questioning information;
- Distinguishing main ideas;
- Interpreting the text;
- Using general knowledge and associations to background
- Commenting on behavior or process;
- Monitoring comprehension;
- Correcting behavior;
- Focusing on textual meaning as a whole; and
- Reacting to the text.

Category 2: Local Strategies
- Paraphrasing;
- Rereading;
- Questioning meaning of a clause or sentence;
- Questioning meaning of a word; and
- Solving a vocabulary problem.

2.4.2.2 Reading Strategy Classification by Anderson (1991)

Anderson (1991) has grouped reading strategies into four categories

with sample strategies proposed as follows:

Category 1: Supervising Strategies
- Recognizing loss of concentration;
- Formulating a question; and
- Referring to a previous passage.

Category 2: Supporting Strategies
- Skipping unknown words;
- Visualizing; and
- Skimming.

Category 3: Paraphrasing Strategies
- Paraphrasing;
- Translating; and

- Using cognates (i.e. words that have a common origin, e.g. ward and guard).

Category 4: Establishing Coherence in Text
- Rereading;
- Using context clues; and
- Reading ahead.

Anderson (1991) introduces four main categories of strategies for reading that have been reported by language learners. These categories include Supervising Strategies, Supporting Strategies, Paraphrasing Strategies, and Establishing Coherence in Text.

2.4.2.3 Reading Strategy Classification by Pressley and Afflerbach (1995)

Pressley and Afflerbach (1995) compile a comprehensive list of strategies that individuals employ in order to understand and comprehend the reading tasks. They identify several strategies as follows:

1. Overviewing before reading;

2. Looking for important information and paying greater attention to it (which often requires jumping forward or backward to process information);

3. Relating important points to one another;

4. Activating and using prior knowledge;

5. Changing strategies when understanding is not good; and

6. Monitoring understanding and taking action to correct inaccuracies in comprehension.

2.4.2.4 Reading Strategy Classification by Jiménez, García, and

Pearson (1996)

Jiménez, García, and Pearson (1996) have classified the strategies for

dealing with reading into three major groups as follows:

1. Text-initiated strategies which include (a) using text structure; (b) summarizing; and (c) rereading, etc.;
2. Interactive strategies which include (a) inferencing; (b) predicting; and (c) questioning, etc.;
3. Reader-initiated strategies which comprise (a) visualizing; (b) evaluating; and (c) invoking prior knowledge, etc.

As being classified by Jiménez et.al (1996), strategies for reading fall into

three major groups, text-initiated strategies, interactive strategies, and reader-initiated

strategies. From their study, they have found many strategies the successful readers

have employed to deal with while reading, such as resolving unknown vocabulary by

using context clues, invoking relevant prior knowledge, questioning, inferencing,

searching for cognates, and translating; monitoring comprehension by rereading and

demonstrating awareness; connecting prior knowledge with text by integrating prior

knowledge of relevant topics; making inferences and drawing conclusions; and asking

questions while reading.

2.4.2.5 Reading Strategy Classification by Aebersold and Field

(1997)

Many language teachers and researchers have attempted to identify the

mental activities that readers use in order to construct meaning from a text (Aebersold

and Field, 1997). These activities are generally referred to as reading strategies. The

following is the list of reading strategies suggested by Aebersold and Field (1997).

1. Recognize words quickly;
2. Use text features (subheadings, transitions, etc.);
3. Use title(s) to infer what information might follow;
4. Use world knowledge;
5. Analyze unfamiliar words;
6. Identify the grammatical functions of words;
7. Read for meaning, concentrate on constructing meaning;
8. Guess the meaning of the text;
9. Evaluate guesses and try new guesses if necessary;
10. Monitor comprehension;
11. Keep the purpose for reading the text in mind;
12. Adjust strategies concerning the purposes for reading;
13. Look for the main ideas;
14. Understand the relationship between the parts of a text;
15. Distinguish main ideas from minor ideas;
16. Tolerate ambiguity in a text (at least temporarily);
17. Paraphrase;
18. Use context to build meaning and aid comprehension; and
19. Continue reading even when unsuccessful, at least for a while.

2.4.2.6 Reading Strategy Classification by Ghonsooly (1997)

Ghonsooly (1997 cited in Ghonsooly and Eghtesadee, 2006) has

classified the strategies for dealing with reading as follows:

Category 1: Metacoginitive Reading Strategies
- Planning: This refers to the reader's decision on the way to read the text and what to search for in the text;
- Monitoring: This refers to the reader's identification of a problem at word level and stating the existence of a problem;
- Evaluating (Problem identification at sentence/discourse level): This strategy is observed when the reader comes across a problem in understanding a sentence or a set of sentences and states this difficulty;
- Evaluating (Reprocessing to get the gist): This occurs when the reader fails to comprehend a sentence or part of the text, then either rereads that parts or reread only the missed part;
- Self-questioning: This refers to the reader's asking himself a question;
- Self-correcting (Correcting a previous hypothesis): This occurs when the reader discovers the falsity of a prior guess or inference;
- Self-correcting (Correcting a wrong pronunciation): It occurs when the reader mispronounces a word and repeats the word to correct the pronunciation;
- Selective attention (Identifying important information parts of texts); and
- Selective attention (Ignoring trivial or difficult sections): It occurs

when the readers cannot understand part of the text but they decide to ignore it either because they regard that part unimportant in comprehending the whole text or because they find that part difficult to process.

Category 2: Cognitive Reading Strategies
- Using background knowledge: Referring to using knowledge about the world and the contents of the text that contributes to understanding the text;
- Predicting: Predicting the content of the text based on the information presented in part of the text;
- Repeating to get the meaning of word: The reader repeats a word or a phrase in order to remember or retrieve the meaning from the long term memory;
- Paraphrasing: It refers to the reader's attempt to either provide synonyms and antonyms for a word or restating the contents in his own words;
- Inferencing: Using the context or the knowledge of affixed to guess the meaning of an unknown word;
- Inferencing (Reprocessing to get the meaning of a word): The act of rereading a phrase, a clause or sentence in order to infer the meaning of an unknown word;
- Translating: Using mother tongue to provide equivalents for a word;
- Using a dictionary;
- Decoding: Breaking a word into syllables in order to easify the pronunciation or processing its meaning;
- Word identifying: This refers to the reader's attempt to get the meaning of an unknown lexical item by comparing it to its closest possible neighbor, which bears some phonological similarity;
- Grammatical analyzing: Using the knowledge of grammar to interpret and understand a word, a phrase or a sentence; and
- Imagery: Using visual images and visualizing the content of a text in order to understand.

2.4.2.7 Reading Strategy Classification by Tang (1997)

Tang (1997 cited in Jaruwan Wirotanan, 2002) has classified strategies

used in reading into four main categories as follows:

Category 1: Text-based Strategies
- Focusing on vocabulary;
- Relating to the prior sentences in the text; and
- Summarizing or making conclusion.

Category 2: Text Structure-based Strategies
- Looking for key words;

- Looking for main ideas; and
- Recognizing the text structure.

Category 3: Text and Prior Knowledge Combined Strategies
- Relating to prior experience or knowledge;
- Evaluating the content of the text; and
- Forming hypothesis.

Category 4: Self-corrective Strategies
- Adjusting reading speed;
- Skipping unknown words or terms; and
- Borrowing words from another language or switching language.

Tang (1997) has classified reading strategies into four main categories. These include Text-based Strategies, Text Structure-based Strategies, Text and Prior Knowledge Combined Strategies, and Self-corrective Strategies. For Text-based Strategies, they refer to the methods the readers use to construct meanings of the text by focusing on the selected components of the text such as words, phrases, or clauses. Text Structure-based Strategies refer to the readers' attempt to use their knowledge of text organization to aid their comprehension. In Text and Prior Knowledge Combined Strategies, the readers use both information from the text and their prior knowledge about content, language, and their world experience, to construct the meaning from the text. Lastly, Self-corrective Strategies refers to the readers' procedural knowledge for planning, monitoring, and evaluating their comprehension.

2.4.2.8 Reading Strategy Classification by Sheorey and Mokhtari (2001)

Sheorey and Mokhtari (2001) have done a research work on 'Differences in the Metacognitive Awareness of Reading Strategies among Native and Non-Native Readers'. The data for their study were collected through the '*Survey of*

Reading Strategies (SORS)' which was used to discover the reading strategies employed by college students. The reading strategy classification on SORS can be classified into three main categories as follows:

Category 1: Metacognitive Strategies
- Setting purpose for reading;
- Previewing text before reading;
- Checking how text content fits purpose;
- Noting text characteristics;
- Determining what to read;
- Using text features (e.g. tables);
- Using context clues;
- Using typographical aids (e.g. italics);
- Predicting or guessing text meaning; and
- Confirming predictions.

Category 2: Cognitive Strategies
- Using prior knowledge;
- Reading aloud when text becomes hard;
- Reading slowly and carefully;
- Trying to stay focused on reading;
- Adjusting reading rate;
- Paying close attention to reading;
- Pausing and thinking about reading;
- Visualizing information read;
- Evaluating what is read;
- Resolving conflicting information;
- Re-reading for better understanding; and
- Guessing meaning of unknown words.

Category 3: Support Strategies
- Taking notes while reading;
- Underlining information in text;
- Using reference materials;
- Paraphrasing for better understanding;
- Going back and forth in text; and
- Asking oneself questions.

Sheorey and Mokhtari (2001) have classified reading strategies into three main categories which are Metacognitive Strategies, Cognitive Strategies, and Support Strategies. Metacognitive strategies are those intentional, carefully planed techniques

by which learners monitor or manage their reading. Cognitive strategies are the actions and procedures readers use while working directly with the text. These are localized, focused techniques used when problems develop in understanding textual information. Finally, the support strategies are basically support mechanisms intended to aid the reading in comprehending the text such as using a dictionary and taking notes.

2.4.2.9 Reading Strategy Classification by Salataci (2002)

Salataci (2002) has proposed two main categories of the reading strategy classification based on his research work on 'Possible Effects of Strategy Instruction on L1 and L2 Reading'. His reading strategies can be classified as follows:

Category 1: Bottom-up Strategies
- **Individual Word Focus**
  a) Questioning meaning of word; and
  b) Using dictionary.
- **Intrasentential Features**
  a) Questioning clause or sentence; and
  b) Questioning grammatical structure.
- **Restatement**
  a) Paraphrasing; and
  b) Rereading.

Category 2: Top-down Strategies
- Predicting;
- Confirming of prediction;
- Making inferences;
- Using prior knowledge;
- Questioning/ assessing/ commenting;
- Skimming/ scanning**;**
- Making reference;
- Visualizing; and
- Summarizing.

The reading strategy classification by Salataci (2002) can be divided into two main categories: Cognitive Strategies and Metacognitive Strategies. Cognitives Strategies aid the readers in constructing meaning from the text. Salataci has provided

a binary division of Cognitive Strategies as Bottom-up and Top-down. Within the sub-category of Bottom-up Strategies, it has three strategies including individual word focus, intrasentential features, and restatement. Within Top-down Strategy sub-category, it includes nine strategies such as predicting, making inferences, and using prior knowledge. The second category is the category of Metacognitive Strategies which are strategies that function to monitor or regulate cognitive strategies. They include commenting on task and commenting on behaviour.

2.4.2.10 Reading Strategy Classification by Anderson (2003)

Within the research work of Anderson (2003) on the topic 'Scrolling, Clicking, and Reading English: Online Reading Strategies in a Second/ Foreign Language', he presents a list of three main reading strategy categories: Global Reading Strategies, Problem Solving Strategies, and Support Strategies.

Category 1: Global Reading Strategies
- Guessing what the content of the text is about;
- Using prior knowledge;
- Designing what to read closely and what to ignore;
- Scanning;
- Reviewing the text first by noting its characteristics like length and organization;
- Using typographical features like bold face and italics to identify key information;
- Participating in live chat with native speakers of target language (English); and
- Participating in live chat with other learners of target language (English)

Category 2: Problem Solving Strategies
- Getting back on track when losing concentration;
- Rereading the text to increase understanding;
- Paying more attention to the text;
- Reading slowly and carefully to make sure the understanding of the text;
- Guessing the meaning of unknown words or phrases;
- Distinguishing the fact and opinion in the texts;
- Visualizing information;

- Adjusting the reading speed; and
- Stopping from time to time and thinking about the texts.

Category 3: Support Strategies
- Thinking about information in both English and mother tongue;
- Asking oneself questions;
- Using reference materials;
- Reading aloud;
- Printing out the text, then underlining or circling information;
- Translating from target language into mother tongue; and
- Taking notes while reading.

2.4.2.11 Reading Strategy Classification by Ozek (2006)

Ozek (2006) has demonstrated the findings of her research work on 'A study on the Use of Cognitive Reading Strategies by ELT Students' that the reading strategies can be classified into three main categories as follows:

Category 1: Pre-reading Strategies
- Using the title;
- Skimming the text;
- Thinking about the previous knowledge on the topic of the text;
- Reading the first line of each paragraph; and
- Using pictures/ illustrations.

Category 2: While-reading Strategies
- Consulting the dictionary for important words;
- Guessing the meaning of a word from the context;
- Skipping some unknown words;
- Reading without translating word-for-word;
- Thinking aloud during reading;
- Guessing the meaning of a word from the grammatical category;
- Thinking of situation to remember a word;
- Considering other sentences to understand the meaning of a sentence;
- Visualizing events;
- Recognizing organization;
- Taking notes
- Assimilating the text with the passage events;
- Assimilating the text with the background information; and
- Rereading a sentence.

Category 3: Post-reading Strategies
- Classifying words according to their meanings;
- Classifying words according to their grammatical categories;

- Summarizing the main ideas;
- Rereading the text to remedy comprehension failures; and
- Rereading the text to remember important information.

Ozek has made use of data from the self-report questionnaire and think-aloud protocol to investigate ELT students' use of reading strategies. Reading strategies have been evaluated under three headings: pre-reading, while-reading, and post-reading. She presents a list of five strategies which are evaluated under the pre-reading strategy heading; fourteen strategies under the while-reading strategy heading; and also five strategies evaluated under the post-reading strategy heading.

2.4.2.12 Reading Strategy Classification by Willingham (2006)

Willingham (2006) has proposed two main categories of the reading strategy classification based on the article on reading from the National Reading Panel (2000 cited in Willingham, 2006, p. 43). Willingham's reading strategy classification can be shown as follows:

Category 1: **The strategies which are designed to encourage students to relate sentences to one another:**
- Graphic organizer;
- Question answering;
- Question generation;
- Summarization;
- Mental imagery;
- Cooperative learning;
- Story structure; and
- Multiple strategy instruction.

Category 2: **The strategies which are designed to encourage students to relate sentences to things they already know:**
- Prior knowledge; and
- Vocabulary-comprehension relationship.

The reading strategy classification of Willingham (2006) can be categorized into two main categories. Within the first category, it includes many strategies; for

example, graphic organizer strategy which helps learners to learn how to make graphic representations of texts; question answering strategy relates to the questions posed by the teacher in order to check the information the students obtain from the text after finishing reading; and question generation strategy can help students to generate their own questions. Within the second category, it includes only two strategies: prior knowledge strategy which helps students to apply what they know from their own lives to the text; and vocabulary-comprehension relationship which students are encouraged to use background knowledge to make educated guesses about the meaning of unfamiliar words.

2.4.2.13 Reading Strategy Classification by Zhang and Wu (2009)

Zhang and Wu (2009) have proposed three main categories of the reading strategy obtained through The Survey of Reading Strategies (SORS) that was developed to measure the metacognitive awareness and 'perceived' use of reading strategies of adolescent and adult learners of English as a second language (ESL) while reading school related materials in English. The reading strategy classification by Zhang and Wu includes:

Category 1: Global reading strategies (GLOB) which are the intentional, carefully planned techniques by which learners monitor or manage their reading.
1. Having a purpose in mind when reading;
2. Thinking about whether the content of the text fits one's reading purpose;
3. Reviewing the text to know about its length, organization and main idea;
4. Deciding what to read closely and what to ignore when reading;
5. Using one's prior knowledge (e.g., knowledge about the theme of the text, or grammar knowledge) to help one understand what one reads;
6. Using tables, figures, and pictures in text to increase one's understanding;
7. Using context clues to help one better understand what one is reading;
8. Using typographical features like bold face and italics to identify key information;
9. Checking one's understanding when coming across new information;
10. Trying to guess what the content of the text is about when reading;
11. Checking to see if one's guesses about the text are right or wrong; and

12. Analyzing critically and evaluating the information presented in the text rather than passively accept everything

Category 2: Problem-solving strategies (PROB) which are the localized, focused techniques used when problems develop in understanding textual information.
1. Reading slowly and carefully to make sure one understands what one reads;
2. Adjusting one's reading speed according to what one is reading;
3. Stopping from time to time and think about what one is reading;
4. Trying to picture or visualize information to help remember what one reads;
5. When text becomes difficult, re-reading it to increase one's understanding;
6. Guessing the meaning of unknown words or phrases when reading; and
7. Trying to get back on track when one loses concentration

Category 3: Support strategies (SUP) which are the basic support mechanisms intended to aid the reader in comprehending the text.
1. Taking note of the key expressions and ideas while reading;
2. Underlining or circling information in the text to help one remember it;
3. When text becomes difficult, reading aloud to help one understand what one reads;
4. Using reference materials (e.g., a dictionary) to help one understand what one reads;
5. Paraphrasing (restating ideas in one's own words) to better understand what one reads;
6. Going back and forth in the text to find relationships among ideas in it
7. Asking oneself questions one likes to have answered in the text;
8. Translating from English into one's native language when reading; and
9. Think about information in both English and one's mother tongue when Reading

In conclusion, reading strategies have been classified differently in various ways by different researchers. This depends on 1) the researchers' own experience; for example, as language learners, or language teachers, 2) the researchers' research works, and/or 3) the researchers' literature review. Some reading strategies have been classified into distinctive categories, while some have been made in lists. Even though the classification systems of different researchers are different, some common characteristics exist. In other words, there are similar reading strategies in many researchers' strategy classification although they are called by different names. Moreover, reading strategies are very important for learners since they encourage

learners to take control of their learning away from the teacher. That is to say, the learners with well-trained reading strategies would become more autonomous learners.

2.5 Research Works on Reading Strategies

Reading involves a variety of factors, which may have an impact on students' target language reading ability (Tercanlioglu, 2004). Some samples of these factors are students' lack of target language proficiency and vocabulary, unfamiliarity with the context, and inefficient reading strategies.

Because of the importance of reading as mentioned in 2.2.2, reading strategies have been investigated widely for reading comprehension in general and in second and foreign language contexts, in particular. Many studies on students' use of reading strategies have discovered that readers spontaneously use different strategies in the reading comprehension process (Tercanlioglu, 2004).

There are a great number of research works which examine the reading strategies that second/ foreign language readers use to process a text. The research process generally includes a problem statement, a literature review, a sample of participants, the research instruments, and the procedure of data collection and analysis. Brantmeier (2002) states that the researchers use a variety of research methods and tasks to examine strategy type and frequency of strategy use, for example, think-aloud verbal reports, interviews, questionnaires, observations, and written recalls. Moreover, in studies of subjects who were at high school level or older, most investigators have found that good readers tend to report using more strategies than do poor readers (Kletzien, 1991).

The focus of this section is on past research works on reading strategies. There are two main reasons for reviewing these research works in the present study. The first reason is for reviewing how past researchers devised their instruments for data collection to serve the purposes of their studies. The other reason is to advance my understanding of reading strategies employed by ESL/EFL students. In other words, the results of previous research works can contribute to a better understanding of how learners deal with reading problems they face while reading, and what reading strategies employed by learners. The following are selected studies which were conducted with either Thai or foreign participants studying a foreign language at the primary, the secondary or tertiary levels.

Table 2.2 Research Works on Reading Strategies Conducted with Foreign Students

1. Hosenfeld, C. (1977). A Preliminary Investigation of the Reading Strategies of Successful and Unsuccessful Second Language Learners	
Purpose of the study	The purpose of this study was to discover the differences that existed between the strategies of two groups of students: successful and non-successful readers.
Research Question	What are the reading strategies employed by successful and non-successful second-language readers?
Participants	20 successful readers and 20 poor readers
Investigated Variable(s)	Levels of language proficiency
Method of Data Collection	Interview; and Think-aloud protocol
Data Analysis	Descriptive statistics
Result(s)/Finding(s)	The results of the study indicated that the successful readers kept the meaning of the passage in mind while reading, skipped words unimportant to the meaning of the sentence, read in 'broad phrases', used context to determine word meaning, and had a positive self-concept as a reader. Poor readers, on the other hand, translated sentences and lost the general meaning of the passage, rarely skipped words, looked up unknown words in a glossary, and had a poor self-concept as a reader. It can be said that poor readers focused on solving unknown words or phrases.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign Students

2. Block, E. (1986). The Comprehension Strategies of Second Language Readers	
Purpose of the study	The main purpose of this study was to provide a detailed description of the comprehension strategies used by ESL students designated as on-proficient readers.
Participants	Nine university level ESL and native English students in a remedial reading course
Investigated Variable(s)	Type of students: Native English speaker students, and ESL students
Instrument(s)/Method of Data Collection	1. Think-aloud protocol; and 2. Multiple-choice tests
Data Analysis	Descriptive Statistics (e.g. frequency, and percentage)
Result(s)/Finding(s)	Block developed a coding scheme to classify strategies that consisted of two types: general strategies and local strategies. General strategies included the following behaviors: anticipate content, recognize text structure, integrate information, question information, distinguish main ideas, interpret the text, use general knowledge and associations to background, comment on behavior or process, monitor comprehension, correct behavior, focus on textual meaning as a whole, and react to the text. Local strategies were paraphrase, reread, question meaning of a clause or sentence, question meaning of a word, and solve a vocabulary problem. Results of the study demonstrated that more successful readers: 1. used their general knowledge; 2. focused on the overall meaning of text; 3. integrated new information with the old one; and 4. differentiated main ideas from supporting points. On the other hand, the poor readers rarely did any of the above.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign
Students

3. Kim, L. S. (1989). The Reading Strategies of ESL Learners at a Malaysia University	
Purpose of the study	The main aim of this study was to test the premise that learners of English as a second language tend to depend more on the graphic information than on the contextual information when they read in English.
Research Questions	1. Which one of the cue systems as defined by Goodman (1970) is employed predominantly by the two groups of ESL learners when they engage in selected tasks administered under experimental conditions? 2. Do the oral reading strategies of the better group of readers (the MAR) differ from the group of poorer readers (the LAR)? 3. If they do differ, can an explanation be found in Goodman's model of reading (1970)?
Participants	40 Malaysian students studied in the second year at the Malaysian university
Investigated Variable(s)	Reading proficiency levels (more able readers (MAR) and less able readers (LAR))
Instrument(s)/Method of Data Collection	Reading questionnaie
Data Analysis	Descriptive statistics
Result(s)/Finding(s)	The results indicated that the ESL learners possessed varying degrees of utilization of the cue systems in coping with the reading task. Both the less and the more able readers did not exploit the semantic cue system fully. The better readers tended to rely on the graphic cues.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign Students

4. Kletzien, S. B. (1991). Strategy Use by Good and Poor Comprehenders Reading Expository Text of Differing Levels	
Purpose of the study	The main aim of this study was to investigate the strategies used by good and poor readers.
Research Questions	1. Do good and poor comprehenders differ in their use of strategies when they are reading passages of the same relative difficulty? 2. Do good comprehenders use different strategies for passages of differing difficulty? 3. Do poor comprehenders use different strategies for passages of differing difficulty?
Participants	48 10th- and 11th-grade U.S. high school students
Investigated Variable(s)	Reading proficiency levels (good and poor)
Instrument(s)/Method of Data Collection	1. Three expository passages with ten comprehension questions for each passage; 2. Interview; and 3. Self-report
Data Analysis	1. ANOVA; and 2. Descriptive statistics
Result(s)/Finding(s)	The findings showed that most subjects reported depending heavily on using key vocabulary, rereading, making inferences, and using previous experience in constructing responses for all three passages. Total strategy use declined for poor comprehenders as texts became more difficult. Good comprehenders also used more strategies on the easiest passage, but their strategy use was the same on the medium and difficult passages. When compared directly, the two groups used the same type and number of strategies on the easy passage, but as the passage difficulty increased, good comprehenders used more types of strategies and used strategies more often than the poor comprehenders did. The overwhelming choices of strategies for both groups were focusing on vocabulary, rereading previous text, making inferences, and using prior knowledge.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign Students

5. Swicegood, M. M. (1994). The Effects of Metacognitive Reading Strategy Training on the Reading Performance and Student Reading Analysis Strategies of Third Grade Bilingual Students	
Purpose of the study	This study aimed to investigate the students' reading performance after being trained to employ metacognitive reading strategy.
Research Questions	1. Will the Spanish reading performance of third grade Spanish dominant students increase following metacognitive reading strategy training in their Spanish reading programme? 2. Will an increase in the English reading performance of third grade Spanish dominant students, following metacognitive strategy training in their Spanish reading programme indicate that a transferal effect has occurred across languages (from Spanish to English)?
Participants	95 3rd grade bilingual Spanish dominant students
Investigated Variable(s)	1. Gender; and 2. Spanish language proficiency level
Instrument(s)/Method of Data Collection	1. The Burke Reading Inventory; 2. Iowa Test of Basic Skills; 3. The La Prueba Spanish Achievement Test; 4. The Language Assessment Scales; and 5. The Burke interview
Data Analysis	1. Regression analysis; and 2. Descriptive and inferential statistics
Result(s)/Finding(s)	Primary findings indicated that, following training in metacognitive Spanish readings strategies, Spanish dominant bilingual children improved in the area of reading performance on the La Prueba Spanish reading test and the Iowa Test of Basic Skills English reading test. Post interview results of the Burke Reading Interview, translated into Spanish, showed increases in the frequency of Spanish reading strategies following metacognitive intervention.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign Students

6. Jiménez, R.T., García,G.E., and Pearson, P.D. (1996). The Reading Strategies of Bilingual Latina/o Students who are Successful English Readers: Opportunities and Obstacles	
Purpose of the study	This study was designed to contribute to the current knowledge base regarding reading instruction for bilingual Latina/o children by exploring the question of how Spanish/English bilingualism and biliteracy affect, and even enhance metacognition.
Research Questions	1. What strategies do successful Latina/o readers use while reading? 2. Do successful Latina/o readers use the same strategies in both languages? 3. Do metacognitive strategies exist that facilitate transfer of strategy knowledge? 4. To what extent do the cognitive and metacognitive strategies of successful Latina/o readers differ from those of successful Anglo readers? 5. To what extent do the cognitive and metacognitive strategies of successful Latina/o readers differ from those of less successful Latina/o readers?
Participants	Fourteen sixth- and seventh-grade students from three schools in two school districts: 8 Latina/o students who were successful English readers, 3 Latina/o students who were marginally successful English readers, and 3 monolingual Anglo students who were successful English readers
Investigated Variable(s)	Reading proficiency levels: successful and less successful English readers
Instrument(s) / Method of Data Collection	1. Unprompted and prompted think-aloud, and Interview; 2. A measure of prior knowledge, and Background questionnaire; and 3. Passage recalls
Data Analysis	The interview data and think-aloud data were coded and analyzed by using the constant-comparative method.
Result(s)/ Finding(s)	The findings showed that three of the strategies were considered unique to the successful Latina/o readers: (a) they actively transferred information across languages, (b) they translated from one language to another but most often from Spanish to English, and (c) they openly accessed cognate vocabulary when they read, especially in their less dominant language. In addition, the successful Latina/o readers frequently encountered unknown vocabulary items whether reading English or Spanish text, but they were able to draw upon an array of strategic processes to determine the meanings of these words. The less successful Latina/o readers used fewer strategies and were often less effective in resolving comprehension difficulties in either language.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign
Students

7. Najar, R.L. (1998). A Study of Cognitive Learning Strategy Use on Reading Tasks in the L2 Classroom	
Purpose of the study	This study aimed to determine the relationship of cognitive learning strategy use and task performance.
Research Questions	1. What is the effect of cognitive learning strategy use on task performance in the L2? 2. Which of the learning strategies used lead to more successful task performance?
Participants	204 university freshmen in Japan enrolled in English 1, a compulsory core subject
Investigated Variable(s)	No variables were mentioned.
Instrument(s)/Method of Data Collection	Reading texts and comprehension questions
Data Analysis	1. Descriptive statistics; 2. ANOVA; and 3. Post-hoc Scheffé test
Result(s)/Finding(s)	The results suggested that not all learning strategies are equally effective in helping the learners identify main ideas and understand the content of the readings. It appeared from the data that learning strategies such as vocabulary identification, full translation of the text and strategies which utilize some form of main idea recognition are more effective in studying the reading materials than situations where there is no evidence of a strategy being used by the learners. Furthermore, the result also suggests that learning strategies such as a full translation approach and strategies such as highlighting key ideas and notetaking which involve main idea recognition and organizing the information into levels of information lead to more successful task performance.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign Students

8. Hardin, V. B. (2001). Transfer and Variation in Cognitive Reading Strategies of Latino Fourth-Grade Students in a Late-Exit Bilingual Program	
Purposes of the study	The purpose of this study was to examine how Spanish-dominant students utilize cognitive reading strategies to enhance comprehension of expository texts in Spanish and transfer strategic reading behaviors to English reading.
Research Questions	1. How do the respective groups utilize cognitive reading strategies when reading in their native language? 2. How do they apply cognitive reading strategies when reading in their second language? 3. How does English oral proficiency influence the use of cognitive reading strategies when they read in English?
Participants	50 fourth-grade Latino bilingual students
Investigated Variable(s)	Level of Spanish reading ability: Able, Average, and Less-able
Instrument(s)/Method of Data Collection	1. Interview protocol on reading (IPOR); 2. Think-aloud protocol; and 3. The structured interview on strategies (SIOS)
Data Analysis	1. IPOR and SIOS were not transcribed verbatim. 2. Think-aloud protocol was analyzed by listening to each segment of the reading to determine which strategies were used or stated explicitly. 3. Percentage
Result(s)/Finding(s)	All groups of the students reported an increase in strategy use in English reading. The results also indicated that all three groups of them transferred prior knowledge from L1 to English (L2), and that the level of second language proficiency played a less prominent role in second-language strategic reading than did the level of strategy use in L1. The samples of reading strategy use are using of prior knowledge, predicting, paraphrasing, and self-questioning.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign Students

9. Sheorey R, and Mokhtari, K. (2001). Differences in the Metacognitive Awareness of Reading Strategies among Native and Non-Native Speakers	
Purpose of the study	The aim of this study was to examine differences in the reported use of reading strategies of native and non-native English speakers when reading academic materials.
Research Questions	1. Are there any differences between ESL and US students in their perceived strategy use while reading academic materials? 2. Are there any differences between male and female ESL and US students, respectively, in their perceived strategy use while reading academic materials? 3. Is there a relationship between reported strategy use and self-rated reading ability?
Participants	302 students: 150 Native English speaking (US) students, and 152 ESL students
Investigated Variable(s)	1. Type of students: native and non-native speakers; and 2. Gender
Instrument(s)/Method of Data Collection	The Survey of Reading Strategies (SORS)
Data Analysis	1. T-test; and 2. ANOVA
Result(s)/Finding(s)	1. The findings showed that the ESL students reported a higher use of strategies than the US students. The ESL students reported using a greater number of support reading strategies such as taking notes while reading, underlining information in text, etc. 2. No significant differences were reported between the male and female readers in this study. 3. The students who had a higher self-reported rating of reading ability reported using a higher frequency of reading strategies than those readers who gave themselves a lower rating

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign Students

10. Bouvet, E. (2002). Reading in a Foreign Language: Strategic Variation between Readers of Differing Proficiency	
Purposes of the study	This study proposed to examine how proficient and less proficient university students of French, at intermediate level of instruction, implement problem-solving strategies when reading literary texts. It also aimed to elicit information on how participants went about solving comprehension difficulties in a natural reading environment.
Research Question	How do the students solve the comprehension difficulties in a natural reading environment?
Participants	10 first-year post-secondary students
Investigated Variable(s)	Reading proficiency levels: proficient and less proficient readers
Instrument(s)/Method of Data Collection	1. Verbal reports (think-aloud protocols); 2. Questionnaire on FL literary reading; 3. Compulsory Placement Test; and 4. The Textual Studies test
Data Analysis	1. All transcripts of verbal report were examined and problem-solving strategies were isolated and coded according to the basic monitoring framework. 2. Strategy use was counted and classified according to the monitoring framework.
Result(s)/Finding(s)	The results obtained indicated that proficient and less proficient readers tend to use the same strategies but with different purposes. In addition, strategies such as guessing at words, consulting a dictionary, making a text for ulterior consultation, and translating mentally, are reported being used by the participants. The study demonstrated that the major difference between the two groups of respondents resides in ability some readers have to integrate meaning and construct text in a cohesive and synthetic fashion. The samples of the reading strategy use are skipping and ignoring problem, rereading, using a dictionary, and refocusing concentration.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign
Students

11. Anderson, N.J. (2003). Scrolling, Clicking, and Reading English: Online Reading Strategies in a Second/Foreign Language	
Purpose of the study/	The purpose of this paper was to examine the role of L2 strategies within the context of online reading tasks.
Research Questions	1. What are the online reading strategies used by second language readers? 2. Do the online reading strategies of English as a second language (ESL) readers differ from English as a foreign language (EFL) readers?
Participants	247 students: 131 EFL students and 116 ESL students
Investigated Variable(s)	1. Types of students (ESL and EFL); and 2. Gender
Instrument(s)/Method of Data Collection	Online Survey of Reading Strategies (OSORS)
Data Analysis	1. Percentage; and 2. ANOVA
Result(s)/Finding(s)	The Online Survey of Reading Strategies (OSORS) was adapted for use in this study. The OSORS consists of 38 items that measure metacognitive reading strategies. Those items are subdivided into three categories: Problem-Solving Strategies, Global Reading Strategies, and Support Strategies. Moreover, the results of the ANOVA showed no significant differences between the EFL and the ESL groups for the overall OSORS. On the other hand, the results indicated that the majority of the top 12 strategies used by the online readers are Problem Solving Strategies. These same strategies are the ones that differentiate the EFL and the ESL readers. The EFL readers reported using the Problem Solving Strategies more frequently than did the ESL readers. The Problem Solving Strategies include things such as adjusting reading rate, rereading difficult text, and pausing to think about what one is reading.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign
Students

12. Phakiti, A. (2003). A Closer Look at Gender and Strategy Use in L2 Reading	
Purpose of the study	This study aimed at examining gender differences in cognitive and metacognitive strategy use in the context of an English as a foreign language reading comprehension test.
Research Questions	1. Are there statistically significant gender differences in L2 reading comprehension performance assessed by a multiple-choice reading comprehension test? 2. Are there statistically significant gender differences in the use of cognitive and metacognitive strategies for the completion of such a test? 3. How do males and females at the same achievement levels differ in reading comprehension performance and in cognitive and metacognitive strategy use?
Participants	384 Thai, non-English Major, first-year undergraduates
Investigated Variable(s)	1. Gender; and 2. Level of reading proficiency (highly successful, moderate successful, and unsuccessful)
Instrument(s)/Method of Data Collection	1. Assessing reading comprehension; and 2. A cognitive-metacognitive reading questionnaire
Data Analysis	1. Descriptive statistics; 2. F-Test; and 3. MANOVA
Result(s)/Finding(s)	Males and females did not differ in their reading comprehension performance and their use of cognitive strategies. Unexpectedly, males reported significantly higher use of metacognitive strategies than females. Within the same achievement groups (highly successful, moderately successful, and unsuccessful), however, there were no gender differences in either reading performance or use of cognitive and metacognitive strategies.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign
Students

13. Tercanlioglu, L. (2004). Postgraduate Students' Use of Reading Strategies in L1 and ESL Contexts: Links to Success	
Purpose of the study	This study aimed to examine how L1 and ESL students approach the complex task of reading.
Research Questions	1. What was the reading comprehension, reading attitude and reading efficacy profile of post graduate students? 2. Can readers be grouped according to the reading strategy or set of strategies that dominate their approach to learning?
Participants	17 postgraduate students: 11 postgraduate non-native-English speaking international students, and 6 native English-speaking British students
Investigated Variable(s)	Types of students: native English speaking students and ESL students
Instrument(s)/Method of Data Collection	1. Audio taped interview; 2. A demographic questionnaire (A single page questionnaire that contained questions or statements about the participant's age, sex, educational and cultural background); 3. The Adult Survey of Reading Attitude (ASRA); 4. A reading efficacy belief instrument; and 5. Three texts
Data Analysis	1. Descriptive statistics (frequency, mean, standard deviation); and 2. A constant comparison method involving sorting, coding, prioritizing and connecting pieces of data.
Result(s)/Finding(s)	The results of the study revealed that both groups of participants (non-native-English-speaking international students, and native English speaking students) showed a clear preference for cognitive strategies followed by metacognitive strategies and support strategies. This study also indicated that while the L1 students reported frequent use of metacognitive reading strategies, the ESL students reported more frequent use of reading support strategies. L1 students produced higher scores on both efficacy items on the reading efficacy belief instrument.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign Students

14. Poole, A. (2005). Gender Differences in Reading Strategy Use among ESL College Students	
Purpose of the study	This study aimed to find out the differences in employing the reading strategies of male and female students.
Research Question	Do ESL males and females report using different academic reading strategies?
Participants	248 advanced college ESL students (138 males and 110 females)
Investigated Variable(s)	Gender
Instrument(s)/Method of Data Collection	The Survey of Reading Strategies (SORS)
Data Analysis	1. Descriptive statistics; and 2. t-test
Result(s)/Finding(s)	The results revealed that males and females did not significantly differ in their overall strategy use. The results from SORS showed very few strategic differences, with both genders using strategies with medium or high frequency. In addition, both genders used problem-solving strategies with high frequency, while global and support strategies were used with medium frequency. The samples of problem-solving strategies are reading slowly and carefully, paying close attention to reading, and pausing and thinking about reading. The samples of global strategies are previewing text before reading, using prior knowledge, and determining what to read. Using reference materials and underlining information in text are the samples of support strategies.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign Students

15. Ghonsooly, B., and Eghtesadee, A. R. (2006). Role of Cognitive Style of Field-dependence/independence in Using metacognitive and Cognitive Reading Strategies by a Group of Skilled and Novice Iranian Students of English	
Purpose of the study	This study aimed at investigating the role of cognitive style of field-dependence/independence (FD/DI) in using metacognitive and cognitive reading strategies in novice and skilled readers.
Research Questions	1. Are there any differences between metacognitive reading strategies used by the subjects? 2. Are there any differences between cognitive reading strategies used by the subjects?
Participants	12 English major students at Ferdowsi University
Investigated Variable(s)	Language proficiency levels (skilled field-dependent, skilled field-independent, novice field-dependent, and novice field-independent)
Instrument(s)/Method of Data Collection	1. A TOEFL test; 2. The Group Embedded Figures Test (GEFT); and 3. Think-aloud protocol
Data Analysis	1. Descriptive statistics (Frequency); and 2. Chi-Square
Result(s)/ Finding(s)	The results from the Chi-Square showed that the difference between frequency of metacognitive and cognitive strategies used by novice field-dependent readers and those used by field-independent readers is not meaningful. This may mean that cognitive style of field-dependence/independence does not influence the use of metacognitive and cognitive reading strategies in novice readers. However, the difference between the frequency of metacognitive and cognitive strategies used by skilled field-dependent and skilled field-independent readers was meaningful which may mean that cognitive style of FD/FI influences the use of reading strategies in skilled readers.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign
Students

16. Lau, K. L. (2006). Reading Strategy Use between Chinese Good and Poor Readers: A Think-aloud study	
Purpose of the study	This study aimed to explore the differences between Chinese good and poor readers in their strategy use by using a think-aloud method.
Research Question	What are the differences in strategy use between Chinese good and poor readers?
Participants	Eight grade 7 (12-year-old) students
Investigated Variable(s)	Language proficiency levels (good and poor)
Instrument(s)/Method of Data Collection	Think-aloud protocol
Data Analysis	Descriptive statistics (Frequency)
Result(s)/ Finding(s)	Findings of this study indicated that Chinese good readers used more strategies and had better ability and knowledge of strategy use than did poor readers. In addition to the cognitive deficiencies, poor readers were also found to have poorer intrinsic motivation than did good readers. The combined problems of poor reading ability and motivation made them reluctant to process the text at a deeper level and they gave up easily when they encountered reading difficulties.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign
Students

17. Ozek, Y. (2006). A Study on the Use of Cognitive Reading Strategies by ELT Students	
Purposes of the study	This study aimed to find out which reading strategies are generally employed by ELT students while reading a text, and which reading strategies are needed to be developed to understand the text better, and therefore, to continue academic studies successfully.
Research Questions	1. Which cognitive reading strategies are used by the university students in their academic studies? 2. What sort of cognitive reading strategies should be developed by these students in order to continue their academic studies successfully and to get the most out of a test they read?
Participants	185 students from the ELT Department in Ziya Gokalp Education Faculty at Dicle University
Investigated Variable(s)	1. Gender: male and female; 2. Class levels (1st year and 4th year students); 3. School source: 1st school graduates and 3rd school graduates; 4. Age; and 5. Reading proficiency: good and poor
Instrument(s)/Method of Data Collection	1. Self-report questionnaire 2. Think-aloud protocol
Data Analysis	1. Percentage 2. Descriptive statistics (e.g. frequency)
Result(s)/ Finding(s)	1. The results of Think-Aloud Protocol revealed that the students used only one strategy namely, "relating the title to the text content" in the pre-reading phrase. As for while-reading phrase, the most effectively employed strategies were "using the dictionary parsimoniously, guessing the meaning of word from the context, skipping unknown words, thinking-aloud during reading and assimilating the text with the background knowledge. However, none of the post-reading strategies were found to be used. 2. The results from the questionnaire analysis indicated that there were some significant differences on the effective use of cognitive reading strategies with regard to students' gender, age, proficiency in reading, and school source.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign Students

18. Parera, M. T. (2006). Reading Strategies and Strategy Awareness in Three EFL Educated Readers of English Literary Texts	
Purpose of the study	This study aimed to contribute to the exploration of the process of reading literary texts in a foreign language.
Research Questions	1. What repertoire of strategies do learners put to use when reading a literary text in a foreign language? 2. Do the use of and awareness of such strategies change after receiving academic instruction? 3. May different readers develop differently in their use and awareness of strategies after receiving such instruction?
Participants	Three students of a Bachalor's degree in Humanities at a university in Barcelona
Investigated Variable(s)	No variables were mentioned.
Instrument(s)/Method of Data Collection	1. Semi-structured post-task interview; 2. Observation of the readers' external behaviour while reading; and 3. Think-aloud protocol
Data Analysis	Descriptive statistics (frequency)
Result(s)/Finding(s)	The analysis of the oral summaries of the texts and the concurrent verbal reports showed that the three readers were successful in understanding plots, characters and implicit information in both literary texts; they were also able to provide personal interpretations of the author's intentions. However, their success depended on different repertoires of strategies. It must be remarked that there arose a great variety of cognitive, support and metacognitive strategies which included the use of external resources, the reliance on linguistic knowledge of various kinds, the recalling of personal experiences, and the creative interpretation of the text and of its implicit information.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign
Students

19. Cubukcu, F. (2007). An Investigation of Reading Strategies Employed by Trainee Teachers	
Purpose of the study	The purpose of this study was to investigate whether teacher trainees are good at reading strategies and whether the strategy use changes depending upon the class level and gender of the teacher trainees.
Research Questions	1. What reading strategies are employed by the trainee teachers? 2. What strategies should be taught to enhance the reading of the learners?
Participants	229 undergraduate teacher trainees (59 males and 170 females)
Investigated Variable(s)	1. Gender; and 2. Class levels (sophomore and senior students)
Instrument(s)/Method of Data Collection	1. The Reading Strategies Scale; and 2. A semi-structured interview
Data Analysis	1. Descriptive statistics; 2. t-test; and 3. ANOVA
Result(s)/Finding(s)	The results indicated that the most frequently used strategies are underlining, visualizing, guessing, reading according to the question(s), and finding out the main theme. The result of the t-test showed that the difference between females and males in using the reading strategies is insignificant. It can be said that males and females employ the same strategies with the same frequency. Moreover, the results also showed that sophomores employ more strategies than senior students in understanding texts.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign Students

20. Ruiqi, Z. (2007). The Impact of Reading Purposes on Text Processing Strategies	
Purpose of the study	This study aimed to find out the impact of reading purposes on employing reading strategies.
Research Questions	1. Will readers with the reading purpose of getting information make more use of global text processing strategies than those with reading purpose of improving language proficiency; on the contrary, will readers with the purpose of improving language proficiency make more use of local text processing strategies than those with the purpose of getting information? 2. Will readers who use more global text processing strategies scores higher both in recall and comprehension test than those who use more local text processing strategies? 3. Are there any individual strategies facilitative to recall and comprehension of English texts? If so, what are they?
Participants	18 subjects from the faculty of Management Guangdong University of Foreign Studies
Investigated Variable(s)	No variables were mentioned.
Instrument(s)/Method of Data Collection	1. Think-aloud protocol; 2. Written recall protocols; 3. Questionnaire; and 4. Reading comprehension test
Data Analysis	1. Descriptive statistics; 2. Regression correlation; and 3. Percentage
Result(s)/Finding(s)	The results of this study showed: 1. reading purpose affected readers' use of text processing strategies; 2. readers' text processing strategies affected their reading outcome; and 3. of the text processing strategies, elaborating was found to be most contributive to the readers' reading performance.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign
Students

21. Ghanaguru, S., Liang, N. H., and Kit, N. L. (n.d.). An Initial Study of Reading Problems and Strategies: A Teacher's Perspective	
Purpose of the study	This study aimed to explore a primary English language teacher's perspective of the reading problems faced by young ESL learners and the strategies they used to overcome these problems.
Research Questions	1. What reading problems does an in-service English language teacher perceive her students face in the classroom? 2. How does an in-service English language teacher help her students cope with reading problem?
Participants	One experienced in-service teacher and students
Investigated Variable(s)	No variables were mentioned.
Instrument(s)/Method of Data Collection	A semi-structured interview
Data Analysis	The interviews were audio-taped and the data obtained transcribed to allow the researchers to offer their insights accordingly. The data were interpreted and categorized according to types of reading problems and strategies.
Result(s)/Finding(s)	The findings of the study indicated that the types of problems and strategies identified by the respondents are based on their experience and understanding of reading and reading problems. The results showed that there was a link between one's background (both academic and social) and the strategies employed to teach and handle reading in the classroom. The samples of the strategy use reported by the subjects were skimming, scanning, recognizing words on sight, using a dictionary, etc.

Table 2.2 (Cont.) Research Works on Reading Strategies Conducted with Foreign Students

22. Zhang, L.J., and Wu, A. (2009). Chinese senior high school EFL students' metacognitive awareness and reading-strategy use	
Purpose of the study	The aim of this study was to find out what reading strategies Chinese senior high school students deploy to approach EFL reading and whether there are differences in strategy choice among high-, intermediate-, and low-proficiency students.
Research Questions	1. How often do the students use the designated strategies? 2. What kind of strategies are they using most? 3. Is there any difference among high-, intermediate-, and low-proficiency students in their proneness of strategy choice and frequency of strategy use?
Participants	249 second-year students at a senior high school in Hainan province of China
Investigated Variable(s)	Reading proficiency level: high, intermediate, and low
Instrument(s)/Method of Data Collection	A questionnaire adapted from the survey of reading strategies (SORS)
Data Analysis	The collected data were analyzed quantitatively to obtain descriptive and inferential statistics. The data were subjected to a two-factor ANOVA with repeated measures to compare the differences among the three proficiency groups.
Result(s)/Finding(s)	The strategies were classified into 3 categories: global, problem-solving, and support. The results showed that the students reported using the 3 categories of strategies at a high-frequency level. Both the main effect for strategies and the main effect for learners' proficiency were significant. The high-proficiency group outperformed the intermediate group and the low-proficiency group in 2 categories of reading strategies: global and problem-solving; but no statistically significant difference was found among the 3 proficiency groups in using support strategies.

Table 2.2 has shown the available past research works on reading strategies conducted in countries other than Thailand. These available research works are mainly discussed with regard to the purpose(s) of study, research question(s), participants of the study, investigated variable(s), instrument(s), method of data collection, data analysis, and findings. It is apparently seen that the available research works on reading strategies have been found from the 1989 up to 2009. Through the extensive review of research works on reading strategies, how the previous researchers conducted the research works on reading strategies has been presented. According to the research works mentioned in Table 2.2, their main purposes were to explore the reading strategies employed by language learners, and to investigate the effect(s) of reading strategies on reading tasks.

With regard to the participants of the previous research works, the participants could be classified into two groups as native speakers of English and non-native speakers of English. The other native language speakers learnt English as a second language (ESL) or as a foreign language (EFL) (e.g. Block, 1986; Anderson, 2003; and Ghonsooly and Eghtesadee, 2006). The subjects of the past research works could also be classified as primary-level, secondary-level and tertiary-level students. However, very few research works have been conducted with young learners or adult learners in the field of reading strategies.

In terms of the variable(s) investigated in the past research works, different types of reading strategies (e.g. cognitive strategies, metacognitive strategies) were used as treatment to test the effectiveness among different variables. Some researchers focused on specific variables in their research works, for example reading and/or language proficiency levels (Hosenfeld, 1977; Kletzien, 1991; Swicegood, 1994;

Jiménez, García, and Pearson, 1996; Hardin, 2001; Sheorey and Mokhtari, 2001; Phakiti, 2003; Ghonsooly and Eghtesadee, 2006; Lau, 2006; and Zhang and Wu, 2009), gender (Swicegood, 1994; Sheorey and Mokhtari, 2001; Anderson, 2003; Phakiti, 2003; Poole, 2005; Ozek, 2006; and Cubukcu, 2007), types of students (Block, 1986; Sheorey and Mokhtari, 2001; and Anderson, 2003), class levels (Ghonsooly and Eghtesadee, 2006; Ozek, 2006; and Cubukcu, 2007), and school source (Ozek, 2006)

Regarding the method of data collection, think-aloud protocols, questionnaires, and interviews were found to be employed as the main instruments in data collection in order to answer the research question(s). Think-aloud protocols were used to elicit information about the participants' reading strategies while reading. The examples of researchers who employed think-aloud protocols in their investigations were Hosenfeld (1977); Block (1986); Jiménez, García, and Pearson (1996); Hardin (2001); Bouvet (2002); Ghonsooly and Eghtesadee (2006); Lan (2006); Ozek (2006), Parera (2006), and Ruiqi (2007). In addition, questionnaires and interviews were used to elicit the information about the participants' background, and reading strategies used while reading. Questionnaires were used as the main instrument in the investigations conducted by Jiménez, García, and Pearson (1996); Sheorey and Mokhtari (2001); Bouvet (2002); Anderson (2003); Phakiti (2003); Tercanlioglu (2004); Poole (2005); Ozek (2006); Ruiqi (2007); and Zhang and Wu (2009). Some researchers employed interview in their study as the method of data collection (Hosenfeld, 1977; Kletzien, 1991; Swicegood, 1994; Jiménez, García, and Pearson, 1996; Hardin, 2001; Tercanlioglu, 2004; Parera, 2006; Cubukcu, 2007; and Ghanaguru, Liang, and Kit, n.d.). Besides, observation has also been found to be

employed for the data collection (Parera, 2006). In terms of the data analysis, it is obviously seen through the review of research works on reading strategies that descriptive statistics, t-test, one-way and two-way ANOVA were the main statistical methods used to analyze the data. Besides, the Chi-square tests (Ghonsooly and Eghtesadee, 2006) and the post-hoc Scheffé test (Najar, 1998) have also been found to be employed for the data analysis.

Through an extensive review of research works on reading strategies conducted with Thai students, only a few research works in this field have been found.

Table 2.3 Research Works on Reading Strategies Conducted with Thai Students

1. Kanchana Prapphal (n.d.) The Relationship between the Reading Strategies and Language Background of Thai Science Students in Performing Summary Tests	
Purpose of the study	This article aimed to examine the relationship between the reading strategies and language background of thirty Thai science students in performing English for Academic Purposes (EAP) summary tests.
Research Questions	1. Do reading strategies (formal schemata) and language background of Thai science students work interdependently as predictors of performance on EAP summary tests when content is the criterion? 2. Do reading strategies (formal schemata) and language background of Thai science students work interdependently as predictors of performance on EAP summary tests when language is the criterion?
Participants	Thirty third-year science students enrolled in the English for Academic Purposes (EAP) Course at the Chulalongkorn University Language Institute in 1993
Investigated Variable(s)	1. Language proficiency levels (low and high) 2. Reading proficiency levels (less-skilled and skilled readers)
Instrument(s)/ Method of Data Collection	1. Pre- and post-test 2. Summary test 3. A check-list of strategies (questionnaire)

Table 2.3 (Cont.) Research Works on Reading Strategies Conducted with Thai
Students

1. Kanchana Prapphal (Cont.) The Relationship between the Reading Strategies and Language Background of Thai Science Students in Performing Summary Tests	
Data Analysis	1. An analysis of covariance (ANCOVA) 2. A two-way analysis of covariance
Result(s)/Finding(s)	1. The results indicated that strategies and language background of the science students worked independently as predictors of performance on EAP summary post-test and EAP final summary test when content is the criterion. Reading strategies and language functions include skimming and scanning; understanding main ideas and details; guessing meaning from context; defining and classifying; making inferences; acknowledging sources; paraphrasing; outlining; explaining graphs, diagrams, etc; summarizing, predicting; stating conclusions; comparing and contrasting; expressing opinions; pronoun reference; relative clauses; sentence combination; problem and solution; cause and effect; conditionals; and transitional devices. 2. The results showed that the observed factors (reading strategies and language background) did not work interdependently.
2. Apasara Chinwonno (2001) A Comparison of Thai and English Reading Comprehension Strategies of Pre-service Teachers in Thailand	
Purpose of the study	The purpose of this study was to identify reading strategies reported by pre-service teachers in order to comprehend Thai and English texts.
Research Questions	1. To what extent do the lower and upper reading level pre-service teachers differ in their reported use of the pre-reading comprehension strategies while reading Thai versus English texts, as measured by the score on the Thai version of the Reading Comprehension Strategy Questionnaire? 2. To what extent do the lower and upper reading level pre-service teachers differ in their reported use of the guided reading comprehension strategies while reading Thai versus English texts, as measured by the score on the Thai version of the Reading Comprehension Strategy Questionnaire? 3. To what extent do the lower and upper reading level pre-service teachers differ in their reported use of the postreading comprehension strategies while reading Thai versus English texts, as measured by the score on the Thai version of the Reading Comprehension Strategy Questionnaire? 4. How is each of the reading comprehension strategies related to Thai Degrees of Reading Power Test scores?

Table 2.3 (Cont.) Research Works on Reading Strategies Conducted with Thai
Students

2. Apasara Chinwonno (Cont.) A Comparison of Thai and English Reading Comprehension Strategies of Pre-service Teachers in Thailand	
	5. How is each of the reading comprehension strategies related to English Degrees of Reading Power Test scores?
Participants	290 1st year undergraduate students at the Faculty of Education, Chulalongkorn University
Investigated Variable(s)	1. Gender 2. Major field 3. Reading proficiency levels
Instrument(s)/ Method of Data Collection	1. Reading Power tests 2. Questionnaire
Data Analysis	1. Descriptive statistics 2. ANOVA 3. Pearson correlation coefficient
Result(s)/ Finding(s)	The results obtained to answer the first research question indicated that the main significant main effects on the types of language and the levels of English reading comprehension proficiency. The results of the repeated measures ANOVA demonstrated significant differences due to the interaction between types of language and levels of Thai reading comprehension proficiency, as well as, the levels of English reading comprehension proficiency. Subjects at the lower and upper levels of Thai and English reading comprehension proficiency significantly varied in reporting their use of these strategies while reading Thai versus English. To answer the third question, the results indicated that the types of language and levels of English reading comprehension proficiency significantly contributed to any differences among subjects' scores on their reported use of the most appropriate postreading comprehension strategies. For the fourth and fifth questions, the results showed that only the guided reading and postreading comprehension strategies significantly correlated with Thai reading comprehension whereas all reading comprehension strategies significantly correlated with English reading comprehension. The guided reading comprehension strategies resulted in the highest correlation to the Thai and English Degrees of Reading Power tests.

Table 2.3 (Cont.) Research Works on Reading Strategies Conducted with Thai
                Students

3. Jaruwan Wirotanan (2002) Reading strategies of university EFL Thai readers in reading Thai and English expository texts	
Purposes of the study	The purpose of this study was to investigate the differences in strategy use of high and low proficiency Thai EFL university readers when they read expository texts in Thai and English. The study also aimed to find the kind of strategies, the frequency of use, and the way the readers coped with reading difficulties when a particular strategy did not work.
Research Questions	1. What strategies do high and low proficiency Thai EFL university readers use in reading expository text in Thai? 2. What strategies do high and low proficiency Thai EFL university readers use in reading expository text in English? 3. Do high proficiency Thai EFL readers transfer L1 reading strategies to L2 reading when they read expository text? 4. What are the differences in strategy use between high and low proficiency Thai EFL readers when they read expository text in English?
Participants	40 graduate Thai students at the University of Pittsburg
Investigated Variable(s)	Reading proficiency levels: high and low
Instrument(s)/ Method of Data Collection	1. Think-aloud procedure 2. Strategy checklists 3. Interview
Data Analysis	1. Descriptive statistical analysis 2. Chi-square analysis 3. An independent sample t-test
Result(s)/Finding(s)	The results indicated that when reading Thai, few differences existed in the number and types of strategies used between high and low proficiency EFL readers. However, when reading English, differences in number and types of strategies used between the groups reached significance. The findings also revealed that the high proficiency EFL readers transferred their reading strategies from L1 to L2 only when the texts shared similar linguistic features. Moreover, both the high and low proficiency EFL readers used strategies when reading a foreign language, but differences existed in how the strategies were used. The samples of reading strategies used by the subjects are using prior knowledge, looking at picture, skipping details, and so on.

Table 2.3 shows a few available research works on reading strategies conducted with Thai students. Two of them (Kanchana Prapphal, n.d. and Apasara Chinwonno, 2001) were conducted with Thai students at the tertiary level studying at Chulalongkorn University. The rest was conducted with 40 Thai graduate students at the University of Pittsburg. The purpose of these three research works was to explore the reading strategies Thai students employed while reading or facing with reading problems. The three research works employed different variables in the investigation, but the variable employed in all studies was a proficiency level.

In terms of method of data collection, questionnaire, interview, and think-aloud protocols were employed in these studies. Questionnaires or strategy checklists were employed in all the three investigations. Think-aloud protocols and interview were found to be employed by Jaruwan Wirotanan (2002). Descriptive statistics, ANOVA, t-test, and the Chi-square test were used to analyze the data.

In the studies illustrated in Tables 2.2 and 2.3, the previous researchers used various methods of data collection to investigate the reading strategies employed by different groups of participants. The subjects performed different tasks while reading texts that varied in type, length, content, and difficulty level. Through the review of previous research works, it appears that the results have provided the research empirical evidence in the field of reading strategies that there is a dearth of information about the relationships between learners' use of reading strategies and any variables that influence the use of reading strategies. Therefore, these relationships are worthy of further investigation.

2.6 Summary

The purpose of this chapter is to examine some significant aspects of reading, reading strategies, and available research works on reading strategies. Reading strategies indicate how readers deal a task, what textual cues they attend to, how they make sense of what they read, and what they do when they do not understand. This chapter has discussed some significant aspects of reading comprehension process, reading strategies, and available research works on reading strategies. Through the broad literature review in the field of reading strategies, we can see that several research works in the past have been carried out for a variety of purposes of the investigation, target populations, methods of data collection, places of research conduction, and different variables of factors. Chapter 3 concentrates on the research methodology and theoretical framework in reading strategies for the present study.

CHAPTER 3

RESEARCH METHODOLOGY AND THEORETICAL

FRAMEWORK FOR READING STRATEGIES

3.1 Introduction and Purpose of the Chapter

Research design is concerned with turning research questions into research projects (Robson 1993). In conducting a research, research designs are extremely varied, reflecting both a great diversity of research questions and purposes (Chaudron, 1988). According to Cohen and Manion (2002), research purposes and research questions are important factors which have to be considered before designing the research. Furthermore, Seliger and Shohamy (1989) affirm that research must be guided from the very beginning by a research design. Without a coherent design, it is not possible to give concrete expression to hypotheses which have been developed from general questions, and it is not possible to pursue answers to research questions. Therefore, it can be concluded that the research design is a crucial part in conducting a research.

Robson (1993) recommends that any research works can be classified in terms of their purposes as well as by the research strategy used. The purposes of any research works are classified in three groups: explanatory, descriptive, and exploratory. Robson (1993, 2002) gives the explanation of each classification of the purposes of research works as follows:

1. Explanatory research: a researcher seeks an explanation of a situation or problem, traditionally but not necessarily in the form of casual relationships. The patterns relating to the phenomenon being researched needs to be explained. In addition, the researcher tries to identify the relationships between aspects of the phenomenon. This type of research maybe qualitative and/or quantitative.

2. Descriptive research: a researcher tries to portray an accurate profile of persons, events or situations. The extensive previous knowledge or the situation is required to be researched or described, so that a research knows appropriate aspects on which to gather information. This type of research may be qualitative and/or quantitative.

3. Exploratory research: a researcher tries to find out what is happening, particularly in little-understood situations; to seek new insights; to ask questions; to assess phenomena in a new light; or to generate ideas and hypotheses for future research. This type of research is usually, but not necessarily, qualitative.

Regarding the types of research, Brown (1988) has classified research into two types as primary and secondary research. The distinction between primary and secondary research is based on the sources of the information or data. In the primary research model, the data is derived from the original sources, such as the students who are learning a language. In the secondary research model, research is based on sources that are one step removed from the original information. Primary research can be categorized into two types: case studies, and statistical studies. Moreover, statistical studies are also grouped into two groups: survey studies and experimental studies.

According to Robson (1993), the appropriate use of the three types of research as experimental studies, survey studies, and case studies has been suggested. The characteristics of these three types are described as follows:

1. *Experimental studies*. These studies are defined as a whole range of different possible studies that investigate the language behavior of groups under controlled conditions (Brown, 1988). They can be varied in the types of questions being asked. They are appropriate for explanatory studies with the 'how' and 'why' type of research questions. They are used to measure the effects of manipulating one variable on another variable as well.

2. *Survey studies.* Survey studies are appropriate for descriptive studies with the 'who, what, where, how many and how much' type of research questions. They focus on a group's attitudes, opinions, and/or characteristics (Brown, 1988). These studies are conducted by collecting data from several groups of people, usually employing questionnaires or interviews.

3. *Case studies.* They are appropriate for exploratory work with the 'how' and 'why' type of research questions. They are used for development of detailed, intensive knowledge about a single 'case', or of a small number of related 'cases'. The case studies are usually longitudinal, that is, they follow the individual or individuals over a relatively long period while tracing some aspect of language development (Brown, 1988).

Since one purpose of the present study was to investigate reading strategies which were generally employed by science-oriented students at the tertiary level to understand their reading tasks; therefore, of the three types of research, the survey study was the most appropriate for this investigation. Based on the characteristics of

research mentioned earlier, the purpose of the study was to look into reading strategies reported as being employed by Thai science-oriented students at the tertiary level in Thai public universities. It can be seen that the present study has been seen as exploratory and descriptive research. Furthermore, this study has been both quantitative and qualitative research.

3.2 Methods in Reading Strategy Research

In conducting a research, research method is a crucial part to control the whole research process. Based on Robson (1993), the general principle is that the research strategy or strategies, and the methods or techniques employed, must be appropriate for the questions a researcher wants to answer. According to Chaudron (1988), methodological approaches to the study of language classrooms are extremely varied, reflecting both a great diversity of research questions and purposes, and a range of theoretical perspectives on the conduct of research. Additionally, research methods are procedures a researcher follows in attempting to achieve the goal of a study (Johnson, 1977).

However, to date, no single research method in the field has been reported as the perfect method (Cohen and Scott, 1996). Although there is not a perfect method for conducting a research, Robson (1993) has suggested many methods which a researcher can use to investigate how reading strategies are employed by students or language learners in order to cope with reading problems, or to enhance reading ability. However, each method has both weak and strong points, but whatever method is chosen, the researcher must consider the main purpose of the study.

Reviewing the recently used research methods in the field of reading strategies would be essential for researchers to consider which research instruments will be suitable and appropriate for their research purposes. Therefore, the research methods used to gather data on reading strategies will be discussed in the following section. These research methods include: 1) Classroom Observation; 2) Oral Interview; 3) Written Questionnaires; and 4) Think-Aloud.

3.2.1 Classroom Observation

Observation is a long tradition tool in the field of social sciences (Punch, 2005). Observational methods are often used in studying language use and classroom events (Richards, Platt, and Platt, 1992). Classroom observation techniques are methods used to collect primary data on programmes, processes, or behaviors being studied. These techniques are important tool being used to identify different reading strategies by observing learners performing reading tasks, normally in classroom setting (Ellis, 1994). In naturalistic observation, observers neither manipulate nor stimulate the behaviour of those whom they are observing, in contrast to some other data gathering techniques; therefore, observation can give natural real data or information to the observer (Punch, 2005).

Robson (1993, 2002) mentions that a major advantage of observation as a research technique is its directness. This is because a researcher does not need to ask the language learners about their views, feelings, or attitudes, but he or she can watch what they do and listen to what they say. Observation also seems to be pre-eminently the appropriate technique for getting at 'real life' in the 'real world'. This can help the researcher get the real facts from the language learners. Oxford and Burry-Stock (1995) point out that classroom observations are easy to use and appropriate for both

formal and informal research. On the contrary, Cohen and Aphek (1981) point out that the classroom observation is not a very fruitful or workable method because it cannot provide adequate information about reading strategies that learners employ. Consequently, not many researchers have employed classroom observation to investigate the students' use of reading strategies. From the related literature reviews, only one previous research work on reading strategies conducted by Parera (2006) employed observation as a method for data collection. Rubin (1975) also affirms that this method is not productive to provide sufficient information about students' use of reading strategies, especially the information on mental operations. In addition, there is also the very practical problem with observation that it tends to be time-consuming (Robson, 1993).

3.2.2 Oral Interview

In order to gather the data about students' use of reading strategies, one possible way is to ask the students directly to describe what strategies they employ in reading. This method for collecting data is called interview.

The term 'interview' can be defined as 'a kind of conversation with a purpose, a directed conversation between an investigator and an individual or groups of individuals in order to gather useful information for the study (Nunan, 1989; Richard et al., 1992; and Robson, 1993). According to Ellis (1994), interview is one method that a researcher can use to investigate students' reading strategies by asking students questions to explain and describe what reading strategies they use and how they use them while dealing with reading tasks. The interview is one of the main data collection tools in qualitative research. It is a very good way of accessing learners' perceptions, meaning, definitions of situations and constructions of reality. It is also

one of the most powerful ways a researcher has of understanding the participants (Punch, 2005). Consequently, some researchers (e.g. Hosenfeld (1977), Kletzien (1991), Jiménez, García, and Pearson (1996), Hardin (2001), Parera (2006), and Cubukcu (2007)) employed interview as the main instrument in collecting the data about students' use of reading strategies.

Interviews can be characterized in terms of their degree of formality, and most can be placed on a continuum ranging from unstructured through semi-structured to structured (Nunan, 1992). According to Robson (1993, 2002), a commonly made distinction is based on the degree of structure or formality of the interview. An unstructured interview is guided by the responses of the interviewee rather than the agenda of the researcher (Nunan, 1992). The interviewer has a general area of interest and concern, but lets the conversation develop within this area (Robson, 2002). This makes the direction of the interview relatively unpredictable, and completely informal. In a semi-structured interview, the interviewer has a general idea of where he or she wants the interview to go, and what should come out of it, but does not enter the interview with a list of predetermined questions (Nunan, 1992). According to Robson (2002), semi-structured interview has predetermined questions, but the order can be modified based upon the interviewer's perception of what seems most appropriate. On the other hand, in the most formal type, the structured interview, the agenda is totally predetermined by the researcher who works through a list of set questions in a predetermined order (Nunan, 1992). This type of interview has predetermined questions with fixed wording, usually in a pre-set order (Robson, 2002).

The oral interview has been widely used as a research tool in applied linguistics. Interview can yield a great deal of useful information (Leedy and Ormrod, 1989). Nunan (1992) mentions that the type of interview one choose will be determined by the nature of the research and the degree of control that the interviewer wishes to exert. Of the three types of interviews (i.e. structured interview, semi-structured interview, and unstructured interview), the semi-structured has been widely used among the researchers in social and educational field, especially in qualitative studies because of its flexibility (Nunan, 1992; Robson, 2002; and Punch, 2005) and more likely to yield information that the researcher has not planned to ask for (Leedy and Ormron, 1989).

3.2.3 Written Questionnaire

Since asking questions is one of the most natural ways of gathering information, the questionnaire has become one of the most popular research instruments applied in the social sciences (Dörnyei, 2003). From the related literature reviews, many researchers have employed questionnaire as the main instrument to investigate the students' use of reading strategies. Examples are Kim (1989), Jiménez, García, and Pearson (1996), Apasara Chinwonno (2001), Sheorey and Mokhtari (2001), Bouvet (2002), Anderson (2003), Phakiti (2003), Tercanlioglu (2004), Poole (2005), Ozek (2006), Ruiqi (2007), and Zhang and Wu (2009).

A questionnaire is a research instrument consisting of a set of questions on a research topic and other purposes of gathering information from respondents (Richards et al, 1992). According to Brown (2001), questionnaires are any written instruments that present respondents with series of questions or statements to which they are to react either by writing out their answers or selecting from among existing

answers. Questionnaires are one of the useful instruments used to collect the data in the qualitative research. They enable the researcher to collect data in field settings, and the data themselves are more amenable to quantification than discursive data such as free-form fieldnotes, participant observers' journals, the transcripts of oral language (Nunan, 1992).

Like oral interviews, written questionnaires can be utilized to investigate practically any aspects of the teaching or learning process in order to obtain information from teachers about their teaching practices, or learners' learning-style preferences (Nunan, 1989). According to Cohen and Scott (1996), written questionnaires are used to elicit learner responses to a set of questions, and they require the researcher to make choices regarding question format and research procedures.

In terms of the types of questionnaires, Nunan (1992) and Denscombe (2003) offer two types of questionnaires as open-ended form (or unstructured questionnaire, or closed-ended form (or structured questionnaire). A closed item is one in which the range of possible responses is determined by the researcher, for example: "Foreign languages should be compulsory in high school (The response can be agree/neutral/ or disagree) (Nunan, 1992)," or "I use my prior knowledge to help me understand what I read (The response may be never/sometimes/usually/always) (Zhang and Wu, 2009)". An open item is one in which the subject can decide what to say and how to say it, for example: "What do you think about the proposal that foreign languages should be compulsory in high school? (Nunan, 1992)", or "What do you do to overcome the reading problems?". According to Denscombe (2003), open questions are those that leave the respondent to decide the wording of the answer, the length of the answer and

the kind of matters to be raised in the answer. Closed questions structure the answers by allowing only answers which fit into categories that have been established in advance by the researcher.

The advantage of open questions is that the information gathered by way of the responses is more likely to reflect the full richness and complexity of the views held by the respondent. On the other hand, the main advantage of closed questions is that the structure imposed on the respondents' answers provides the researcher with information which is of uniform length and in a form that lends itself nicely to being quantified and compared (Denscombe, 2003). Responses to closed questions are easier to collate and analyse; however, researcher often obtains more useful information from open questions (Nunan, 1992).

From the information about questionnaires mentioned above, it can be seen that there are a lot of advantages in using the questionnaires as a method of data collection. However, there are some weak points of questionnaires. For example, the raw data from the open question questionnaires require a lot of time for the analysis, the researcher may not receive all questionnaires back, and it may take time to contact the research participants and ask for the rest of questionnaires.

3.2.4 Think-Aloud

Think-aloud protocol is a method used to investigate learners' reading strategies, in which learners think aloud as they are completing a task in order that the researcher can discover what kinds of thinking processes or strategies they are making use of. The researcher observes while the learner attempts to complete a defined task. Think aloud techniques are those in which subjects complete a task or solve a problem and verbalise their thought processes as they do so. The researcher collects the think-

aloud protocol on tape and then analyses it for the thinking strategies involved (Nunan, 1992). From the related literature reviews, many researchers, for example Hosenfeld (1977), Block (1986), Jiménez, García, and Pearson (1996), Hardin (2001), Ghonsooly and Eghtesadee (2006), Lau (2006), Ozek (2006), Parera (2006), and Ruiqi (2007) have employed think-aloud protocol as the main instrument to investigate the students' use of reading strategies. Lavadenz (2003) states that with think-aloud protocols, students verbalize, in an interview context; how they are processing the text they are reading.

Regarding the method of thinking aloud, Bell (2004) mentions that it is used to model the cognitive processes of reading comprehension. Students verbalise their own thoughts as they read aloud, modeling the kinds of strategies a skilled reader uses during the reading. The main purpose of a think aloud protocol is to model for students the thought processes that take place when difficult material is read.

Feldmann and Stemmer (1987) point out that think aloud protocol has been used mainly to investigate the process of translation and communication in a foreign language. Moreover, think aloud procedures have been employed to investigate learners' ongoing cognitive processes and strategies in four major second language areas including translation, reading, writing, and testing (Matsumoto 1993). Although think-aloud protocol provides more detailed information because the students describes strategies while doing a language task, Oxford (1990) points out that this method is basically used with one-to-one, take a great deal of time-consuming, reflect strategies related to the task at hand, students may not have time to look back on the task and evaluate their performance when the task is completed.

Since the present study aimed to examine what types of reading strategies were reported being employed by science-oriented undergraduate students studying at public universities in Thailand and this study was both qualitative and quantitative in nature, the semi-structured interview and closed reading strategy questionnaire were selected as the main instruments used for data collection. The reasons were that the semi-structured interview is flexible, and the questionnaire has been found to be a useful instrument to collect the data in the survey research and the data from the closed questions are easier to analyze (Nunan, 1992).

3.3 Theoretical Framework and Rationale for Selecting and Rejecting Variables for the Present Study

The main purpose of this section is to develop the theoretical framework of the present study using the knowledge taken from related literature review and other materials on reading strategies. According to Intaraprasert (2000), the review of the related research works, literature, and other materials in the area of reading strategies are helpful for researchers to develop their own theoretical framework, locate the present study in the context of past research works and the opinion of other researchers, and also create the rationale for selecting and rejecting variables for the study.

The main focus of the study is on how five variables: students' gender (male and female), location of universities, field of study (science-oriented major: Health Science, and Science and Technology), levels of reading proficiency (high, moderate, and low), and high school background (state-run and private-run schools) relate to the students' use of reading strategies. The theoretical framework based on the empirical

past research works on reading strategies is presented to give a clear picture about which variables have been hypothesized to have a relationship with reading strategies. Then the theoretical framework of the study in which reading strategies have been examined is proposed. Figure 3.1 below shows the theoretical framework based on the empirical past research works on reading strategies.
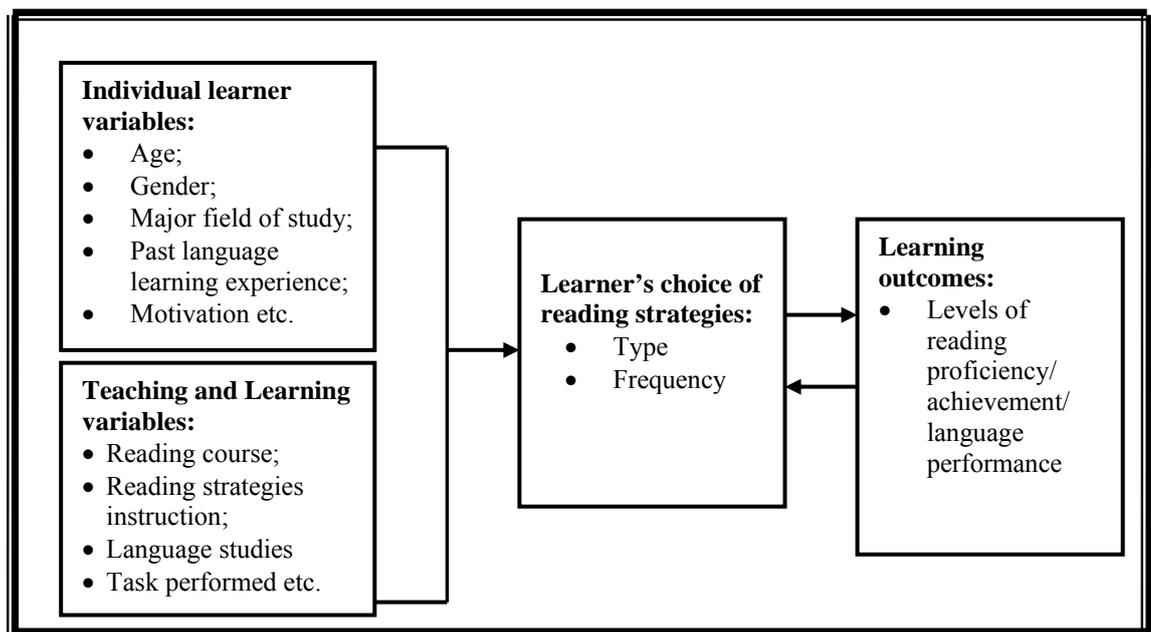
(Source: Adapted from Ellis, 1994)

Figure 3.1 Factors Related to Reading Strategies and Learning Outcomes in the Past Research Works

Based on the theoretical framework shown in Figure 3.1, types of reading strategies and learners' frequency of reading strategy use have been hypothesized to be influenced by two major categories of variables: 1) learner individual difference variables (e.g. age, gender, level of language proficiency); and 2) teaching and learning condition variables in a single-directional relationship (e.g. reading course, reading strategies instruction). Regarding learning outcomes (proficiency/ achievement), the relationship between learners' reading strategy use and learning

outcomes is bi-directional relationship. This can be described as learners' reading strategy use (both type and frequency use) is resulted from learners' reading proficiency; or learners' reading proficiency can be a result of reading strategy use.

To clarify the relationships between factors (e.g. motivation, learning styles, reading course, and past experience) and students' use of reading strategies, the present study has borrowed theory concerning reading strategies developed by Ellis (1994). The prime focus of this study aims at examining variation in the use of overall strategy use, as well as individual strategy and strategy categories, and looking at patterns of variation by gender of students, location of universities, field of study, level of reading proficiency, and students' high school background. Figure 3.2 below is proposed as the theoretical framework for the present study which is adapted from Ellis's model (1994).

(Source: Adapted from Intaraprasert, 2000)
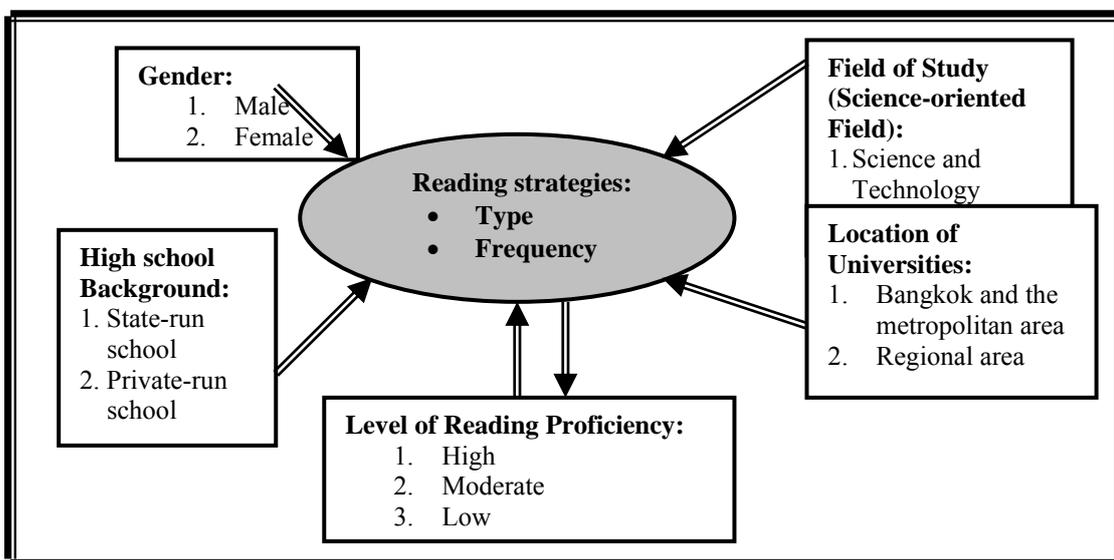
Figure 3.2 Theoretical Framework for the Present Study

In the context of the present study, the theoretical framework (Figure 3.2) is formed adapted from the theoretical framework in figure 3.1 mentioned previously. It shows that the types of reading strategies and reader's frequent use of reading strategies have been predictably hypothesized to have a one directional relationship with different variables, namely gender, location of universities, field of study, and high school background. Both learner-related variables (gender, field of study, and high school background) and institution-related variable (location of the universities) are assumed to have a relationship with types of reading strategies and reader's frequent use of reading strategies.

Regarding the level of reading proficiency, the relationship between reading strategy use and reading proficiency level is two-directional. Reading proficiency level is investigated as an independent variable that may have a relationship with reader's reading strategy use. Hence, there are altogether five independent variables, including gender, field of study, location of institution, level of reading proficiency, and high school background; and reading strategy use as a dependent variable.

Through an extensive review of research works on reading strategies in Chapter 2, it can be seen that a number of variables, which have been related to students' use of reading strategies, have been taken into account for investigation by researchers in the field. Intaraprasert (2000, p. 60) states that some variables have a strong relationship, while others have little or no relationship with students' use of strategies. This largely depended on the context of an investigation, for example, the subjects of the investigation. Based on this study, the researcher has to search for the educational English curriculum for Thai universities in order to establish the variables to be investigated with the hope that it may be possible to make use of the study

findings to suggest both language teachers and students the variables which may have an effect on the students' reading strategy use. Additionally, the findings may be helpful to those students as well as language teachers to improve their reading learning and teaching.

In conducting this study, the researcher aimed to explore the reading strategies the science-oriented students learning English at the tertiary level in the Thai public universities employing to deal with their own reading. However, all variables found in the review of related literature and previous research works on reading strategies could not be examined in the present study. Therefore, the independent variables which have been rarely found in the previous research works, such as, location of universities, high school background were examined in this context.

What follow are the discussions of the basic assumptions about the relationships between learners' reading strategy use and the five variables, based on the theoretical framework, related literature, related research works, other researchers' opinions, and my own justification of the selected variables in the present study.

3.3.1 Students' Use of Reading Strategies and Gender

Male and female students are believed to display some differences in using reading strategies (Intaraprasert, 2000). According to Tercanlioglu (2004), gender is one factor which influences choice of strategies used among students learning a foreign language. Poole (2005) states that even though we know the importance of reading strategies, little research exists on whether or not males and females have similar or different strategic reading habits. In other words, little research has specifically aimed at investigating gender differences in the use of foreign language reading strategies.

Based on the available previous research works on reading strategies, they have found that gender can have a significant impact on how students learn a language, and females use reading strategies more frequently than males (Oxford, 1993; Oxford, 1995; and Young and Oxford, 1997). According to the research work of Dörnyei and Clement (2001 cited in Mori and Gobel, 2006), the result of the study indicated that female students scored significantly higher than male students on the target language reading. Oxford (1993), and Goh and Foong (1997) state that females tend to be more active strategy users than their male counterparts, and the women used a significantly higher number of strategies than did men.

On the contrary, the results of Tercanlioglu's study (2004) which worked with the Turkish students shows different results on gender differences; favoring males, in students' reading strategy use. A possible explanation for this result may be that in the male-dominated Turkish society, female students may have lower self-esteem in reporting the strategies they use (Tercanlioglu, 2004). According to Green and Oxford (1995), Brantmeire (2004), and Mori and Gobel (2006), gender differences in reading strategy use may be affected by many other factors, namely culture, field of study, topics of texts, and level of the students' reading proficiency. Many findings suggest that ESL readers' strategy use is influenced by gender (Goh and Foong, 1997; Oxford, 1993; Oxford, 1995; and Moria and Gobel, 2006); on the other hand, some language researchers have found very few differences or no significant differences between males and females in reading strategy use (Poole, 2005; and Sheorey and Mokhtari, 2001).

As mentioned earlier, gender has been seen as one of the factors that are related to reading, but it has received little attention by many language researchers.

The purpose of the present study was to examine whether or not gender differences among students were related to their reading strategy use.

3.3.2 Students' Use of Reading Strategies and Location of Universities

In this era, Thailand has a number of public institutions offering a bachelor degree to Thai students. These institutions are located in every part of the country, namely Bangkok and metropolitan areas, and the other regions. As a developing country, the distribution of advanced technology in Thailand is still seen mostly in Bangkok and the metropolitan areas or a few other major cities of the regions (Intaraprasert, 2000). Some institutions are located in the faraway areas and very hard to go through because of the inconvenience of public transportation. In addition, the communications may not be very good. As location of institutions, only one previous study by Intaraprasert (2000) has been conducted in order to examine the relationship between this variable and students' use of language learning strategies, but not on reading strategies. The results of that study showed that significant variations in frequency of use of both classroom-related and out-of-class or classroom-independent strategies were found according to location of institution, with students studying at the institutions in Bangkok and the metropolitan areas reporting more frequent use of these strategies than those studying in the regional areas. The researcher of the present study aimed to explore such a relationship to see whether or not the difference of the location of universities could give effect to the students' use of reading strategies.

3.3.3   Students' Use of Reading Strategies and Field of Study

Field of study in the tertiary level offered by public universities can be classified into two main types: Art and Science. Based on this study, it focuses on

only the science-oriented students: Health Science; and Science and Technology. The different learning conditions of these two types may affect the choice of students' reading strategy use. An initial review of previous research works appear to reveal that many of the research works on reading strategies have been carried out with native speakers of English learning a foreign language, or non-native speakers of English learning English as a second language (ESL). A small amount of research has been carried out with learners learning English as a foreign language (EFL), especially in the context of Thailand. Moreover, a small amount of research has been carried out to investigate reading strategy use by science-oriented students (i.e. Kanchana Prapphal, n.d.). Therefore, the present study aims to explore whether or not the different field of study (science-oriented major: Health Science; and Science and Technology) are related to their reading strategy use.

3.3.4 Students' Use of Reading Strategies and Level of Reading Proficiency

Based on an extensive review of research works on reading strategies, the reading proficiency has been found as one of the most frequent factors selected by many language researchers. Reading proficiency has been seen as one of the factors that has played a role in influencing the use of strategies. The results of a number of previous research works on the reading strategies (e.g. Hosenfeld, 1977; Kletzien, 1991; Apasara Chinwonno, 2001; and Greyer and Nel, 2003; Zhang and Wu, 2009) have indicated that the readers with a higher level of reading proficiency tend to report using a greater range of reading strategies and more appropriate strategies than those with a lower level of reading proficiency.

Students' reading proficiency level in previous research works on reading strategies was generally classified as successful and unsuccessful, or good and poor, or low and high reading proficiency levels. In order to clearly distinguish between weak students and good ones, many researchers have tended to take samples from the extreme ends of the achievement spectrum. This may have led to a lack of focus on the middle group, those readers with a moderate level of reading proficiency. This suggests a gap in research comparing readers with only two different levels of reading proficiency.

In the present study, besides high and low proficiency, the researcher simultaneously explores three distinct levels of reading proficiency to see whether or not this difference has an effect on students' use of reading strategies. Therefore, reading proficiency in this study are classified into three levels as high, moderate, and low based on the students reading test scores obtained through the researcher-constructed Reading Proficiency Test.

3.3.5 Students' Use of Reading Strategies and High school Background

In Thailand, there are two main types of high schools: state-run schools and private-run high schools. State-run high schools are under the jurisdiction in the educational administration and management of the state or the local administration organizations; on the contrary, private-run high schools are under the jurisdiction in the educational administration and management of some private sections. In terms of language learning and teaching, high schools in Thailand have to follow the curriculum provided by the Ministry of Education (2002). Although almost all high schools have followed the same language curriculum, there may be some factors that affect students' use of strategies in different high schools, for example, learning

facilities provided for students such as computer, library, or other resources. Apart from this, students' socio-economic status might relate to their choices of strategy use. Private-run high schools are generally more expensive the state-run schools in terms of tuition fees. Therefore, the majority of the students from the private-run high schools tend to come from rich families.

Unfortunately, no previous empirical research works investigating the relationship between students' choices of strategy use and this variable have been found. However, the present study has been carried out to see whether or not this difference has an effect on students' use of reading strategies.

3.4 Research Questions

According to the proposed relationship between learners' reading strategy use and each of the five selected independent variables (see Section 3.3), and the review of past research works, the research questions have been formed. To describe reading strategies employed by science-oriented students at the tertiary level in the public universities in Thailand, the present study is designed to answer the seven research questions below:

1. What types of reading strategies do the science-oriented undergraduate students studying in the public universities in Thailand report employing?

2. How frequently are these different reading strategies reported being used by the students under this study?

3. Do students' choices of reading strategies vary significantly with their gender? If they do, what are the main patterns of variation?

4. Do students' choices of reading strategies vary significantly according to the location of universities at which they are studying? If they do, what are the main patterns of variation?

5. Do students' choices of reading strategies vary significantly with their field of study? If they do, what are the main patterns of variation?

6. Do students' choices of reading strategies vary significantly with their levels of reading proficiency? If they do, what are the main patterns of variation?

7. Do students' choices of reading strategies vary significantly with their high school background? If they do, what are the main patterns of variation?

3.5 Sampling and Rationales for Choice of Subjects

Researchers frequently encounter the difficulty that they cannot collect data from everyone who is in the category being investigated. As a result, they rely on getting evidence from a portion of the whole in the expectation and hope that what is found in that portion applies equally to the rest of the population (Denscombe, 2003). A sample is a subset of the population selected according to the needs and purposes of the study to which the researcher intends to generalize the results (Robson, 2002; Dörnyei, 2003; and Wiersma, 1991). Wiersma (1991) states that conducting the research work, the researcher wants the sample, or the individuals actually involved in the research, to be the representative of the larger population. Dörnyei (2003) defines the sample as the group of people or a subset of population whom researchers actually examine as the representative of the whole population. Selecting the sample of the research work is a very important step because the sample is the representative of the

actual population drawing from the total target group who would be the subject of the work.

Identifying the sample must depend on what research question(s) the researcher wants to answer. If the researcher wants to draw inferences about an entire population, then s/he must choose a sample that can be presumed to represent that population (Leedy and Ormrod, 1989). In order to generalize from the findings of a survey, the sample must not only be carefully selected to be representative of the population; it also needs to include a sufficient number (Denscombe, 2003). In other words, the sample of the research needs to be of an adequate size. As a result, how good the sample group can be the representative of the population is the important point that the researcher has to consider.

Denscombe (2003) points out that the sample size depends on a number of factors connected with the research which needs to be borne in mind and weighed up by the researcher in the process of reaching a decision about the sample size. It is unnecessary to investigate the whole population. Selecting a smaller number of people to be questioned the researcher can save a considerable amount of time, cost, and effort and can come up with accurate results (Dörnyei, 2003). It can be said that a number of subjects in the study necessarily depends on the time researchers have for the study. According to Cohen and Manion (1984), the correct sample size depends on the purpose of the study and the nature of the population under scrutiny. Drew (1980) indicates that sample size is very important because the interpretations of the results may not be accurate if the sample does not accurately represent the population.

For the exploratory research as the present study, the sample must be good representative for the whole population; it should not be too big to be manageable. In

other words, the subjects should be the good representatives of science-oriented students learning English at the tertiary level in Thailand.

3.6 Characteristics of the Research Participants

This section focuses on characteristics of the research participants. Tables 3.1–3.4 show the breakdown of the number of participating students related to each variable in the data collection in order to give a context for the results obtained through the data analysis for the present study. This breakdown has been crosstabulated, and the chi-square ($\chi 2$) tests were employed to determine the subject distribution among the investigated variables.

Table 3.1 Number of Students by 'Gender' in Terms of 'Location of Universities', 'Field of Study', Levels of Reading Proficiency' and 'High School Background'

Gender	Location of Universities		Field of Study		Levels of Reading Proficiency			High School Background	
	Metro-Bkk	Region	Health-Sci	Sci-Tech	Hi	Mo	Lo	State - run	Private - run
Male (n= 421)	107	314	79	342	69	233	119	379	42
Female (n=675)	159	516	306	369	170	411	94	626	49
Total (n=1,096)	266	830	385	711	239)	644	213	1005	91
$\chi 2$ Value	N.S.		$\chi 2 = 80.32***$		$\chi 2 = 37.99***$			N.S.	

Note: 1) Metro-BKK means 'Metro-Bangkok'   2) Region means 'Regional'
3) Health-Sci means 'Health Science'; and Sci-Tech means 'Science and Technology'
4) Hi means 'high'; Mo means 'moderate'; and Lo mean 'low'; and   5) *** p<.001

Table 3.1 above presents the number of students in each group of the four independent variables when related to 'gender of students'. Of the four variables presented in the 'white' areas, results from the chi-square ($\chi 2$) tests reveal that the distribution of the male and female subjects varied significantly with 'field of study',

and 'levels of reading proficiency'. That is to say, there are more Science and Technology students from both gender than Health Science students; moreover, more female students have studied in the science-oriented field. In terms of 'levels of reading proficiency', a large number of male students are with 'moderate-' and 'low-' levels of reading proficiency. On the contrary, a higher population of female students are 'moderate' and 'high' reading proficiency levels than of the 'low' level. When considering the number of students with their location of universities and high school background, it appears that the patterns of 'location of universities' and 'high school background' are consistent irrespective of 'gender of students'.

Table 3.2 Number of Students by 'Location of Universities' in Terms of 'Field of Study', Levels of Reading Proficiency' and 'High School Background'

Location of Universities	Field of Study		Levels of Reading Proficiency			High School Background	
	Health - Sci	Sci- Tech	Hi	Mo	Lo	State - run	Private - run
Metro-BKK (n= 266)	66	200	91	155	20	234	32
Regional (n=830)	319	511	148	489	193	771	59
Total (n=1,096)	385	711	239	644	213	1005	91
χ_2 Value	$\chi_2 = 16.40$***		$\chi_2 = 50.46$***			$\chi_2 = 6.41$*	

Note: 1) Metro-BKK means 'Metro-Bangkok'
        2) Health-Sci means 'Health Science'; and Sci-Tech means 'Science and Technology'
        3) Hi means 'high'; Mo means 'moderate'; and Lo mean 'low'; and
        4) * p<.05, *** p<.001

In terms of 'location of universities' related with the other three variables as shown in Table 3.2, the chi-square (χ_2) results show that the distribution of the subjects studying at the universities located in Metro-Bangkok area, and those located in regional area varied significantly within 'field of study', 'levels of reading

proficiency', and 'high school background'. That is, a higher population of students studying at the university located in both areas are from 'Science and Technology' rather than another field; and more students who got high-school degree from state-run high school than those from private-run high school. It appears that a large number of students studying at the universities located in metro-Bangkok area are with 'moderate-' and 'high-' levels of reading proficiency. On the contrary, a higher population of students whose universities located in regional area are 'moderate' and 'low' reading proficiency levels than of the 'high' level. Moreover, a higher proportion of students who got high-school degree from state-run high school study at the universities located in both areas than those from private-run high school.

Table 3.3 Number of Students by 'Field of Study' in Terms of 'Levels of Reading Proficiency' and 'High School Background'

Field of Study	Levels of Reading Proficiency			High School Background	
	High	Moderate	Low	State - run	Private -run
Health Science (n= 385)	106	252	27	358	27
Science and Technology (n=711)	133	392	186	647	64
Total (n=1,096)	239	644	213	1005	91
χ^2 Value	$\chi^2 = 60.57$***			N.S.	

Note: *** $p<.001$

The results of the chi-square (χ^2) tests presented in Table 3.3 reveal that the distribution of the number of Health Science; and Science and Technology students varied significantly within 'levels of reading proficiency'. The results shown in Table 3.3 demonstrate that a higher proportion of Health Science students are of 'moderate' and 'high' reading proficiency levels than of the 'low' level. On the other hands, more Science and Technology students are of 'moderate' and 'low' reading proficiency

levels than of the 'high' level. The distribution of students with different field of study

is not significantly different in respect of their high school background.

Table 3.4 Number of Students by 'Levels of Reading Proficiency' in Terms of 'High
School Background'

Levels of Reading Proficiency	High School Background	
	State-run School	Private-run School
High (n = 239)	209	30
Moderate (n = 644)	592	52
Low (n = 213)	204	9
Total (n =1,096)	1005	91
$\chi 2$ Value	$\chi 2 = 10.36**$	

Note: ** p<.01

The results of the chi-square ($\chi 2$) tests shown in Table 3.4 reveal that the

distribution of the number of students with different levels of reading proficiency

varied significantly within their 'high school background'. That is, there are more

students with various levels of reading proficiency who got high-school degree from

state-run high schools than those from private-run schools.

Table 3.5 below summarises the characteristics of the research participants

when the distribution of the number of students among the variables is examined. The

information demonstrates whether or not the distribution of the research participants

varies significantly when related to different variables. This participant

characterization may be useful for the researcher to interpret some cases of the

research findings in Chapter 7.

Table 3.5 Summary of the Variation of the Research Participants

	Location of Universities	Field of Study	Reading Proficiency Levels	High School Background
Gender		YES	YES	NO
Location of Universities		YES	YES	YES
Field of Study			YES	NO
Reading Proficiency Levels				YES

Note: 'YES' means the population varies significantly; and 'NO' means the population does not.

The research participants can be summarized as follows:

- The total number of students reveals that there are more 'female' students than their 'male' counterparts; more students study at the universities located in regional area than those located in metro-Bangkok area; more 'Science and Technology' students than 'Health Science' students; more students with 'moderate level of reading proficiency' than those with 'high-', and 'low-' level of reading proficiency; and more students from state-run schools than those from private-run schools.

- The number of male students who study in the field of Science and Technology is a lot more than those studying in Health Science field.

- The number of Science and Technology students studying in the universities located in both areas is larger than Health Science students.

- The number of students with moderate level of reading proficiency is the largest group of the investigated variables.

- The number of students who got high-school degree from state-run high schools is much larger than the number of those from private-run schools.

In terms of the characteristics of the research population demonstrated in Tables 3.1–3.4, they are generally satisfactory although the distribution is not perfectly well-balanced or proportioned as planned. This can be summarized briefly as follows:

1. Male and Female Students Proportion

The researcher made an assumption about gender of science-oriented students by generalizing that there would be equal number of female and male students studying at Thai public universities. Unfortunately, it was impossible for the researcher to get a well-balanced proportion of the two genders. Actually, the number of female and male students was different from a well-balanced proportion. That is, the number of the participating female students for the present study was relatively big when compared with their male counterparts. However, these male students had provided the researcher with useful information for the present study.

2. Location of the universities

The regional area is a very large area comparing to the Metro-BKK area. In nearly every province in Thailand, there are public universities. Therefore, the number of public universities is more than the number of universities in Metro-BKK area. This affects the number of students studying at different universities located in different areas.

3. Health Science, and Science and Technology students Proportion

Proportion of Health Science, and Science and Technology students was not well-balanced because the number of Science and Technology students was a lot larger than the number of Health Science students. At first, the research assumed that the number from the field of Health Science, and Science and Technology might be

well-balanced. On the other hands, as presented earlier in Table 3.3, it demonstrates that the distribution of field of study was not well-balanced between two fields as planned. That is to say, the number of the participating Health Science students for the present study was relatively small when compared with those studying in the field of Science and Technology. However, these Health Science students had provided the researcher with useful information for the present study.

4. The Students' Levels of Reading Proficiency

As we can see in Table 3.4, proportion of the students with different levels of reading proficiency was not perfectly well-balanced because the group of 'moderate' reading proficiency is the largest group. The number of students with moderate level of reading proficiency were a lot bigger when compared with those with either 'high' or 'low' level of reading proficiency. However, it was unpredictable whether students with which certain gender, field of study, location of universities, and high school background would do the proficiency test better than others. As a result of the proficiency test for the present study, the students have been grouped into three levels of reading proficiency as shown in Tables 3.1-3.4.

5. The Students' High School Background

The number of state-run and private-run schools in Thailand was different. The number of state-run schools was much larger than private-run schools. Because of limited number of private-run schools, it was impossible for the researcher to get an ideally well-balanced proportion of the two types of high schools. As a result, the number of the participating students who got high-school degree from state-run schools was extremely larger than those from private-run ones.

3.7 Framework of Data Collection Methods for the Present Study

Robson (1993, p. 290) points out, "There is no rule that says that only one method must be used in an investigation. Using more than one method in an investigation can have substantial advantages, even though it almost inevitably adds to the time investment required. One important benefit of the multiple methods is in the reduction of inappropriate certainty. Using a single method and finding a pretty clear-cut result may delude investigators into believing that they have found the right answer". That is to say, using more than one method of data collection in a research work is acceptably more beneficial than using only one method.

To answer the research questions, each researcher has to look for the appropriate methods of data collection. Denscombe (2003, p. 3) states, "There is no one right direction to take. There are some strategies which are better suited than others for tackling specific issues. The crucial thing for good research is that the choices are reasonable and that they are made explicit as part of any research report". According to Creswell (2003), each individual researcher has a freedom of choice to choose the methods, techniques, and procedures of research that are more appropriate to his/her purposes and his/her needs. In other words, researchers have freedom to choose appropriate methods of data collection in order to serve the purpose of their research works.

There are various methods of data collection, and each method has its own advantages and disadvantages; therefore, the researchers should take crucial aspects of each method of data collection into their consideration and justify which method can best suit the purpose(s) of the studies. Through the review of the past research works in the field of reading strategies, different methods of data collection have been

used to gather the data, e.g. reading questionnaires, classroom observation, interviews and think-aloud procedure. In the context of the present study, the researcher has decided to use multiple methods or triangulation—a mixed methods for data collection and analysis, or "a method of finding out where something is by getting a 'fix' on it from two or more places" (Robson, 1993, p. 290). The study has employed both quantitative and qualitative methods of data collection which include semi-structured interview and reading strategy questionnaire. According to Ellis (1994), a method that has been found to be more successful involves the use of interviews and questionnaires, because they can require learners to report on the strategies they use in general or in relation to a specific activity. O'Malley and Chamot (1990) affirm that the broadest range of coverage for strategy use can be obtained with questionnaires and interviews.

This study is an exploratory and descriptive research in nature which aims to explore, and describe types of reading strategies and frequency of strategy use while students are dealing with academic texts. Moreover, to explore the relationship between strategy use and the five investigated variables is also one purpose of this study. The two main data collection methods (semi-structured interview and questionnaire) have been selected as the main methods for data collection for the present study.

3.8 Methods for Data Collection

For the data collection of this study, the semi-structured interview and the reading strategy questionnaire were used as the main instruments to elicit information about strategy use of the subjects to answer the proposed research questions. These

two types of data collection methods were conducted with the science-oriented undergraduate students studying at the public universities in Thailand. There were two main phases in collecting data for the present study, i.e. the semi-structured interview, and the reading strategy questionnaire. The semi-structured interview was used as the main instrument in the first phase, and then the reading strategy questionnaire was employed in the second phase of data collection. For the first phase of data collection, the purposive sampling was firstly used to select four public university subjects for interview session. Each university was a representative of each region. There were 39 undergraduate students from those four universities to take part in the semi-structured interview. The data obtained through those 39 students in the semi-structured session were used to generate the reading strategy questionnaire which was used as the major instrument in the second phase of data collection.

In the second phase of data collection, there were altogether ten public universities in different geographical regions obtained through stratified sampling and purposive sampling methods. One thousand and ninety six science-oriented students (Health Science, and Science and Technology students) sampled from those ten public universities involved in responding to the written reading questionnaire. Furthermore, the characteristics of the research subjects in both phases of data collection have covered the investigated variables: gender, location of the universities, field of study, levels of language proficiency, and students' high school background. What follows is the detail of each method for data collection:

3.8.1 Semi-Structured Interview

Semi-structured interview was used as the main instrument for data collection in the first phase of the present study in order to elicit information about reading

strategies employed by Thai university students. In the semi-structured interview, the interviewer has a general idea of where he or she wants the interview to go, and what should come out of it, but does not enter the interview with a list of predetermined question (Nunan, 1992). The data to be obtained from the semi-structured interview in the first phase of data collection was used to generate the reading strategy questionnaire which was used as the main instrument in the second phase of data collection in order to examine the overall reading strategy use, as well as patterns of reading strategies that science-oriented students studying at the tertiary level employ in general.

For this study, the semi-structured interview questions were based on the research questions. The interview questions were checked by the supervisor and then revised as suggested. After the interview questions were revised, they were translated into the Thai language so that the participants would not misinterpret or misunderstand the questions which may distract the actual responses. Again, the questions in the Thai version were rechecked by the supervisor before the actual use. After that, the interview questions were piloted with the science-oriented undergraduate students who were from the target population, but were not the subjects of the study in order to see whether or not the questions worked properly; there were anything wrong with the question items, question sequences, time consuming; and whether they were clear for the interviewees. The implications from the piloted group were taken into consideration for the potential questions. This step had to be done in order to ensure that the questions might not be problematic for the actual use.

The interview comprised two main parts: the first part of the interview questions (Questions 1 to 4) was about the background information of the

interviewees. This part was intended to build the good relationship between the interviewer and the interviewees, increase the confidence to the interviewees, and also reduce the interviewees' embarrassment in the interview environment (Measor, 1985 cited in Intaraprasert, 2000). The second part (Questions 5 to 13) focused on the students' reading strategies employed both inside and outside the classroom settings. The main purposes of this part were to explore the students reading strategies they used while reading academic texts, the problems the students encountered while reading, and how they solved those problems.

Each interviewee's appointment was arranged at a different time based on their convenience of time to participate in the interview. Basically, the duration of each interview was approximately between twenty and thirty minutes. This might be the right period of time as it could allow the researcher to explore the main points of the interview. The interview may become boring and tiring for both the interviewer and interviewee if it takes too long (Intaraprasert, 2000). Tape recorder was used to record the conversation instead of taking notes during the interview. According to Intaraprasert (2000), taking notes while conducting the interview can interrupt the interview process and eventually it may result in the failure of the interviews. The interview data from the tape recorder were transcribed later. Then, the data obtained from the semi-structured interview were used to generate the questionnaire items.

3.8.2 Reading Strategy Questionnaire

In the second phase of data collection, the reading strategy questionnaire was administered to science-oriented undergraduate students studying at the tertiary level to find out types of reading strategies and the frequency of the strategy use. The items in the questionnaire were generated from the information obtained from the semi-

structured interview. The questionnaire used as the main instrument in the second phase of data collection for the present study was a 4-point rating scale. For the scale, the researcher has adapted the descriptor from Oxford (1990).

1 = Never or almost never true of me

2 = Somewhat true of me

3 = Often true of me

4 = Always or almost always true of me

3.9 Analysing, Reporting, and Interpreting Data

The data obtained through both phases of data collection (the interviews and the reading strategy questionnaire) were analysed as shown below.

3.9.1 Semi-structured Interview

The transcribed interview data were analysed with 'open and axial coding' techniques. Strauss and Corbin (1998) define the term 'open coding' as the process of breaking down, examining, comparing, conceptualizing and categorizing data. The aim of 'open coding' is to discover, name and categorise phenomena and to develop categories in terms of their properties and dimensions. While the 'open coding' is used to break down the data and to identify first level concepts and categories, the 'axial coding' is a set of procedure whereby data are put back together in new ways after open coding paradigm involving conditions, context, action/ interactional strategies and consequences. Strauss and Corbin (1998) also point out that the data

will be put back together in new ways by making connections between a category (open coding) and its sub-category (axial coding).

3.9.2 Reading Strategy Questionnaire

The data obtained through the reading strategy questionnaire were analysed with an assistance of the SPSS programme. This has been done in order to examine the relationship between the students' reading strategies and the variables used in the present study: student's gender, location of the universities, field of study, levels of language proficiency, and high school background. The researcher also tried to find whether or not a significant relationship between reading strategy use and each of the five variables exists. If any, what kinds of patterns exist? To achieve the research purposes, the following statistical methods were used for data analysis and interpretation:

1. **Descriptive Statistics**

Descriptive statistics were used to compare the extent to which reading strategies were reported being used frequently or infrequently by students in general. Three levels of strategy use: 'high use', 'medium use', and 'low use' based on the holistic mean scores of frequency of strategy use by the research subjects of the present study have been defined (Intaraprasert, 2000).

2. **Analysis of Variance (ANOVA)**

Analysis of Variance (ANOVA) is a method of statistical analysis which is used to test the significant differences among the means of two or more groups on a variable (Nunan, 1989). The independent variables are usually nominal. Nunan (1989) and Roscoe (1975) point out that ANOVA is also used when the researchers wish to divide the variation observed in two or more sets of data into different parts, assign

the parts to different causes, and then test to see whether the variation is greater than predicted. This statistical method was used to determine the relationship between learners' overall picture of reported reading strategy use and 1) gender (male and female), 2) location of universities (Bangkok and metropolitan areas, and regional), 3) field of study (science-oriented major: Health Science, and Science and Technology) 4) levels of reading proficiency (high, moderate, and low), and 5) high school background (state-run and private-run schools).

3. The post hoc Scheffé Test

This method is used to examine the significant differences as the result of ANOVA where the variables have more than two groups (Roscoe, 1975). The post hoc Scheffé test is used to indicate which pair of the groups under such a variable contributes to the overall differences (Intaraprasert, 2000). As the result, in the context of the present study, the post hoc Scheffé test was used to test the significant differences of students' levels of reading proficiency (high, medium, and low).

4. The Chi-square Tests

The chi-square test is a statistical procedure for comparing the frequencies of two or more samples which is used when dealing with data in the form of frequencies, or when we are analyzing the number of times a particular event(s) occur (Nunan, 1989; 1992). According to Roscoe (1975), this statistical test is used to determine whether there is a relationship between the two variables. Intaraprasert (2000) also points out that the chi-square tests are employed to determine the significant variation patterns in students' reported strategy use at the individual item level.

In the context of the study, the chi-square tests were used to determine the significant variation patterns in students' reported strategy use at the individual item

level. Then, the chi-square tests were used to compare the actual frequencies with which students gave different responses on the 4-point rating scale, a method of analysis closer to the raw data than comparisons based on average responses for each item. In the context of the present study, responses of 1 (Never or almost never true of me);   and 2 (Somewhat true of me) were consolidated into a single 'low strategy use' category, whereas the responses of 3 (Often true of me) and 4 (Always or almost always true of me) were combined into a single 'high strategy use' category. According to Green and Oxford (1995), the purpose of consolidating the four response levels into two categories is to obtain cell sizes with expected values high enough to ensure a valid analysis.

5. Factor Analysis

Factor analysis is the technique used to explore which variables in a data set are related to each other. It is used to reduce space from a large number of variables to a smaller number of factors, and to determine the nature of underlying patterns among a large number of variables (Cohen and Manion, 1994), to look at patterns of variance among a number of variables, and to determine whether or not the variables share a common variance (Nunan, 1989). For this study, the researcher attempted to seek the underlying patterns of reading strategies which were emerged from such analysis, and the variation patterns which were strongly related to each of the five independent variables.

3.10 Summary

In conclusion, there are two main sections presented in this chapter: 1) a background of research methodology which includes research design, types of

research, and the purposes of research works; and 2) methodology for the present study. For the latter, this chapter looks into methods in reading strategies (classroom observation, interview, written questionnaire, and think-aloud); as well as theoretical framework and rationale for selecting and rejecting variables. Then, research questions, and framework of data collection methods for the present study are proposed. This is followed by sampling and rationales for choice of subjects. Finally, characteristics of the research population are discussed before pinpointing the analysis, interpretation, and report of data to end the chapter.

In terms of data collection, there were two main phases in collecting data in the present study. Student oral interviews were employed for the first phase of data collection. This phase involved 39 informants from four public universities. The data obtained through this stage were used to generate the reading strategy questionnaire which was used as the main instrument in the second phase of data collection.

The data obtained through both phases of data collection were analysed and presented in the following chapters. Chapter 4 deals with the results of the student oral interviews which later were used to generate the reading strategy inventory, and the reading strategy questionnaire. Then, the results of the data obtained through the reading strategy questionnaire are presented in Chapters 5 and 6.

CHAPTER 4

READING STRATEGY INVENTORY AND THE

STRATEGY QUESTIONNAIRE FOR THE PRESENT

INVESTIGATION

4.1 Introduction and Purpose of the Chapter

This chapter mainly deals with the Reading Strategy Inventory (RSI) which emerged from the data obtained through the student oral semi-structured interviews conducted with 39 science-oriented undergraduate students undertaking EAP or ESP courses at four different public universities in different geographical regions in Thailand. The procedures of obtaining the data from those 39 students in the first phase of data collection are presented firstly. This is followed by the description of how to generate the RSI based on the data obtained through the semi-structured interviews. Then, the generation of definitive RSI and how to validate it are discussed. The last part of this chapter ends with the reading strategy questionnaire (RSQ) which has been used as the main instrument for the second phase of data collection.

Based on the reading classification system presented in Chapter 2, we can see that different researchers have classified reading strategies differently. They may classify the strategies based on their own or other researchers' studies, or on the review of related literature in the subject areas. It is generally accepted among many researchers that no single classification of language learning strategies is perfect or

comprehensive. It is also true in the field of reading strategies that there is no perfect or comprehensive classification. Further, the reading strategy classification system which is accepted as a suitable way for a researcher to elicit one group of students' reading strategy use may not be suitable for another. Because of no perfect reading strategy classification system, the researcher for the present study took the reading strategy classification system proposed by different researchers into consideration. In addition, the researcher carefully planned that the most suitable and effective method for the task in hand to elicit reading strategies from science-oriented undergraduate students was to make use of the information reported by those students themselves.

4.2 The Main Stage of the Student Oral Interviews

The oral interviews were used as the main method in the first phase of data collection. In the present study, the one-to-one semi-structured interviews were used. They were carried out with 39 science-oriented students in Thai public universities from mid June to the beginning of July 2008. The main purpose of the student oral interviews at this stage was to elicit the students' reading strategy use. The researcher took the information obtained from the piloting stage to design the interview questions. The interview questions were mainly designed to ask their perceptions about their reading ability, what makes their reading comprehension difficult, how reading skill plays an important role in their lives, what reading strategies they employed in order to comprehend what they read, and how they solved the problems they encountered while reading both within and outside the classroom settings. The questions about reading problems found while reading were also included in the interviews. The content of the interview questions partly emerged from the related

literature review, available research works in the field of reading strategies, and partly through the researcher's personal experience about reading and reading strategies. The following is a summary of the sample interview questions for the present study:

Q1: an introduction part of the interviews, including the interviewer's and interviewee's names, the interviewee's field of study, and the purposes of the interview;

Q2: an investigation of the number of English courses each interviewee is studying, or has already studied;

Q3: an investigation of the number of hours each interviewee is taking an English class, or has already taken per week; and whether or not it is sufficient;

Q4: an investigation of the number of hours each interviewee is taking EAP or ESP class, or has already taken per week; and whether or not it is sufficient;

Q5: an investigation of each interviewee's perception of his/her reading ability

Q6 and Q7: an investigation of each interviewee's opinion about the importance of English academic reading in his/her life, and future career;

Q8: an investigation of each interviewee's opinion about what he/she finds difficult in English academic reading;

Q9: an investigation of reading problems each interviewee encounters while reading English academic material, and how he/she solves those problems;

Q10: an investigation of each interviewee's strategies he/she employs to discover the meanings of unknown vocabularies as it is an important problem in reading English;

Q11 and Q12: an investigation of the student's use of reading strategies both within and outside the classroom settings (pre-reading, while-reading, and post-reading); and

Q13: an investigation of each interviewee's opinion about reading study from his/her own experience.

After the discussion about the oral interview process and interview questions with the researcher's supervisor, the researcher started the process for collecting the data from the oral interview by getting the official letters from The Chair of School of English asking for the co-operation from the four public universities chosen to be part in the first phase of data collection. Since there were two main target groups of science-oriented students: Health Science, and Science and Technology students, the letters were addressed to the Deans of the Faculties concerning Health Science, and the ones concerning Science and Technology chosen as the subjects of each university, asking for permission to interview eight students from those Faculties. The interviewees were the students who were studying EAP or ESP at that time, or the students who already finished that course in the previous semester. The selection of students studying at those public universities was to ensure they would provide enough useful information for the researcher to generate a reading strategy questionnaire to be used as the main instrument in the second phase of data collection. The subjects of the first phase of data collection were 14 males, and 25 females. Among these subjects, 16 were Health Science students, and 23 were Science and Technology students.

The researcher spent the third and fourth weeks of March 2008 preparing materials for the interview data collection. The materials included the interview timetable, interview question guides, cassette tapes, and tape recorder for interview recordings. The researcher prepared her work schedule and all materials in advance in order not to waste more time and money because the first phase of data collection

could be costly, and time-consuming. Thus, everything was prepared in advance to make sure that everything was ready before starting the oral interview process.

The oral interview session was firstly conducted with eleven students at one university in the Northeast. It was not difficult for the researcher to get co-operation and make appointments with the students before starting the interviews. Everything was smooth because both the university and the students were very co-operative.

The process of oral interview started by explaining and informing the students what the purposes of the interview were. The students were also informed of what they would be required to do. Some students seemed to be worried with the language used in the interview because they were afraid of being interviewed in English. The researcher ensured that the interview would be conducted in Thai. After that, the timetable was arranged and the interview question guide was given to every interviewee. According to Intaraprasert (2000, p. 91), it was found to be helpful for students to have an interview question guide before the interview took place in terms of their preparation for responses to the proposed questions.

Setting a relaxed atmosphere in the interview and having a good relationship between the interviewer and interviewee are important points for the interviewer to think about. Based on Denscombe's suggestion (2003, p. 179), setting a relaxed atmosphere in which the students feel free to answer the questions is necessary. A good relationship between the interviewer and the interviewees is also very important. Intaraprasert (2000, p.91) suggests that knowing and calling the interviewee's name is very helpful in building a good relationship between the interviewer and the students because the students do not feel anxious or frustrated when being interviewed. Therefore, the researcher strictly followed this suggestion by addressing the students

by their first name, or nickname based on their preference. This suggestion was very helpful as the students reported that they felt free, more confident, and less nervous when being interviewed under a relaxed atmosphere. Furthermore, the researcher also followed the suggestions by Robson (2002, p. 274) that during the interview process, the researcher should listen to the students more than speak; should not give the cues which can lead the interviewees to respond in a particular way; should put the questions in a straightforward, clear, and non-threatening way to the students while interviewing; should look satisfied with responses; and the researcher should make the interviewees feel that they will be understanding and easy to talk to. A similar oral interview process was conducted at the other three public universities which were in the North, the East, and the Central part of Thailand respectively.

In summary, the semi-structured interview was conducted in the first phase of data collection. Things were carried out as planned, and they generally went smoothly. After having finished the first phase of data collection, the researcher transcribed each interview recording verbatim. Then, the transcription of each interview recording was translated from Thai to English by the researcher. The interview translated-version was checked by the university lecturers who have taught English for at least 3 years. This was followed by the process of data analysis in order to discover the reading strategies reported being employed by those science-oriented students. The overall processes of oral interview data collection were time-consuming. They took the researcher almost two months to finish the transcription, and the translation. The subsequent data analysis was used to generate the reading strategy inventory, and the reading strategy questionnaire for the second phase of data collection.

4.3 How was the Reading Strategy Inventory Generated?

After finishing the process of interview data transcription and translation, the next step was to generate the reading strategy inventory. The researcher started generating the reading strategy inventory through the following steps.

1. The researcher looked through the data obtained through the oral interviews provided by 39 science-oriented undergraduate students in order to see the overall picture of what the students reported doing while reading.

2. The researcher looked at each interview data script in detail, and considered what could be seen as reading strategies. At this stage, the researcher had to notice how reading strategies have been defined for the present study (see Chapter 1, Section 1.2.1). Each reading strategy was then singled out, and they had to be consistent with the definition of the reading strategy which was specified for the study. The researcher had to pay more attention to this step in order to ensure that every single reported strategy was identified.

3. From the list of every single reported reading strategy, the researcher started to look at the similarities and differences. As a whole, it was found that the interviewees produced altogether 541 statements about reading strategies. These statements were reported being used in order to achieve some particular academic reading goals.

4. Then, the researcher carefully grouped all these 541 statements based on the similarities of the context or situation in which the reading strategies were reported being employed for English academic reading. At this stage, the researcher had to think carefully how these reported statements should be categorized. They could be categorized roughly under three main categories: the strategies used before reading,

the strategies used while reading, and the strategies used after reading; or the researcher could use a classification system like those of Block (1986), and Aebersold and Field (1997). Furthermore, Intaraprasert (2004) suggests that these strategies could be categorized according to the purpose of each strategy use. Therefore, the researcher had to keep in mind how to categorize the reported statements appropriately in order to carry out the classification that best served the purpose of the present study. Finally, the preliminary classification of 541 statements was administered based on the definition of reading strategies because this would serve the purpose of academic reading of students in the university context.

5. At this stage, the researcher had to take both academic reading purposes and actions into consideration. For example, one of the science-oriented students reported, "*If I have a dictionary with me while reading, I am sure that the first thing I do in order to know the meanings of unknown words is to look them up in the dictionary*" [translated]. Another science-oriented student reported a similar statement, "*When facing with unknown words, what I do first is to open a dictionary and look for their meanings*" [translated]. This means that 'using a dictionary' is an action for both students and they share the same purpose which is to discover the meanings of new vocabulary items. Since the interview was conducted in Thai, the researcher might not get the precise words for the purpose. Therefore, the researcher had to interpret and look for the most suitable words to describe the purposes the students reported trying to achieve. Based on the 541 statements obtained from 39 students through the semi-structured interview, 94 main groups emerged. The researcher had to extensively reviewed before moving on to the next one in order to make sure that the reported

statements in each group shared the similar characteristics in the context or situation in which they were reported being used.

6. The next step was to identify each group of academic reading behaviors. It was not easy to merge each strategy use into a suitable group and to find the suitable name to cover most because some strategies reported being employed seemed to overlap with others.

7. After some intensive revisions, the researcher had to make a clear distinction between English academic reading strategies for the present study and other types of strategies, such as English academic reading classroom strategies, the strategies used to improve academic reading skill. Consequently, 33 groups of the reported reading behaviors were deleted because they were not consistent with the definition of reading strategies for the present study. The excluded reading behaviors include two main groups. They are 1) the strategies which students reported employing in order to be able to achieve the reading lessons, e.g. *studying the course outline beforehand, studying the lessons beforehand,* and *doing revision of the previous lessons*; and 2) the strategies employed to improve their reading ability in general, e.g. *listening to English songs, reading on-line materials to improve one's reading skill,* and *watching English-speaking films with English subtitles.* Eventually, 61 groups of academic reading strategies still existed.

8. At this stage, the individual sixty-one strategy groups which had already been identified, were again reviewed and then grouped together according to the purpose of each strategy use. The researcher had to think again how these individual strategy items could be classified. Regarding the review of related literature on reading strategy classification proposed by many scholars, it is noted that even though

different researchers could classify the reading strategies differently, most strategy classifications shared at least one common characteristic which was using prior knowledge or background. Thus, when considering the reported 61 reading strategies, the researcher found that these strategies could be further classified based on the reading strategy definition. Then, the researcher came up with five purposes. After that, an appropriate name for each purpose of strategy use was initially given.

9. This step was to match a strategy item with each purpose. The researcher with the assistance from her supervisor started to reconsider how these five groups of strategy use could be classified further. The researcher tried to see whether there was a common characteristic these purposes might share. Then, 'The Proposed Reading Strategy Inventory' (RSI) with two main categories of reading behaviors were identified. They are 1) strategies for comprehending reading texts category; and 2) strategies for enhancing textual comprehension category. Next, the researcher started to match the two main categories with each of the five purposes. The purpose of this step was to ensure that each individual strategy was matched with the appropriate purpose and each purpose was matched with the appropriate main category. The strategies for comprehending reading texts category comprise three purposes, and the strategies for enhancing textual comprehension category comprise two purposes. The main category 1 (strategies for comprehending reading texts) has been abbreviated as SCT, and main category 2 (strategies for enhancing textual comprehension category) as SETC in order to apply a structure and reference system to the data.

1. Strategies for comprehending reading texts (SCT)
    1.1 To comprehend reading texts before doing the actual reading (SCTBAR)

    1.2 To comprehend reading texts while doing the actual reading (SCTWAR)

    1.3 To comprehend reading texts after having done the actual reading (SCTAAR)

2. Strategies for enhancing textual comprehension (SETC)

    2.1 To enhance textual comprehension by solving problems dealing with unknown vocabulary items (SETCUV)

    2.2 To enhance textual comprehension by retaining knowledge of newly-learned vocabulary items (SETCRV)

For example, SCTBAR 1 was abbreviated to the first individual reading strategy which students reported employing to comprehend reading texts before doing the actual reading. The first category for the present strategy inventory runs from SCTBAR1 to SCTBAR 11, SCTWAR 1 to SCTWAR 11, and SCTAAR1 to SCTAAR 5; and the second category runs from SETCUV1 - SETCUV5, and SETCRV1-SETCRV6.

In classifying reading strategies for the present study, it was evident that the reading strategies in both categories were supportive of each other. That is, the strategies which students reported employing in order to enhance the textual comprehension may help them improve their reading skills in general. With the same effect, the strategies for comprehending reading texts which students reported employing to comprehend an academic reading text may enhance the knowledge of new vocabulary items. That is, the reading strategies under the two main categories have a spiral rather than linear relationship.

In conclusion, the researcher looked through the transcriptions of the 39 translated semi-structured interview recordings with an attempt to find out the common characteristics of the reported statements. It was found that most of the

statements which could be regarded as 'reading strategies' were reported in order to achieve a particular reading purpose. These statements were classified into two main categories based on the definition, i.e. strategies for comprehending reading texts, and strategies for enhancing textual comprehension. Moreover, different aspects of the classification, e.g. terms used to identify purposes of strategy use and labels to identify the whole system of strategies, had been taken into consideration many times in order to reach a satisfactory classification. This stage took the researcher over a month to develop a satisfactory reading strategy inventory. Table 4.1 summaries the outline of the reading strategy inventory which emerged from the data obtained through the student oral semi-structured interviews.

Table 4.1 The Outline of the Reading Strategy Classification for the Study

Reading Strategy Inventory (RSI)		
Main Category	**Purpose to be Achieved**	**Individual Strategy**
Main Category 1 Strategies for comprehending reading texts (SCT)	• To comprehend reading texts before doing the actual reading (SCTBAR)	SCTBAR 1 – SCTBAR 11
	• To comprehend reading texts while doing the actual reading (SCTWAR)	SCTWAR 1 – SCTWAR 11
	• To comprehend reading texts after having done the actual reading (SCTAAR)	SCTAAR 1 – SCTAAR 5
Main Category 2 Strategies for enhancing textual comprehension (SETC)	• To enhance textual comprehension by solving problems dealing with unknown vocabulary items (SETCUV)	SETCUV 1 – SETCUV 5
	• To enhance textual comprehension by retaining knowledge of newly-learned vocabulary items (SETCRV)	SETCRV 1- SETCRV 6

4.4 Reading Strategy Inventory

As previously mentioned, the reading strategy inventory for the present study was generated from the data obtained through the oral semi-structured interview data carried out with 39 science-oriented students in the first phase of data collection. The semi-structured interview data were transcribed first, and then classified into two main categories based on the working definition of reading strategies which aim to achieve particular purposes of English academic reading.

While interviewing, each student's first name or nickname was used for the purpose of creating trust and friendliness between the interviewer and the interviewee as suggested in section 4.2. On the contrary, in this section, each student as the interviewee was labeled as a code according to the field of study in which he or she is studying. For example, ST1 means that he or she is a Science and Technology student, and he or she is the first student who was interviewed. HS1 is used to label the first Health-Science student who was interviewed.

4.4.1 Strategies for comprehending reading texts (SCT)

The reading strategies under this main category were reported being employed in order to comprehend the academic reading texts in the actual reading. Some strategies were reported being employed to comprehend reading texts before actual reading, some while doing actual reading, and other after having done actual reading. The twenty-eight strategies for comprehending reading texts include:

1. To comprehend reading texts before doing the actual reading (SCTBAR)

SCTBAR 1:   Searching for the meanings of new vocabulary items
SCTBAR 2:   Reading the title of the text
SCTBAR 3:   Going through the text quickly
SCTBAR 4:   Reading the first and the last paragraphs
SCTBAR 5:   Looking at pictures/charts/tables/figures that appear in the text (if any)

SCTBAR 6: Looking at questions about the text (if any)
SCTBAR 7: Scanning for main ideas
SCTBAR 8: Thinking of one's background knowledge about the text
SCTBAR 9: Reading the abstract or introductory part
SCTBAR 10: Looking for the parallel article(s) in Thai (if any)
SCTBAR 11: Predicting what might happen in the text

2. To comprehend reading texts while doing the actual reading (SCTWAR)

SCTWAR 1: Searching for the meanings of new vocabulary items
SCTWAR 2: Analysing a sentence structure
SCTWAR 3: Taking notes the important information
SCTWAR 4: Guessing the meaning of the text from context
SCTWAR 5: Rereading certain part(s) of the text
SCTWAR 6: Reading certain part(s) of the text slowly
SCTWAR 7: Avoiding a difficult part
SCTWAR 8: Highlighting important information or difficult vocabulary items by underlining
SCTWAR 9: Highlighting important information or difficult vocabulary items by making symbol(s)
SCTWAR 10: Thinking about the meaning of the reading text in Thai
SCTWAR 11: Making a summary of certain part(s) of the reading text in either Thai or English, or both

3. To comprehend reading texts after having done the actual reading (SCTAAR)

SCTAAR 1: Searching for the meanings of new vocabulary items
SCTAAR 2: Discussing the reading text with classmate(s) or friend(s)
SCTAAR 3: Making a summary of the whole reading text
SCTAAR 4: Retelling oneself or other people about what has been read
SCTAAR 5: Reviewing one's own notes
SCTAAR 6: Translating the reading text into Thai using Thai script

4.4.1.1 To comprehend reading texts before doing the actual

reading (SCTBAR)

Some students reported that they found it very helpful to prepare themselves about the text before doing the actual reading. They also reported that preparing themselves about the text might help them understand what they were going to read. Eleven individual strategies which students reported employing in order to achieve this academic reading purpose include:

- **SCTBAR 1: Searching for the meanings of new vocabulary items**

Some students reported preparing themselves for academic reading. Different students reported different ways of achieving this purpose. Searching for the meanings of new vocabulary items before doing actual academic reading may be helpful for them. Different students reported employing this reading strategy as follows:

ST 1: … I will look roughly through the whole passage, text, etc. which I am going to read for new words and underline them. Then I will look them up in a dictionary.

HS 7: ... When glancing through the text, I will underline the new vocabulary items and look them up in a dictionary before reading.

ST 13: …I will glance through the text in order to check how many new vocabulary items appear. Then I will list all of them and look for their meanings. If I fail asking their meanings from my friends, I will look them up in a dictionary.

ST 14: …If it is possible, I like to look new vocabulary items up in a talking dictionary before starting reading…

ST 15:….I will scan the whole text and underline all new words. Then I list all new words and look up them in a dictionary or ask for their meanings from my teacher…

ST 16: …I will list all new vocabulary items and look up for their meanings before reading.

- **SCTBAR 2: Reading the title of the text**

Some students reported that they found it useful if they read the title of the text before starting reading. They also reported that at least they could check whether or not they had some background about what was going to be read.

ST 2: … I also look at the title of the text. Its title helps me to imagine what the text is about.

HS 1: … I will look at the title of the text, and I also look at the bold subtitles to guess what the text is about.

ST 11: … I will read the title and guess what might happen in the text.

HS 9: … I am sure that what I will do before reading is to look at the title of the text. If I don't look at it, I won't know what it is about.

HS 11: …Before reading, I will look at its title in order to know roughly what the author talks about.

ST 16: …I firstly look at the title before reading because it can help me imagine what might happen in the text before reading.

ST 18: …I will look at the title of the text. Its title can help me guess what might happen in the text.

- **SCTBAR 3: Going through the text quickly**

Besides reading the title of the text, some students reported going through the

text quickly also helped them to know roughly what might happen in the text.

HS 1: … I will scan the text. I will read the whole text quickly to see what it is about.

HS 2: … I try to concentrate on what I am going to read and then go over the text quickly to check whether it is difficult or not…

HS 10: …Unknown vocabulary items give a serious effect on my comprehension in reading. Before reading, I glance through the whole text for new vocabulary items.

HS 7: … In the beginning, I will glance over the whole text to guess what might happen.

ST 14: … In the beginning, I will open and look through the text in order to guess what the author talks about.

- **SCTBAR 4: Reading the first and the last paragraphs**

Some students reported that reading only the first and the last paragraphs

might help them understand the text because they believed that the main idea of the

text might be in the first or the last paragraphs.

ST 6: … I will read only the first paragraph in order to know roughly what the text is about.

ST 8: … I try to read the beginning of the text to guess what might happen.

ST 17: … I will read the last paragraph in order to know the end of the text before reading.

ST 19: … I will read the last paragraph in order to know the conclusion of the text.

HS 12: … I will read roughly the beginning and the end of the text in order to guess what might happen in the text before reading.

- **SCTBAR 5: Looking at pictures/charts/tables/figures that appear in the text**

Some students believed that pictures, charts, tables, and figures may help them

guessed what might happen in the text.

HS 3: … I prefer to read texts with pictures. I feel more comfortable to read those texts with pictures. I feel like the text is boring to read if there is plenty of letter.

HS 6: …If there are some pictures in that text, I will look at them and then guess what might happen.

ST 19: ... Before reading, I will look at the pictures. They can help me guess what might happen.

HS 16: …I will look at everything appearing in the text before reading such as pictures, tables, diagrams, etc.

ST 23: …I like to look at pictures. The pictures can tell me roughly what I am going to read.

HS 15: …When scanning, if there are some pictures, I will look at them because they can help me guess what will happen in the text…

- **SCTBAR 6: Looking at questions about the text (if any)**

Some students reported that they might be able to guess what would happen in

the text if they read the questions before reading.

HS 5: … In a reading test, before reading, I always look at the questions provided. The questions can lead me where I should concentrate on.

ST 9: … Before reading, I always check whether there are questions provided or not. If there are, I will look at them…

HS 9: … If there are some questions about the text, I will read all the questions before reading.

ST 18: …I will check to see how many questions there are and read all of them before reading. Then I will know what I should concentrate on while reading.

- **SCTBAR 7: Scanning for main ideas**

Some students reported that they tried to look through the text for main ideas before starting reading. They believed that this could help them understand what was going to be read.

HS 5: … I glance over the text in order to look for where the main idea is. The main idea of each text helps me to understand what happens in the text.

HS 9: … Then, I will scan the whole text in order to catch its main idea.

ST 13: …While scanning through a text, I try to look at its main idea in order to know what the text is about.

- **SCTBAR 8: Thinking of one's background knowledge about the text**

Some students reported that they tried to recognize what they had already known about the text and linked it to the text. Background knowledge is believed to help readers understanding the text more easily.

ST 15: … After reading the title of the text, I will think about what I have already known about the title before.

HS 14: … I will read the title of the text in order to imagine what happen and think whether or not I have known something about that topic.

- **SCTBAR 9: Reading the abstract or introductory part**

Some students felt that abstract or introductory part of an article may be helpful for them to understand the article that they were going to read more easily.

Sil 4: … Before selecting any articles in the journals, I will start from looking at their abstracts. Their abstracts can guide me to know what those articles are about.

Sil 5: … For my study, I have to read many articles concerning my field of study. When reading each article, I will start from reading its abstract in order to know what it is about.

Sil 6: … I would like to know what the text is about roughly before reading. If there is an introductory part, I will read it because it can help me imagine what might happen.

- **SCTBAR 10: Looking for the parallel article(s) in Thai (if any)**

Only one student reported that when he had to read an English article, he tried to look for some parallel articles in Thai. He believed that this could be helpful for him to comprehend what he was going to read in English.

HS 14: … I will search for Thai articles concerning that title. This can help me understand the English text more easily.

- **SCTBAR 11: Predicting what might happen in the text**

One student reported that he would predict what might happen after he read its title. This may help him understand the text better.

HS 5: … I sometimes ask myself questions about the text based on its title before reading. Then I will answer my question predicting from its title.

4.4.1.2 To comprehend reading texts while doing the actual

reading (SCTWAR)

Apart from before-reading preparation, many students reported that it was also important to employ some strategies to comprehend reading texts while reading. They hoped that these strategies might help them to collect the correct idea of such an academic article. Eleven individual strategies which students reported employing in order to achieve that reading purpose include:

- **SCTWAR 1: Searching for the meanings of new vocabulary items**

Many students reported that they always had problems with new vocabulary items in English academic reading. Searching for the meanings of new vocabulary

items while reading might be helpful for them. Different students reported employing

this reading strategy as follows:

ST 10: ... Although I have already looked up the meanings of difficult words before starting reading, I will consult a dictionary again if I face new words while reading.

HS 9: … I have only a problem about unknown vocabulary items. Therefore, I always consult a dictionary while reading.

HS 12: …While reading, I try to know the meanings of unknown words by looking in a dictionary and write their meanings in a text.

HS 13: …When I face unknown words while reading, I will look up their meanings in a dictionary.

ST 15: … While reading, I look for the meanings of unknown words from a dictionary and write their meanings in the text paper.

ST 16: … If I face some new words that I am not familiar with while reading, I will consult a dictionary.

ST 21: … While facing with unknown words, I will look them up in a dictionary.

ST 23: … If I fail guessing the meaning of the text from the context, I will look up the meanings of difficult words in a dictionary and write them in a text.

- **SCTWAR 2: Analysing a sentence structure**

Some students reported that the knowledge about sentence structure is quite

important in reading. They believed that they might interpret a sentence incorrectly

without the knowledge of sentence structure. They hoped that the ability in analysing

a sentence structure could help them comprehend the text more easily.

ST 7: …For me, apart from vocabulary, grammar is also important. If I know what tense is used in each sentence, it helps me to understand what I am reading.

ST 11 … I will solve the problem in reading by looking at the sentence structure.

HS 10: …I sometimes look at the sentence structure in general. It can help me guess what might happen. Only knowing the meanings of new words may not help me to understand the text clearly.

- **SCTWAR 3: Taking notes the important information**

Some students reported that they found it useful if they took notes the important information found while reading. They could reread the notes instead of the whole text when they would like to ensure their understanding about the text.

HS 6: … I usually write the important ideas found while reading in my notebook. If I face difficult words while reading, I also take note those words.

HS 11: …While reading, I take notes the important ideas.

ST 9: …While reading, I take note the important information of the text.

ST 14: …When facing with new vocabulary items while reading, I will make note those new items with their meanings.

HS 15: … Then, I write the important ideas in a notebook. When encountering the new words, I also write them in a notebook and look up for their meanings.

- **SCTWAR 4: Guessing the meaning of the text from context/sentence structure/known vocabulary items/introductory part, etc.**

Apart from consulting a dictionary for the meanings of unknown words, some students reported that they sometimes did not look up the meanings of new words from a dictionary but they guessed their meanings from the context. Then, they could comprehend the text. Moreover, they sometimes tried to understand what they read from the known-vocabulary items or introductory part.

ST 12: … I will guess the meaning of the sentence or paragraph from the known vocabulary items.

HS 2: … I try to read the whole text continuously; therefore, I may understand what I read by guessing from the context.

HS 3:…I try to guess some unknown vocabulary items from the context while reading.

ST 23: …While reading, I use the context clue to help me understand the text

- **SCTWAR 5: Rereading certain part(s) of the text**

Some students reported that if they faced some difficulties in reading, they would reread those parts many times until they could comprehend them.

Nare 2: …I reread the text many time until I am quite sure that I don't miss any important information while reading.

Bura 3: …While reading, I will read the whole text without doing anything in order to know roughly what happens. I will reread it and look for the meanings of unknown vocabulary items in order to understand the text better.

Sil 6: … Then, I will reread the text to make sure that I can understand the text and do not miss any important information.

- **SCTWAR 6: Reading certain part(s) of the text slowly**

Some students reported that they had to read some important parts slowly. This could help them not to miss the important ideas while reading.

Sil 4: … I try to read each sentence slowly in order not to miss any important ideas.
Sil 5: … I will read each paragraph slowly so that I won't miss any important information.

- **SCTWAR 7: Avoiding a difficult part**

Some students reported that avoiding a difficult part did not make a big problem in reading. They believed that the other parts left could help them comprehend what they read. They did not think that it was necessary to understand every sentence in a text.

HS 2: …I sometimes skip some difficult parts while reading.

ST 12: …I often ignore the difficult part if I can't guess the meaning of that part from its context. On the other hand, I will reread it later if I fail guessing from the context.

- **SCTWAR 8: Highlighting important information or difficult vocabulary items by underlining**

Underlining the important information or unknown vocabulary items was reported being employed by the students in order to remind them later where the important information was.

HS 3: … If I see some important information while reading, I usually underline it or write it in my notebook.

HS 7: … I use a color-pen to underline the important sentence.

HS 16: …While reading, I underline the important information. And I also make a note besides each sentence to remind me what it is about.

ST 16: … I try to underline the important ideas and parts that I do not understand while reading.

ST 17: ... After finishing reading the introductory parts, I start reading. While reading, I will underline the difficult words and look for their meanings.

ST 23: …While reading, I will underline the difficult words and look for their meanings.

HS 14: ... I try to underline the important idea(s) while reading.

- **SCTWAR 9: Highlighting important information or difficult vocabulary items by making symbol(s)**

Making symbols at the important information or difficult vocabulary items can remind the students what should be reread. This strategy was reported being employed by the student while reading academic text.

HS 10: …I always underline or make symbols at the important ideas.

ST 13 :… I will do symbols at the important ideas in order to know who, why, where, and how.

- **SCTWAR 10: Thinking about the meaning of the reading text in Thai**

Thinking about the meaning of the reading text in Thai while reading was reported being helpful for some students in reading academic text.

HS 1: … I will make myself understand by translating the text sentence by sentence. When finishing each sentence, I will take note the translation. After finishing the whole text, I will make myself understand the text by linking every sentence together.

ST 11: …While reading, I will translate it into Thai. If I can't understand because of unknown words, I will consult a dictionary.

ST 23: …While reading, I will translate the important information and take note only the important information in Thai.

HS 14:…When reading, I usually translate each sentence into Thai and write it in a notebook.

- **SCTWAR 11: Making a summary of certain part(s) of the reading text in either Thai or English, or both**

Some students reported that making s summary of the reading text might be

helpful when they needed to reread it instead of rereading the whole text.

HS 1: … I will make myself understand by translating the text sentence by sentence. When finishing each sentence, I will take note the translation. After finishing the whole text, I will make me understand the text by linking every sentence together.

ST 11: …While reading, I will translate it into Thai. If I can't understand because of unknown words, I will consult a dictionary.

ST 23: …While reading, I will translate the important information and take note only the important information in Thai.

HS 14: …When reading, I usually translate each sentence into Thai and write it in a notebook.

4.4.1.3 To comprehend reading texts after having done the actual reading (SCTAAR)

Apart from the strategies reported being employed in order to comprehend reading texts before and while reading, many students reported that they employed some strategies after finishing reading. They hoped that employing those strategies might help them to comprehend what they read better. Six individual

strategies which students reported employing in order to comprehend the texts after having done the actual reading include:

- **SCTAAR 1: Searching for the meanings of new vocabulary items**

After having done the actual reading, one student reported that it was important for him to look for the meanings of unknown words which were skipped while reading. This strategy can help him learn more vocabulary items.

HS 7: … After reading, I will reread the unknown words found while reading. Then, I may look for the meanings of unknown words that I have skipped while reading using the dictionary or asking other people after reading.

- **SCTAAR 2: Discussing the reading text with classmate(s) or friend(s)**

A few students reported that it was very helpful for them to discuss about what they read with their classmates or friends after finishing reading. They could share their opinions on that topic.

HS 10: … If I read with my classmates, I will discuss with them after reading.
HS 16: … I like to talk with my friends after finishing reading. If I can't understand some parts, my friend can help me. On the other hand, I can explain the part which they aren't clear.

- **SCTAAR 3: Making a summary of the whole reading text**

Some students reported that doing a summary of what they read after having finished reading might be very useful for them because they could reread the summary instead of rereading the whole text.

ST 2: … I like to make a summary of what I have read after reading.

HS 1: … I will make a summary of what I have read using my own words in Thai after reading.

ST 7: … I think about how the text is alike and make a summary after reading.

HS 11: … I will do a summary and write in my notebook using my own words in Thai.

ST 18: … After finishing reading, I will make a summary of the important
information using my own words.

ST 20: … When finishing reading, I will make a summary using my own words and
write it in a notebook.

HS 14: … I will make a summary from what I have translated in Thai while reading.

- **SCTAAR 4: Retelling oneself or other people about what has been read**

In order to memorise what they read, some students reported retelling

themselves or their friends about what had been read.

ST 6: … I will check my understanding by retelling what happens in the text after
reading.

HS 4: … I will tell myself the story I have read to check my understanding. If there
are some parts I don't understand, I will reread those parts.

ST 13: …When finishing reading, I will close the text and tell myself what it is
about.

ST 17: … If it is a good text or story, I will tell my close friends after reading. I
sometimes reread it to check my understanding.

ST 23: … I will check my understanding by closing a book and saying aloud of what
the text is about.

- **SCTAAR 5: Reviewing one's own notes**

Some students reported that reviewing their own notes might be helpful

because they themselves could check whether their understanding was clear or not.

ST 21: … After finishing reading, I will reread the Thai summary I have done while
reading and compare with the original text to check its correction.

HS 13: … I will reread my Thai summary which I have done while reading. If I am
not clear, I will reread some difficult parts from the original text.

HS 15: … I will reread the summary I have written in my notebook in order to check
whether I have miss any important information or not.

- **SCTAAR 6: Translating the reading text into Thai using Thai script**

One student reported that he translated what he read into Thai and took notes.

This may help him not to spend much time in rereading the whole text.

HS 12: … I translate the whole text into Thai after finishing reading.

4.4.2 Strategies for enhancing textual comprehension (SETC)

The reading strategies under this category are the strategies which were reported being employed by 39 science-oriented students in order to enhance the textual comprehension. Some strategies were reported being employed in order to solve problems dealing with unknown vocabulary items while doing the actual reading, and some to retain knowledge of newly-learned vocabulary items. The eleven strategies for enhancing textual comprehension (SETC) include:

1. **To enhance textual comprehension by solving problems dealing with unknown vocabulary items (SETCUV)**

SETCUV 1: Guessing the meaning of a new vocabulary item with or without looking at the context
SETCUV 2: Looking at the root of a new vocabulary
SETCUV 3: Looking up the meaning of a new vocabulary item from electronic resources e.g. Talking dictionary, dictionary program in a computer, and the Internet
SETCUV 4: Looking up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai
SETCUV 5: Appealing for assistance from other people about the meaning of a new vocabulary item

2. **To enhance textual comprehension by retaining knowledge of newly-learned vocabulary items (SETCRV)**

SETCRV 1: Using new vocabulary items to converse with classmates and friends
SETCRV 2: Memorising new words (with or without vocabulary lists)
SETCRV 3: Reciting vocabulary items in rhymes
SETCRV 4: Associating real objects with vocabulary items
SETCRV 5: Associating the sound of a Thai word with that of a new English vocabulary item
SETCRV 6: Tutoring one's classmate(s) or friend(s) about what was learnt in the reading class

4.4.2.1 To enhance textual comprehension by solving problems

dealing with unknown vocabulary items (SETCUV)

According to the information obtained through the student oral interviews, the problem with unknown words seems to be a big problem for the science-oriented students in English academic reading. This may be because many of them reported that they believed that their academic reading ability would be better if they knew a large number of vocabulary items. The students reported different strategies which they employed in order to solve this problem, and to discover the meaning of new vocabulary items.

- **SETCUV 1: Guessing the meaning of a new vocabulary item with or without looking at the context**

Guessing the meaning of a new vocabulary item using some techniques like context clue was reported enabling some students to learn the meaning of the new item found while reading.

ST 2: …Reading English is unnecessary to know the meaning of every word. We can guess the meaning of a word from the context. We only look at the sentence in general. … While taking a reading test, I can't bring any dictionaries with me; I must look at the context and guess the meaning of the unknown word.

ST 4: …If I know some words in the sentence, these known words can help me to guess the meaning of another unknown word in the sentence. For example, in the field of engineering, if we know some words, we can guess what the author talks about…

ST12: …I sometimes try to read and read although I encounter with new vocabulary items. I may guess their meanings from the context.

HS 7: …While taking a reading test, I always encounter the problems of unknown vocabulary items. What I can do at that time is to guess the meanings of those words from the context.

ST 20: …It is unnecessary to know the meaning of every word. The context can help me guessing the meanings of new words…

- **SETCUV 2: Looking at the root of a new vocabulary**

Apart from guessing the meanings of new vocabulary items from the context, looking at the root or the form of new vocabulary items was reported being employed by some students.

ST 23: … Guessing the meaning of a word by considering the root of a word is one technique I use to discover its meaning…

HS 15: … I sometimes guess the meaning of new vocabulary items from their roots…

- **SETCUV 3: Looking up the meaning of a new vocabulary item from electronic resources e.g. Talking dictionary, dictionary program in a computer, and the Internet**

Many students reported that using electronic resources, especially an electronic dictionary (Talking Dictionary) to check the meanings of new vocabulary items may be very helpful for them to solve the problems of unknown words found while reading.

ST 6: … I don't like to carry a dictionary with me. I often use a dictionary program in the computer…

HS 4: … Normally I take my talking dictionary with me to the reading class because I know myself well that I can't read any English texts without knowing the meanings of vocabulary items. Therefore I always consult the talking dictionary….I also look up the meanings of unknown vocabulary items in the internet when I work in front of the computer.

ST 7: …Talking dictionary is the main instrument to help me understanding what I read in English. I sometimes consult a dictionary but it is not comfortable comparing to a talking dictionary…

ST 11: …I look for the meanings of unknown vocabulary items form a dictionary, especially talking dictionary because it is light and comfortable to use and carry…..

ST 13: …I may use talking dictionary to discover the meanings of new vocabulary items found while reading. I sometimes search from the internet as well.

ST 20: … If I fail in consulting a dictionary for some difficult technical terms, I try to search their meanings from the internet.

ST 21: …I usually look the new words up in a regular dictionary or talking dictionary. However, if I read the PDF file text in a computer, I will link to the translation web in the internet…

- **SETCUV 4: Looking up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai**

Many students reported that using a dictionary to check the meaning of a new vocabulary item would be the first technique they did. This helped them to learn new vocabulary items found while reading.

ST 1: … I always use a dictionary while encountering new vocabulary items. I look those words up in the dictionary... In reading, it is important not to ignore new vocabulary items. For me, I have to look them up in the dictionary immediately when encountering new words.

ST 3: … If I have a dictionary with me while reading, I am sure that the first thing I do to find the meanings of unknown words is to look them up in the dictionary…

ST 6: … I will read and read although I cannot comprehend what I read. I will scan it in order to know what the author talks about. Then I will reread it. If I still fail to understand the text because of words, I will look them up in a dictionary.

HS 4: …When facing with unknown words, what I do first is to open the dictionary and look for their meanings…

ST 8: … I always use an English-Thai dictionary to discover the meaning of unknown English vocabulary items. I never use English-English dictionary because I can't understand the sentences explained in English.

ST 12: …The fast and easy way to discover the meanings of unknown words is consulting a dictionary. I normally use an English-Thai dictionary because it is a lot easier than using an English-English dictionary.

HS 10: … If the context cannot help me to guess the meanings of unknown words, I have to look them up in my dictionary.

ST 17: … To discover the meaning of unfamiliar words, the first thing I rely on is to use an English-Thai dictionary. I always bring it with me to the class….

ST 19: … If I fail in guessing unknown words from the context, I look them up in a dictionary. It is the easiest way to discover the meanings of new words.

HS 15: …I have one Oxford English- English dictionary. When I encounter an unknown word, I will consult that dictionary…

- **SETCUV 5: Appealing for assistance from other people about the meaning of a new vocabulary item**

Asking for some assistance from other people such as teachers, friends, and classmates was reported being used by some students as a way to solve the problems about unknown vocabulary items they encountered while reading.

ST 6: …I may ask my teacher for the meanings of unknown words if they are difficult words which can't be looked up from a general dictionary.

HS 3: …I will consult other people who may know those words. I may ask my friends who have high level of English proficiency. I sometimes ask my teacher or my parents to help me.

HS 5: …Normally, I rarely ask my classmates for the meanings of unknown vocabulary items because I think that they also don't know their meanings. I usually ask my teacher, or the senior who used to take this course…

ST 9: … While reading in class, I will ask my classmate who sits next to me about the meanings of new vocabulary items. However, if she cannot give me the answer, I will ask my teachers.

ST 13: …If I encounter difficult words which cannot be found in a regular dictionary, I will ask my teacher.

ST 20: … Many technical terms cannot be looked up in a regular dictionary. I have to ask the teacher…

4.4.2.2 To enhance textual comprehension by retaining knowledge of newly-learned vocabulary items (SETCRV)

The reading strategies under this purpose are the strategies reported being employed in order to retain the knowledge of newly-learned vocabulary items found while reading academic materials. Six individual strategies for the retention of the knowledge of newly-learned vocabulary items include:

- **SETCRV 1: Using new vocabulary items to converse with classmates and friends**

Some students reported that using newly-learned vocabulary items to converse with classmates and friends was one technique to help them recognise those items.

ST 1: …I believe that after I know the meanings of new vocabulary items. If I use those words often in my life, I will be familiar with them and finally I can remember them. I try to talk with my friends by using the newly-learned words in our conversation.

ST 6: … When I am with my friend, I try to talk with them using some English words in our conversation….

HS 7: …I try to talk with my friends by using the newly-learned words in our conversation. We always mix both English and Thai words together in our conversation…

HS 8: … I try to use the newly-learned words often by talking with friends.

ST 13: …I try to remember newly-learned vocabulary items by talking with friends using the newly-learned English vocabulary items in daily conversation…

- **SETCRV 2: Memorising new words (with or without vocabulary lists)**

Memorising new vocabulary items was one strategy reported being employed by a lot of students even though not all students had the same memorising techniques. It was reported that students may memorise new vocabulary items with or without vocabulary lists.

ST 2: …While reading, I always look some unknown words up in the dictionary. This can help me understand what I read….After knowing the meanings of new words, I try to memorise their meanings. I think if I memorise them more often, I can remember them by heart…

ST 3: …It is better to look at those words more often. After I found them while reading, I will write those words with their meanings in my note book. Then I will look at them and try to rememorize by saying them aloud with their meanings many times in order to remember the meanings of them.

ST 5: … I write the vocabulary items with their meanings in pieces of paper and stick them on the front door of my room. Every time before entering the room, I look and read them …

HS 6: …I will start from learning a word and try to memorise by saying a single vocabulary item with its meaning again and again until I can remember both meaning and spelling. I will start from the easiest word such as dog, cat, because I don't have enough background knowledge about English. I feel that my knowledge in English is about 10% comparing to other students…

ST 8: …After class, I usually write new vocabulary items found in the lessons on pieces of A4 paper and stick on the wall in my bedroom. I look at and memorise them when I walk pass. This can help me remember their meanings.

HS 11: …When I face new vocabulary items, I write them with their meanings in a notebook in order to memorise by saying to myself their spellings and meaning again and again until I can remember them by heart…

ST 13: …I usually memorise new vocabulary items by saying their spellings and meanings aloud many times until I can remember them.

ST 18: …Another way to remember the newly-learned vocabulary items is to memorise. I think that to memorise by practicing writing those words many times can help me remember them.

- **SETCRV 3: Reciting vocabulary items in rhymes**

    Some students reported that reciting vocabulary items in rhymes may be very

helpful for them to remember newly-learned vocabulary items.

HS 7: … When I was young, my teacher suggested me to remember vocabulary items in rhymes using the words with similar sounds. For example, I will say 'adapt apply' alongside their meanings. I still use this technique.
ST 18: …I normally memorise the words by saying words in rhymes starting from an English word alongside its meaning…

- **SETCRV 4: Associating real objects with vocabulary items**

    Associating real objects with vocabulary items was reported helping some

students to recall the newly-learned vocabulary. Then, they could remember them.

HS 7: … For me, I try to link new vocabulary items with objects found in my daily life. For example, when I see an instrument used for drawing circles, I associate it to the word 'compasses'.

HS 8: …I try to use the newly-learned words often by linking English words with objects found in my daily life.

ST 23: …When I see any real objects in my daily life, I try to link them with English words…

- **SETCRV 5: Associating the sound of a Thai word with that of a new English vocabulary item**

Associating the sound of a Thai word with that of a new English vocabulary item was reported enabling the students to remember newly-learned vocabulary items found in reading texts.

ST 14: …When I have to learn a new vocabulary item, I try to think about the sound of Thai vocabulary which has similar sound of an English vocabulary item. For example, when I see a wall built across a river which stops the river's flow and collects the water which is called 'dam', I link its sound to 'dam' in Thai (black).

- **CEURK 6: Tutoring one's classmate(s) or friend(s) about what was learnt in the reading class**

Apart from associating the sound of a Thai word with that of a new English vocabulary item, and associating real objects with vocabulary items; tutoring one's friends the reading lessons was reported being helpful for some students to memorizing newly-learned vocabulary items found while reading.

HS 5: …I am very lazy to memorise new vocabulary items. One strategy to help me remember new words is to tutor my friends the reading passages.

To sum up, the reading strategy inventory for the present study was based on the data obtained through the oral semi-structured interviews conducted with 39 science-oriented students studying EAP or ESP course at different public universities during June-July 2008. Thirty-nine individual reading strategies emerged from the students' interview data. These 39 individual reading strategies were classified into two main categories according to the definition of reading strategies which involved particular purposes of academic reading. These include 1) strategies for comprehending reading texts (SCT), and 2) strategies for enhancing textual

comprehension (SETC). The strategies from both these two main categories were used to generate the reading strategy questionnaire which was use as the main instrument in the second phase of data collection, in order to elicit information about the science-oriented students' reading strategy use.

4.5 Reading Strategy Questionnaire

The next step in conducting this study was to generate the reading strategy questionnaire which would be used as the main instrument in the second phase of data collection. The reading strategy questionnaire was conducted in both Thai and English version. The English version was used for discussion purpose for the study, while the Thai version was used for the purpose of data collection with Thai students. The main purpose of the Thai version was to avoid the misunderstanding by the research respondents to the questions. It was also used to ensure greater accuracy of results especially with the students with low proficiency in English academic reading (Siriwan, 2007).

The reading strategy questionnaire has been designed with the main purpose of eliciting the frequency of students' reading strategy use. There were two main parts in the questionnaire: the respondents' personal information; and the reading strategy use. The students' personal information was used in order to provide useful information for the researcher which included students' gender, institution, field of study, and high school background. It was very necessary to determine the student personal information in the questionnaire because it involved the main variables being investigated in the present study and the relationship between these variables and the

reading strategy use of the respondents. The Thai version was checked for the correct language usage by the researcher's supervisor and three Thai native speaking teachers who have been teaching English for many years at the public universities. This process is very important as suggested by Denscombe (2003, p. 152), the wording of the questions is important to get right. It was found that some question items were not very clear and needed refinements accordingly. After the refinement of the question items, the Thai version was translated into English (see full English version in Appendix B).

The reading strategy questionnaire was divided into five main sections according to the purpose to be achieved their particular goals of reading. Each section of the questionnaire started with an introductory question asking whether or not the respondent tried to achieve the stated purpose in reading. If the response was 'no', the respondent was asked to skip to the following section. On the contrary, if the response was 'yes', the respondent was requested to look at the strategies which were employed while he or she was reading; and then to choose the appropriate frequency of strategy use from the range 'never or almost never true of me', 'somewhat true of me', often true of me', or 'always or almost always true of me'. The researcher did not expect that every respondent would employ every reading strategy listed in the questionnaire. Respondents had the freedom to indicate whether or not they actually employed some of these strategies to achieve each reading purpose. It was possible that some respondents never employed any of these strategies at all. This type of instrument was advantageous as suggested by Bialystok (1981) that a questionnaire can be easily administered to a large group of research subjects and easily scored.

Prior to the actual use of the reading strategy questionnaire, it was developed and piloted for content; moreover, reliability analysis was conducted. Before the strategy questionnaire was used in the piloting stage, it was reread and checked many times among the researcher, the researcher's supervisor, and some teachers who have taught English for years. Moreover, Alpha Coefficient (α) or Cronbach alpha was used to check the internal consistency of the reading strategy questionnaire. Franenkel and Wallen (1993) indicate that Alpha Coefficient (α) was appropriate for calculating the reliability of the items that were not scored right versus wrong. What is demonstrated in Table 4.2 is the reliability estimate based on a 31 students in the piloting stage.

Table 4.2 Reliability Estimate of the Reading Strategy Questionnaire as a Whole and the Two Main Categories (SCT and SETC)

Reading Strategy Category	Strategy Questionnaire as a Whole	Strategies for comprehending reading texts (SCT)			Strategies for enhancing textual comprehension (SETC)	
		SCTBAR	SCTWAR	SCTAAR	SETCUV	SETCRV
Reliability Estimate (Alpha Coefficient α)	.95	.93	.90	.91	.79	.87

In general, reliability coefficient can take on values from 0 to 1.0. Conceptually, if a reliability coefficient were 0, there would be no 'true' component in the observed score— a test which has a reliability coefficient of 0 would give sets of results unconnected with each other. On the other hand, if the reliability coefficient were 1.0, the observed score would contain no error, it would consist entirely of the true score—a test with a reliability of 1 is one which would give precisely the same results for a particular set of candidates regardless of when it happened to be

administered (Hughes, 1989; and Wiersma and Jurs (2005). Fraenkel and Walen (1993) indicate that the reliability coefficient of .70 is acceptable as a useful rule of thumb for research purposes. Table 4.2 shows that the values of reliability coefficient estimated for the present study are higher than the acceptable value of .70. Figure 4.1 shows a sample of the questionnaire used as the main instrument for the last phase of data collection in order to elicit the students' frequency of reading strategy use.

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1. Before reading English academic text, do you look for any techniques to help you understand what you are going to read ?

   ☐ Yes ☐ No

If 'No', please proceed to 2. If 'Yes', how often do you……?

Reading Strategy	Frequency of Your Own Reading Strategy Use			
	Always or almost always true of me	Often true of me	Somewhat true of me	Never or almost never true of me
1) search for the meanings of new vocabulary items in order to comprehend reading texts before doing the actual reading				

Figure 4.1 A Sample of the Reading Strategy Questionnaire

4.6 Summary

This chapter has dealt with the process of designing a reading strategy questionnaire which was used as the main instrument for the second phase of data collection. The chapter starts with the explanation of how the reading strategy inventory was generated. The proposed reading strategy inventory resulted from 39

student-oral semi-structured interviews comprises two main categories: 1) strategies for comprehending reading texts (SCT); and 2) strategies for enhancing textual comprehension (SETC). The first category consists of three purposes with a total of twenty-eight individual strategies; and two purposes with eleven individual strategies in the second category. Both categories comprised a total of thirty-nine individual strategies.

The reading strategy inventory was then used to generate the reading strategy questionnaire which was used to elicit students' frequency of reading strategy use. The strategy questionnaire used to collect the data was conducted in Thai in order to make sure that the respondents would not misunderstand each individual strategy. There are two main parts in the reading strategy questionnaire: the respondents' personal information, and the reading strategy use. The respondents' personal information completed while administering the strategy questionnaire could provide the researcher with four independent variables, i.e. gender; location of universities; field of study; and high school background. However, 'reading proficiency level' was only one variable for the present study which could not be obtained through the use of the first part of the reading strategy questionnaire; hence, the researcher-constructed Reading Proficiency Test in English for Science and Technology (RPTEST) was employed. The next chapter will discuss the data analysis.

CHAPTER 5

DATA ANALYSIS FOR READING STRATEGY USE (I)

5.1 Introduction and Purpose of the Chapter

The main aim of this chapter is to describe the research findings of the present study at different levels of data analysis, i.e. overall use of reading strategies, use of reading strategies in two main categories, and use of individual reading strategies. However, significant variations in frequency of students' reported use of reading strategies are not taken into consideration in this chapter. Instead, comparisons of frequency of reading strategy use reported by 1,096 science-oriented undergraduate students studying English at public universities based on the holistic mean scores obtained through the reading strategy questionnaire are determined.

Reading strategies for the present study have been defined as learning processes or learning techniques employed by the learners in comprehending an English text. These techniques may be employed before, while, or after they do the actual reading. These techniques may also be employed when the learners are facing with difficulty in understanding new vocabulary items in the reading texts or retaining the newly-learnt vocabulary items.

As mentioned in the review of literature in Chapter 2, it is evident that there are many variables affecting the language learners' use of reading strategies. Ellis (1994) indicates that the variables may be classified as 'learner individual difference' and 'teaching and learning condition' which are hypothesized to affect learner's

frequency of reading strategy use. These variables include levels of language proficiency, gender, field of study, types of students, class level, school source, motivation, anxiety, and attitudes. Examples are the research works conducted by Hosenfeld (1977), Block (1986), Kim (1989), Kletzien (1991), Hardin (2001). Moreover, as evidences in the review of literature in Chapter 2, in terms of variation in students' use of reading strategies in relation to an independent variable, students' levels of language proficiency have received more attention from the researchers more often than other variables. However, it is difficult for the researcher to study all of the variables mentioned. Therefore, the relationship between students' use of reading strategies and gender of students, location of institutions, field of study, levels of reading proficiency, and student's upper secondary school background has been focused in the present study.

In this chapter, a more detail of different levels of reading strategy use has been taken into account in order to examine the research subjects' strategy use. Firstly, the frequency of overall use of reading strategies reported by 1,096 public university students will be exploded. This will be followed by the frequency of reading strategy use in the two main categories: 1) strategies for comprehending reading texts (SCT); and 2) strategies for enhancing textual comprehension (SETC). Finally, the frequency of students' reported use of 39 individual reading strategies (SCTBAR 1-SCTBAR 11, SCTWAR 1- SCTWAR 11, SCTAAR 1-SCTAAR 6, SETCUV 1-SETCUV 5, and SETCRV 1-SETCRV 6) employed to achieve the particular purposes of reading will be examined and analyzed.

5.2 Reading Strategy Use Reported by 1,096 Science-Oriented Students Learning English at the Public Universities in Thailand

This section starts with simple statistical methods employed in analyzing the data obtained from 1,096 science-oriented students through the reading strategy questionnaire. No significant variation patterns of students' choices of reading strategies have been discussed at this stage. The comparisons of students' reported frequency of strategy use in different layers are the main point of discussion. The frequency of students' reading strategy use has been categorized as 'high', 'medium', and 'low' use. This is determined by students' responses to the reading strategy questionnaire. The frequency of strategy use is indicated on a four-point rating scale, ranging from 'Never or almost never true of me' valued as 1, 'Somewhat true of me' valued as 2, 'Often true of me' valued as 3, 'Always or almost always true of me' valued as 4. Consequently, the average value of frequency of strategy use can be valued from 1.00 to 4.00. The mid-point of minimum and the maximum values is 2.50. The mean frequency score of strategy use of each category or item valued from 1.00 to 1.99 is determined as 'low use', from 2.00 to 2.99 is determined as 'medium use', and from 3.00 to 4.00 as 'high use'. Figure 5.1 presents the applied measures.
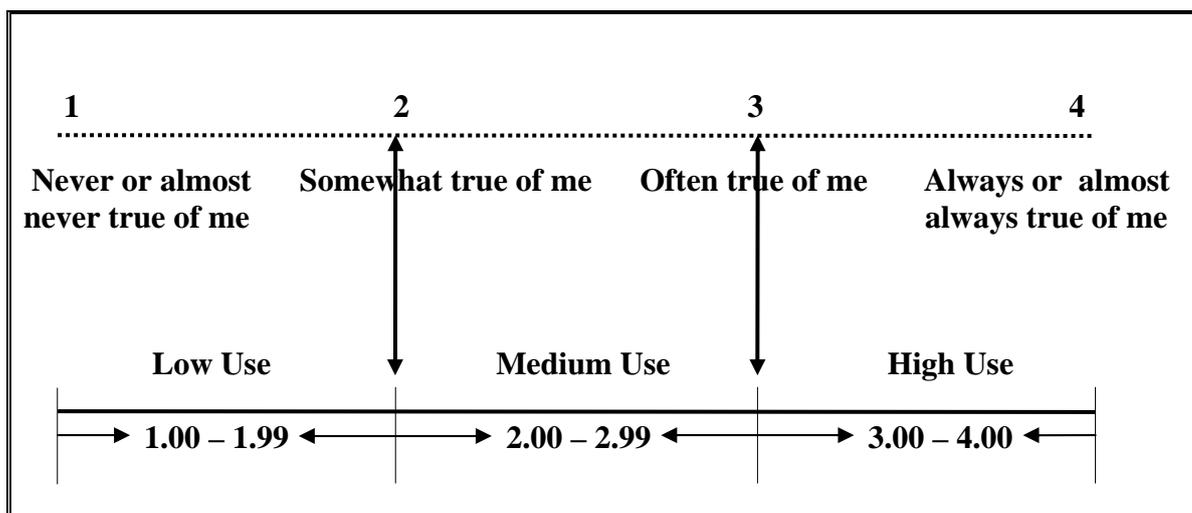
Figure 5.1 The Measure of High, Medium, and Low Frequency of Strategy Use

5.2.1 Frequency of Students' Overall Strategy Use

The results of the holistic mean frequency score across the reading strategy questionnaire responded by 1,096 science-oriented undergraduate students are shown in table 5.1.

Table 5.1 Frequency of Students' Reported Overall Strategy Use

Students' Reported Strategy Use	Number of Students (n)	Mean Frequency Score ($\bar{x}$)	Standard Deviation (S.D.)	Frequency Category
Overall Strategy Use	1,096	2.32	0.49	Medium Use

As shown in Table 5.1, the mean frequency score of 2.32 indicates that as a whole, these science-oriented students reported employing reading strategies with moderate frequent level when reading English academic texts. Also, later in this chapter, certain reading strategies which were reported by these 1,096 students to fall into the 'high use' or 'low use' categories will be presented.

Frequency of Reading Strategy Use in the SCT and SETC

Categories

As mentioned earlier in Chapter 4, reading strategies under the present study have been grouped into two main groups based on the definition of reading strategies which are 1) strategies for comprehending reading texts (SCT); and 2) strategies for enhancing textual comprehension (SETC). Furthermore, each main group has contained a few purposes. Table 5.2 below demonstrates frequency of strategy use in both categories, together with standard deviation and frequency category.

Table 5.2 Frequency of Reading Strategy Use in the SCT and SETC categories

Strategy Main Category	Number of Students	Mean Frequency Score ($\bar{x}$)	Standard Deviation (S.D.)	Frequency Category
SCT Category	1,096	2.33	0.54	Medium Use
SETC Category	1,096	2.28	0.52	Medium Use

Table 5.2 above demonstrates that 1,096 students reported medium frequency of reading strategy use in both categories. By comparing the mean frequency score of both categories, the strategies which were reported being employed the most frequently fall into the SCT category, and followed by the SETC category. These mean frequency scores illustrate that Thai students reported slightly more frequent use of strategies for comprehending reading texts rather than the strategies for enhancing textual comprehension.

The frequency of individual reading strategy use will be explored in the next section. This can help us to explore in detail which individual reading strategies have been reported being employed more frequently than others.

5.2.3 Frequency of Individual Reading Strategy Use

The frequency of reading strategy use shown in Table 5.2 presents an overall picture of science-oriented students' strategy use in the two main categories. This section provides more information on students' reported strategy use in a more detailed manner, which is based on the reading strategy classification as shown in the reading strategy inventory for the present study.

The frequency of individual strategy use, together with the standard deviation as well as the frequency category, would be illustrated in Tables 5.3 and 5.4 respectively according to the two main reading strategy categories. In order to make it easier to see the whole picture of students' reported frequency of each individual reading strategy use, these strategies are presented in order of their mean frequency scores, ranging from the highest to the lowest. This may help us being able to see a clearer picture of the strategies which have been reported most and least frequently. The higher mean frequency score of a strategy use implies that students claimed to employ that strategy more frequently.

5.2.3.1 Frequency of Individual Reading Strategy Use for

Comprehending Reading Texts (SCT)

There are three main purposes for using reading strategy in this category. Twenty-eight individual strategies are under this category. Eleven of these are for comprehending the text before doing the actual reading and are referred to as SCTBAR 1 - SCTBAR 11. Another eleven are for comprehending the text while doing the actual reading and are referred to as SCTWAR 1 – SCTWAR 11. The rest is for comprehending the text after having done the actual reading and is referred to as SCTAAR 1 – SCTAAR 6. The twenty-eight individual reading strategies are:

1. To comprehend reading texts before doing the actual reading (SCTBAR)

SCTBAR 1:   Searching for the meanings of new vocabulary items
SCTBAR 2:   Reading the title of the text
SCTBAR 3:   Going through the text quickly
SCTBAR 4:   Reading the first and the last paragraphs
SCTBAR 5:   Looking at pictures/charts/tables/figures that appear in the text (if any)
SCTBAR 6:   Looking at questions about the text (if any)
SCTBAR 7:   Scanning for main ideas
SCTBAR 8:   Thinking of one's background knowledge about the text
SCTBAR 9:   Reading the abstract or introductory part
SCTBAR 10: Looking for the parallel article(s) in Thai (if any)
SCTBAR 11: Predicting what might happen in the text

2. To comprehend reading texts while doing the actual reading   (SCTWAR)

SCTWAR 1:   Searching for the meanings of new vocabulary items
SCTWAR 2:   Analysing a sentence structure
SCTWAR 3:   Taking notes the important information
SCTWAR 4:   Guessing the meaning of the text from context
SCTWAR 5:   Rereading certain part(s) of the text
SCTWAR 6:   Reading certain part(s) of the text slowly
SCTWAR 7:   Avoiding a difficult part
SCTWAR 8:   Highlighting important information or difficult vocabulary items by underlining
SCTWAR 9:   Highlighting important information or difficult vocabulary items by making symbol(s)
SCTWAR 10: Thinking about the meaning of the reading text in Thai
SCTWAR 11: Making a summary of certain part(s) of the reading text in either Thai or English, or both

3. To comprehend reading texts after having done the actual reading (SCTAAR)

SCTAAR 1:   Searching for the meanings of new vocabulary items
SCTAAR 2:   Discussing the reading text with classmate(s) or friend(s)
SCTAAR 3:   Making a summary of the whole reading text
SCTAAR 4:   Retelling oneself or other people about what has been read
SCTAAR 5:   Reviewing one's own notes
SCTAAR 6:   Translating the reading text into Thai using Thai script

Table 5.3 presents frequency of individual reading strategy use in the SCT category which contains altogether 28 individual items reported employing by the research subjects in order to comprehend the academic reading material. These reading strategies are presented in order of their mean frequency scores, ranging from

the highest to the lowest. Apart from the mean frequency score, the standard deviation

together with the frequency category for each individual strategy are shown.

Table 5.3 Frequency of Individual Reading Strategy Use for Comprehending
         Reading Texts (SCT)

Individual Reading Strategy Use for Comprehending Reading Texts (SCT)		Mean ($\bar{x}$)	Standard Deviation (S.D.)	Frequency Category
SCTBAR	**SCTBAR 5**: Looking at pictures/charts/ tables/figures that appear in the text	2.70	1.00	Medium Use
	SCTBAR 11: Predicting what might happen in the text	2.62	0.96	Medium Use
	SCTBAR 7: Scanning for main ideas	2.49	0.91	Medium Use
	SCTBAR 2: Reading the title of the text	2.48	0.92	Medium Use
	SCTBAR 6: Looking at questions about the text (if any)	2.43	0.96	Medium Use
	SCTBAR 3: Going through the text quickly	2.37	0.87	Medium Use
	SCTBAR 8: Thinking of one's background knowledge about the text	2.29	0.89	Medium Use
	SCTBAR 4: Reading the first and the last paragraphs	2.26	0.89	Medium Use
	SCTBAR 9: Reading the abstract or introductory part	2.26	0.89	Medium Use
	SCTBAR 1: Searching for the meanings of new vocabulary items	2.24	0.79	Medium Use
	SCTBAR 10: Looking for the parallel article(s) in Thai (if any)	2.14	0.93	Medium Use
SCTWAR	**SCTWAR 4**: Guessing the meaning of the text from context	2.70	0.85	Medium Use
	SCTWAR 8: Highlighting important information or difficult vocabulary items by underlining	2.70	0.96	Medium Use
	SCTWAR 5: Rereading certain part(s) of the text	2.57	0.91	Medium Use
	SCTWAR 6: Reading certain part(s) of the text slowly	2.57	0.88	Medium Use
	SCTWAR 1: Searching for the meanings of new vocabulary items	2.56	0.85	Medium Use

Table 5.3 (Cont.) Frequency of Individual Reading Strategy Use for Comprehending Reading Texts (SCT)

Individual Reading Strategy Use for Comprehending Reading Texts (SCT)		Mean ($\bar{x}$)	Standard Deviation (S.D.)	Frequency Category
SCTWAR (Cont.)	**SCTWAR 9**: Highlighting important information or difficult vocabulary items by making symbol(s)	2.48	0.94	Medium Use
	SCTWAR 10: Thinking about the meaning of the reading text in Thai	2.42	0.87	Medium Use
	SCTWAR 7: Avoiding a difficult part	2.35	0.80	Medium Use
	SCTWAR 11: Making a summary of certain part(s) of the reading text in either Thai or English, or both	2.24	0.82	Medium Use
	SCTWAR 3: Taking notes the important information	2.16	0.87	Medium Use
	SCTWAR 2: Analysing a sentence structure	2.08	0.76	Medium Use
SCTAAR	**SCTAAR 1**: Searching for the meanings of new vocabulary items	2.33	0.93	Medium Use
	SCTAAR 6: Translating the reading text into Thai using Thai script	2.13	0.89	Medium Use
	SCTAAR 5: Reviewing one's own notes	2.04	0.84	Medium Use
	SCTAAR 4: Retelling oneself or other people about what has been read	1.91	0.80	Low Use
	SCTAAR 2: Discussing the reading text with classmate(s) or friend(s)	1.90	0.79	Low Use
	SCTAAR 3: Making a summary of the whole reading text	1.89	0.79	Low Use

Table 5.3 reveals that students reported not to employ any strategies from SCT category at the high frequency level. On the contrary, it can be seen three strategies from this category were reported being employed at the low level of frequency. These strategies are those for comprehending the text after having done the actual reading. The strategies which were reported being employed at 'low use' are ' retelling oneself or other people about what has been read (SCTAAR 4); discussing the reading text

with classmate(s) or friend(s) (SCTAAR 2); and making a summary of the whole reading text (SCTAAR 3).' The rest were reported being employed at the medium use.

As a whole, to be more specific, the strategies in the SCT categories which appear to be reported 'medium use' are mainly those employed to comprehend the text before doing the actual reading (SCTBAR), and while doing the actual reading (SCTWAR). All of the strategies under these two purposes have been reported at medium frequency level. On the other hand, a closer look at the strategies employed to comprehend the text after having done the actual reading (SCTAAR) reveals that students reported both 'medium use' and 'low use' under this purpose. Hence, the frequency use of individual strategies under this purpose (SCTAAR) may reflect the students' action after finishing academic reading. The strategy which was found to be reported least frequently is 'making a summary of the whole reading text after having done the actual academic reading (SCTAAR3)'.

5.2.3.2 Frequency of Individual Reading Strategy Use for

Enhancing Textual Comprehension (SETC)

As can be seen in Table 5.4, the SETC category contains eleven individual reading strategies which were reported being employed by the research subjects under the present study in order to enhance the English academic reading comprehension. There are two main purposes for employing reading strategy in this category. Five of these are under the purpose of solving problems dealing with unknown vocabulary items and are referred to as SETCUV 1-SETCUV 5. The other six are for retaining knowledge of newly-learned vocabulary items and are referred to as SETCRV 1-SETCRV 6. The eleven individual reading strategies are:

1. To enhance textual comprehension by solving problems dealing with unknown vocabulary items (SETCUV)

SETCUV 1: Guessing the meaning of a new vocabulary item with or without looking at the context

SETCUV 2: Looking at the root of a new vocabulary

SETCUV 3: Looking up the meaning of a new vocabulary item from electronic resources e.g. talking dictionary, dictionary program in a computer, and the Internet

SETCUV 4: Looking up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai

SETCUV 5: Appealing for assistance from other people about the meaning of a new vocabulary item

2. To enhance textual comprehension by retaining knowledge of newly-learned vocabulary items (SETCRV)

SETCRV 1: Using new vocabulary items to converse with classmates and friends

SETCRV 2: Memorising new words (with or without vocabulary lists)

SETCRV 3: Reciting vocabulary items in rhymes

SETCRV 4: Associating real objects with vocabulary items

SETCRV 5:Associating the sound of a Thai word with that of a new English vocabulary item

SETCRV 6: Tutoring one's classmate(s) or friend(s) about what was learnt in the reading class

Table 5.4 presents frequencies of individual reading strategy use in the SETC category which contains altogether 11 individual items reported employing by the research subjects in order to enhance the English academic reading comprehension.

Table 5.4 Frequency of Individual Reading Strategy Use for Enhancing Textual Comprehension (SETC)

Individual Reading Strategy Use for Enhancing Textual Comprehension (SETC)		Mean ($\bar{x}$)	Standard Deviation (S.D.)	Frequency Category
SETCUV	**SETCUV 1**: Guessing the meaning of a new vocabulary item with or without looking at the context	2.82	0.82	Medium Use
	SETCUV 3: Looking up the meaning of a new vocabulary item from electronic resources e.g. talking dictionary, dictionary program in a computer, and the Internet	2.79	0.95	Medium Use
	SETCUV 4: Looking up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai	2.73	0.88	Medium Use
	SETCUV 2: Looking at the root of a new vocabulary	2.58	0.86	Medium Use
	SETCUV 5: Appealing for assistance from other people about the meaning of a new vocabulary item	2.47	0.80	Medium Use
SETCRV	**SETCRV 2**: Memorising new words with or without a list	2.13	0.79	Medium Use
	SETCRV 4: Associating real objects with vocabulary items	2.10	0.82	Medium Use
	SETCRV 5: Associating the sound of a Thai word with that of a new English vocabulary item	1.97	0.81	Low Use
	SETCRV 1: Using new vocabulary items to converse with classmates and friends	1.92	0.72	Low Use
	SETCRV 3: Reciting vocabulary items in rhymes	1.82	0.77	Low Use
	SETCRV 6: Tutoring one's classmate(s) or friend(s) about what was learnt in the reading class	1.73	0.75	Low Use

As demonstrated in Table 5.4, there are altogether 11 strategies under the SETC category. The students' reported strategies in this category mainly involved the strategies for solving problems dealing with unknown words, and the strategies employed to retain the knowledge of new vocabulary items. None of the reading

strategies in this category were reported at a 'high use' level. The results reveal more than half of them (7 strategies) were reported at a 'medium use' level, whereas four strategies were reported at a 'low use' level.

A closer look at the frequency use of the seven reading strategies in the SETC category revealed that the students reported employing at the medium frequency level in order to solve the problems dealing with unknown vocabulary items, and to retain the knowledge of new vocabulary items. In terms of employing these strategies, the strategy which was found to be reported the most frequently in order to discover the meaning of unknown words found in the academic text is guessing the meaning of them with or without looking at the context (SETCUV 1). Students also reported looking up the meaning of a new vocabulary item from both electronic resources and traditional dictionary (SETCUV 3). To be specific, the students reported using the electronic resources to look up the meaning of a new vocabulary items more frequently than traditional dictionary. Furthermore, the students reported guessing the meaning of a new vocabulary item by looking at its root (SETCUV 2), and they also reported consulting other people which they faced the problems of unknown vocabulary items (SETCUV 5). After discovering the meanings of unknown vocabulary items, students reported memorising new items with or without a list (SETCRV 2), and to associate real objects with those items in order to retain knowledge of newly-learned vocabulary items (SETCRV 4).

In respect of strategies for enhancing textual comprehension by retaining knowledge of newly-learned vocabulary items, the students reported low frequency of use of associating the sound of a Thai word with that of a new English vocabulary item (SETCRV 5), using new vocabulary items to converse with classmates and

friends, reciting vocabulary items in rhymes (SETCRV 3), and tutoring one's classmate(s) or friend(s) about what was learnt in the reading class (SETCRV 6).

5.3 Summary

This chapter presents the frequency of reading strategy use at different levels reported by 1,096 science-oriented students. The description of this reported frequency of students' reading strategy use has provided an overall picture of reading strategy use. A summary of the highlights of the findings of the present study is shown below.

1. Regarding the overall reading strategy use, 1,096 science-oriented undergraduate students reported employing reading strategies with medium frequency.

2. The particular purposes of employing reading strategies by these students are to comprehend the academic texts, and to enhance textual comprehension.

3. In terms of frequency of use of reading strategies in the SCT, and SETC categories, 1,096 students reported employing strategies at the medium frequency level of use in each of both categories.

4. Students reported employing strategies in the SCT category slightly more frequently than those in the SETC category.

5. In terms of using strategies for comprehending reading texts (SCT), the students reported employing the strategies to comprehend the text after having done the actual reading less than those to comprehend the text before, and while doing the actual reading.

In this chapter, the frequency level of reading strategies that science-oriented students reported employing has been described. The chapter has presented the frequency level of overall strategy use, the frequency level of strategy use in two main categories, and a detail analysis of the frequency level of the individual strategy in each of both categories shown in the mean frequency scores ranging from the highest to the lowest. The next chapter will present data analysis for reading strategy use in relation to the five independent variables. Lastly, a factor analysis has been conducted to seek underlying relationships among the individual reading strategies in the strategy inventory for the present study, as well as their strong relationships to the five variables. And this will also be discussed in Chapter 6.

CHAPTER 6

DATA ANALYSIS FOR READING STRATEGY USE (II)

6.1 Introduction and Purpose of the Chapter

As illustrated in Chapter 5, the students' reported reading strategy use has been divided into three different levels: overall reported reading strategy use; use of the strategies in the two main categories (SCT, and SETC); and use of 39 individual reading strategies under the five purposes. In this chapter, the students' use of reading strategies has been divided into four different levels, i.e. overall reported reading strategy use; use of the strategies in the two main categories (SCT, and SETC); use of strategies in each purpose of the two categories; and use of individual reading strategies. In addition, significant variations and patterns of variation in frequency of reading strategy use at each of the four levels, analyzed in terms of the five independent variables, are presented. Lastly, the results of a factor analysis are shown.

The primary purpose of this chapter is to examine the relationship between the reading strategy use of 1,096 science-oriented students and the five variables, namely:

1. Gender (male and female);

2. Location of universities (Metro-Bangkok and regional);

3. Field of study (science-oriented major: Health Science, and Science and Technology);

4. Levels of reading proficiency (high, moderate, and low); and

5. High school background (state-run and private-run schools).

In order to present the results of data analysis in this chapter, variations in frequency of students' overall reported reading strategy use according to the five variables will be presented first. Then, the variation in frequency of reading strategy use in the two main categories: 1) strategies for comprehending reading texts (SCT); and 2) strategies for enhancing textual comprehension (SETC) will be presented. This is followed by the variation in use of strategies to achieve SCT and SETC purposes according to the five variables. Finally, an examination of individual reading strategy use with a relationship to the five variables will be shown. The main data analyses carried out for this section are an analysis of variance (ANOVA), and chi-square tests. The four main levels of data analysis for students' reported reading strategy use are illustrated in Figure 6.1.

Level 1: Overall Reported Strategy Use

Level 2: Use of Strategies in the Two Main Categories (SCT and SETC)

Level 3: Use of Strategies to Achieve both SCT and SETC Purposes

Level 4: Use of Individual Reading Strategies
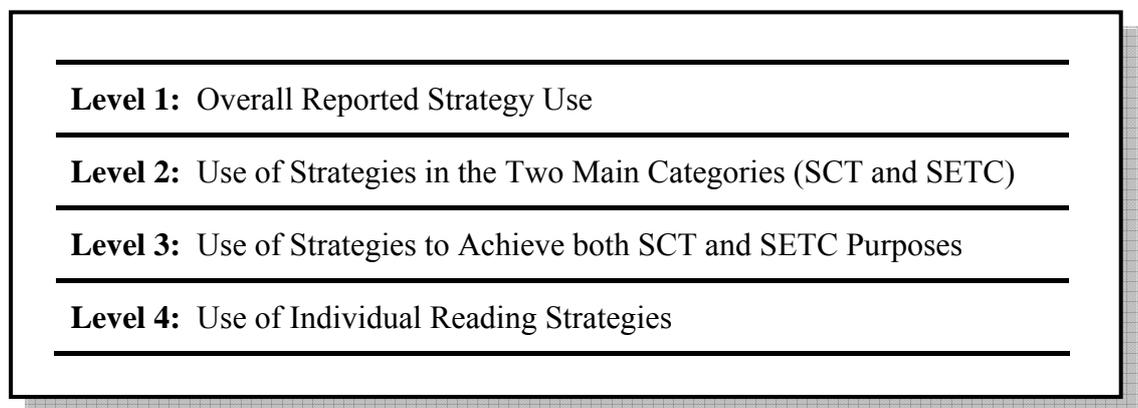
Figure 6.1 Analysis of Variations in Frequency of Different Levels of Reading Strategy Use

6.2 Variation in Students' Overall Reported Reading Strategy Use

This section involves variation in students' reported reading strategy use as a whole based on the analysis of variance (ANOVA). This statistical method demonstrates significant variation according to the five variables, i.e. gender, location of university, field of study, level of reading proficiency, and high school background. The results of the first level from the ANOVA are summarized in Table 6.1. This table contains the independent variables hypothesized to influence students' reading strategy use, followed by mean frequency score of strategy use ($\bar{x}$), standard deviation (S.D.), level of significance, and pattern of variation in frequency of students' strategy use, if a significant variation exists.

Table 6.1 A Summary of Variation in Frequency of Students' Overall Reported Strategy Use

Gender	Female (n= 675)		Male (n= 421)		Comments	
	Mean ($\bar{x}$)	S.D.	Mean ($\bar{x}$)	S.D.	Significance Level	Pattern of Variation
Overall Strategy Use	2.39	.46	2.21	.51	p<.01	Female>Male

Location of Universities	Metro-Bangkok (n= 266)		Regional (n=830)		Comments	
	Mean ($\bar{x}$)	S.D.	Mean ($\bar{x}$)	S.D.	Significance Level	Pattern of Variation
Overall Strategy Use	2.28	.50	2.33	.49	N.S.	-

Field of Study	Health Science (n=385)		Science and Technology (n=711)		Comments	
	Mean ($\bar{x}$)	S.D.	Mean ($\bar{x}$)	S.D.	Significance Level	Pattern of Variation
Overall Strategy Use	2.40	.50	2.27	.48	p<.01	Health Science > Science and Technology

Table 6.1 (Cont.) A Summary of Variation in Frequency of Students' Overall
Reported Strategy Use

High School Background	State-run School (n=1005)		Private-run School (n=91)		Comments	
	Mean ($\bar{x}$)	S.D.	Mean ($\bar{x}$)	S.D.	Significance Level	Pattern of Variation
Overall Strategy Use	2.31	.49	2.38	.53	N.S.	-

Reading Proficiency Levels	High (n=239)		Moderate (n=644)		Low (n=213)		Comments	
	Mean ($\bar{x}$)	S.D.	Mean ($\bar{x}$)	S.D.	Mean ($\bar{x}$)	S.D.	Significance Level	Pattern of Variation
Overall Strategy Use	2.46	.48	2.32	.47	2.15	.51	p<.01	High > Moderate > Low

According to Table 6.1, the results from the analysis of variance (ANOVA) reveal that the frequency of students' overall strategy use varied significantly according to three variables, i.e. gender, field of study, and levels of reading proficiency (p < 0.1).

In terms of the students' gender, the results from ANOVA show significant differences between male and female students. The mean frequency scores of female and male students were 2.39 and 2.21 respectively. This means that in the overall use of reading strategies, female students reported employing reading strategies significantly more frequently than did their male counterparts.

With regard to the student's field of study, the ANOVA result shows significant differences between Health Science, and Science and Technology major students. The mean frequency scores of the reported strategy use by Health Science, and Science and Technology major students were 2.40 and 2.27 respectively. It is

obviously seen that Health Science students generally reported employing reading strategies significantly more frequently than Science and Technology students did.

With respect to levels of reading proficiency, students' levels of reading proficiency were determined based on their scores obtained through the researcher-constructed Reading Proficiency Test in English for Science and Technology (see Appendix C for RPTEST). By comparing the mean frequency scores of student's level of reading proficiency, the post-hoc Scheffé Test carried out after the ANOVA results shows significant variations in the overall strategy use among students with high, moderate, and low levels of reading proficiency. The mean frequency scores were 2.46, 2.32, and 2.15 respectively. This indicates that the higher proficiency students reported employing greater overall strategy use than lower proficiency students.

As shown in Table 6.1, the frequency of students' overall strategy use did not vary according to their location of universities, or high school background. What follow are the results from ANOVA for the use of strategies in the two main categories.

6.3 Variation in Frequency of Students' Use of Strategies in the Two Main Categories (SCT and SETC)

As mentioned in Chapter 4, the reading strategies for the present study have been classified into two main categories: 1) strategies for comprehending reading texts (SCT); and 2) strategies for enhancing textual comprehension (SETC). The results from ANOVA demonstrate that the frequency of students' use of reading

strategies in SCT and SETC categories varied significantly according to their gender, field of study, and levels of reading proficiency, but did not vary according to location of universities, or high school background. Tables 6.2-6.6 present the ANOVA results and the variations in frequency of students' use of reading strategies in the two main categories according to each of the five variables.

6.3.1 Variation in Frequency of Students' Use of Strategies in the Two Main Categories According to Gender

Table 6.2   Variation in Frequency of Students' Use of Strategies in the Two Main Categories According to Gender of Students

Strategy Categories	Gender				Comments	
	Female (n=675)		Male (n=421)		Significance Level	Pattern of Variation
	Mean ($\bar{x}$)	S.D.	Mean ($\bar{x}$)	S.D.		
SCT Category	2.40	.51	2.22	.56	p<.01	Female>Male
SETC Category	2.34	.50	2.20	.55	p<.01	Female>Male

As shown in the Table 6.2 above, based on the result from ANOVA, significant differences were found in the use of reading strategies in the two main categories according to gender of students, with female students reporting employing the strategies significantly more frequently than did male students.

6.3.2 Variation in Frequency of Students' Use of Strategies in the Two

Main Categories According to Location of Universities

Table 6.3   Variation in Frequency of Students' Use of Strategies in the Two Main
Categories According to Location of Universities

Strategy Categories	Location of Universities				Comments	
	Metro-Bangkok (n =266)		Regional (n =830)		Significance Level	Pattern of Variation
	Mean ($\bar{x}$)	S.D.	Mean ($\bar{x}$)	S.D.		
SCT Category	2.28	.55	2.35	.53	N.S.	-
SETC Category	2.27	.55	2.28	.51	N.S.	-

The ANOVA results shown in Table 6.3 demonstrate no significant differences in students' use of strategies in the SCT category and the SETC category according to location of universities. Although the reported use of strategies in these two main categories did not vary significantly according to this variable, the students in the regional area reported slightly greater use of both strategy categories than those studying in Metro-Bangkok. However, in the present study, both the students studying in regional and Metro-Bangkok shared the same tendency of strategy use. That is, they reported employing the reading strategies in the SCT category slightly more frequently than the strategies in the SETC category. The mean frequency scores of the reported strategy use by students studying in Metro-Bangkok, and those in regional for the SCT category were 2.28 and 2.35, while those for the SETC category were 2.27 and 2.28 respectively.

6.3.3 Variation in Frequency of Students' Use of Strategies in the Two

Main Categories According to Field of Study

Table 6.4 Variation in Frequency of Students' Use of Strategies in the Two Main Categories According to Field of Study

Strategy Categories	Field of Study				Comments	
	Health Science (n=385)		Science and Technology (n=711)		Significance Level	Pattern of Variation
	Mean ($\bar{x}$)	S.D.	Mean ($\bar{x}$)	S.D.		
SCT Category	2.41	.55	2.29	.52	p<.01	Health Science> Science and Technology
SETC Category	2.37	.52	2.23	.52	p<.01	Health Science> Science and Technology

Based on the results from ANOVA, Table 6.4 demonstrates that significant differences were found in the use of strategies in both SCT and SETC categories with Health Science students reporting employing the strategies significantly more frequently than Science and Technology students.

6.3.4 Variation in Frequency of Students' Use of Strategies in the Two

Main Categories According to Levels of Reading Proficiency

Table 6.5 Variation in Frequency of Students' Use of Strategies in the Two Main Categories According to Levels of Reading Proficiency

Strategy Categories	Levels of Reading Proficiency						Comments	
	High (n=239)		Moderate (n=644)		Low (n=213)		Significance Level	Pattern of Variation
	($\bar{x}$)	S.D.	($\bar{x}$)	S.D.	($\bar{x}$)	S.D.		
SCT Category	2.49	.53	2.33	.52	2.17	.55	p<.01	High>Moderate>Low
SETC Category	2.40	.50	2.29	.51	2.11	.55	p<.01	High>Moderate>Low

As demonstrated in Table 6.5, based on the results from ANOVA, significant variations in use of SCT and SETC categories have been found according to students' reading proficiency levels, with high-proficiency students reporting employing reading strategies more frequently than those with moderate and low proficiency levels. Similarly, the moderate proficiency students reported employing more frequent use of those strategies than those with low proficiency level. It can also be seen that students from all three levels of reading proficiency reported employing strategies in the SCT category more frequently than those in the SETC category.

6.3.5 Variation in Frequency of Students' Use of Strategies in the Two Main Categories According to High School Background

Table 6.6 Variation in Frequency of Students' Use of Strategies in the Two Main Categories According to High School Background

Strategy Categories	High School Background				Comments	
	State-run School (n=1,005)		Private-run School (n=91)		Significance Level	Pattern of Variation
	Mean ($\bar{x}$)	S.D.	Mean ($\bar{x}$)	S.D.		
SCT Category	2.33	.53	2.40	.57	N.S.	-
SETC Category	2.28	.52	2.31	.57	N.S.	-

The results from ANOVA in Table 6.6 above show significant variations in frequency of students' use of strategies in neither SCT nor SETC category. Despite no variations in the two main categories according to student's high school background, the students who attended private-run schools happened to report slightly greater use of both strategy categories than those who attended state-run schools. On the other hand, in this study, the students from both types of high school background shared the same tendency of strategy use in that they reported employing the strategies in the

SCT category slightly more frequently than those in the SETC category. The mean frequency scores of the reported strategy use by students attending the state-run and private-run schools for the SCT category were 2.33 and 2.40, while those for the SETC category were 2.28 and 2.31, all of which are determined as medium use of strategies.

Table 6.7 Summary of Significant Variations in Frequency of Strategy Use in Both Categories: i.e. SCT, and SETC Categories According to the Five Independent Variables

Strategy Categories	Gender	Location of Universities	Field of Study	Reading Proficiency Levels	High School Background
SCT Category	YES	N.S.	YES	YES	N.S.
SETC Category	YES	N.S.	YES	YES	N.S.

Note: 'YES' means a significant variation exists whereas 'N.S.' stands for not significant

In summary, when looking at the use of strategies in the SCT and SETC categories based on the results of ANOVA, a clearer picture of students' strategy use in this level has been formed. In terms of both SCT category and SETC category strategies, significant variations in frequency of strategy use were found according to gender, field of study, and reading proficiency levels. On the other hand, no significant variations in frequency of students' use of strategies were found according to location of universities or the students' high school background.

6.4 Variation in Use of Strategies for Comprehending Reading Texts (SCT) and for Enhancing Textual Comprehension (SETC) Purposes

As presented in Chapter 4, the strategy inventory for the present study has been classified according to the students' reported employment of strategies to achieve purposes of reading strategy use. There are five purposes classified under two main categories, i.e. SCT and SETC (see Chapter 4, Section 4.4 for detail of the purposes). Three purposes were classified under strategies for comprehending reading texts (SCT) category, i.e. to comprehend reading texts before doing the actual reading (SCTBAR), to comprehend reading texts while doing the actual reading (SCTWAR), and to comprehend reading texts after having done the actual reading (SCTAAR); and other two purposes were classified under strategies for enhancing textual comprehension (SETC) category, i.e. to enhance textual comprehension by solving problems dealing with unknown vocabulary items (SETCUV), and to enhance textual comprehension by retaining knowledge of newly-learned vocabulary items (SETCRV).

In this section, the ANOVA results for use of strategies for comprehending reading texts (SCT) to achieve the SCT purposes, together with those for use of the strategies for enhancing textual comprehension (SETC) to achieve the SETC purposes by the five independent variables are presented in Tables 6.8-6.12.

6.4.1 Variation in Use of Strategies for Comprehending Reading Texts (SCT) and for Enhancing Textual Comprehension (SETC) Purposes According to Gender of Students

The data shown in Table 6.8 provide an overall picture of how male and female students deal with reading in a foreign language. Male and female students seemed to differ slightly in terms of their employment of strategies to achieve the purposes under both SCT and SETC categories. Similar results of frequency of strategy use have been revealed earlier in use of strategies for comprehending reading texts in the SCT category, and strategies for enhancing textual comprehension in the SETC category (Section 6.3). Moreover, male and female students were similar in that they reported low frequency of use of strategies to retain knowledge of newly-learned vocabulary items (SETCRV).

Table 6.8 Variation in Use of Strategies for Comprehending Reading Texts (SCT) and for Enhancing Textual Comprehension (SETC) Purposes According to Gender of Students

Purposes to be Achieved	Gender				Comments	
	Female (n=675)		Male (n=421)		Significance Level	Patterns of Variation
	Mean	S.D.	Mean	S.D.		
SCTBAR	2.45	0.66	2.30	0.75	p<.01	Female>Male
SCTWAR	2.51	0.59	2.32	0.64	p<.01	Female>Male
SCTAAR	2.13	0.68	1.89	0.71	p<.01	Female>Male
SETCUV	2.78	0.59	2.52	0.67	p<.01	Female>Male
SETCRV	1.96	0.59	1.92	0.63	N.S.	-

The ANOVA results in Table 6.8 show significant variations by gender of students in frequency of use of strategies to achieve 3 purposes for comprehending reading texts category (SCT), and one purpose for enhancing textual comprehension category (SETC). Female students reported more frequent use of the strategies to

achieve these purposes than their male counterparts. These purposes are to comprehend reading texts before doing the actual reading (SCTBAR), to comprehend reading texts while doing the actual reading (SCTWAR), to comprehend reading texts after having done the actual reading (SCTAAR), and to enhance textual comprehension by solving problems dealing with unknown vocabulary items (SETCUV).

As shown in the previous section (Section 6.3: Table 6.2), female students reported employing strategies for comprehending reading texts and strategies for enhancing textual comprehension significantly more frequently than male students did. The findings shown in Table 6.8 appear to confirm such a strategy use in a more specific manner, i.e. in terms of purposes that these students reported trying to achieve in doing the actual reading. This strategy use analysis also shows that these students were not different in their employment of strategies to enhance textual comprehension by retaining knowledge of newly-learned vocabulary items.

6.4.2 Variation in Use of Strategies for Comprehending Reading Texts (SCT) and for Enhancing Textual Comprehension (SETC) Purposes According to Location of Universities

The data shown in Table 6.9 provide an overall picture of how students studying in Metro-Bangkok area and those studying in regional area deal with reading in a foreign language. The ANOVA results in Table 6.9 show that only the frequency with which students use SETC strategies aimed at retaining knowledge of newly-learned vocabulary items (SETCRV) shows significant variation. In this case, students studying in regional area reported greater use of the strategies to achieve this purpose than did students studying in Metro-Bangkok area. Although there is a significant

variation, the ANOVA results show that both students studying in Metro-Bangkok and those studying in regional areas reported low frequency of use of such strategies to achieve this purpose (mean frequency scores for students studying in Metro-Bangkok area and those in regional area were 1.88 and 1.97 respectively).

Table 6.9 Variation in Use of Strategies for Comprehending Reading Texts (SCT) and for Enhancing Textual Comprehension (SETC) Purposes According to Location of Universities

Purposes to be Achieved	Location of Universities				Comments	
	Metro-BKK (n =266)		Regional (n =830)		Significance Level	Patterns of Variation
	Mean	S.D.	Mean	S.D.		
SCTBAR	2.37	0.79	2.40	0.66	N.S.	-
SCTWAR	2.38	0.66	2.46	0.60	N.S.	-
SCTAAR	1.94	0.73	2.06	0.69	N.S.	-
SETCUV	2.74	0.66	2.66	0.63	N.S.	-
SETCRV	1.88	0.69	1.97	0.58	$p<.05$	Region>Metro-BKK

An overall picture of students' reported strategy use in order to achieve both SCT and SETC purposes reveals that both students studying in Metro-Bangkok and those studying in regional areas appeared to report a similar level of frequency of strategy (medium or low). It can be seen that students studying in the regional area reported slightly more frequent use of strategies in order to achieve almost every purpose except to enhance textual comprehension by solving problems dealing with unknown vocabulary items (SETCUV), whereas students studying in Metro-Bangkok area reported slightly higher use of the strategies in order to achieve this purpose.

6.4.3 Variation in Use of Strategies for Comprehending Reading Texts (SCT) and for Enhancing Textual Comprehension (SETC) Purposes According to Field of Study

The data shown in Table 6.10 provide an overall picture of how Health Science, and Science and Technology students deal with reading in a foreign language. Health Science, and Science and Technology students seemed to differ slightly in terms of their employment of strategies to achieve both SCT and SETC purposes. Similar results of frequency of strategy use have been revealed earlier in use of strategies for comprehending reading texts in the SCT category, and strategies for enhancing textual comprehension in the SETC category (Section 6.3). Moreover, Health Science, and Science and Technology students were similar in that they reported low frequency of use of strategies to enhance textual comprehension by retaining knowledge of newly-learned vocabulary items (SETCRV).

Table 6.10 Variation in Use of Strategies for Comprehending Reading Texts (SCT) and for Enhancing Textual Comprehension (SETC) Purposes According to Field of Study

| Purposes to be Achieved | Field of Study | | | | Comments | |
| | Health Science (n=385) | | Science and Technology (n=711) | | Significance Level | Patterns of Variation |
	Mean	S.D.	Mean	S.D.		
SCTBAR	2.45	0.71	2.36	0.69	p<.05	Health > Technology
SCTWAR	2.54	0.60	2.38	0.62	p<.01	Health > Technology
SCTAAR	2.12	0.74	1.99	0.68	p<.01	Health > Technology
SETCUV	2.81	0.61	2.61	0.64	p<.01	Health > Technology
SETCRV	1.99	0.62	1.92	0.60	N.S.	-

The ANOVA results in Table 6.10 show significant variations by field of study in frequency of use of strategies to achieve 3 purposes for comprehending

reading texts category (SCT), and one purpose for enhancing textual comprehension category (SETC). Health Science students reported more frequent use of the strategies to achieve these purposes than did Science and Technology students. These purposes are to comprehend reading texts before doing the actual reading (SCTBAR), to comprehend reading texts while doing the actual reading (SCTWAR), to comprehend reading texts after having done the actual reading (SCTAAR), and to enhance textual comprehension by solving problems dealing with unknown vocabulary items (SETCUV).

As shown in the previous section (Section 6.3: Table 6.4), Health Science students reported employing strategies for comprehending reading texts and strategies for enhancing textual comprehension significantly more frequently than Science and Technology students did. The findings shown in Table 6.10 appear to confirm such a strategy use in a more specific manner, i.e. in terms of purposes that these students reported trying to achieve in doing the actual reading. This strategy use analysis also shows that these students were not different in their employment of strategies to enhance textual comprehension by retaining knowledge of newly-learned vocabulary items.

6.4.4 Variation in Use of Strategies for Comprehending Reading Texts (SCT) and for Enhancing Textual Comprehension (SETC) Purposes According to Levels of Reading Proficiency

The results of ANOVA in Table 6.11 reveal significant variations by levels of reading proficiency in frequency of use of strategies to achieve all 3 purposes for comprehending reading texts category, and both of two purposes for enhancing textual comprehension category. High proficiency students reported more frequent

use of the strategies to achieve these purposes than did both moderate and low proficiency students. These purposes are to comprehend reading texts before doing the actual reading (SCTBAR), to comprehend reading texts while doing the actual reading (SCTWAR), to comprehend reading texts after having done the actual reading (SCTAAR), to enhance textual comprehension by solving problems dealing with unknown vocabulary items (SETCUV), and to enhance textual comprehension by retaining knowledge of newly-learned vocabulary items (SETCRV). The findings shown in Table 6.11 appear to confirm the results found in the previous section (Section 6.3: Table6.5).

Table 6.11 Variation in Use of Strategies for Comprehending Reading Texts (SCT) and for Enhancing Textual Comprehension (SETC) Purposes According to Levels of Reading Proficiency

Purposes to be Achieved	Levels of Reading Proficiency						Comments	
	High (n=239)		Moderate (n=644)		Low (n=213)		Significance Level	Patterns of Variation
	($\bar{x}$)	S.D.	($\bar{x}$)	S.D.	($\bar{x}$)	S.D.		
SCTBAR	2.56	0.71	2.39	0.69	2.20	0.65	p<.01	High > Moderate High > Low Moderate > Low
SCTWAR	2.58	0.61	2.45	0.60	2.26	0.64	p<.01	High > Moderate High > Low Moderate > Low
SCTAAR	2.18	0.75	2.02	0.69	1.93	0.67	p<.01	High > Moderate High > Low Moderate > Low
SETCUV	2.86	0.60	2.70	0.61	2.40	0.67	p<.01	High > Moderate High > Low Moderate > Low
SETCRV	2.02	0.61	1.95	0.61	1.87	0.58	p<.05	High > Moderate High > Low Moderate > Low

6.4.5 Variation in Use of Strategies for Comprehending Reading Texts (SCT) and for Enhancing Textual Comprehension (SETC)

Purposes According to High School Background

The data shown in Table 6.12 provide an overall picture of how students who attended state-run schools and those who attended private-run schools deal with reading in a foreign language. The ANOVA results in Table 6.12 show that only the frequency with which students use SCT strategies aimed at comprehending the texts before doing the actual reading (SCTBAR) shows significant variation. In this case, the students who attended private-run schools reported greater use of the strategies to achieve this purpose than did those attended state-run schools. Although there is a significant variation, the ANOVA results show that both students attended state-run schools and those attended private-run schools reported medium frequency of use of the strategies to achieve this purpose.

Table 6.12 Variation in Use of Strategies for Comprehending Reading Texts (SCT) and for Enhancing Textual Comprehension (SETC) Purposes According to High School Background

Purposes to be Achieved	High School Background				Comments	
	State-run School (n=1,005)		Private-run School (n=91)		Significance Level	Pattern of Variation
	Mean	S.D.	Mean	S.D.		
SCTBAR	2.38	0.69	2.55	0.73	p<.05	Private>State
SCTWAR	2.44	0.61	2.47	0.69	N.S.	-
SCTAAR	2.04	0.70	2.00	0.73	N.S.	-
SETCUV	2.67	0.63	2.76	0.70	N.S.	-
SETCRV	1.95	0.60	1.96	0.64	N.S.	-

An overall picture of students' reported strategy use in order to achieve both strategies for comprehending reading texts and strategies for enhancing textual comprehension purposes reveals that both students attended state-run schools and those who attended private-run schools appeared to report a similar level of frequency

of strategy use, i.e. moderate or low. Taking a closer look at the mean frequency scores of use of these strategies, it can be seen that students attended private-run schools reported slightly more frequent use of strategies in order to achieve almost every purpose except to comprehend reading texts after having done the actual reading (SCTAAR)—students attended state-run schools reported slightly higher use of the strategies in order to achieve this purpose (mean frequency scores were 2.04 and 2.00 respectively).

In conclusion, an analysis of variance (ANOVA) at the 'purpose' of reading strategy use level presents an overall picture as to how each variable affects or relates to students' use of strategies in order to achieve both SCT and SETC purposes. Table 6.13 shows the summary of students' frequency of strategy use in order to achieve SCT and SETC purposes in association with the five variables for the present study. It reveals that four purposes of strategy use varied significantly with regards to gender and field of study, one purpose according to location of universities and high school background, and all five purposes were found to vary significantly according to students' levels of reading proficiency.

Table 6.13 Summary of Significant Variations in Use of Strategies for Comprehending Reading Texts (SCT) and for Enhancing Textual Comprehension (SETC) Purposes by the Five Variables

Purposes	Variables				
	Gender	**Location of Universities**	**Field of Study**	**Reading Proficiency**	**High School Background**
SCTBAR	YES	N.S.	YES	YES	YES
SCTWAR	YES	N.S.	YES	YES	N.S.
SCTAAR	YES	N.S.	YES	YES	N.S.
SETCUV	YES	N.S.	YES	YES	N.S.
SETCRV	N.S.	YES	N.S.	YES	N.S.

Note: A Significant variation is specified with 'YES' and non-significant is labeled with 'N.S.'.

6.5 Variation in Use of Individual Reading Strategies

Sections 6.2, 6.3, and 6.4 discussed significant variations in frequency of students' overall strategy use across the entire survey, including use of strategies in the two main categories and use of strategies to achieve both SCT and SETC purposes. In this section, the results of the chi-square tests used to determine patterns of the significant variations in student's reported strategy use at the individual strategy item level are demonstrated. The purpose of using the chi-square tests was to check all of the individual strategy items for significant variations by the five independent variables. The percentage of students' reporting high use of reading strategies (3 and 4 in the reading strategy questionnaire), and the observed chi-square ($\chi2$) value were employed in order to demonstrate the strength of variation in use of each individual strategy. The individual strategies were presented here in order of the percentage of students reporting high use (3 and 4 in the reading strategy questionnaire), ranking from highest to lowest. This leads to easier understanding a picture of the reading strategies which were reported being frequently used, analysed in terms of each of the five variables. What follow are patterns of significant variations in students' reported use of individual reading strategies according to the five variables, including a brief discussion of each of the variables.

6.5.1 Variation in Students' Reported Use of Individual Reading Strategies According to the Gender of Students

As mentioned previously in Sections 6.2 and 6.3, significant variations in frequency of students' overall strategy use, use of strategies in the two main categories, varied according to the gender of students. In this section, the individual reading strategies are emphasized in terms of variations in frequency of use, as well as the patterns of variation of reading strategy use. The results of chi-square tests shown in Table 6.14 reveal that more than half of the reading strategies in the reading strategy inventory (23 out of 39) varied significantly according to this variable.

Table 6.14 Variation in Students' Reported Use of Individual Reading Strategies According to the Gender of Students

Individual Reading Strategy	% of high use (3 or 4)		Observed $\chi2$
Used more by *female students* – 23 strategies	Females	Males	
SETCUV1: Guessing the meaning of a new vocabulary item with or without looking at the context to enhance textual comprehension	74.4	65.3	$\chi2 = 10.29**$
SETCUV 4: Looking up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai to enhance textual comprehension	69.8	47.5	$\chi2 = 54.18***$
SETCUV 3: Looking up the meaning of a new vocabulary item from electronic resources e.g. talking dictionary, dictionary program in a computer, and the Internet to enhance textual comprehension	69.5	50.4	$\chi2 = 40.31***$
SCTWAR 8: Highlighting important information or difficult vocabulary items by underlining to comprehend reading text while doing the actual reading	68.4	48.7	$\chi2 = 42.46***$

Table 6.14 (Cont.) Variation in Students' Reported Use of Individual Reading Strategies According to the Gender of Students

Individual Reading Strategy	% of high use (3 or 4)		Observed $\chi2$
Used more by *female students* – 23 strategies	Females	Males	
SCTBAR 5: Looking at pictures/charts/tables/ figures that appear in the text to comprehend reading text	65.9	59.6	$\chi2 = 4.45*$

before doing the actual reading			
SCTBAR 11: Predicting what might happen in the text to comprehend reading text before doing the actual reading	63.3	57.0	χ2 = 4.26*
SCTWAR 5: Rereading certain part(s) of the text to comprehend the text while doing the actual reading	59.0	49.4	χ2 = 9.58**
SCTWAR 6: Reading certain part(s) of the text slowly to comprehend the text while doing the actual reading	59.0	48.2	χ2 = 12.09**
SCTWAR 1: Searching for the meanings of new vocabulary items to comprehend the text while doing the actual reading	57.6	46.6	χ2 = 12.78***
SCTBAR 2: Reading the title of the text to comprehend the text before doing the actual reading	54.5	43.5	χ2 = 12.67***
SETCUV 5: Appealing for assistance from other people about the meaning of a new vocabulary item to enhance textual comprehension	52.9	39.2	χ2 = 19.50***
SCTWAR 9: Highlighting important information or difficult vocabulary items by making symbol(s) to comprehend the text while doing the actual reading	52.7	43.7	χ2 = 8.47**
SCTBAR 6: Looking at questions about the text (if any) to comprehend reading text before doing the actual reading	50.5	40.9	χ2 = 9.73**
SCTAAR 1: Searching for the meanings of new vocabulary items to comprehend the text after having done the actual reading	50.5	39.2	χ2 = 13.38***
SCTWAR 10: Thinking about the meaning of the reading text in Thai to comprehend the text while doing the actual reading	49.9	37.5	χ2 = 16.09***
SCTBAR 3: Going through the text quickly to comprehend the text before doing the actual reading	49.8	39.7	χ2 = 10.67**
SCTBAR 9: Reading the abstract or introductory part to comprehend the text before doing the actual reading	41.8	34.2	χ2 = 6.26*
SCTWAR 11: Making a summary of certain part(s) of the reading text in either Thai or English, or both to comprehend the text while doing the actual reading	39.3	29.7	χ2 = 10.36**

Table 6.14 (Cont.) Variation in Students' Reported Use of Individual Reading Strategies According to the Gender of Students

Individual Reading Strategy	% of high use (3 or 4)		Observed χ2
Used more by *female students* – 23 strategies	Females	Males	
SCTAAR 6: Translating the reading text into Thai using Thai script to comprehend the text after	38.1	24.5	χ2 = 21.77***

having done the actual reading			
SCTBAR 1: Searching for the meanings of new vocabulary items to comprehend the text before doing the actual reading	37.8	28.0	χ2 = 10.98**
SCTAAR 5: Reviewing one's own notes to comprehend the text after having done the actual reading	34.8	23.8	χ2 = 14.95***
SCTAAR 2: Discussing the reading text with classmate(s) or friend(s) to comprehend the text after having done the actual reading	24.6	17.8	χ2 = 6.94**
SCTAAR 3: Making a summary of the whole reading text to comprehend the text after having done the actual reading	23.7	15.2	χ2 = 11.53**

Note: * p<.05, ** p<.01, *** p<.001

The results from the chi-square tests in Table 6.14 reveal the significant variation in students' use of individual reading strategies in terms of students' gender, with a greater percentage of female students than male students reporting high use of 23 strategies. For all of the 23 strategies which significant differences were found according to gender, fourteen strategies were reported with high frequency of use by more than fifty percent of the female students.

Table 6.14 demonstrates that a greater percentage of the female students than did their male counterparts reported using either English-English or English-Thai dictionaries (SETCUV4), and using electronic resources e.g. Talking dictionary, dictionary program in a computer, and the Internet (SETCUV 3) to discover the meanings of new vocabulary items. Female students also reported employing strategies to enhance textual comprehension by solving problems dealing with unknown vocabulary items significantly more frequently than did their male counterparts. Examples are guessing the meaning of a new vocabulary item with or

without looking at the context (SETCUV 1), and appealing for assistance from other people about the meaning of a new vocabulary item (SETCUV 5).

Furthermore, female students reported employing strategies for comprehending reading texts significantly more frequently than did their male counterparts, such as searching for the meanings of new vocabulary items to comprehend reading text before doing the actual reading (SCTBAR1); predicting what might happen in the text to comprehend reading text before doing the actual reading (SCTBAR11); thinking about the meaning of the reading text in Thai to comprehend reading text while doing the actual reading (SCTWAR10); making a summary of certain part(s) of the reading text in either Thai or English, or both to comprehend reading text while doing the actual reading (SCTWAR11); discussing the reading text with classmate(s) or friend(s) to comprehend reading text after having done the actual reading (SCTAAR2); and making a summary of the whole reading text to comprehend reading text after having done the actual reading (SCTAAR3).

6.5.2 Variation in Students' Reported Use of Individual Reading Strategies According to the Location of Universities

In this section, the individual reading strategies are considered regarding the variations in frequency of use, and patterns of strategy use based on the results from the chi-square tests as shown in Table 6.15 below. The results of ANOVA reported in the previous sections (Sections 6.2 and 6.3) show no significant variations in frequency of students' overall strategy use, and use of strategies in the two main categories, according to the location of universities. On the other hand, the results of chi-square tests show significant variation in use of nine individual reading strategies by this variable.

Table 6.15 Variation in Students' Reported Use of Individual Reading Strategies
According to the Location of Universities

Individual Reading Strategy	% of high use (3 or 4)		Observed χ^2
Used more by students studying in *Metro-Bangkok*– 3 strategies	Metro-BKK	Regional	
SETCUV 3: Looking up the meaning of a new vocabulary item from electronic resources e.g. Talking dictionary, dictionary program in a computer, and the Internet to enhance textual comprehension	72.6	58.8	$\chi^2 = 16.21$***
SCTAAR 2: Discussing the reading text with classmate(s) or friend(s) to comprehend reading texts after having done the actual reading	56.8	48.2	$\chi^2 = 5.92$*
SETCRV 3: Reciting vocabulary items in rhymes to enhance textual comprehension	22.6	17.0	$\chi^2 = 4.17$*
Individual Reading Strategy	**% of high use (3 or 4)**		**Observed χ^2**
Used more by students studying in *Regional*– 6 strategies	Regional	Metro-BKK	
SCTWAR 8:Highlighting important information or difficult vocabulary items by underlining to comprehend reading text while doing the actual reading	63.6	52.3	$\chi^2 = 10.91$**
SCTWAR 10:Thinking about the meaning of the reading text in Thai to comprehend reading text while doing the actual reading	47.3	38.3	$\chi^2 = 6.59$*
SCTBAR 8: Thinking of one's background knowledge about the text to comprehend reading text before doing the actual reading	42.2	33.8	$\chi^2 = 5.82$*
SCTBAR 10: Looking for the parallel article(s) in Thai (if any) to comprehend reading text before doing the actual reading	36.3	29.3	$\chi^2 = 4.29$*
SCTWAR 3: Taking notes the important information to comprehend reading text while doing the actual reading	35.9	24.4	$\chi^2 = 11.96$**
SCTAAR 6: Translating the reading text into Thai using Thai script to comprehend reading text after having done the actual reading	34.6	27.4	$\chi^2 = 4.65$*

Note: * p<.05, ** p<.01, *** p<.001

The results of the chi-square tests in Table 6.15 show significant variations in use of individual reading strategies in terms of location of universities, with a greater percentage of students studying in Metro-Bangkok area than those studying in

regional area reporting high use of three reading strategies (one from SCT Category and another two from SETC Category). In terms of employing strategies for comprehending reading texts, slightly more than half of students in Metro-BKK reported a high frequency level of use of SCTAAR 2—discussing the reading text with classmate(s) or friend(s) in order to comprehend the text after having done the actual reading. Furthermore, almost three quarters of students in Metro-BKK reported a high frequency level of use of SETCUV 3—looking up the meaning of a new vocabulary item from electronics resources to enhance textual comprehension. While less than half of students in Metro-BKK reported a high frequency level of use of SETCRV 3—reciting vocabulary items in rhymes to enhance textual comprehension.

A greater percentage of students studying in the regional area than those studying in Metro-Bangkok area reported high use of six strategies. The results of the chi-square tests show that the strategy which more than half of the students studying in the regional area reported employing at a high use level was SCTWAR 8—highlighting important information or difficult vocabulary items by underlining to comprehend reading text while doing the actual reading. The results presented in Table 6.15 reveal that a greater percentage of students studying in the regional area than those studying in the Metro-Bangkok reported employing all five strategies from SCT category (SCTWAR 8, SCTWAR 10, SCTBAR 8, SCTBAR 10, SCTWAR 3, and SCTAAR 6). In all, of the nine strategies for which significant differences were found according to this variable, three had a high reported frequency of use by more than fifty percent of the students.

6.5.3 Variation in Students' Reported Use of Individual Reading Strategies According to the Field of Study

This section presents the individual reading strategies regarding variations in frequency of use, and patterns of variation of use based on the results of the chi-square tests as shown in Table 6.16. The results of the chi-square tests reveal that more than half of the reading strategies in the strategy inventory (24 out of 39) varied significantly according to field of study. What follows is variation in students' individual reading strategy use according to this variable.

Table 6.16 Variation in Students' Reported Use of Individual Reading Strategies According to the Field of Study

Individual Reading Strategy	% of high use (3 or 4)		Observed χ^2
Used more by *Health-Science* students– 24 strategies	Health-Science	Science and Technology	
SETCUV 1: Guessing the meaning of a new vocabulary item with or without looking at the context to enhance textual comprehension	75.6	68.4	$\chi^2 = 6.33*$
SETCUV 4: Looking up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai to enhance textual comprehension	70.9	56.0	$\chi^2 = 23.46***$
SCTWAR 4: Guessing the meaning of the text from context to comprehend reading text while doing the actual reading	69.9	63.0	$\chi^2 = 5.20*$
SETCUV 3: Looking up the meaning of a new vocabulary item from electronic resources e.g. Talking dictionary, dictionary program in a computer, and the Internet to enhance textual comprehension	67.8	59.1	$\chi^2 = 8.07**$
SCTWAR 8: Highlighting important information or difficult vocabulary items by underlining to comprehend reading text while doing the actual reading	66.0	58.1	$\chi^2 = 6.52*$
SCTWAR 5: Rereading certain part(s) of the text to comprehend reading text while doing the actual reading	62.9	51.2	$\chi^2 = 13.74***$
SCTWAR 6:Reading certain part(s) of the text slowly to comprehend reading text while doing the actual reading	60.8	51.6	$\chi^2 = 8.47**$

Table 6.16 (Cont.) Variation in Students' Reported Use of Individual Reading Strategies According to the Field of Study

Individual Reading Strategy	% of high use (3 or 4)		Observed χ^2
Used more by *Health-Science* students– 24 strategies	Health-Science	Science and Technology	
SCTBAR 7: Scanning for main ideas to comprehend reading text before doing the actual reading	59.5	51.2	$\chi^2 = 6.90**$

SCTBAR 2: Reading the title of the text to comprehend reading text before doing the actual reading	56.1	47.1	$\chi2 = 8.07$**
SETCUV 5: Appealing for assistance from other people about the meaning of a new vocabulary item to enhance textual comprehension	55.3	43.5	$\chi2 = 14.10$***
SCTBAR 6: Looking at questions about the text (if any) to comprehend reading text before doing the actual reading	54.0	42.9	$\chi2 = 12.42$***
SCTBAR 3: Going through the text quickly to comprehend reading text before doing the actual reading	52.7	42.2	$\chi2 = 11.16$**
SCTWAR 10: Thinking about the meaning of the reading text in Thai to comprehend reading text while doing the actual reading	49.4	42.9	$\chi2 = 4.20$*
SCTWAR 7: Avoiding a difficult part to comprehend reading text while doing the actual reading	45.2	38.0	$\chi2 = 5.40$*
SCTBAR 9: Reading the abstract or introductory part to comprehend reading text before doing the actual reading	43.1	36.6	$\chi2 = 4.51$*
SCTWAR 11: Making a summary of certain part(s) of the reading text in either Thai or English, or both to comprehend reading text while doing the actual reading	42.1	32.1	$\chi2 = 10.91$**
SCTAAR 6: Translating the reading text into Thai using Thai script to comprehend the text after having done the actual reading	38.2	30.0	$\chi2 = 7.67$**
SCTWAR 3: Taking notes the important information to comprehend reading text while doing the actual reading	37.4	30.8	$\chi2 = 4.91$*
SCTAAR 5: Reviewing one's own notes to comprehend the text after having done the actual reading	36.6	27.3	$\chi2 = 10.26$**
SCTAAR 4: Retelling oneself or other people about what has been read to comprehend the text after having done the actual reading	27.0	19.7	$\chi2 = 7.74$**
SCTAAR 2: Discussing the reading text with classmate(s) or friend(s) to comprehend the text after having done the actual reading	25.7	20.0	$\chi2 = 4.80$*
SCTAAR 3: Making a summary of the whole reading text to comprehend the text after having done the actual reading	24.2	18.4	$\chi2 = 5.05$*
SETCRV 1: Using new vocabulary items to converse with classmates and friends to enhance textual comprehension	21.6	16.0	$\chi2 = 5.17$*
SETCRV 6: Tutoring one's classmate(s) or friend(s) about what was learnt in the reading class to enhance textual comprehension	16.1	11.5	$\chi2 = 4.57$*

Note: * p<.05, ** p<.01, *** p<.001

The results of the chi-square tests presented in Table 6.16 above show the significant variations in use of individual reading strategies in terms of field of study. The majority of Health Science students reported a greater use of 24 out of 39 reading strategies than did the Science and Technology students. The variations in students'

individual reading strategy reported with high frequency of use according to this variable demonstrate that Health Science students reported employing some strategies in order to comprehend the text before doing the actual reading more frequently than did the Science and Technology students. Examples are reading the title of the text (SCTBAR 2), going through the text quickly (SCTBAR 3), looking at questions about the text (if any) (SCTBAR 6), scanning for main ideas (SCTBAR 7), and reading the abstract or introductory part (SCTBAR 9). They also reported employing strategies to comprehend the text while doing the actual reading more frequently than did the Science and Technology students. Examples are taking notes the important information (SCTWAR 3), guessing the meaning of the text from context or other techniques (SCTWAR 4), rereading certain part(s) of the text (SCTWAR 5), reading certain part(s) of the text slowly (SCTWAR 6), avoiding a difficult part (SCTWAR 7), and highlighting important information or difficult vocabulary items by underlining (SCTWAR 8).   Some strategies, such as discussing the reading text with classmate(s) or friend(s) (SCTAAR2); making a summary of the whole reading text (SCTAAR 3); retelling oneself or other people about what has been read (SCTAAR 4); reviewing one's own notes (SCTAAR 5); and translating the reading text into Thai using Thai script (SCTAAR 6), were reported employing to comprehend the text after having done the actual reading more frequently by Health Science students than did the Science and Technology students.

In addition to the strategies which were employed for comprehending reading texts, Health Science students reported employing SETCUV 1 (Guessing the meaning of a new vocabulary item with or without looking at the context to enhance textual comprehension), SETCUV 3 (Looking up the meaning of a new vocabulary item from

electronic resources e.g. Talking dictionary, dictionary program in a computer, and the Internet to enhance textual comprehension), SETCUV 4 (Looking up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai to enhance textual comprehension), and SETCUV 5 (Appealing for assistance from other people about the meaning of a new vocabulary item to enhance textual comprehension) more frequently than did the Science and Technology students. Similarly, Health Science students also reported employing SETCRV 1 (Using new vocabulary items to converse with classmates and friends), and SETCRV 6 (Tutoring one's classmate(s) or friend(s) about what was learnt in the reading class) in order to enhance textual comprehension by retaining knowledge of newly-learned vocabulary items significantly more frequently than did the Science and Technology students.

6.5.4 Variation in Students' Reported Use of Individual Reading Strategies According to Levels of Reading Proficiency

As mentioned earlier in Sections 6.2 and 6.3, frequency of overall use, and use of strategies in both main categories, varied significantly according to students' reading proficiency levels. This section considers the individual reading strategies regarding variations in frequency of use, and patterns of variations. The results of the chi-square tests reveal that 28 out of 39 strategies varied significantly according to this variable. When compared with the other four variables, this variable seems to have the strongest relationships with students' choices of strategy use, with a larger proportion of significant variations in students' use of individual strategies across the strategy inventory found to be related to their reading proficiency levels. Oxford and Green (1995) suggested that the pattern of variation in terms of level of reading proficiency may be positive (used more by higher-proficiency students), negative (use

more by lower-proficiency students), or mixed. Of the 28 individual strategies showing significant variations, all of them are classified as positive. No individual strategies show neither a negative pattern of variation nor mixed in the present study. The students with high reading proficiency reported a greater percentage of high use of all 28 out of 39 reading strategies across the strategy questionnaire than did the low reading proficiency students. Similarly, a greater percentage of the moderate than the low reading proficiency students reported high use of all these 28 strategies.

To give a clearer picture of the patterns of variation according to this variable, an example of stacked bar graph illustrating the classification by stair-step patterns is provided later. Table 6.17 demonstrates the variations in students' individual reading strategy use according to levels of reading proficiency.

Table 6.17 Variation in Students' Reported Use of Individual Reading Strategies According to Levels of Reading Proficiency

Individual Reading Strategy	% of high use (3 or 4)			Observed $\chi 2$
Used more by *high reading proficiency* students– Positive 28 strategies	High	Moderate	Low	

Individual Reading Strategy	High	Moderate	Low	Observed χ2
SETCUV 1: Guessing the meaning of a new vocabulary item with or without looking at the context to enhance textual comprehension	81.6	71.9	55.9	$\chi 2 = 36.87^{***}$
SCTWAR 4: Guessing the meaning of the text from context to comprehend reading text while doing the actual reading	76.2	66.3	50.7	$\chi 2 = 32.78^{***}$
SETCUV 3: Looking up the meaning of a new vocabulary item from electronic resources e.g. Talking dictionary, dictionary program in a computer, and the Internet to enhance textual comprehension	71.5	64.9	43.2	$\chi 2 = 43.59^{***}$
SCTWAR 5: Rereading certain part(s) of the text to comprehend reading text while doing the actual reading	71.1	55.9	35.7	$\chi 2 = 57.49^{***}$
SCTWAR 6: Reading certain part(s) of the text slowly to comprehend reading text while doing the actual reading	70.7	54.8	37.1	$\chi 2 = 51.41^{***}$
SETCUV 4: Looking up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai to enhance textual comprehension	66.1	65.7	42.3	$\chi 2 = 40.09^{***}$
SCTBAR 7: Scanning for main ideas to comprehend reading text before doing the actual reading	65.3	54.0	41.8	$\chi 2 = 25.03^{***}$
SCTBAR 2: Reading the title of the text to comprehend reading text before doing the actual reading	64.9	50.8	32.4	$\chi 2 = 47.62^{***}$
SCTWAR 1: Searching for the meanings of new vocabulary items to comprehend reading text while doing the actual reading	64.4	53.9	39.4	$\chi 2 = 28.44^{***}$
SETCUV 2: Looking at the root of a new vocabulary to enhance textual comprehension	64.4	55.1	50.2	$\chi 2 = 9.97^{**}$
SCTBAR 6: Looking at questions about the text (if any) to comprehend reading text before doing the actual reading	61.9	45.7	33.3	$\chi 2 = 37.81^{***}$
SCTBAR 3: Going through the text quickly to comprehend reading text before doing the actual reading	60.3	47.8	23.9	$\chi 2 = 62.14^{***}$

Table 6.17 (Cont.) Variation in Students' Reported Use of Individual Reading Strategies According to Levels of Reading Proficiency

Individual Reading Strategy	% of high use (3 or 4)			Observed χ2
Used more by *high reading proficiency* students– Positive 28 strategies	High	Moderate	Low	

Individual Reading Strategy	High	Moderate	Low	Observed χ^2
SCTAAR 1: Searching for the meanings of new vocabulary items to comprehend the text after having done the actual reading	56.1	45.7	36.6	$\chi^2 = 17.31^{***}$
SETCUV 5: Appealing for assistance from other people about the meaning of a new vocabulary item to enhance textual comprehension	53.6	48.9	37.1	$\chi^2 = 13.28^{**}$
SCTBAR 8: Thinking of one's background knowledge about the text to comprehend reading text before doing the actual reading	47.3	39.0	35.7	$\chi^2 = 7.20^{*}$
SCTBAR 9: Reading the abstract or introductory part to comprehend reading text before doing the actual reading	47.3	39.3	28.2	$\chi^2 = 17.43^{***}$
SCTBAR 1: Searching for the meanings of new vocabulary items to comprehend reading text before doing the actual reading	46.4	34.3	19.2	$\chi^2 = 37.16^{***}$
SCTWAR 11: Making a summary of certain part(s) of the reading text in either Thai or English, or both to comprehend reading text while doing the actual reading	42.3	35.2	29.1	$\chi^2 = 8.58^{*}$
SCTAAR 5: Reviewing one's own notes to comprehend the text after having done the actual reading	38.9	29.5	24.4	$\chi^2 = 11.99^{**}$
SCTAAR 6: Translating the reading text into Thai using Thai script to comprehend the text after having done the actual reading	38.9	32.3	27.7	$\chi^2 = 6.63^{*}$
SETCRV 4: Associating real objects with vocabulary items to enhance textual comprehension	38.9	30.6	20.7	$\chi^2 = 17.72^{***}$
SETCRV 2: Memorising new words with or without a list to enhance textual comprehension	36.0	32.8	22.5	$\chi^2 = 10.64^{**}$
SCTBAR 10: Looking for the parallel article(s) in Thai (if any) to comprehend reading text before doing the actual reading	35.6	35.4	31.0	$\chi^2 = 1.51^{*}$
SCTAAR 2: Discussing the reading text with classmate(s) or friend(s) to comprehend the text after having done the actual reading	29.3	20.3	18.8	$\chi^2 = 9.72^{**}$
SCTAAR 4: Retelling oneself or other people about what has been read to comprehend the text after having done the actual reading	28.5	21.3	18.3	$\chi^2 = 7.58^{*}$

Table 6.17 (Cont.) Variation in Students' Reported Use of Individual Reading Strategies According to Levels of Reading Proficiency

Individual Reading Strategy	% of high use (3 or 4)			Observed χ^2
Used more by *high reading proficiency* students– Positive 28 strategies	High	Moderate	Low	

SETCRV 5:Associating the sound of a Thai word with that of a new English vocabulary item to enhance textual comprehension	28.1	28.0	16.4	χ2 = 11.96**
SCTAAR 3: Making a summary of the whole reading text to comprehend the text after having done the actual reading	27.2	19.4	16.0	χ2 = 9.76**
SETCRV 3: Reciting vocabulary items in rhymes to enhance textual comprehension	23.8	18.2	12.7	χ2 = 9.42**

Note: * p<.05, ** p<.01, *** p<.001

Of the 28 strategies with significant differences in terms of students' levels of reading proficiency, fourteen strategies were reported with high frequency of use by more than 50 percent of the high reading proficiency students, whereas ten strategies were reported with high frequency of use by more than 50 percent of the moderate reading proficiency students, and only three strategies were reported with high frequency of use by more than 50 percent of the low reading proficiency students. The rest were reported with high proficiency of use by less than half of the students.

As shown in Table 6.17, the strategies which show a positive pattern of variation are strategies from both two main categories. This implies that good language learners, as high reading proficiency students reported employing reading strategies significantly more frequently than did poor language learners (moderate and low reading proficiency students). This is similar to the results of ANOVA which show that students with different reading proficiency levels do show significant differences in frequency of use of both two main category strategies.

The positive pattern of variation in students' individual reading strategies with high frequency of use according to levels of reading proficiency reveals that the high reading proficiency students reported employing strategies under each of both two main categories higher than both did the moderate and the low reading proficiency

students. Examples are SCTBAR 1 (Searching for the meanings of new vocabulary items to comprehend the text before doing the actual reading), SCTBAR 2 (Reading the title of the text to comprehend the text before doing the actual reading), SCTBAR 3 (Going through the text quickly to comprehend the text before doing the actual reading), SCTWAR 4 (Guessing the meaning of the text from context or other techniques to comprehend the text while doing the actual reading), SCTWAR 5 (Rereading certain part(s) of the text to comprehend the text while doing the actual reading), SCTWAR 6 (Reading certain part(s) of the text slowly to comprehend the text while doing the actual reading), SCTAAR 1 (Searching for the meanings of new vocabulary items to comprehend the text after having done the actual reading), SCTAAR 2 (Discussing the reading text with classmate(s) or friend(s) to comprehend the text after having done the actual reading), SCTAAR 3 (Making a summary of the whole reading text to comprehend the text after having done the actual reading), SETCUV 1 (Guessing the meaning of a new vocabulary item with or without looking at the context to enhance textual comprehension), SETCUV 2 (Looking at the root of a new vocabulary to enhance textual comprehension), SETCRV 3 (Reciting vocabulary items in rhymes to enhance textual comprehension), and SETCRV 5 (Associating the sound of a Thai word with that of a new English vocabulary item to enhance textual comprehension). The stacked bar graph in Figure 6.2 illustrates an example of a positive pattern of variation.
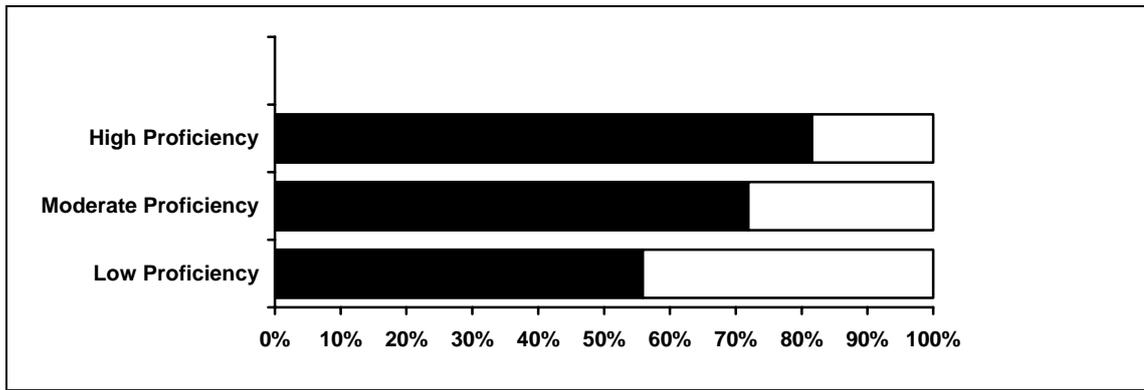
	(Darker areas) 'Usually' or 'Always or almost always'			(White areas) 'Never' or 'Sometimes'	
	n	**Response**	**(%)**	**Response**	**(%)**
High Proficiency	239	195	81.6	44	18.4
Moderate Proficiency	644	463	71.9	181	28.1
Low Proficiency	213	119	55.9	94	44.1

Note: $\chi 2 = 36.87$ (df = 2), p< .001

Figure 6.2 Example of Variation Pattern Classified as Positive (High > Moderate > Low)

SETCUV1: **Guessing the meaning of a new vocabulary item with or without looking at the context to enhance textual comprehension by solving problems dealing with unknown vocabulary items**

Figure 6.2 shows that 81.6 percent of high reading proficiency students reported high frequency of use of SETCUV 1: guessing the meaning of a new vocabulary item with or without looking at the context in order to enhance textual comprehension by solving problems dealing with unknown vocabulary items; whereas, 71.9 and 55.9 percent of moderate and low reading proficiency students reported high frequency of use of this reading strategy.

6.5.5 Variation in Students' Reported Use of Individual Reading Strategies According to High School Background

This section demonstrates the individual reading strategies regarding variations in frequency use and patterns of variation of use based on the results of chi-square tests as shown in Table 6.18 below. The results of ANOVA presented in the former section do not show any significant variations in frequency of students' use of strategies in relation to 'high school background'. However, at the individual strategy level, the chi-square tests show significant variations in use of seven out of thirty-nine strategies according to this variable. What follows is variation in students' individual reading strategy use according to this variable.

Table 6.18 Variation in Students' Reported Use of Individual Reading Strategies According to High School Background

Individual Reading Strategy	% of high use (3 or 4)		
Used more by students graduated from *private school* –7 strategies	**Private-run**	**State-run**	**Observed $\chi2$**
SETCUV 1: Guessing the meaning of a new vocabulary item with or without looking at the context to enhance textual comprehension	80.2	70.0	$\chi2 = 41.8*$
SCTBAR 7: Scanning for main ideas to comprehend reading text before doing the actual reading	65.9	53.0	$\chi2 = 5.59*$
SCTWAR 5: Rereading certain part(s) of the text to comprehend reading text while doing the actual reading	65.9	54.3	$\chi2 = 4.55*$
SCTBAR 6: Looking at questions about the text (if any) to comprehend reading text before doing the actual reading	58.2	45.8	$\chi2 = 5.21*$
SCTBAR 8: Thinking of one's background knowledge about the text to comprehend reading text before doing the actual reading	57.1	38.6	$\chi2 = 11.93**$
SCTBAR 1: Searching for the meanings of new vocabulary items to comprehend reading text before doing the actual reading	46.2	32.9	$\chi2 = 6.49*$
SCTWAR 11: Making a summary of certain part(s) of the reading text in either Thai or English, or both to comprehend reading text while doing the actual reading	46.2	34.6	$\chi2 = 4.84*$

Note: * p<.05, ** p<.01, *** p<.001

The results of the chi-square tests in Table 6.18 demonstrate the significant variations in students' use of individual reading strategies in relation to their high school background. The students who attended the private-run school reported a greater use of reading strategies than did those who attended the state-run school. Of the seven strategies with significant differences in this variation, five were reported with high percentage of use by more than 50 percent of students attended private-run school.

The variations in students' individual reading strategy reported with high percentage of use according to high school background in this pattern include employing strategies to comprehend the text before and while doing the actual reading, such as searching for the meanings of new vocabulary items to comprehend reading text before doing the actual reading (SCTBAR 1), looking at questions about the text to comprehend reading text before doing the actual reading (SCTBAR 6), scanning for main ideas to comprehend reading text before doing the actual reading (SCTBAR 7), thinking of one's background knowledge about the text to comprehend reading text before doing the actual reading (SCTBAR 8), rereading certain part(s) of the text to comprehend reading text while doing the actual reading (SCTWAR 5), and making a summary of certain part(s) of the reading text in either Thai or English, or both to comprehend reading text while doing the actual reading (SCTWAR 11).The students who attended private-run school also reported employing strategies to enhance textual comprehension by solving problems dealing with unknown vocabulary items, i.e. guessing the meaning of a new vocabulary item with or without looking at the context (SETCUV 1) significantly more frequently than did those who attended state-run school.

6.6 Results of Factor Analysis

Apart from the analysis of variance (ANOVA), and the chi-square tests, factor analysis is another statistical method used in the present study in order to examine which variables in a data set are strongly related to the examined variables. Factor analysis is a technique, or sets of techniques for identifying the underlying hypothetical constructs to account for the relationship between variables (Foster, Bascus, and Yavorsky, 2006). According to Robson (1993); and Howitt and Cramer (1997), factor analysis is another approach to allow a researcher to make sense of a complex set of variables by reducing them to a smaller number of factors which account for many of the original variables. Many researchers (e.g. Foster et al., 2006; Cohen and Manion, 1994; Howitt and Cramer, 1997; Robson, 1993) affirm that with data on so many variables, it becomes difficult to make sense of the complexity of the data. This is where factor analysis will be beneficial and appropriate to deal with this difficulty by reducing attribute space from a large set or number of variables to a smaller set or number of underlying variables called *factors* (Howitt and Cramer, 1997). Consequently, factor analysis helps the researcher make large sets of data more manageable by identifying a factor or factors that underlie the data (Seliger and Shohamy, 1989).

Furthermore, factor analysis is commonly used when trying to understand the pattern of responses of people completing closed-ended questionnaires. The items measuring similar things can be identified through factor analysis and, consequently, the structure of replies to the questionnaire (Howitt and Cramer, 1997). Cohen and Manion (1994) indicate that this approach is appropriate in exploratory research where the researcher aims at imposing an orderly simplification on a number of

interrelated measures. For the context of the present study, factor analysis is employed in order to help the researcher to seek the underlying structure of the whole set of reading strategies in the reading strategy inventory. Before proceeding the process of factor analysis, it should be noted that the factor analysis for the present study is intended to be exploratory rather than confirmatory.

In order to understand factor analysis for the present study, it started with the 37 reading strategies in the reading strategy inventory which were found to vary significantly with regard to the five independent variables. In seeking the underlying structure of these 37 reading strategies, a principal component factor analysis, and then varimax rotation were carried out on the correlations of these reading strategies. Initially, seven factors were extracted with eigenvalues equal to or greater than 1.00. As suggested by Howitt and Cramer (1997), any factors with the eigenvalues less than 1.00 have been ignored. The eigenvalues or the sums of the squared loadings of the extracted six factors are demonstrated in Table 6.19.

Table 6.19 The Sums of the Squared Factor Loadings of the Initial Seven Factors

Factor	Extraction Sums of Squared Loadings (Eigenvalues)		
	Total	% of Variance	Cumulative %
1	12.290	33.217	33.217
2	3.581	9.680	42.897
3	2.791	7.543	50.440
4	2.014	5.442	55.882
5	1.649	4.457	60.340
6	1.041	2.814	63.154
7	1.002	2.708	65.862

Table 6.19 above shows that when taken these initial seven factors together, they accounted for 65.86 % of the variability among 37 reading strategies which were

found to vary significantly in relation to all five variables. The researcher would like to ensure that those initial seven factors were appropriate for the present study. In fact, there could be as many factors as variables which a researcher started off with and this could make it difficult to interpret. Therefore, the researcher decided to explore further by reducing the number of factors from seven to five or six instead of using the initial seven factors.

Having taken the factor interpretation into consideration, the researcher found that it was difficult to interpret the extracted five factors because there would be many individual strategies in each factor. After some consideration between the extracted six and initial seven factors, the results of the varimax rotation show slightly different groupings of strategies between six and seven factors. The six and seven factors were found slightly different in respect of internal relationship among the strategies emerging under the same factors. In addition, for initial seven factors, the seventh factor contains only two strategy items which are rather few as suggested by Foster et al. (2006) that there should be at least three variables for each factor. The basic idea by Foster et al. (2006) is to have a number of variables for each factor so that there are correlations in which it can be revealed. Therefore, the researcher made a decision that it would be more straightforward to interpret the extracted six factors rather than initial seven factors. The percentage of variance in Table 7.19 indicates that more than half of the total variation (63.15%) between the frequency of strategy use can be explained by the first six principal components. That is to say, the figure of 63.15 percent means that less than half of the variability (36.85%) could not be explained by the six factors; thus, other influences may also make a difference in students' strategy use. Then, the individual reading strategies were ordered or sorted according to their loading on the first factor.

In terms of factor loadings of the strategies in each factor, the 'factor loadings'
indicate the level of correlation between the factors and the different variables used in
the analysis (Seliger and Shohamy, 1989). According to Foster et al. (2006), factor
analysis is a statistical method which works on the correlations between items, and if
the items do not correlate then it is not sensible to do it. Factor loadings follow all of
the rules for correlation coefficients, they vary from -1.00 through 0.00 to +1.00
(Howitt and Cramer, 2000). Foster et al. (2006), and Howitt and Cramer (2000)
recommend that the variable should be included as one of the measures of the factor
and used in naming the factor when a factor loading is 0.3 or higher. In other words,
the factor loadings with values below 0.3 are too low to be important.

The reading strategies which have the highest loadings with the first factor, are
used to define the factor. For example, the reading strategies which are highly loaded
are grouped together for their loading on the first factor. According to Howitt and
Cramer (1997), the strategy items are ordered or sorted according to their loading on
the first factor from those with the highest loadings to those with the lowest loadings.
This grouping helps interpretation of the factor since the high loading strategy items
are the ones which primarily help a researcher decide what the factor might be.
However, differences in interpretation may occur with factor analysis. That is to say,
different researchers may describe the emerging factors differently. The reading
strategies as identified in the strategy inventory and the six factors existing from the
process of factor analysis were not expected to be identical, but they were expected to
be mutually supportive.

In the present study, each factor has been described in terms of the content or
the relationship of the majority of the reading strategy items which appear to share

common characteristics under the same factor. Table 6.20 shows the six extracted factors, the factor loadings on each strategy item, and the percentage of variance accounted for each factor.

Table 6.20 List of the Six Extracted Factors

Factor 1: Strategies for prior text comprehension facilitation	Factor Loading	% of Variance
SCTBAR 7: Scanning for main ideas to comprehend reading text before doing the actual reading	.801	
SCTBAR 3: Going through the text quickly to comprehend reading text before doing the actual reading	.789	
SCTBAR 2: Reading the title of the text to comprehend reading text before doing the actual reading	.773	33.22
SCTBAR 11: Predicting what might happen in the text to comprehend reading text before doing the actual reading	.771	
SCTBAR 5: Looking at pictures/charts/tables/figures that appear in the text to comprehend reading text before doing the actual reading	.764	
SCTBAR 6: Looking at questions about the text (if any) to comprehend reading text before doing the actual reading	.751	
SCTBAR 8: Thinking of one's background knowledge about the text to comprehend reading text before doing the actual reading	.751	
SCTBAR 9: Reading the abstract or introductory part to comprehend reading text before doing the actual reading	.727	
SCTBAR 1: Searching for the meanings of new vocabulary items before doing actual reading to comprehend reading text before doing the actual reading	.663	
SCTBAR 10: Looking for the parallel article(s) in Thai (if any) to comprehend reading text before doing the actual reading	.601	
Factor 2 : Strategies for the reading text review		
SCTAAR 3: Making a summary of the whole reading text to comprehend the text after having done the actual reading	.798	9.68
SCTAAR 5: Reviewing one's own notes to comprehend the text after having done the actual reading	.794	
SCTAAR 6: Translating the reading text into Thai using Thai script to comprehend the text after having done the actual reading	.780	
SCTAAR 1: Searching for the meanings of new vocabulary items after having done the actual reading to comprehend the text after having done the actual reading	.753	

Table 6.20 (Cont.) List of the Six Extracted Factors

Factor 2 (Cont.) : Strategies for the reading text review		
SCTAAR 4: Retelling oneself or other people about what has been read to comprehend the text after having done the actual reading	.743	
SCTAAR 2: Discussing the reading text with classmate(s) or friend(s) to comprehend the text after having done the actual reading	.728	
Factor 3: Strategies for vocabulary retention		
SETCRV 4: Associating real objects with vocabulary items to enhance textual comprehension	.782	7.54
SETCRV 3: Reciting vocabulary items in rhymes to enhance textual comprehension	.780	
SETCRV 5: Associating the sound of a Thai word with that of a new English vocabulary item to enhance textual comprehension	.739	
SETCRV 6:Tutoring one's classmate(s) or friend(s) about what was learnt in the reading class to enhance textual comprehension	.701	
SETCRV 1: Using new vocabulary items to converse with classmates and friends to enhance textual comprehension	.696	
SETCRV 2: Memorising new words with or without a list to enhance textual comprehension	.641	
Factor 4: Strategies for text comprehension facilitation while reading		
SCTWAR 10: Thinking about the meaning of the reading text in Thai to comprehend the text while doing the actual reading	.765	
SCTWAR 9: Highlighting important information or difficult vocabulary items by making symbol(s) to comprehend the text while doing the actual reading	.697	
SCTWAR 11: Making a summary of certain part(s) of the reading text in either Thai or English, or both to comprehend the text while doing the actual reading	.696	
		5.44
SCTWAR 8: Highlighting important information or difficult vocabulary items by underlining to comprehend the text while doing the actual reading	.604	
SCTWAR 3: Taking notes the important information to comprehend the text while doing the actual reading	.518	
SCTWAR 7: Avoiding a difficult part to comprehend the text while doing the actual reading	.487	
Factor 5: Strategies for meaning discovery		
SETCUV 3: Looking up the meaning of a new vocabulary item from electronic resources e.g. Talking dictionary, dictionary program in a computer, and the Internet to enhance textual comprehension	.728	
SETCUV 1: Guessing the meaning of a new vocabulary item with or without looking at the context to enhance textual comprehension	.728	4.46
SETCUV 4: Looking up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai to enhance textual comprehension	.677	

Table 6.20 (Cont.) List of the Six Extracted Factors

Factor 5 (Cont.): Strategies for meaning discovery		
SETCUV 5: Appealing for assistance from other people about the meaning of a new vocabulary item to enhance textual comprehension	.643	
SETCUV 2: Looking at the root of a new vocabulary to enhance textual comprehension to enhance textual comprehension	.623	
Factor 6: Strategies for solving comprehension difficulty		
SCTWAR 5: Rereading certain part(s) of the text to comprehend the text while doing the actual reading	.749	
SCTWAR 6: Reading certain part(s) of the text slowly to comprehend the text while doing the actual reading	.716	2.81
SCTWAR 4: Guessing the meaning of the text from context to comprehend the text while doing the actual reading	.622	
SCTWAR 1: Searching for the meanings of new vocabulary items to comprehend the text while doing the actual reading	.547	

Table 6.20 shows the detail of the six extracted factors as the results of a factor analysis, i.e. the varimax rotation method. It shows that:

- Factor 1, which is named 'Strategies for prior text comprehension facilitation' accounted for 33.22 percent of the variance among the reading strategies in the reading strategy questionnaire for the present study. It comprises ten of the strategies for comprehending reading texts which students reported employing to comprehend the text before doing the actual reading, namely scanning for main ideas to comprehend reading text before doing the actual reading (SCTBAR 7), reading the abstract or introductory part to comprehend reading text before doing the actual reading (SCTBAR 9), or reading the title of the text to comprehend reading text before doing the actual reading (SCTBAR 2).

- Factor 2, 'Strategies for the reading text review' accounted for 9.68 percent of the whole strategy variance. It comprises six of the strategies for comprehending reading texts involving strategies employed to comprehend the text

after having done the actual reading. Examples are making a summary of the whole reading text to comprehend the text after having done the actual reading (SCTAAR 3), reviewing one's own notes to comprehend the text after having done the actual reading (SCTAAR 5), or discussing the reading text with classmate(s) or friend(s) to comprehend the text after having done the actual reading (SCTAAR 2)**.**

- Factor 3, 'Strategies for vocabulary retention' accounted 7.54 percent of the variance of the strategy items. A closer look at factor 3 reveals six strategies which were reported employing for enhancing textual comprehension. These strategies mainly involve strategies to enhance textual comprehension by retaining knowledge of newly-learned vocabulary items, for example, associating real objects with vocabulary items to enhance textual comprehension (SETCRV 4); reciting vocabulary items in rhymes to enhance textual comprehension (SETCRV 3); or associating the sound of a Thai word with that of a new English vocabulary item to enhance textual comprehension (SETCRV 5).

- Factor 4, 'Strategies for text comprehension facilitation while reading' accounted for 5.44 percent of the variance of the strategy items. This factor comprises six strategies from the SCT category (Strategies for comprehending reading texts) which students reported employing in order to comprehend the text while doing the actual reading. The examples of the strategies in this factor are highlighting important information or difficult vocabulary items by making symbol(s) to comprehend the text while doing the actual reading (SCTWAR 9), highlighting important information or difficult vocabulary items by underlining to comprehend the text while doing the actual reading (SCTWAR 8), or taking notes the important information to comprehend the text while doing the actual reading (SCTWAR 3).

- Factor 5, 'Strategies for meaning discovery' accounted 4.46 percent of the variance of the strategy items. All five strategies under this factor are from the SETC category (Strategies for enhancing textual comprehension) which the students reported employing in order to enhance textual comprehension by solving problems dealing with unknown vocabulary items.

- Factor 6, 'Strategies for solving comprehension difficulty' accounted 2.81 percent of the variance of the strategy items. Four strategies under this factor, including searching for the meanings of new vocabulary items to comprehend the text while doing the actual reading (SCTWAR 1); guessing the meaning of the text from context or other techniques to comprehend the text while doing the actual reading (SCTWAR 4); rereading certain part(s) of the text to comprehend the text while doing the actual reading (SCTWAR 5); and reading certain part(s) of the text slowly to comprehend the text while doing the actual reading (SCTWAR 6), were reported employing by the research subjects in order to solve the comprehension difficulty found while reading.

As mentioned above, the underlying factors of the reading strategies, the factor loading for each strategy item, and the percentage of variance of each factor have been identifies. To examine which of these factors are strongly related to each of the five variables is the next task.

In determining such a relationship, the researcher put great emphasis on factors which are strongly related to a particular variable. For the purpose of the discussions of the factor analysis results in the following section, the criteria for strong relation between the factors and each of the variables suggested by Seliger and Shohamy (1990) are adopted. That is, a factor can be accepted to be strongly related

to a variable when half or more of the reading strategies in that particular factor have a loading of .50 or more, showing a significant variation in relation to that variable. In the present study, the results of the varimax rotation reveal that five factors were found to have strong relationship to three investigated variables, i.e. gender of students, field of study, and levels of reading proficiency; furthermore, one was found to be strongly related to field of study. However, none of the factors was found to be strongly related to students' high school background. What follow are the full details of factors which found to be strongly related to each of the independent variable.

6.6.1 Factors Strongly Related t o 'Gender of Students'

As reported in the previous sections, the results from the analysis of variance (ANOVA) show significant variations in frequency of strategy use in both two main categories according to gender of students, with female students reported employing the strategies significantly more frequently than male students did. This is in agreement with the results of the factor analysis in terms of variations in students' reported use of strategies in both SCT and SETC categories. Table 6.21 below shows the five factors (Factors 1, 2, 4, 5, and 6) found to have strong relationship to this investigated variable.

Table 6.21 Factors Strongly Related to 'Gender of Students'

Factor 1: Strategies for prior text comprehension facilitation	Factor Loading	Comments
SCTBAR 7: Scanning for main ideas to comprehend reading text before doing the actual reading	.801	N.S.
SCTBAR 3: Going through the text quickly to comprehend reading text before doing the actual reading	.789	Female>Male
SCTBAR 2: Reading the title of the text to comprehend reading text before doing the actual reading	.773	Female>Male
SCTBAR 11: Predicting what might happen in the text to comprehend reading text before doing the actual reading	.771	Female>Male
SCTBAR 5: Looking at pictures/charts/tables/figures that appear in the text to comprehend reading text before doing the actual reading	.764	Female>Male
SCTBAR 6: Looking at questions about the text (if any) to comprehend reading text before doing the actual reading	.751	Female>Male
SCTBAR 8: Thinking of one's background knowledge about the text to comprehend reading text before doing the actual reading	.751	N.S.
SCTBAR 9: Reading the abstract or introductory part to comprehend reading text before doing the actual reading	.727	Female>Male
SCTBAR 1: Searching for the meanings of new vocabulary items before doing actual reading to comprehend reading text before doing the actual reading	.663	Female>Male
SCTBAR 10: Looking for the parallel article(s) in Thai (if any) to comprehend reading text before doing the actual reading	.601	N.S.
Factor 2: Strategies for the reading text review	**Factor Loading**	**Comments**
SCTAAR 3: Making a summary of the whole reading text to comprehend the text after having done the actual reading	.798	Female>Male
SCTAAR 5: Reviewing one's own notes to comprehend the text after having done the actual reading	.794	Female>Male
SCTAAR 6: Translating the reading text into Thai using Thai script to comprehend the text after having done the actual reading	.780	Female>Male
SCTAAR 1: Searching for the meanings of new vocabulary items after having done the actual reading to comprehend the text after having done the actual reading	.753	Female>Male
SCTAAR 4: Retelling oneself or other people about what has been read to comprehend the text after having done the actual reading	.743	N.S.
SCTAAR 2: Discussing the reading text with classmate(s) or friend(s) to comprehend the text after having done the actual reading	.728	Female>Male

Table 6.21 (Cont.) Factors Strongly Related to 'Gender of Students'

Factor 4: Strategies for text comprehension facilitation while reading		
SCTWAR 10: Thinking about the meaning of the reading text in Thai to comprehend the text while doing the actual reading	.765	Female>Male
SCTWAR 9: Highlighting important information or difficult vocabulary items by making symbol(s) to comprehend the text while doing the actual reading	.697	Female>Male
SCTWAR 11: Making a summary of certain part(s) of the reading text in either Thai or English, or both to comprehend the text while doing the actual reading	.696	Female>Male
SCTWAR 8: Highlighting important information or difficult vocabulary items by underlining to comprehend the text while doing the actual reading	.604	Female>Male
SCTWAR 3: Taking notes the important information to comprehend the text while doing the actual reading	.518	N.S.
SCTWAR 7: Avoiding a difficult part to comprehend the text while doing the actual reading	.487	N.S.
Factor 5: Strategies for meaning discovery		
SETCUV 3: Looking up the meaning of a new vocabulary item from electronic resources e.g. Talking dictionary, dictionary program in a computer, and the Internet to enhance textual comprehension	.728	Female>Male
SETCUV 1: Guessing the meaning of a new vocabulary item with or without looking at the context to enhance textual comprehension	.728	Female>Male
SETCUV 4: Looking up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai to enhance textual comprehension	.677	Female>Male
SETCUV 5: Appealing for assistance from other people about the meaning of a new vocabulary item to enhance textual comprehension	.643	Female>Male
SETCUV 2: Looking at the root of a new vocabulary to enhance textual comprehension to enhance textual comprehension	.623	N.S.
Factor 6: Strategies for solving comprehension difficulty		
SCTWAR 5: Rereading certain part(s) of the text to comprehend the text while doing the actual reading	.749	Female>Male
SCTWAR 6: Reading certain part(s) of the text slowly to comprehend the text while doing the actual reading	.716	Female>Male
SCTWAR 4: Guessing the meaning of the text from context to comprehend the text while doing the actual reading	.622	N.S.
SCTWAR 1: Searching for the meanings of new vocabulary items to comprehend the text while doing the actual reading	.547	Female>Male

Note: N.S. means no statistical significance was found in use of that particular strategy.

6.6.2 Factors Strongly Related to 'Location of Universities'

Table 6.22 below shows only one factor found to be strongly related to 'location of universities'. It is factor 4. Although the results of the ANOVA do show significant variations in students' reported use of strategies under neither SCT nor SETC category in relation to location of universities, the results show significant variations in students' reported use of some individual strategies. However, the results of the factor analysis show one factor which was found having strong relationship to this variable.

Table 6.22 Factors Strongly Related to 'Location of Universities'

Factor 4: Strategies for text comprehension facilitation while reading	Factor Loading	Comments
SCTWAR 10: Thinking about the meaning of the reading text in Thai to comprehend the text while doing the actual reading	.765	Regional> Metro-BKK
SCTWAR 9: Highlighting important information or difficult vocabulary items by making symbol(s) to comprehend the text while doing the actual reading	.697	N.S.
SCTWAR 11: Making a summary of certain part(s) of the reading text in either Thai or English, or both to comprehend the text while doing the actual reading	.696	N.S.
SCTWAR 8: Highlighting important information or difficult vocabulary items by underlining to comprehend the text while doing the actual reading	.604	Regional> Metro-BKK
SCTWAR 3: Taking notes the important information to comprehend the text while doing the actual reading	.518	Regional> Metro-BKK
SCTWAR 7: Avoiding a difficult part to comprehend the text while doing the actual reading	.487	N.S.

Note: N.S. means no statistical significance was found in use of that particular strategy.

6.6.3 Factors Strongly Related to 'Field of Study'

Five factors, Factors 1, 2, 4, 5, and 6, were found to be strongly related to students' field of study. The results of the factor analysis have confirmed the ANOVA results, showing significant variations in students' reported use of strategies from both

two main strategy categories (SCT and SETC categories) with their field of study.

Table 6.23 shows the five factors strongly related to this investigated variable.

Table 6.23 Factors Strongly Related to 'Field of Study'

Factor 1: Strategies for prior text comprehension facilitation	Factor Loading	Comments
SCTBAR 7: Scanning for main ideas to comprehend reading text before doing the actual reading	.801	Health > Technology
SCTBAR 3: Going through the text quickly to comprehend reading text before doing the actual reading	.789	Health > Technology
SCTBAR 2: Reading the title of the text to comprehend reading text before doing the actual reading	.773	Health > Technology
SCTBAR 11: Predicting what might happen in the text to comprehend reading text before doing the actual reading	.771	N.S.
SCTBAR 5: Looking at pictures/charts/tables/figures that appear in the text to comprehend reading text before doing the actual reading	.764	N.S.
SCTBAR 6: Looking at questions about the text (if any) to comprehend reading text before doing the actual reading	.751	Health > Technology
SCTBAR 8: Thinking of one's background knowledge about the text to comprehend reading text before doing the actual reading	.751	N.S.
SCTBAR 9: Reading the abstract or introductory part to comprehend reading text before doing the actual reading	.727	Health > Technology
SCTBAR 1: Searching for the meanings of new vocabulary items before doing actual reading to comprehend reading text before doing the actual reading	.663	N.S.
SCTBAR 10: Looking for the parallel article(s) in Thai (if any) to comprehend reading text before doing the actual reading	.601	N.S.
Factor 2: Strategies for the reading text review		
SCTAAR 3: Making a summary of the whole reading text to comprehend the text after having done the actual reading	.798	Health > Technology
SCTAAR 5: Reviewing one's own notes to comprehend the text after having done the actual reading	.794	Health > Technology
SCTAAR 6: Translating the reading text into Thai using Thai script to comprehend the text after having done the actual reading	.780	Health > Technology
SCTAAR 1: Searching for the meanings of new vocabulary items after having done the actual reading to comprehend the text after having done the actual reading	.753	N.S.
SCTAAR 4: Retelling oneself or other people about what has been read to comprehend the text after having done the actual reading	.743	Health > Technology
SCTAAR 2: Discussing the reading text with classmate(s) or friend(s) to comprehend the text after having done the actual reading	.728	Health > Technology

Table 6.23 (Cont.) Factors Strongly Related to 'Field of Study'

Factor 4: Strategies for text comprehension facilitation while reading		
SCTWAR 10: Thinking about the meaning of the reading text in Thai to comprehend the text while doing the actual reading	.765	Health > Technology
SCTWAR 9: Highlighting important information or difficult vocabulary items by making symbol(s) to comprehend the text while doing the actual reading	.697	N.S.
SCTWAR 11: Making a summary of certain part(s) of the reading text in either Thai or English, or both to comprehend the text while doing the actual reading	.696	Health > Technology
SCTWAR 8: Highlighting important information or difficult vocabulary items by underlining to comprehend the text while doing the actual reading	.604	Health > Technology
SCTWAR 3: Taking notes the important information to comprehend the text while doing the actual reading	.518	Health > Technology
SCTWAR 7: Avoiding a difficult part to comprehend the text while doing the actual reading	.487	Health > Technology
Factor 5: Strategies for meaning discovery	**Factor Loading**	**Comments**
SETCUV 3: Looking up the meaning of a new vocabulary item from electronic resources e.g. Talking dictionary, dictionary program in a computer, and the Internet to enhance textual comprehension	.728	Health > Technology
SETCUV 1: Guessing the meaning of a new vocabulary item with or without looking at the context to enhance textual comprehension	.728	Health > Technology
SETCUV 4: Looking up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai to enhance textual comprehension	.677	Health > Technology
SETCUV 5: Appealing for assistance from other people about the meaning of a new vocabulary item to enhance textual comprehension	.643	Health > Technology
SETCUV 2: Looking at the root of a new vocabulary to enhance textual comprehension to enhance textual comprehension	.623	N.S.
Factor 6: Strategies for solving comprehension difficulty		
SCTWAR 5: Rereading certain part(s) of the text to comprehend the text while doing the actual reading	.749	Health > Technology
SCTWAR 6: Reading certain part(s) of the text slowly to comprehend the text while doing the actual reading	.716	Health > Technology
SCTWAR 4: Guessing the meaning of the text from context to comprehend the text while doing the actual reading	.622	Health > Technology
SCTWAR 1: Searching for the meanings of new vocabulary items to comprehend the text while doing the actual reading	.547	N.S.

Note: N.S. means no statistical significance was found in use of that particular strategy.

6.6.4 Factors Strongly Related to 'Levels of Reading Proficiency'

Table 6.24 shows the five factors found to have strong relation to students' levels of reading proficiency, including Factors 1, 2, 3, 5, and 6. The results of the factor analysis show significant variations in students' reported employing strategies for comprehending reading texts, and enhancing textual comprehension in relation to level of reading proficiency. Table 6.24 presents the five factors found to be strongly related to this investigated variable.

Table 6.24 Factors Strongly Related to 'Levels of Reading Proficiency'

Factor 1: Strategies for prior text comprehension facilitation	Factor Loading	Comments
SCTBAR 7: Scanning for main ideas to comprehend reading text before doing the actual reading	.810	Positive
SCTBAR 3: Going through the text quickly to comprehend reading text before doing the actual reading	.789	Positive
SCTBAR 2: Reading the title of the text to comprehend reading text before doing the actual reading	.773	Positive
SCTBAR 11: Predicting what might happen in the text to comprehend reading text before doing the actual reading	.770	N.S.
SCTBAR 5: Looking at pictures/charts/tables/figures that appear in the text to comprehend reading text before doing the actual reading	.763	N.S.
SCTBAR 6: Looking at questions about the text (if any) to comprehend reading text before doing the actual reading	.752	Positive
SCTBAR 8: Thinking of one's background knowledge about the text to comprehend reading text before doing the actual reading	.751	Positive
SCTBAR 9: Reading the abstract or introductory part to comprehend reading text before doing the actual reading	.727	Positive
SCTBAR 1: Searching for the meanings of new vocabulary items before doing actual reading to comprehend reading text before doing the actual reading	.662	Positive
SCTBAR 10: Looking for the parallel article(s) in Thai (if any) to comprehend reading text before doing the actual reading	.599	N.S.

Table 6.24 (Cont.) Factors Strongly Related to 'Levels of Reading Proficiency'

Factor 2: Strategies for the reading text review		
SCTAAR 3: Making a summary of the whole reading text to comprehend the text after having done the actual reading	.805	Positive
SCTAAR 5: Reviewing one's own notes to comprehend the text after having done the actual reading	.799	Positive
SCTAAR 6: Translating the reading text into Thai using Thai script to comprehend the text after having done the actual reading	.786	Positive
SCTAAR 1: Searching for the meanings of new vocabulary items after having done the actual reading to comprehend the text after having done the actual reading	.752	Positive
SCTAAR 4: Retelling oneself or other people about what has been read to comprehend the text after having done the actual reading	.750	Positive
SCTAAR 2: Discussing the reading text with classmate(s) or friend(s) to comprehend the text after having done the actual reading	.734	Positive
Factor 3: Strategies for vocabulary retention	**Factor Loading**	**Comments**
SETCRV 4: Associating real objects with vocabulary items to enhance textual comprehension	.782	Positive
SETCRV 3: Reciting vocabulary items in rhymes to enhance textual comprehension	.780	Positive
SETCRV 5: Associating the sound of a Thai word with that of a new English vocabulary item to enhance textual comprehension	.739	Positive
SETCRV 6:Tutoring one's classmate(s) or friend(s) about what was learnt in the reading class to enhance textual comprehension	.701	Mixed
SETCRV 1: Using new vocabulary items to converse with classmates and friends to enhance textual comprehension	.696	N.S.
SETCRV 2: Memorising new words with or without a list to enhance textual comprehension	.641	Positive
Factor 5: Strategies for meaning discovery		
SETCUV 3: Looking up the meaning of a new vocabulary item from electronic resources e.g. Talking dictionary, dictionary program in a computer, and the Internet to enhance textual comprehension	.728	Positive
SETCUV 1: Guessing the meaning of a new vocabulary item with or without looking at the context to enhance textual comprehension	.728	Positive
SETCUV 4: Looking up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai to enhance textual comprehension	.677	Positive
SETCUV 5: Appealing for assistance from other people about the meaning of a new vocabulary item to enhance textual comprehension	.643	Positive

Table 6.24 (Cont.) Factors Strongly Related to 'Levels of Reading Proficiency'

Factor 5 (Cont.): Strategies for meaning discovery		
SETCUV 2: Looking at the root of a new vocabulary to enhance textual comprehension to enhance textual comprehension	.623	Positive
Factor 6: Strategies for solving comprehension difficulty		
SCTWAR 5: Rereading certain part(s) of the text to comprehend the text while doing the actual reading	.749	Positive
SCTWAR 6: Reading certain part(s) of the text slowly to comprehend the text while doing the actual reading	.716	Positive
SCTWAR 4: Guessing the meaning of the text from context to comprehend the text while doing the actual reading	.622	Positive
SCTWAR 1: Searching for the meanings of new vocabulary items to comprehend the text while doing the actual reading	.547	Positive

Note: **Positive** means that particular strategy was reported being used significantly more frequently by high-proficiency students than moderate- and low-proficiency students; **Mixed** means low-proficiency students reported employing that particular strategy significantly more frequently than moderate-proficiency students but less frequently than high-proficiency students; and **N.S.** means no statistical significance was found in use of that particular strategy.

In conclusion, six factors were extracted as the results of a factor analysis. The researcher attempted to reduce the number of factors from 7 to 5 or 6 respectively. Finally, she found that the six extracted factors are the most appropriate for the present study. Factors 1, 2, 4, 5, and 6 were found to be strongly related to both 'gender of students' and 'field of study'. Factors 1, 2, 3, 5, and 6 were found to be strongly related to 'levels of reading proficiency'. And only Factor 3 was found to be strongly related to 'location of universities'. For students' high school background, no factor was found to have strong relationship to. Table 6.25 is the summary of the strong relationship between the factors and the variables for the present study.

Table 6.25 Summary of Factors Strongly Related to Different Variables

Factors	Gender	Location of Universities	Field of Study	Reading Proficiency Levels	High School Background
1: Prior text comprehension facilitation	YES	no	YES	YES	no
2: Reading text review	YES	no	YES	YES	no
3: Text comprehension facilitation while reading	YES	YES	YES	no	no
4: Vocabulary retention	no	no	no	YES	no
5: Meaning discovery	YES	no	YES	YES	no
6: Solving comprehension difficulty	YES	no	YES	YES	no

Note: *YES* means 'significant', and *no* means 'not significant'.

6.7 Summary

This chapter has focused on the data analysis for reading strategy use with the significant variation. The variations in frequency of students' overall reported reading strategy use, the two main categories (Strategies for comprehending reading texts, and Strategies for enhancing textual comprehension), each purpose of the two categories, and individual strategy use in relation to the five independent variables have been systematically examined. These five variables include gender of students, location of universities, field of study, levels of reading proficiency, and high school background. The data were collected through the reading strategy questionnaire with a total of 39 individual reading strategies. The analysis of variance (ANOVA), the chi-square ($\chi 2$) test, and factor analysis were the three main statistical methods carried out on the data for the present study.

The research findings presented in this chapter have demonstrated a number of points. Each focal point may help the reader for a better understanding about reading

strategies in a new perspective, as well as the relationship between reading strategy use at different levels and the factors which are the main focus for the present study. The summary of each focal point is as follows.

1) According to the ANOVA results, significant variations in frequency of students' overall strategy use were found in relation to three investigated variables, namely gender of students, field of study, and levels of reading proficiency.

2) The results from ANOVA reveal that significant variations in frequency of students' reported use of the strategies to achieve both two main reading strategy categories (SCT and SETC categories) purposes were found in relation to three independent variables, namely gender of students, field of study, and levels of reading proficiency. On the other hands, the significant variations were not found in relation to location of universities, and high school background.

3) In respect of purposes of strategy use, significant variations in frequency of use of reading strategies to achieve purposes in SCT and SETC categories were found in relation to gender, location of universities, field of study, levels of reading proficiency, and high school background.

4) Based on the results of the chi-square (χ2) tests, significant variations in students' use of individual reading strategies were found in relation to all five investigated variables.

5) Six factors (Factor 1 – Factor 6) appeared as the results of factor analysis, and these results provide parallel evidence to the findings obtained through the different levels of an analysis of variance. In sum, the results of the factor analysis reveal that gender of students, field of study, and levels of reading proficiency show greater

relationship to students' use of reading strategies than do the location of universities, and high school background.

The research findings for the present study have provided the researcher with useful information for another perspective of research in the area of reading strategies. Chapter 7 which is the last chapter of the study summarises the research findings in response to the research questions proposed in Chapter 3, the discussions of the research findings, the implications, the contributions of the present study, as well as limitations of the present study and proposals for future research.

CHAPTER 7

SUMMARY OF RESEARCH FINDINGS, DISCUSSION

AND CONCLUSION

7.1 Introduction and Purpose of the Chapter

In Chapters 5 and 6, the researcher has systematically attempted to identify types of reading strategies and the reported frequency of use of these reading strategies by 1,096 science-oriented undergraduate students learning English at public universities obtained through the reading strategy questionnaire using different statistical methods. The main purpose of this chapter is to present the principal findings of the present study in response to research questions 1 to 7 proposed earlier in Chapter 3. Then, a discussion of the research findings is demonstrated. It is followed by the implications of the research findings for the teaching and learning of English for science-oriented students arising from the present study. After that, the contributions of the present study to related areas are discussed. Finally, the limitations of the present study and proposals for future research are presented.

In Chapter 5, the researcher has attempted to describe the research findings of the present study at different levels of data analysis, i.e. overall use of reading strategies, use of reading strategies in the two main categories, and use of individual reading strategies. Significant variations in frequency of students' reported use of reading strategies by 1,096 science-oriented undergraduate students are taken into

consideration in Chapter 6. That is to say, Chapter 6 examines significant variations in strategy use, especially the relationship between students' reported frequency of reading strategy use and five different independent variables, i.e. gender of students, location of universities, field of study, levels of reading proficiency, and high school background. Significant findings in students' frequency of strategy use are taken out of the reading strategy questionnaire. In order to shed some light on the certain patterns of significant variations in strategy use, as well as other apparent significant differences in relation to each investigated variable, the researcher will suggest reasons for a better understanding of those significant variations in the subsequent discussion section (Section 7.3).

7.2 Summary of Research Findings

The research findings of students' reported reading strategy use give responses to the research questions. Those findings are discussed below.

7.2.1   Research Question 1: What types of reading strategies do the science-oriented undergraduate students studying in the public universities in Thailand report employing?

In response to Research Question 1, the research findings demonstrate that a total of 39 reading strategies were reported being used by science-oriented undergraduate students studying at public universities in Thailand. In addition, these strategies were primarily classified according to the purposes for which they were employed in academic reading. As a result, purposes of reading strategy use appeared and they were further grouped into two main categories. These categories are Category 1: strategies for comprehending reading texts (SCT), comprising three

purposes, i.e. to comprehend reading texts before doing the actual reading (SCTBAR), to comprehend reading texts while doing the actual reading (SCTWAR), and to comprehend reading texts after having done the actual reading (SCTAAR) with twenty-eight individual reading strategies altogether; and Category 2: strategies for enhancing textual comprehension (SETC), comprising two purposes, i.e. to enhance textual comprehension by solving problems dealing with unknown vocabulary items (SETCUV), and to enhance textual comprehension by retaining knowledge of newly-learned vocabulary items (SETCRV) with eleven individual reading strategies altogether. What are shown in this section are types of reading strategies students reported employing for their academic reading purposes

Category 1: Strategies for Comprehending Reading Texts (SCT)

Purpose 1: To comprehend reading texts before doing the actual reading (SCTBAR)

SCTBAR 1:	Searching for the meanings of new vocabulary items
SCTBAR 2:	Reading the title of the text
SCTBAR 3:	Going through the text quickly
SCTBAR 4:	Reading the first and the last paragraphs
SCTBAR 5:	Looking at pictures/charts/tables/figures that appear in the text
SCTBAR 6:	Looking at questions about the text (if any)
SCTBAR 7:	Scanning for main ideas
SCTBAR 8:	Thinking of one's background knowledge about the text
SCTBAR 9:	Reading the abstract or introductory part
SCTBAR 10:	Looking for the parallel article(s) in Thai (if any)
SCTBAR 11:	Predicting what might happen in the text

Purpose 2: To comprehend reading texts while doing the actual reading (SCTWAR)

SCTWAR 1:	Searching for the meanings of new vocabulary items
SCTWAR 2:	Analysing a sentence structure
SCTWAR 3:	Taking notes the important information
SCTWAR 4:	Guessing the meaning of the text from context
SCTWAR 5:	Rereading certain part(s) of the text
SCTWAR 6:	Reading certain part(s) of the text slowly

SCTWAR 7:   Avoiding a difficult part

SCTWAR 8:   Highlighting important information or difficult vocabulary items by underlining

SCTWAR 9:   Highlighting important information or difficult vocabulary items by making symbol(s)

SCTWAR 10: Thinking about the meaning of the reading text in Thai

SCTWAR 11: Making a summary of certain part(s) of the reading text in either Thai or English, or both

Purpose 3: To comprehend reading texts after having done the actual reading (SCTAAR)

SCTAAR 1:   Searching for the meanings of new vocabulary items

SCTAAR 2:   Discussing the reading text with classmate(s) or friend(s)

SCTAAR 3:   Making a summary of the whole reading text

SCTAAR 4:   Retelling oneself or other people about what has been read

SCTAAR 5:   Reviewing one's own notes

SCTAAR 6:   Translating the reading text into Thai using Thai script

Category 2: Strategies for Enhancing Textual Comprehension (SETC)

Purpose 1: To enhance textual comprehension by solving problems dealing with unknown vocabulary items (SETCUV)

SETCUV 1:   Guessing the meaning of a new vocabulary item with or without looking at the context

SETCUV 2:   Looking at the root of a new vocabulary

SETCUV 3:   Looking up the meaning of a new vocabulary item from electronic resources e.g. talking dictionary, dictionary program in a computer, and the Internet

SETCUV 4:   Looking up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai

SETCUV 5:   Appealing for assistance from other people about the meaning of a new vocabulary item

Purpose 2: To enhance textual comprehension by retaining knowledge of newly-learned vocabulary items (SETCRV)

SETCRV 1: Using new vocabulary items to converse with classmates and friends

SETCRV 2: Memorising new words with or without a list

SETCRV 3: Reciting vocabulary items in rhymes

SETCRV 4: Associating real objects with vocabulary items

SETCRV 5: Associating the sound of a Thai word with that of a new English vocabulary item

SETCRV 6: Tutoring one's classmate(s) or friend(s) about what was learnt in the reading class

7.2.2   Research Question 2: How frequently are these different reading

strategies reported being used by the students under the study?

In response to Research Question 2, the research findings reveal that the students' reported overall use of reading strategies based on the holistic mean score is of medium frequency of strategy use according to the measure given the explanation previously in Chapter 5 (Section 5.2.1). The mean frequency score was 2.32. The frequency of use of the two main categories, i.e. SCT and SETC Categories, is similar. The mean frequency scores of these two categories were 2.33, and 2.28 respectively.

Frequency of reading strategy use level was found that none of individual reading strategies reported high frequency use. When the reported frequency of use of strategies to achieve the purposes of Category 1 was determined, it was found that almost all of the individual strategies were reported medium frequency of use of strategies. That is to say, for the SCTBAR and SCTWAR purposes, students reported medium frequency of use of all 22 individual strategies. However, three individual strategies from the SCTAAR purpose, including retelling oneself or other people about what has been read to comprehend the text after having done the actual reading (SCTAAR 4); discussing the reading text with classmate(s) or friend(s) to comprehend the text after having done the actual reading (SCTAAR 2); and making a summary of the whole reading text to comprehend the text after having done the actual reading (SCTAAR 3), were reported employing at low frequency level of use. The mean frequency scores of these three individual reading strategies were 1.91, 1.90, and 1.89 respectively.

Based on the findings at the individual strategy level for the SETC Category, students reported medium frequency of use of seven individual strategies, and low frequency of use of four individual strategies. The similarity of both two main categories is no individual strategy was reported high frequency of strategy use. The four individual strategies which were found to be reported employing at low frequency of strategy use are from SETCRV purpose, i.e. associating the sound of a Thai word with that of a new English vocabulary item to enhance textual comprehension (SETCRV 5); using new vocabulary items to converse with classmates and friends to enhance textual comprehension (SETCRV 1); reciting vocabulary items in rhymes to enhance textual comprehension (SETCRV 3); and tutoring one's classmate(s) or friend(s) about what was learnt in the reading class to enhance textual comprehension (SETCRV 6), with the mean frequency scores of 1.97; 1.92; 7.82; and 1.73 respectively.

7.2.3 Research Question 3: Do students' choices of reading strategies vary significantly with their gender? If they do, what are the main patterns of variation?

In response to the third question, examining the variation in reading strategy use as well as patterns of variation has been focused in this section. As found from the data obtained through the reading strategy questionnaire responded to by 1,096 research subjects, the findings at the three different levels of data analysis as well as the results of a factor analysis to be related to gender of the students are summarised as follows:

- **Overall Strategy Use**

In respect of gender of students, the results of ANOVA demonstrated that there were significant variations in students' reported frequency of overall strategy use in relation to this variable. The significant variations revealed that female students generally reported more frequent overall strategy use than did their male counterparts.

- **Use of Strategies in the SCT and SETC Categories**

The results of ANOVA revealed that significant variations in students' reported use of reading strategies both in the SCT and SETC categories were found to be related to gender of the students. Those results (Table 6.2, Chapter 6) showed that female students reported more frequent use of strategies for comprehending reading texts, and those for enhancing textual comprehension than did their male counterparts.

- **Use of Individual Reading Strategies**

The results of the chi-square ($\chi2$) tests revealed that the use of 23 out of 39 individual reading strategies (58.97%) varied significantly according to gender of students. The variation pattern of this variable was Female > Male. This pattern indicates that female students reported more frequent use of twenty-three individual strategies than their male counterparts, such as 'predicting what might happen in the text to comprehend reading text before doing the actual reading (SCTBAR 11)'; 'rereading certain part(s) of the text to comprehend reading text while doing the actual reading (SCTWAR 5)'; or 'searching for the meanings of new vocabulary items to comprehend reading text while doing the actual reading (SCTWAR 1)'.

- **Factor Analysis Results**

The results of the factor analysis demonstrated that there were five factors found to be strongly related to gender of students, namely Factor 1 (Strategies for

prior text comprehension facilitation); Factor 2 (Strategies for the reading text review); Factor 3 (Strategies for text comprehension facilitation while reading); Factor 5 (Strategies for meaning discovery); and Factor 6 (Strategies for solving comprehension difficulty). The main underlying relationship between students' reported strategy use and gender is in the use of strategies for comprehending reading texts (SCT Category), and the use of strategies for enhancing textual comprehension (SETC Category).

7.2.4   Research Question 4: **Do students' choices of reading strategies vary significantly according to the location of universities at which they are studying? If they do, what are the main patterns of variation?**

In Response to Research Question 4, the results of the ANOVA revealed no significant variations in relation to location of universities and students' reported overall strategy use, or use of strategies in the two main categories. On the contrary, the chi-square (χ2) tests revealed that use of 9 out of 39 individual reading strategies (23.08 %) varied significantly according to this variable. These chi-square (χ2) tests results also showed that the students studying at the universities located in Metro-Bangkok area reported more frequent use of three strategies than those studying at the universities located in regional area, i.e. looking up the meaning of a new vocabulary item from electronic resources e.g. talking dictionary, dictionary program in a computer, and the Internet to enhance textual comprehension (SETCUV 3); discussing the reading text with classmate(s) or friend(s) to comprehend the text after having done the actual reading (SCTAAR 2); and reciting vocabulary items in rhymes to enhance textual comprehension (SETCRV 3). Furthermore, other six strategies

were reported more frequent use by the students studying at the universities located in regional area, including highlighting important information or difficult vocabulary items by underlining to comprehend the text while doing the actual reading (SCTWAR 8); thinking about the meaning of the reading text in Thai to comprehend the text while doing the actual reading (SCTWAR 10); thinking of one's background knowledge about the text to comprehend the text before doing the actual reading (SCTBAR 8); looking for the parallel article(s) in Thai (if any) to comprehend the text before doing the actual reading (SCTBAR 10); taking notes the important information to comprehend the text while doing the actual reading (SCTWAR 3); and translating the reading text into Thai using Thai script to comprehend the text after having done the actual reading (SCTAAR 6). Moreover, the results of a factor analysis showed only one factor (Factor 3: Strategies for text comprehension facilitation while reading) found to be strongly related to this variable.

7.2.5 Research Question 5: Do students' choices of reading strategies vary significantly with their field of study? If they do, what are the main patterns of variation?

In response to the fifth research question, examining the variation in reading strategy use as well as patterns of variation have been focused in this section. As found from the data obtained through the reading strategy questionnaire responded to by 1,096 science-oriented undergraduate students studying at public universities, the findings at the three different levels of data analysis as well as the results of a factor analysis to be related to field of study are summarised as follows:

- **Overall Strategy Use**

Based on the results of ANOVA, the findings demonstrated that there were significant variations in students' reported frequency of overall strategy use in relation to this variable. The significant variations revealed that Health Science students generally reported more frequent overall strategy use than Science and Technology students did.

- **Use of Strategies in the SCT and SETC Categories**

The results of ANOVA revealed that significant variations in students' reported use of reading strategies both in SCT and SETC categories were found to be related to field of study. The results (Table 6.4, Chapter 6) showed that Health Science students reported more frequent use of strategies for comprehending reading texts, and those for enhancing textual comprehension than Science and Technology students did.

- **Use of Individual Reading Strategies**

The results of the chi-square ($\chi2$) tests revealed that the use of 24 out of 39 individual reading strategies (61.54%) varied significantly according to field of study. The variation pattern of this variable was Health Science > Science and Technology. This pattern indicates that Health Science students reported more frequent use of twenty-four individual strategies than Science and Technology students did, such as 'guessing the meaning of a new vocabulary item with or without looking at the context to enhance textual comprehension (SETCUV 1)'; 'looking up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai to enhance textual comprehension (SETCUV 4)'; and 'guessing the meaning of the text from context to comprehend the text while doing the actual reading (SCTWAR4)'.

- **Factor Analysis Results**

The results of the factor analysis demonstrated that there were five factors found to be strongly related to field of study, namely Factor 1 (Strategies for prior text comprehension facilitation); Factor 2 (Strategies for the reading text review); Factor 3 (Strategies for text comprehension facilitation while reading); Factor 5 (Strategies for meaning discovery); and Factor 6 (Strategies for solving comprehension difficulty). The main underlying relationship between students' reported strategy use and field of study is in the use of strategies for comprehending reading texts (SCT Category), and the use of strategies for enhancing textual comprehension (SETC Category).

7.2.6 Research Question 6: Do students' choices of reading strategies vary significantly with their levels of reading proficiency? If they do, what are the main patterns of variation?

In response to Research Question 6, the researcher has examined the different levels of students' reported frequency of reading strategy use and patterns of variations. As found from the data obtained through the reading strategy questionnaire responded to by 1,096 science-oriented undergraduate students studying at public universities, the findings at the three different levels of data analysis as well as the results of a factor analysis to be related to levels of reading proficiency are summarised as follows:

- **Overall Strategy Use**

Based on the results of ANOVA, the findings demonstrated that significant variations in students' reported frequency of overall strategy use were found in relation to this variable. The results of the post hoc Scheffé Test also emphasized that

high proficiency students generally reported greater frequent overall strategy use than those with moderate and low proficiency levels.

- **Use of Strategies in the SCT, and SETC Categories**

The results of ANOVA revealed that significant variations in students' reported use of reading strategies both in the SCT and SETC categories were found to be related to levels of reading proficiency. The results of the post hoc Scheffé Test carried out after ANOVA demonstrated that students with high level of reading proficiency reported more frequent use of the strategies for comprehending reading texts, and those for enhancing textual comprehension than students with moderate and low levels of reading proficiency did.

- **Use of Individual Reading Strategies**

The results of the chi-square ($\chi2$) tests revealed that the use of 28 out of 39 individual reading strategies (71.79%) varied significantly according to levels of reading proficiency. The significant variations show that high reading proficiency students reported greater use in all 28 individual strategies than did both moderate and low reading proficiency students, such as looking up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai to enhance textual comprehension (SETCUV 4); looking at the root of a new vocabulary to enhance textual comprehension (SETCUV 2); and looking for the parallel article(s) in Thai (if any) to comprehend the text before doing the actual reading (SCTBAR 10).

- **Factor Analysis Results**

The results of the factor analysis demonstrated that there were five factors found to be strongly related to levels of reading proficiency, namely Factor 1 (Strategies for prior text comprehension facilitation); Factor 2 (Strategies for the

reading text review); Factor 4 (Strategies for vocabulary retention); Factor 5 (Strategies for meaning discovery); and Factor 6 (Strategies for solving comprehension difficulty). The main underlying relationship between students' reported strategy use and levels of reading proficiency is in the use of strategies for comprehending reading texts (SCT Category), and the use of strategies for enhancing textual comprehension (SETC Category).

7.2.7 Research Question 7: Do students' choices of reading strategies vary significantly with their high school background? If they do, what are the main patterns of variation?

In Response to Research Question 7, the results of the ANOVA revealed no significant variations in relation to students' high school background and students' reported overall strategy use, or use of strategies in the two main categories. On the other hands, the chi-square ($\chi 2$) tests revealed that use of 7 out of 39 individual reading strategies (17.95 %) varied significantly according to this variable. The chi-square ($\chi 2$) tests also showed that the students who attended private-run schools reported more frequent use of those seven strategies than those who attended state-run schools, e.g. rereading certain part(s) of the text to comprehend the text while doing the actual reading (SCTWAR 5); looking at questions about the text (if any) to comprehend the text before doing the actual reading (SCTBAR 6); and thinking of one's background knowledge about the text to comprehend the text before doing the actual reading (SCTBAR 8). Moreover, the results of a factor analysis showed that no factors were found to have strong relation to this variable.

7.3 Discussion of Research Findings

The previous section (Section 7.2) has focused on the responses to all seven research questions. Based on the responses to those questions, the relationships of reading strategy use at different levels and the five independent variables have been described. Therefore, in this section, the research findings in association with those variables investigated are discussed. The discussion is presented regarding the possible explanations for what have been discovered. The focal point for discussion concerns possible reasons hypothesized by the researcher to where significant differences in certain strategy use with reference to each variable become apparent. It is important to indicate that it may not be easy to compare strategy use by students in the very detailed manner of the present study with previous studies. This is because the present study has a different method of classifying reading strategies; moreover, the resulting analysis has to be examined according to the strategy classification. What follow are further discussions of the research findings in relation to the five variables.

- **Use of Reading Strategies and Gender**

According to several prior studies, gender of the students make a significant difference in learning a second or foreign language (Oxford and Nyikos, 1989; Oxford and Ehrman, 1995; Oh, 1996; and Siriwan, 2007). Most studies in the use of language learning strategies which examined gender as a variable showed more frequency of strategy use by females than males as suggested by Ok (2003). According to Oxford (1993), most prior studies also showed that females tend to be more active strategy users than their counterparts.

The findings of the present study showed strong relation between the gender of students and their choices of strategy use. The results are consistent with the study by OK (2003). The findings demonstrate that female students showed significantly higher frequency of overall strategy use, use of strategies in both SCT and SETC categories, and use of individual reading strategies than their male counterparts. No strategies were reported being used significantly more frequently by male students. That is to say, female students use both the strategies for comprehending reading texts (SCT), and the strategies for enhancing textual comprehension (SETC) more frequently than their male counterparts. This is consistent with the results of most previous studies which can be concluded that females employ certain strategies significantly more frequently than their male counterparts. For example, the findings of Ozek's study (2006) revealed that female students were better than the male ones in terms of using reading strategies. In the US context, Sheorey and Mokhtari (2001) found that the overall male and female mean scores of the use of reading strategies were significantly different with female students reporting significantly higher frequency of strategy use than did their male counterparts. Moreover, Goh and Foong (1997) also studied the reading strategies employed by Chinese learners of English. In their study, significant differences were found between males and females by females used more strategies.

In short, most of the prior studies dealing with second or foreign language reading showed significant differences between males and females in the use of strategies, with women's overall dominance in frequency and range of the strategies. Oxford and Nyikos (1989) who looked at the strategies used by 1,200 university students, concluded that gender differences had 'a profound influence' (p.296) on

strategy use, and that females used strategies more frequently than males. Therefore, a few factors which could possibly be explanations for such significant differences have been hypothesized by the researcher. These factors include innate characteristic of women, reading proficiency levels, and social interaction.

In respect of innate characteristics of women, females are innately more skilled language learners than males, which Oxford, Nyikos and Ehrman (1988, p. 321) identify as 'the language learning folklore that women learn languages better than men'. According to Mori and Gobel (2006), female students show higher self-perception in English whereas males show higher self-perception in math and sports. That is, females have more positive attitudes toward studying a foreign language than their male counterparts.

Another possible factor which may explain higher frequency of strategy use by female is level of reading proficiency. The results of this present study have revealed that female students use strategies more frequently than their male counterparts, and more females fall in the high proficiency reading level. Therefore, the connection between high reading proficiency level and strategy use may explain the higher frequency of strategy use by females. According to Oxford (1993), females tend to be higher language achievers because of their higher level of strategy use.

In addition, there do appear to be some gender differences in the process of language learning acquisition. According to several studies, gender of students makes a significant difference in learning a second or foreign language (e.g. Politzer, 1983; Oxford et al., 1988; Oxford and Nyikos, 1989; Oxford and Ehrman, 1995; and Oh, 1996). Oxford (1995) points out that besides brain hemisphericity, socialization differences between the two gender have been attributed to the differences in strategy

use. According to Politzer's (1983) and Ok's (2003) studies, they showed that females used social learning strategies significantly more than males. Politzer (1983, p. 62) has said that "Variance due to sex of learners seems relatively minor, but does exist with regard to such variables as social interaction". Ok (2003) explains that female students are superior to, or very different from, male students in many social skills with females showing a greater social orientation. Considering the results of previous research works and the present study, it might be concluded that there are differences in strategy use between male and female students. If female students are naturally more skilled in using strategies to learn a language, then males students might need more help in developing such strategies. Therefore, teachers should include strategy instruction for all students as a regular part of language teaching and learning, so that both female and male students can make use of their learning power (Oxford, 1993).

In sum, some possible explanations hypothesized by the researcher for the significant differences in the strategy use by different gender of students may be accounted for the innate characteristics of women, levels of reading proficiency, and social interaction. However, we cannot be definitely certain about what really caused these significant differences; thus, research to investigate these aspects is needed.

- **Use of Reading Strategies and Location of Universities**

Both Health Science, and Science and Technology field of study are located in almost all universities in every part of the country. The location of universities in this study have been categorized as: Bangkok and the metropolitan areas (Metro-Bangkok), and the other regions of the country (Regional).

The findings of the present study have revealed no significant differences between students studying at the universities located in Metro-Bangkok and those located in

regional areas in terms of the reading strategies they used. That is, students studying at the universities located in either location have similar strategic reading habits. However, when it comes to the use of reading strategies for comprehending reading texts (SCT); and the strategies for enhancing textual comprehension (SETC), it has been found that students studying in regional areas reported employing the strategies in each of both categories slightly more frequently than those studying in the Metro-Bangkok area, especially the strategies for enhancing textual comprehension by solving problems dealing with unknown vocabulary items (SETCUV). No previous studies have been found to be carried out to investigate the relationship between location of universities and students' choice of reading strategy use. However, there is a minor significant difference in use of individual strategy items which students studying in the Metro-Bangkok area reported using significantly more frequently than those studying in the regional area. These reading strategies are looking up the meaning of a new vocabulary item from electronic resources e.g. talking dictionary, dictionary program in a computer, and the Internet to enhance textual comprehension (SETCUV 3); discussing the reading text with classmate(s) or friend(s) to comprehend the text after having done the actual reading (SCTAAR 2); and reciting vocabulary items in rhymes to enhance textual comprehension (SETCRV 3).

- **Use of Reading Strategies and Field of Study**

In addition to gender, field of study have also been found related to students' use of reading strategies. As mentioned earlier, science-oriented field of study are located in almost all universities in every part of the country. The science-oriented field of study in the present study have been divided into two groups: Health Science, and Science and Technology. Very few studies have been found in terms of the use of

reading strategies and field of study. Previous research work on language learning strategies in relation to field of study carried out by Oxford and Nyikos (1989) showed that university majors were amongst the key factors that determined students' choice of language strategy use. Their findings revealed that humanities/social sciences/education majors were found to employ certain strategies more frequently than the technical or business ones. Likewise, Siriwan (2007) also concluded that students' major field of study was significantly related to their choice of strategy use.

The findings of the present study demonstrate that Health-Science students showed significantly higher in terms of frequency of overall strategy use, use of strategies in both SCT and SETC categories, and use of individual reading strategies than Science and Technology students did. No strategies were reported being employed significantly more frequently by Science and Technology students. However, as mentioned earlier, at present, not many previous empirical research works in the field of reading strategies have been carried out to support the findings of such a relationship. Consequently, the factors which could possibly be drawn out to explain such significant differences have been hypothesized by the researcher including nature of the major field of study, students' gender, and students' motivation.

According to the section of use of reading strategies and gender as mentioned earlier, gender of students was significantly related to their choice of strategy use--female students showed significantly higher in terms of frequency of strategy use than their male counterparts. Moreover, Table 3.1 in Chapter 3 has shown that absolutely more percentage of female students study in the field of Health-Science reported employing more strategies for interaction in their academic reading than their male counterparts. This may be a factor that can explain the findings of the present study.

Another possible explanation that might be drawn from the findings is students' motivation. Ellis (1997, p. 141) has defined motivation as "the effort learners put into learning an L2 as a result of their desire or need to learn it." While looking at the findings of the present study both in the semi-structured interviews and students' responses of the strategy questionnaire, these findings reflected the fact that Health Science students might be more motivated in English academic reading than Science and Technology ones because they reported employing a wider range of strategies. This could be implied that Science and Technology students might be uninterested in academic reading and/or did not enjoy reading.

This could be summarised that female and male students with different level of motivation studying in different field are likely to have different choices of strategy use in academic reading.

- **Use of Reading Strategies and Levels of Reading Proficiency**

Previous research works on language learning strategies (e.g. Oxford and Nyikos, 1989; and Intaraprasert, 2000) carried out to investigate the use of language learning strategies by students with different levels of language proficiency have revealed that higher proficiency students generally reported employing learning strategies significantly more frequently than did lower proficiency students. Likewise, the findings of previous research works in the field of reading strategies revealed that higher reading proficiency students generally reported employing reading strategies significantly more frequently than did lower reading proficiency students. Examples are Hosenfeld (1977); Kim (1989); Kletzien (1991); Swicegood (1994); Jiménez, García, and Pearson (1996); Hardin (2001); Bouvet (2002); and Ghonsooly, and Eghtesadee (2006). The present study also revealed the similar results as previously

shown that higher reading proficiency students generally reported employing reading strategies significantly more frequently than did lower reading proficiency students.

Based on the findings of the present study, higher reading proficiency students reported greater use of overall strategies than did lower reading proficiency students. When it comes to the use of reading strategies in the two main categories (SCT and SETC categories), the findings showed significant differences among the students with different reading proficiency levels in each of both categories One possible explanation for the conclusion that might be drawn from this study for the relationship between use of reading strategies and students' levels of reading proficiency is students' lack of knowledge of the reading strategies. According to Gersten (1998), a lot of students with academic difficulties may not be aware of strategies that are used by academically competent students when they study. Moreover, many researchers have demonstrated that strategy use and awareness of reading strategies are different in more and less proficient readers; and more proficient readers generally use various types of strategies, and they use them in more efficient ways (Jimenez, Garcia and Pearson, 1995). This is consistent with Bouvet (2002) and Cubukcu (2007), proficient learners know how to use reading strategies efficiently although both proficient and less proficient learners use a similar number of strategies. In addition, the higher reading proficiency students can use reading strategies more frequently because they have received more reading strategy instruction (Hardin, 2001).

Another possible factor which may explain the relationship between use of reading strategies and students' levels of language proficiency is students' motivation. Ghanaguru (n.d.) suggested that students who lack interest of motivation in reading are unwilling or uncooperative learners. According to Gardner (1985), positive

motivation is related to success in second language learning. The term 'motivation' is defined by Gardner (1985) as 'the combination of effort plus desire to achieve the goals of learning the language plus favourable attitudes toward learning the language. That is, motivation to learn a second language is seen as referring to the extent to which the individual works or strives to learn the language because of a desire to do so and the satisfaction experienced in this activity (p. 10).' Similarly, Ellis (1994, p. 715) defines motivation as 'the effort which learners put into learning an L2 as a result of their need or desire to learn it'.

It is generally accepted by many scholars (e.g. Ellis, 1985; 1994; Gardner, 1985; and Dörnyei, 2003) that motivation plays an important part in language learning and language achievement. In this regard, Yule (1996, p. 195) comments that students who experience success in language learning are among the highest motivated to learn and 'motivation may be as much a result of success as a cause'. The findings of the present study suggest that higher reading proficiency students may be highly motivated to find opportunities for better understanding English reading texts, with students reporting high frequency of use both the strategies for comprehending reading texts (SCT), and the strategies for enhancing textual comprehension (SETC). This means that the effort which high reading proficiency students put into their reading may enable them to employ a wider range of strategies. In other words, their employment of reading strategies may help them becoming high reading proficiency students. Furthermore, high reading proficiency students may be better at managing themselves by performing language tasks more actively and effectively, because they are more proficient than those with moderate and low reading proficiency students. According to Chamot (1987), effective learners and ineffective learners are different

in that the former are able to use strategies appropriately, whereas the latter also use a number of strategies but inappropriately. This is consistent with Bouvet (2002) who indicated that proficient and less proficient readers tend to use the same strategies but with different purposes.

The understanding of the motivational factors of reading problems may provide important directions for educators to design effective lesson plan and reading instruction for students with low level of reading proficiency. According to Lau and Chan (2003), the close relation between strategy use and reading comprehension provided support for the possibility that the educators can enhance poor students' reading comprehension through direct strategy instruction. The traditional instructional approach of language learning in Thailand is teacher centred and focuses on rote memorization and comprehension tests (Mackenzie, 2002). In such a learning environment, students with low level of reading proficiency may find it difficult to develop their ability and motivation in reading. The present findings suggested that implementing direct strategy instruction and changing the teaching approach in language classes may be an important move towards enhancing low reading proficiency students' reading development.

- **Use of Reading Strategies and High School Background**

To date, no research works have been found to be carried out to investigate students' high school background in relation to use of reading strategies. The two different types of secondary schools offering a high school degree in the present study have been categorized as state-run and private-run schools.

The findings of this study reveal that no significant variations in the overall strategy use of students who got high school degree from either type of high schools

were found. However, a closer look in detail when comparing the use of reading strategies in both SCT and SETC categories, it has been found that students attended the private-run schools reported employing the strategies in each of both categories significantly slightly more frequently than those attended the state-run school, especially the strategies for comprehending reading texts. A few possible factors hypothesized by the researcher may help to explain the significant differences in use of strategies reported by students who attended different types of high schools. These factors include members of staff, students' socio-economic background, and access to and provision of the facilities such as computers.

In terms of members of staffs, many private-run schools can afford to attract foreigners to work as members of teaching staffs (Intaraprasert, 2000). Consequently, it is probably easier for students in private-run school to practice English and get useful advice from the native English speaking teachers. Therefore, foreign teachers or lecturers may be seen as a factor which could encourage students to try every possible way to keep up with their teachers so as to understand the lessons. This may also reflect the socio-economic status of students who got the high school degree from private-run school. Generally speaking, most of the students who attended private-run school are from the families with high socio-economic status because the bench fee of the private-run school is normally higher than the state-run school. As a result, these students may be able to afford for any language mass media and facilities, e.g. computer, talking dictionary; which can help them to improve their reading skill.

Another possible factor which may explain high use of reading strategies of students attended the private-run schools is provision of the facilities such as computers (Intaraprasert, 2000). Many private-run schools may be able to afford and

provide facilities, such as computers, for the students more easily because they do not need to wait for the public fund. On the other hand, many students from the state-run schools which located in the regional areas may not have such an easy chance to access to modern facilities, especially the ones located out of town with limited public transportation. As a result, it may be easy of the students from the private-run schools to gain access to computers and other facilities which they can use for their independent reading.

In conclusion, the findings suggest that three independent variables for the present study, i.e. gender of students, field of study and students' levels of reading proficiency, have been found in association with students' choice of strategy use. The findings of the present study are generally consistent with the previous studies as demonstrated in Chapter 2 in terms of gender of students, and students' levels of reading proficiency, where female students reported a higher frequency of strategy use than did their male counterparts; similarly, high reading proficiency students reported a higher frequency of strategy use than did moderate and low reading proficiency students. Likewise, Health-Science students reported a higher frequency of strategy use than those majoring in Science and Technology. On the contrary, in respect of the location of university, like high school background, the findings of this study suggest that there is a minor significant difference in strategy use between students studying at the universities located in Metro-Bangkok and regional areas. There is also a minor significant difference in strategy use in relation to high school background of students. All in all, when taking all five independent variables into account, we may come to the conclusion that the relationship between students' choice of reading strategy use and gender of students, location of universities, field of

study, and high school background seems to be one directional as presented in Chapter 3. In contrast, the relationship between students' choices of strategy use and levels of reading proficiency is still complex because it is bi-directional – it cannot be clearly determined whether reading strategy use is the cause or result of students' levels of reading proficiency.

7.4 Implications of the Research Findings for the Teaching and Learning of English for Science-Oriented Students

As summarized in the previous section in response to the research questions, the research findings demonstrate that there is a relationship between gender of students; field of study; and students' levels of reading proficiency, and students' overall use of strategies, use of strategies in the two main categories, as well as use of individual reading strategies. Some implications for the teaching and learning of English for science-oriented students may be drawn as follows:

1. Arising out of the research findings, high reading proficiency students reported using electronic resources, e.g. talking dictionary; dictionary program; and internet, to look up the meanings of new vocabulary items. It is recommended that teachers of English should provide these facilities as many different forms as possible and encourage students to make maximum use of them as an alternative means of learning.

2. One of the significant findings of the present study is that, as a whole, all of students with high level of reading proficiency reported utilizing strategies in both main categories in order to improve their reading comprehension in general. It is recommended that language teachers should train their students as many reading

strategies as possible and encourage the students to make maximum use of them while reading.

3. Arising out of the research findings, the greatest number of science-oriented undergraduate students reported employing strategies for comprehending reading texts rather than the strategies for enhancing textual comprehension. To be more specific, these students reported employing strategies to comprehend the text before doing the actual reading (SCTBAR), strategies to comprehend the text while doing the actual reading (SCTWAR), and strategies to comprehend the text after having done the actual reading (SCTAAR). In this regard, the students should be trained or introduced to employ these reading strategies while reading academic materials.

4. One finding reveals that students with high level of reading proficiency reported making use of electronic resources, e.g. dictionary program in a computer, and the Internet to look up the meaning of a new vocabulary item. In this instance, teachers should provide interactive computer programs with hi-speed internet in a self-access centre where students can study on their own.

5. The findings reveal that the greatest number of students with different gender, location of universities, field of study, levels of reading proficiency, and high school background, reported employing both the strategies for comprehending reading texts (SCT), and the strategies for enhancing textual comprehension (SETC). In this instance, teachers of English should introduce a wide range of reading strategies for reading comprehension. Therefore, both teachers and students should be aware of what and how important reading strategies are. In order to raise their awareness, the researcher would like to propose that:

A mini-conference among the members of English teaching staff should be held. These staffs should be encouraged to introduce reading strategies as part of classroom lessons to their students. They will be also asked to examine the strategy inventory and think of what should be included so that the strategy inventory will be more comprehensive and offer a wider selection for students when teachers use this inventory as a guide for samples of reading strategies

A semi-seminar about reading strategies could also be held for students, especially at the beginning of new semesters before they start their English lessons. This can encourage and help them to become aware of the importance of reading strategies. In other words, this will raise awareness of how reading strategies can help them in reading. The seminar can be held in two separate sessions in terms of types of reading strategies, i.e. the strategies for comprehending reading texts, and the strategies for enhancing textual comprehension. At the seminar, students may be asked to examine the already-identified reading strategies based on the strategy inventory for the present study, providing feedback on what they think about those strategies in terms of usefulness and workability. They may add into the list some strategies which they think are missing. Furthermore, an informal talk with students about reading strategies can be held occasionally.

7.5 Contributions of the Present Study

The present study has made some significant contributions to the field of reading strategies. These contributions based on the findings of the present study can be characterized as follows:

1. As mentioned earlier in Chapter 2, there has been some previous research work on reading strategies carried out with Thai students, however, most of the focal points of study have generally been limited to examining the relationship among reading strategy use, levels of reading proficiency and field of study. Consequently, the present study has widened the focal points of study through a variety of investigated variables, namely gender of students; location of universities; field of study; levels of reading proficiency; and high school background.

2. Apart from the variables investigated, the researcher for the present study has systematically produced a reading strategy inventory as shown in Chapter 4, which was based on the self-reported data obtained through students' semi-structured interviews. This reading strategy inventory has been used as the instrument to elicit the strategy use of science-oriented undergraduate students in detail.

3. In measuring the students' levels of reading proficiency, the researcher for the present study has systematically constructed The Reading Proficiency Test in English for Science and Technology –RPTEST – based on many scholars' guidelines. This test was constructed rigorously to serve the particular purpose of the present study; moreover, it has proved to be effective in terms of reliability and validity. If the test content is not appropriate for other groups of students, the test construction process may serve other researchers as a guide to construct their own reading proficiency tests.

4. In terms of data analysis, different types of statistical methods were employed, namely an analysis of variance (ANOVA), chi-square tests ($\chi 2$), and factor

analysis. This data analysis can be a guide for other researchers to apply in similar types of reported data.

7.6 Limitation of the Present Study and Proposals for Future Research

The present study has been accepted valuable in addressing the research questions, which are to describe types of reading strategies reported employed by science-oriented undergraduate students as well as to examine variation patterns and to explore relationships between frequency of students' reported use of strategy at different levels with reference to each investigated variable. However, in conducting this study, certain limitations have been apparent, and the areas for possible future research works should take these limitations into consideration:

1. Although some researchers, such as Cohen and Aphek (1981) comment that classroom observations is not a productive method of data collection to reveal students' learning strategies, the researcher realized that classroom observation should have been included as one of the methods of data collection for the present study. This method may enable a researcher to discover other classroom aspects, for example, how the teacher manages his or her English class, classroom interaction between teacher and students, students' classroom participation, other than students' reading strategies. The research findings show that science-oriented undergraduate students with different gender, field of study, and levels of reading proficiency reported significant differences in use of reading strategies. Therefore, classroom

observation might have revealed what was the cause of such significant differences in English classrooms.

2. Students with longer experiences in university study may have more advantages of acquiring certain reading strategies through their experiences than those with shorter experiences in university study. Therefore, the research population should have been more homogeneous in terms of years of study in the university.

3. The research population should have been more well-balanced in terms of each investigated variable. In other words, the number of students from each gender, location of universities, field of study, levels of reading proficiency, and high school background should have been approximately the same.

4. A larger number of students should have been involved in the semi-structured interviews; moreover, the number of interviewees should have been more homogeneous in terms of gender.

5. Although responses to closed questions in the reading strategy questionnaire are easier to collate and analyse, the closed question questionnaires allow for less subtlety in the answers. Consequently, the study needs replication with more reading strategies from other existing strategy questionnaires offered by other researchers in order to provide a wider range of reading strategies to students to choose from. Additionally, in replication, the open question questionnaire may be provided for the students because the information gathered by way of the responses from open questions is more likely to reflect the full richness and complexity of the views held by the respondent (Denscombe, 2003)

6. This study aims to study reading strategies specifically employed by science-oriented undergraduate students studying at public universities. Therefore, all participants were students from limited admission universities in Thailand. The findings would be more interesting if students from other types of universities, e.g. open admission universities; private universities; teacher universities; and so on, participated in the present study. Then, another pattern of reading strategy use may be discovered.

In spite of the limitations, the researcher acknowledges that some areas might justify further research works. These areas could include the following:

1. As we have seen in the review of related literature in Chapter 2, a large number of research works on reading strategies have been carried out with native speakers of English learning a foreign language and/or with non-native speakers of English learning English as a second language. More researcher works in this area need to be carried out with a wider range of populations in different contexts, e.g. non-native speakers of English learning English as a foreign language.

2. To date, based on the related literature review, no researchers in the field of reading strategies have taken high-school background into consideration as one of the factors related to students' choices of reading strategy use. Other aspects which should be further explored include education background, class size, students' socio-economic backgrounds, attitude and motivation towards reading academic texts, and institution facility.

3. As demonstrated in the literature review section in Chapter 3, it can be seen that many research works on reading strategies have made use of strategy

questionnaire as the most common instrument for data collection. Other methods of data collection, e.g. classroom observation and think-aloud protocol, should be employed in order to elicit students' reading strategy use.

4. As mentioned earlier, the research population for the present study consists of science-oriented undergraduate students studying at public universities. The findings would be more useful if we recruited students from other types of universities. To get a whole picture of the undergraduate students' strategy use, students with different types of universities should be included in the future research works.

5. The research population for the present study consists of students studying in different years of study (i.e. 2nd, and 3rd), the researcher has recognized that the heterogeneity of students in terms of the numbers of years of study at each university may have affected students' choices of strategy use. Consequently, there is a need for future research works to investigate whether or not this aspect associates with students' reported choices of reading strategy use.

6. The research population for the present study was the students in the science-oriented field. The findings would be more interesting and useful if we recruited students from other field of study, such as English major students, education students, law students, or applied art students. To get a whole picture of the students' strategy use, students with different field of study should be included in the future research works.

7.7 Conclusion

The present study has contributed to the field of reading strategy in terms of reading strategy classification, the variables investigated, and students' reading proficiency measurement. One of the major contributions of the present study has been the classification system of reading strategies which science-oriented undergraduate students reported employing in dealing with academic reading. The reading strategies have been classified on the basis of reading purposes, including the strategies for comprehending reading texts, and the strategies for enhancing textual comprehension, as reported by the research subjects. Of all the variables investigated, two variables, i.e. location of universities, and high school background, have rarely been taken into consideration by any former researchers in this area.

Lastly, the researcher of the present study has suggested some points for implications emerging from the research findings for the teaching and learning of English to science-oriented undergraduate students. Additionally, limitations of the present study and some proposals for future research have been provided. The researcher believes that with a research design presented in Chapter 3, as well as appropriate instruments for eliciting reading strategies, a researcher for the future study can gain further insights into how students cope with their academic reading, and how reading strategies are employed by different students in different learning contexts.

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APPENDICES

APPENDIX A
แบบสอบถาม

<u>คำชี้แจง</u> แบบสอบถามนี้มีทั้งหมด 5 หน้า โดยแบ่งเป็น 2 ส่วน
ส่วนที่ 1 ข้อมูลทั่วไปเกี่ยวกับผู้ตอบแบบสอบถาม (หน้าที่ 1)
ส่วนที่ 2 แบบสอบถาม เรื่อง "กลวิธีการอ่านภาษาอังกฤษเชิงวิชาการ" (หน้าที่ 2-5)

ส่วนที่ 1
ข้อมูลทั่วไปเกี่ยวกับผู้ตอบแบบสอบถาม

โปรดทำเครื่องหมาย (X) หรือกรอกข้อความที่ตรงกับความเป็นจริงของนักศึกษา

1. เพศ   :   ☐   ชาย

            ☐   หญิง

2. สถาบันการศึกษา : _____

3. คณะ   : _____ สาขา   :_____

4. ถ้าให้นักศึกษาประเมินความสามารถในการอ่านภาษาอังกฤษเชิงวิชาการของตนเอง นักศึกษาคิดว่า
   ความ สามารถของตนเองอยู่ในระดับ......

        ☐ สูง   ☐ กลาง   ☐ ต่ำ

5. ทำไมนักศึกษาจึงประเมินตนเองในระดับดังกล่าว
   _____
   _____

6. นักศึกษาจบการศึกษาระดับมัธยมศึกษาตอนปลาย หรือเทียบเท่าจากสถาบันการศึกษาในสังกัด....

        ☐ รัฐบาล   ☐ เอกชน

7. นักศึกษาคิดว่าการอ่านภาษาอังกฤษเชิงวิชาการเป็นกิจกรรมที่...... (ตอบได้มากกว่า 1 ข้อ)

   ☐ ง่าย   ☐ ยาก   ☐ น่าสนใจ   ☐ มีประโยชน์

   ☐ น่าเบื่อ   ☐ไม่มีประโยชน์   ☐อื่น ๆ (โปรดระบุ) _____

8. ตามปกติ โดยเฉลี่ยในหนึ่งสัปดาห์ นักศึกษาอ่านภาษาอังกฤษเชิงวิชาการ......

   ☐ ทุกวันหรือเกือบทุกวัน   ☐ 3-4 ครั้ง   ☐ 1-2 ครั้ง   ☐ แทบจะไม่อ่านหรือ ไม่อ่านเลย

ส่วนที่ **2**

แบบสอบถาม เรื่อง "กลวิธีการอ่านภาษาอังกฤษเชิงวิชาการ"

คำชี้แจง: แบบสอบถามนี้สร้างขึ้นเพื่อรวบรวมข้อมูลเกี่ยวกับกลวิธีการอ่านภาษาอังกฤษเชิงวิชาการของนักศึกษา ระดับปริญญาตรี พื้นฐานสายวิทยาศาสตร์ นักศึกษาโปรดอ่านและพิจารณาว่า เมื่อนักศึกษาอ่านภาษาอังกฤษเชิง วิชาการ และนักศึกษาต้องการเข้าใจในเนื้อหาที่อ่าน นักศึกษาใช้กลวิธีการอ่านที่ปรากฏในแบบสอบถามนี้หรือไม่ โดยเลือกคำตอบว่า "มี" หรือ "ไม่มี" ถ้าตอบว่า "ไม่มี" ให้นักศึกษาข้ามไปตอบส่วนต่อไปตามคำสั่ง ถ้าตอบว่า "มี" ให้นักศึกษาพิจารณาเลือกกลวิธีการอ่านภาษาอังกฤษเชิงวิชาการที่กำหนด ให้สอดคล้องกับความเป็นจริงที่ นักศึกษาใช้ โดยการทำเครื่องหมายถูก ☑ ลงในช่องว่างโดย พิจารณาตามเกณฑ์ต่อไปนี้

"ไม่เคย" หมายถึง เมื่อนักศึกษาอ่านภาษาอังกฤษเชิงวิชาการ นักศึกษา *ไม่เคยใช้* กลวิธีการอ่านนั้นเลย

"บางครั้ง" หมายถึง เมื่อนักศึกษาอ่านภาษาอังกฤษเชิงวิชาการนักศึกษาใช้กลวิธีการอ่านนั้น ๆ *เป็นครั้งคราว ประมาณหนึ่งในสี่ของกลวิธีการอ่านที่นักศึกษาใช้ทั้งหมด*

"บ่อย" หมายถึง เมื่อนักศึกษาอ่านภาษาอังกฤษเชิงวิชาการ นักศึกษาใช้กลวิธีการอ่านนั้น ๆ *ประมาณสองใน สามของกลวิธีการอ่านที่นักศึกษาใช้ทั้งหมด*

"สม่ำเสมอ" หมายถึง เมื่อนักศึกษาอ่านภาษาอังกฤษเชิงวิชาการ นักศึกษาใช้กลวิธีการอ่านนั้น *มากกว่า สามใน สี่ของกลวิธีการอ่านที่นักศึกษาใช้ทั้งหมด*

ตัวอย่าง:

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1. นักศึกษาพยายามหาวิธีการ เพื่อช่วยให้ตนเองเข้าใจเนื้อหาที่จะอ่าน <u>ก่อนการอ่านจริง</u> หรือไม่

    ☑   มี   ☐ ไม่มี

ถ้าไม่มี โปรดข้ามไปตอบส่วนที่ 2

ถ้ามี นักศึกษาใช้วิธีการต่อไปนี้บ่อยเพียงใด เพื่อช่วยให้ตนเองเข้าใจเนื้อหาที่จะอ่าน <u>ก่อนการอ่านจริง</u>

กลวิธีการอ่าน	ความถี่ในการใช้กลวิธีการอ่านภาษาอังกฤษ			
	สม่ำเสมอ	บ่อย	บางครั้ง	ไม่เคย
1. ค้นหาความหมายของคำศัพท์ใหม่	√			

1. นักศึกษาพยายามหาวิธีการ เพื่อช่วยให้ตนเองเข้าใจเนื้อหาที่จะอ่าน <u>ก่อนการอ่านจริง</u> หรือไม่

    ☐ มี   ☐ ไม่มี

    ถ้าไม่มี โปรดข้ามไปตอบส่วนที่ 2

    ถ้ามี นักศึกษาใช้วิธีการต่อไปนี้บ่อยเพียงใด เพื่อช่วยให้ตนเองเข้าใจเนื้อหาที่จะอ่าน <u>ก่อนการอ่านจริง</u>

กลวิธีการอ่านภาษาอังกฤษเชิงวิชาการ	ความถี่ในการใช้กลวิธีการอ่านภาษาอังกฤษ			
	สม่ำเสมอ	บ่อย	บางครั้ง	ไม่เคย
1. ค้นหาความหมายของคำศัพท์ใหม่				
2. อ่านชื่อเรื่องของบทความหรือเนื้อหา				
3. อ่านเนื้อหาทั้งหมดอย่างคร่าวๆ				
4. อ่านย่อหน้าแรก และย่อหน้าสุดท้าย				
5. ดูรูปภาพ แผนภาพ แผนภูมิ ตาราง (ถ้ามี)				
6. อ่านคำถามเกี่ยวกับเนื้อหา(ถ้ามี)				
7. อ่านผ่าน ๆ เพื่อหาใจความหลักของเนื้อหา				
8. โยงความรู้เดิมของตนเองกับเนื้อหาที่จะอ่าน				
9. อ่านบทนำ หรือ บทคัดย่อของเนื้อหา				
10. ค้นหาเนื้อเรื่องเป็นภาษาไทย ที่เกี่ยวข้องหรือใกล้เคียงกับเรื่องที่จะอ่าน (ถ้ามี)				
11. คาดเดาเกี่ยวกับเนื้อหาที่อ่านว่าจะเกี่ยวกับอะไร				

2. นักศึกษาพยายามหาวิธีการเพื่อช่วยให้ตนเองเข้าใจเนื้อหา<u>ขณะที่กำลังอ่านจริง</u> หรือไม่

    ☐ มี   ☐ ไม่มี

    ถ้าไม่มี โปรดข้ามไปตอบส่วนที่ 3

    ถ้ามี นักศึกษาใช้วิธีการต่อไปนี้บ่อยเพียงใด เพื่อช่วยให้ตนเองเข้าใจเนื้อหา<u>ขณะที่กำลังอ่านจริง</u>

กลวิธีการอ่านภาษาอังกฤษเชิงวิชาการ	ความถี่ในการใช้กลวิธีการอ่านภาษาอังกฤษ			
	สม่ำเสมอ	บ่อย	บางครั้ง	ไม่เคย
1. ค้นหาความหมายของคำศัพท์ใหม่				
2. พิจารณาวิเคราะห์โครงสร้างทางไวยากรณ์ของประโยคในเนื้อหา				
3. จดบันทึกประเด็นที่สำคัญ ของเนื้อหา				
4. เดาความหมายของคำศัพท์ที่ปรากฏในเนื้อหาจากบริบท หรือวิธีการอื่น ๆ				
5. อ่านเนื้อหาส่วนที่ยาก หรือไม่เข้าใจซ้ำอีก อย่างน้อยหนึ่งครั้ง				
6. อ่านเนื้อหาส่วนที่ยาก หรือไม่เข้าใจอย่างช้า ๆ และอย่างพินิจพิจารณา				

กลวิธีการอ่านภาษาอังกฤษเชิงวิชาการ	ความถี่ในการใช้กลวิธีการอ่านภาษาอังกฤษ			
	สม่ำเสมอ	บ่อย	บางครั้ง	ไม่เคย
7. ข้ามเนื้อหาส่วนที่ยาก หรือไม่เข้าใจ				
8. ขีดเส้นใต้ใจความสำคัญ หรือคำศัพท์ที่ไม่รู้ความหมาย				
9. ทำเครื่องหมายดอกจัน หรือสัญลักษณ์อื่น ไว้ที่ใจความสำคัญหรือคำศัพท์ที่ไม่รู้ความหมาย				
10. แปลเนื้อหาที่อ่านเป็นภาษาไทย โดยอาจจะเขียนเนื้อหาที่แปลด้วย				
11. สรุปเนื้อหาที่อ่านบางส่วนเป็นภาษาไทย และ/หรือภาษาอังกฤษ				

3. นักศึกษาพยายามที่จะเข้าใจเนื้อหาที่อ่าน <u>หลังการอ่านจริง</u> หรือไม่?

☐ มี ☐ ไม่มี

ถ้าไม่มี โปรดข้ามไปตอบส่วนที่ 4

ถ้ามี นักศึกษาใช้วิธีการต่อไปนี้บ่อยเพียงใด เพื่อช่วยให้นักศึกษาเข้าใจเนื้อหาที่อ่าน<u>หลังการอ่านจริง</u>

กลวิธีการอ่านภาษาอังกฤษเชิงวิชาการ	ความถี่ในการใช้กลวิธีการอ่านภาษาอังกฤษ			
	สม่ำเสมอ	บ่อย	บางครั้ง	ไม่เคย
1. ค้นหาความหมายของคำศัพท์ใหม่				
2. อภิปรายเนื้อหาที่อ่าน กับเพื่อนร่วมชั้นเรียน หรือกับนักศึกษาคนอื่น ๆ				
3. บันทึกสรุปเนื้อหาที่อ่านทั้งหมด				
4. ทบทวนเนื้อหาที่อ่านโดยการพูดกับตนเอง หรือเล่าให้เพื่อนร่วมชั้นเรียนหรือนักศึกษาคนอื่นๆ ฟัง				
5. ทบทวนเนื้อหาโดยการอ่านจากบันทึกที่จดไว้ ขณะที่อ่าน				
6. แปลเนื้อหาที่อ่านจากภาษาอังกฤษเป็นภาษาไทย โดยเขียนเนื้อหาที่แปลด้วย				

4. ตามปกติแล้ว นักศึกษามีปัญหาในการ<u>ไม่รู้ความหมายของคำศัพท์ใหม่</u> ที่พบในเนื้อหาที่อ่านหรือไม่?

☐ มี ☐ ไม่มี

ถ้าไม่มี โปรดข้ามไปตอบส่วนที่ 5

ถ้ามี นักศึกษาใช้วิธีการต่อไปนี้บ่อยเพียงใดเพื่อ <u>แก้ปัญหาการไม่รู้ความหมายของคำศัพท์ใหม่ที่พบในเนื้อหาที่อ่าน</u>

กลวิธีการอ่านภาษาอังกฤษเชิงวิชาการ	ความถี่ในการใช้กลวิธีการอ่านภาษาอังกฤษ			
	สม่ำเสมอ	บ่อย	บางครั้ง	ไม่เคย
1. เดาความหมายของคำศัพท์ที่ปรากฏในเนื้อหาจากบริบท				
2. เดาความหมายของคำศัพท์ที่ปรากฏในเนื้อหาจากรากศัพท์				

กลวิธีการอ่านภาษาอังกฤษเชิงวิชาการ	ความถี่ในการใช้กลวิธีการอ่าน ภาษาอังกฤษ			
	สม่ำเสมอ	บ่อย	บางครั้ง	ไม่เคย
3. ค้นหาความหมายของคำศัพท์ใหม่ จากเครื่องมืออิเลกทรอนิกส์ เช่น จากพจนานุกรมอิเลกทรอนิกส์ (Talking dictionary) โปรแกรมแปลในคอมพิวเตอร์ และ อินเตอร์เนต				
4. ค้นหาความหมายของคำศัพท์ใหม่ จากหนังสือพจนานุกรม ทั้งพจนานุกรม อังกฤษเป็นอังกฤษ และอังกฤษเป็นไทย				
5. หาความหมายของคำศัพท์ใหม่ โดยการถามครู เพื่อนร่วมชั้นเรียน หรือบุคคลอื่น ๆ				

5. นักศึกษาพยายามที่จะจดจำความหมายของคำศัพท์ใหม่ ที่นักศึกษาได้เรียนรู้ความหมายแล้ว หรือไม่?

☐ มี ☐ ไม่มี

ถ้าไม่มี กรุณาหยุดทำแบบสอบถาม

ถ้ามี นักศึกษาใช้วิธีการต่อไปนี้บ่อยเพียงใด เพื่อช่วยให้ตนเองสามารถจดจำความหมายของคำศัพท์ใหม่ ที่ได้เรียนรู้ ความหมาย แล้ว

กลวิธีการอ่านภาษาอังกฤษเชิงวิชาการ	ความถี่ในการใช้กลวิธีการอ่าน ภาษาอังกฤษ			
	สม่ำเสมอ	บ่อย	บางครั้ง	ไม่เคย
1. นำคำศัพท์ที่เรียนรู้ความหมายแล้วมาฝึกสนทนากับเพื่อน				
2. ท่องคำศัพท์ที่ได้เรียนรู้ความหมายแล้ว โดยการดูจากบันทึกรายการคำศัพท์ใหม่ หรือไม่ก็ได้				
3. ผูกคำศัพท์ที่ได้เรียนรู้ความหมายแล้วให้มีเสียงคล้องจองกัน				
4. โยงความหมายของคำศัพท์ที่ได้เรียนรู้ความหมายแล้วกับสิ่งของ หรือ สถานการณ์จริงรอบตัว				
5. โยงเสียงในภาษาไทยที่คล้ายคลึงกับเสียงคำศัพท์ภาษาอังกฤษ ที่ได้เรียนรู้ความหมายแล้ว				
6. ทำหน้าที่เป็นผู้ทบทวนเนื้อหาที่อ่านให้กับเพื่อนร่วมชั้นเรียน				

ขอขอบคุณในความร่วมมือ

APPENDIX B

Student Background Questionnaire

Instruction: There are 2 parts in this questionnaire.

        <u>Part 1:</u>   Respondents' personal information

        <u>Part 2:</u>   The academic reading questionnaire

………………………………………………………………………………………

Part 1:   Respondents' personal information

Instruction: Please provide your personal information by putting a check mark (X) in the appropriate box or writing the response where necessary.

1. Your gender: ☐ male

                                 ☐ female

2. Your institution: _____

3. Faculty: _____ Major of study areas: _____

4. Your ability in Academic English reading:

    ☐ high   ☐ moderate   ☐ low

5. Why do you estimate your ability in that level?_____

6. Your upper secondary school background

    ☐ state-run school   ☐ private run school

7. You think reading English is: (you can choose more than one)

    ☐ easy   ☐ difficult   ☐ interesting   ☐ useful

    ☐ boring   ☐ useless   ☐ others (please specify) _____

8. The frequency of your academic English reading:

    ☐ Everyday or almost everyday   ☐ 3-4 times a week
    ☐ 1-2 times a week   ☐ Never or almost never

Part 2:   The Academic Reading Strategy Questionnaire

Instructions: The Academic Reading Strategy Questionnaire (RSQ) is designed to gather information about how you, as a science-oriented undergraduate government university student, go about academic reading English texts. On the following pages, you will find statements related to academic reading English texts. Please read each statement carefully and choose the response 'Yes' or 'No' which applies to you. If the response you choose is 'Yes', please go on the following statements and mark ☑ the response which best describes how often you actually perform each activity when you are engaged in academic reading English texts. If the response you choose is 'No', please proceed to the next part as instructed. Please also note that there are no correct or incorrect answers for your responses, and your responses will not at all affect your English course at your university. The criteria for the response are as follows:

Never or almost never true of me means that you *never or almost never* perform the activity which is described in the statement.

Somewhat true of me means that you perform the activity which is described in the statement *less than half the time*.

Often true of me means that you perform the activity which is described in the statement *more than half the time*.

Always or almost always true of me means that you *always or almost always* perform the activity which is described in the statement.

Example:

---

1. Before reading academic English text, do you look for any techniques to help you understand what you are going to read ?

☐ Yes   ☐ No

If 'No', please stop here. If 'Yes', how often do you……?

Reading Strategy	Frequency of Your Own Reading Strategy Use			
	Always or almost always	Often true of me	Somewhat true of me	Never or almost never
1) search for the meanings of new vocabulary items				

---

1. Before reading academic English text, do you look for any techniques to help you understand what you are going to read ?

☐ Yes ☐ No

If 'No', please stop here. If 'Yes', how often do you……?

Reading Strategy	Frequency of Your Own Reading Strategy Use			
	Always or almost always	Often true of me	Somewhat true of me	Never or almost never
1) search for the meanings of new vocabulary items				
2) read the title of the text				
3) go through the text quickly				
4) read the first and the last paragraphs				
5) look at pictures/charts/tables/ figures that appear in the text				
6) look at questions about the text (if any)				
7) scan for main ideas				
8) think of your background knowledge about the text				
9) read the abstract or introductory part				
10) look for the parallel article(s) in Thai (if any)				
11) predict what might happen in the text				

2. While reading academic English text, do you look for any techniques to help you understand what you are going to read ?

☐ Yes ☐ No

If 'No', please process to 3. If 'Yes', how often do you……?

Reading Strategy	Frequency of Your Own Reading Strategy Use			
	Always or almost always	Often true of me	Somewhat true of me	Never or almost never
1) search for the meanings of new vocabulary items				

Reading Strategy	Frequency of Your Own Reading Strategy Use			
	Always or almost always	Often true of me	Somewhat true of me	Never or almost never
2) analyse a sentence structure				
3) take notes the important information				
4) guess the meaning of the text from context				
5) reread certain part(s) of the text				
6) read certain part(s) of the text slowly				
7) avoid a difficult part				
8) highlight important information or difficult vocabulary items by underlining				
9) highlight important information or difficult vocabulary items by making symbol(s)				
10) think about the meaning of the reading text in Thai				
11) make a summary of certain part(s) of the reading text in either Thai or English, or both				

3. After reading academic English text, do you try to understand what you have read?

☐ Yes   ☐ No

If 'No', please process to 4. If 'Yes', how often do you……?

Reading Strategy	Frequency of Your Own Reading Strategy Use			
	Always or almost always	Often true of me	Somewhat true of me	Never or almost never
1) search for the meanings of new vocabulary items				
2) discuss the reading text with classmate(s) or friend(s)				
3) make a summary of the whole reading text				

Reading Strategy	Frequency of Your Own Reading Strategy Use			
	Always or almost always	Often true of me	Somewhat true of me	Never or almost never
4) retell yourself or other people about what has been read				
5) review your own notes				
6) translate the reading text into Thai using Thai script				

4. Do you have problems dealing with unknown vocabulary items while doing the actual reading?

☐ Yes   ☐ No

If 'No', please process to 5. If 'Yes', how often do you……?

Reading Strategy	Frequency of Your Own Reading Strategy Use			
	Always or almost always	Often true of me	Somewhat true of me	Never or almost never
1) guess the meaning of a new vocabulary item with or without looking at the context				
2) look at the root of a new vocabulary				
3) look up the meaning of a new vocabulary item from electronics resources e.g. Talking dictionary, dictionary program in a computer, and the Internet				
4) look up the meaning of a new vocabulary item in a dictionary either English – English or English – Thai				
5) appeal for assistance from other people about the meaning of a new vocabulary item				

5. Do you try to retain knowledge of newly-learned vocabulary items?

☐ Yes   ☐ No

If 'No', please stop here. If 'Yes', how often do you……?

Reading Strategy	Frequency of Your Own Reading Strategy Use			
	Always or almost always	Often true of me	Somewhat true of me	Never or almost never
1) use new vocabulary items to converse with classmates and friends				
2) memorise new words with or without a list				
3) recite vocabulary items in rhymes				
4) associate real objects with vocabulary items				
5) associate the sound of a Thai word with that of a new English vocabulary item				
6) tutor your classmate(s) or friend(s) about what was learnt in the reading class				

Thank you very much for your co-operation

APPENDIX C

The Reading Proficiency Test in English for Science and Technology (RPTEST)

Instructions:

1. Please read the instructions carefully before doing each part of the test.
   (ให้นักศึกษาอ่านคำชี้แจงให้เข้าใจ ก่อนลงมือทำข้อสอบ)

2. In this test, there are four reading passages: (ในข้อสอบนี้ มีเรื่องที่ต้องอ่านทั้งหมด 4 เรื่อง)

   **Reading Passage 1: Bathroom Innovation: New Products Use
   Technology for Health, Energy Saving**
   Numbers: 1-11   25 minutes
   Reading Passage 2: History of Pendulum
   Numbers: 12-25   20 minutes
   Reading Passage 3: What's a Healthy Weight?
   Numbers: 26-40   20 minutes
   Reading Passage 4: Stem Cells Aid Damaged Heart
   Numbers: 41-50   20 minutes
   Total   50   items   1.25 hours

3. Please do not write anything on the test paper.
   (กรุณาอย่าเขียน หรือทำเครื่องหมายใดๆ ลงในข้อสอบ)

4. Put the right answers on the answer sheet provided.
   (ให้เขียนคำตอบลงในกระดาษคำตอบเท่านั้น)

5. Please try to do every item. (กรุณาทำข้อสอบให้ครบทุกข้อ)

6. Please try to finish the test within 1.25 hours. (กรุณา ทำข้อสอบให้เสร็จในเวลา 1.25 ชั่วโมง)

7. If you have any questions, please ask the researcher before starting the test.
   (ถ้านักศึกษามีคำถาม หรือข้อสงสัยใด ๆ กรุณาถามผู้คุมสอบ ก่อนลงมือทำข้อสอบ)

8. When you have finished the test, please proceed to the questionnaire. (เมื่อนักศึกษาทำข้อสอบเสร็จเรียบร้อยแล้ว ให้นักศึกษาทำแบบสอบถามด้วย)

Thank you very much for your co-operation and good luck

Reading Comprehension Test

Questions 1-11

You are advised to spend about 25 minutes on Questions 1-11 which refer to Reading Passage 1 below.

Reading Passage One

BATHROOM INNOVATION: New Products Use Technology for Health, Energy Saving

The Intelligent Toilet (Daiwa House Industry Co., Ltd.)

A. Using the toilet is a necessary part of everyday life, like eating and sleeping. The role of the toilet has long been limited to flushing away waste, but that may be about to change with the recent introduction of a hi-tech bathroom system that can instantly gather, compile, and analyze data about a person's physical health. Another recent bathroom innovation is a highly advanced bathtub that has the potential to significantly reduce the amount of energy used to heat bathwater.

Medical Check

B. The Intelligent Toilet was jointly developed by Daiwa House Industry Co., Ltd. based in Osaka, and Toto Ltd., based in Kita-Kyushu. Daiwa House is marketing the product, which went on sale from April 2005, while Toto is manufacturing it. Through an array of built-in devices, the toilet instantly measures the user's blood pressure, weight, body fat, and urine sugar level.

C. While the user sits on the toilet, one of the devices gauges the urine sugar level, and another device built into a counter beside the toilet bowl measures blood pressure. The monitoring does not stop there. After the user gets off the toilet, a scale built into the floor measures their weight, while body fat is measured by a device built into the sink basin after the user washes their hands. Integrating all these instruments in a single place does away with the fuss of having to set up and operate separate devices whenever a person needs a health check.

D. The aim of putting all this technology into the Intelligent Toilet is to improve quality of

life by keeping a continuous check on symptoms indicative of "lifestyle" diseases, such as diabetes. Such diseases often go unnoticed until the patient goes to the doctor's for a check-up, by which time the symptoms may have progressed. The data collected by the Intelligent Toilet is easily managed. After the user's health data is recorded, it can be uploaded via a home network and stored in a personal computer. A health management application installed on the PC, called *Kenko Kanrikun* (Mr. Health Management), uses the data to create graphs showing monthly and annual changes and even offers advice on ways to improve the user's lifestyle. The system is comprehensive in managing the user's health. These hi-tech toilets cost from ¥380,000 ($3,454 at ¥110 to the dollar) to ¥562,000 ($5,109) more than conventional toilets.

Some Like it Hot

E. In the bathtub business, meanwhile, Toto has come out with a product that promises to keep bathtub water warm for hours on end without consuming energy. The Maho Bin Yokuso (Flowpia Mahobin Bathtub) has been a hit since its introduction in August 2004. The magic of the product lies in its double-insulated design. The outer layer of insulation prevents heat from escaping from the tub. It consists of the base, made from polypropylene foam, a material with high insulating properties. When the base is raised to fit tightly against the rim of the tub, cool air from outside is kept out, and the heat from the hot water inside the tub is sealed in. The second layer consists of an insulated tub lid, made of urethane, and a covering of polystyrene foam, both or which are placed over the tub.

F. Thanks to these innovations, the bathtub is four times better at retaining heat than conventional bathtubs, defying the commonly held notion that hot bath water quickly cools down. The temperature of water in the tub has been shown to drop by only two degrees over a six-hour period. In Japan, where people only enter the bath after they have washed and bathwater is often reheated for the next member of the family, the financial benefit of the product stems from a reduced amount of reheating, potentially saving owners from ¥5,000 ($45) ¥10,000 ($90) a year in their energy bills. The products have also been designed with the environment in mind, as in the use of polypropylene foam, which is easily recyclable. Sales of the Flowpia Mahobin Bathtub are already running at two to three times the originally projected level.

Source: Science and Technology. July 26, 2005. Retrieved on March 20, 2008 from
http://web-japan.org/trends/science/sci050726.html

Questions 1-5

Instructions: Find the appropriate word or words (**not more than 3 words**) with the same meaning as the definitions given below from the suggested paragraphs in the brackets for each item. Write your answers in the spaces numbered 1-5 on the answer sheet.

คำสั่ง: ให้นักศึกษาหาคำศัพท์จากเนื้อเรื่องที่อ่าน ที่มีความหมายตรงกับคำนิยามที่ให้ไว้แต่ละข้อ**ไม่เกิน 3 คำ** แล้วตอบลงในกระดาษคำตอบ ข้อ 1-5 โดยคำศัพท์ที่ต้องการจะอยู่ในย่อหน้าต่าง ๆ ที่ให้ไว้ในวงเล็บท้ายประโยค

1. A room in which there is a bath, a wash-basin, and sometimes a toilet (paragraph A)
2. It is sent around the body by the heart and carries oxygen and important substances to organs and tissue (paragraph B)
3. A disease in which the body cannot control the level of sugar in the blood (paragraph **D**)
4. The state of the high temperature of something (paragraph F)
5. White or yellow greasy (oily) substance found in animal bodies under the skin (paragraph **C**)

Questions 6-11

Instructions: Write the letter of the paragraph (A, B, C, D,…) where you can find the information in order to answer each question in the spaces numbered 6-11 on the answer sheet.

คำสั่ง: ให้นักศึกษาพิจารณาว่าคำตอบของคำถามแต่ละข้อจากข้อ 6-11 นั้นอยู่ในย่อหน้าใด แล้วนำตัวอักษรที่บ่งชี้ย่อหน้านั้น ๆ (A- F) มาตอบลงในกระดาษคำตอบ

6. What are the advantages of the new development of a bathroom? _____
7. What is the base of the hi-tech bathtub made from? _____
8. How does the hi-tech toilet measure the user's
   blood pressure, weight, body fat, and urine sugar level? _____
9. Where was the hi-tech toilet developed? _____
10. What is the difference of the price between
    hi-tech and conventional toilets? _____
11. How much do the hi-tech toilets cost? _____

Questions 12 - 25
You are advised to spend about 20 minutes on Questions 12- 25 which refer to Reading Passage 2 below.

Reading Passage Two

History of Pendulum

A. As recorded in the 4th century Chinese *Book of Later Han*, one of the earliest uses of the pendulum was in the seismometer device of the Han Dynasty (202 BC - 220 AD) scientist and inventor Zhang Heng (78-139). Its function was to sway and activate a series of levers after being disturbed by the tremor of an earthquake far away. After this was triggered, a small ball would fall out of the urn-shaped device into a metal toad's mouth below, signifying the cardinal direction of where the earthquake was located (and where government aid and assistance should be swiftly sent). An Egyptian scholar, Ibn Yunus, is known to have described an early pendulum in the 10th century.

B. Among his scientific studies, Galileo Galilei performed a number of observations of all the properties of pendula. His interest in the pendulum may have been sparked by looking at the swinging motion of a chandelier in the Pisa Cathedral. He began serious studies of the pendulum around 1602. Galileo noticed that period of the pendulum is independent of the bob mass or the amplitude of the swing. He also found a direct relationship between the square of the period and the length of the arm. The isochronism of the pendulum suggested a practical application for use as a metronome to aid musical students, and possibly for use in a clock.

C. Perhaps based upon the ideas of Galileo, in 1656 the Dutch scientist Christiaan Huygens patented a mechanical clock that employed a pendulum to regulate the movement. This approach proved much more accurate than previous time pieces, such as the hourglass. Following an illness, in 1665 Huygens made a curious observation about pendulum clocks. Two such clocks had been placed on his fireplace mantel, and he noted that they had acquired an opposing motion. That is, they were beating in unison but in the opposite direction—an anti-phase motion. Regardless of how the two clocks were adjusted, he found that they would eventually return to this state, thus making the first recorded observation of a coupled oscillator.

D. During his Académie des Sciences expedition to Cayenne, French Guiana in 1671, Jean Richer demonstrated that the periodicity of a pendulum was slower at Cayenne than at Paris. From this he deduced that the force of gravity was lower at Cayenne. Huygens reasoned that the centripetal force of the Earth's rotation modified the weight of the pendulum bob based on the latitude of the observer.

E. In his 1673 opus *Horologium Oscillatorium sive de motu pendulorum*, Christian Huygens published his theory of the pendulum. He demonstrated that for an object to descend down a curve under gravity in the same time interval, regardless of the starting point, it must follow a cycloid (rather than the circular arc of a pendulum). This confirmed the earlier observation by Marin Mersenne that the period of a pendulum does vary with amplitude, and that Galileo's observation was accurate only for small swings in the neighborhood of the center line.

F. The English scientist Robert Hooke devised the conical pendulum, consisting of a pendulum that is free to swing in both directions. By analyzing the circular movements of the pendulum bob, he used it to analyze the orbital motions of the planets. Hooke would suggest to Isaac Newton in 1679 that the components of orbital motion consisted of inertial motion along a tangent direction plus an attractive motion in the radial direction. Isaac Newton was able to translate this idea into a mathematical form that described the movements of the planets with a central force that obeyed an inverse square law—Newton's law of universal

gravitation. Robert Hooke was also responsible for suggesting (as early as 1666) that the pendulum could be used to measure the force of gravity.

H. In 1851, Jean-Bernard-Leon Foucault suspended a pendulum (later named the Foucault pendulum) from the dome of the Panthéon in Paris. It was the third Foucault pendulum he constructed, the first one was constructed in his basement and the second one was a demonstration model with a length of 11 meters. The mass of the pendulum in Pantheon was 28 kg and the length of the arm was 67 m. The Foucault pendulum was a worldwide sensation: it was the first demonstration of the Earth's rotation with a purely indoors experiment. Once the Paris pendulum was set in motion the plane of motion was observed to precess about 270° clockwise per day. A pendulum located at either of the poles will precess 360° relative to the ground it is suspended above. There is a mathematical relation between the latitude where a Foucault pendulum is deployed and its precession; the lengthening of the period of the precession is inversely proportional to the sine of the latitude.

I. The National Institute of Standards and Technology based the U.S. national time standard on the Riefler Clock from 1904 until 1929. This pendulum clock maintained an accuracy of a few hundredths of a second per day. It was briefly replaced by the double-pendulum W. H. Shortt Clock before the NIST switched to an electronic time-keeping system clock.

Source: Retrieved on March 27, 2008 from http://en.wikipedia.org/wiki/Pendulum

Questions 12-17

Instructions: Put the statements below in the correct chronological order according to the reading passage. Start with number 1 for the event that happened first. Write the appropriate numbers 1-6, in the spaces numbered 12-17 on the answer sheet.

คำสั่ง: ให้นักศึกษาจัดเรียงเหตุการณ์ข้างล่างนี้จากเหตุการณ์ที่ 1 ถึง 6 ให้ถูกต้อง แล้วตอบลงใน กระดาษคำตอบที่ให้ไว้ในข้อ 12-17 เหตุการณ์ใดเกิดก่อนให้ใส่หมายเลข 1 จนไปถึงเหตุการณ์สุดท้ายให้ใส่ หมายเลข 6

12. Zhang Heng was the scientist in the Han Dynasty who used the pendulum as the device to measure the strength of an earthquake.

13. The swinging motion of a chandelier in the Pisa Cathedral might be the main cause that could spark Galileo's interest in the pendulum.

14. Robert Hooke used the knowledge of the circular movements of the pendulum bob to analyze the orbital motions of the planets.

15. Jean Richer found that the force of gravity at Cayenne lower that Paris because the periodicity of a pendulum was slower at Cayenne.

16. An early pendulum in the 10th century was described by Ibn Yunus.

17. The third Foucault pendulum constructed by Jean-Bernard-Leon Foucault was suspended from the dome of the Panthéon in Paris.

Questions18-25
Instructions: Decide whether the statements below support information in Reading Passage Two. In the spaces numbered 18-25, write:

คำสั่ง: ให้นักศึกษาพิจารณาว่า ข้อมูลที่ปรากฏในแต่ละประโยคจากข้อ 18-25 นี้ สอดคล้องกับเนื้อหาในเนื้อเรื่องที่ 2 หรือไม่ โดยให้ตอบลงในกระดาษคำตอบข้อที่ 18-25ว่า:…

> **'Yes'** if the statements support information
>
> (ตอบ **'Yes'** ถ้าประโยคนั้น ๆ สอดคล้องกับเนื้อหาในเนื้อเรื่องที่ 2)
>
> **'No'** if the statements do not support information
>
> (ตอบ **'No'** ถ้าประโยคนั้น ๆ ไม่สอดคล้องกับเนื้อหาในเนื้อเรื่องที่ 2)
>
> **'Not given'** if the statements do not refer to the information
>
> (ตอบ **'Not given '** ถ้าประโยคนั้น ๆไม่ได้กล่าวถึงในเนื้อหาในเนื้อเรื่องที่ 2 เลย)

18. The swinging motion of a chandelier in the Pisa cathedral was the definite cause of Galileo's interest in the study of pendulum.

19. The bob mass and the amplitude of the swing control the period of the pendulum.

20. The Dutch scientist used the ideas of Galileo about a pendulum to invent a mechanical clock in 1656.

21. Based on his study, Jean Richer concluded that the force of gravity was lower at Cayenne than at Paris.

22. Huygens found that the centripetal force of the Earth's rotation modified the weight of the pendulum bob based on the latitude of the observer.

23. Huygens' theory of the pendulum was published in 1679.

24. One of the earliest uses of the pendulum was recorded in the book named *"Book of Later Han"*

25. A mechanical clock is more expensive than a digital one.

Reading Passage Three

Questions 26-40

You are advised to spend about 20 minutes on Questions 26-40 which refer to Reading Passage 3 below.

What's a Healthy Weight?

A. Good health is about more than just your weight. It depends on many things, including your family's medical history, your genes, whether you smoke, the type of food you eat and how active you are.

B. A combination of factors determines our weight, and that's why it's difficult to set an exact ideal weight that applies to everyone. It's important to remember there's a range of healthy body weights. Aiming to keep within this means an end to aspiring to one magic weight you think you should be. Many people have a distorted perception of what constitutes a healthy body weight. We're surrounded by images of celebrities, many of whom are underweight. Comparing yourself with these images isn't helpful. But comparing yourself to friends and family isn't that useful either, because as obesity becomes more common our perception of 'average' weight may in fact be too heavy.

C. It's important to make an objective assessment of your size. Looking at yourself in the mirror isn't a good way to assess whether you're a healthy weight.

D. How do I know if I'm a healthy weight?

There are a number of ways you can work out if you're within a healthy weight range. You need to get an accurate idea because it's easy to underestimate or overestimate your own weight.

E. Body mass index

You can check your body size using the body mass index (BMI), which assesses your weight in relation to your height. Work out your BMI with our calculator, available in both metric and imperial versions.

F. Waist circumference

Another method of assessing whether you're a healthy weight is to measure your waist. This gives an indication of how much fat is stored around your middle. Excess fat in this area increases your risk of heart disease and diabetes.

G. Body fat

You can measure the amount of fat in your body using scales designed for this purpose, often called body fat analysers. These pass a small, safe electrical signal through your body. Lean tissue, such as muscle, and blood contain water and act as conductors of the electrical signal, while fat resists it. The greater the resistance, the more body fat you have. Body fat is only one aspect of health. Your GP can advise whether additional measurements such as blood pressure, resting heart rate, blood cholesterol, and fat and glucose tests are necessary.

H. Are you overweight?

If your BMI and waist circumference indicate you're overweight, changes to your lifestyle could help to control your weight. Think about how you can make changes to your diet and physical activity over the long term.

I. Are you underweight?

Not weighing enough can also put your health at risk. If you're underweight because of a restriction of your diet, you're at risk of a number of nutritional deficiencies. Young women especially are at risk of anaemia (a lack of iron), while insufficient calcium can lead to osteoporosis in later life. Amenorrhoea (missing menstrual periods) is also common among women who are underweight, and it can lead to infertility.

J. Are you a healthy weight but unhappy?

If your weight lies within the healthy range but you're unhappy with your shape, you'll probably derive more benefits from a supervised exercise programme than by restricting your diet.

K. This will improve your fitness, help to tone specific muscle groups and enhance your overall health and wellbeing.

Source: Jebb, Susan. (2007) Retrieved on March 29, 2008 from
http://www.bbc.co.uk/health/healthy_living/your_weight/whatis_healthy.shtml

Questions 26-31

Instructions: Read each statement carefully. Based on the text, write 'T' if the statement is true, and 'F' if the statement is false. Write your answers in the spaces numbered 26-31 on the answer sheet.

คำสั่ง: ให้นักศึกษาอ่านแต่ละประโยค แล้วเขียน **'T'** ถ้าประโยคนั้นถูกต้อง และเขียน **'F'** ถ้าประโยคนั้นไม่ถูกต้องลงในกระดาษคำตอบข้อที่ 26-31

26. The family's medical history is one factor that can tell whether one's health is good or not.

27. Looking at yourself in the mirror is one way to check your weight.

28. A lot of fat stored around your waist increases your risk of heart disease.

29. If you're underweight because of your diet restriction, you may be at risk of calcium insufficiency which may cause anaemia.

30. The body mass index (BMI) is the value used to describe the relationship of people's weight and height.

31. It is difficult to set an exact ideal weight that applies to everyone because there is a combination of factors determining our weight.

Questions 32-36

Instructions: Five sentences have been left out of Reading Passage Three. Each sentence is divided into *Beginning of Sentence* and *End of Sentence*. Complete questions 32-36 adding a phrase from **A-E**. Write your answers in the spaces numbered 32-36 on the answer sheet. One choice can be used only **once**.

คำสั่ง: ให้นักศึกษาจับคู่ประโยคในข้อ 32-36 กับประโยคที่อยู่ในกรอบสี่เหลี่ยมให้ถูกต้อง โดยให้เขียนคำตอบลงในกระดาษคำตอบ คำตอบแต่ละประโยคจะใช้ได้เพียง<u>**หนึ่งครั้ง**</u>เท่านั้น

Beginning of Sentence

32.   Good health………

33.   People should take benefits from a special exercise programme……..

34.   Body mass index (BMI) ……………

35.   A woman who is underweight ………….

36.   Changing the lifestyle………………

End of sentence

A. can be used to assess people's weight in relation to their height.
B. depends on many things, including your family's medical history, your genes, whether you smoke, the type of food you eat and how active you are.
C. can be at risk of Amenorrhoea which can lead to infertility.
D. could help people to control their weight.
E. when they feel unhappy with their weight.

Questions 37-40

Instructions: Complete the following statements by writing **ONE** word from Reading Passage Three in the spaces numbered 37-40 on the answer sheet.

คำสั่ง: ให้นักศึกษาหาคำศัพท์ จากเนื้อเรื่องที่อ่านมาเติม เพื่อทำให้ประโยคในข้อ 37-40 สมบูรณ์ โดยในแต่ละข้อจะสามารถนำคำศัพท์มาเติมได้ข้อละ <u>**หนึ่งคำเท่านั้น**</u> และให้เขียนคำตอบลงในกระดาษคำตอบ

37. Good _____ depends on family's medical history, genes, and type of food.

38. Measuring people's waists is one _____ of assessing their healthy weight.

39. The amount of fat in people's bodies can be measured by using body fat _____.

40. If you're unhappy with your shape, you'll probably derive more _____ from a supervised exercise programme than by restricting your diet.

Questions 41-50
You are advised to spend about 20 minutes on Questions 41-50 which refer to Reading Passage 4 below.

Reading Passage Four

Stem Cells Aid Damaged Heart

A   Heart attack victims given injections of cells from their bone marrow showed striking signs of recovery, say researchers.

B   The scientists from the University of Rostock in Germany believe that the cells may help new tissue to grow within the organ. When the heart is deprived of blood during a heart attack, heart muscle cells die because of the lack of oxygen. Even if the patient survives the attack, the heart may never recover to the level it was prior to the attack.

C   Laboratory experiments have shown that if bone marrow cells are injected into damaged heart tissue, it triggers the growth of fresh blood vessels to supply the damaged region. Bone marrow contains "stem cells" - master cells that have the ability to grow into many different types of cell. In the heart tissue, scientists think ***they*** are prompted to grow into new tissues, helping the organ compensate for the damage it has suffered. The German team injected these cells into the hearts of six patients who had suffered attacks.

D Because the treatment is unproven, these patients were also given conventional procedures, such as heart bypass operations, to help keep their hearts going. However, all the patients did well after surgery - and five had unusually good blood flow to the heart. While ***this*** is not proof that the stem cells had anything to do with it, it is encouraging for the researchers. The next step may be to give the injection on its own to patients ***who*** have suffered an attack.

E   Professor Gustav Steinhoff, who led the team, said: "***We*** have shown that local bone marrow stem cell implantation together with a bypass operation is safe. Controlled studies are needed to clarify the role of cell transplantation in myocardial regeneration."

F Another team from the University of Hong Kong carried out a similar experiment, also described in The Lancet. ***They*** injected stem cells into eight patients - all of whom had improved heart function three months later. However, a commentary accompanying the papers, from Drs Roger Latham and Peter Oettgen, from Harvard Medical School in the US, warned against over-optimism by either doctors or patients.

G ***They*** wrote: "Wherever this field leads, it is likely to follow the well-known pathway of incredible results leading to unrealistic expectations followed by sobering complications and disappointments - and ultimately, cautious optimism."

Source: Adapted from BBC NEWS. (2003). Retrieved on March 29, 2008 from
http://news.bbc.co.uk/2/hi/health/2622801.stm

Questions 41-45

Instructions: Find <u>**one word**</u> from the reading passage which has the same meaning as the definitions given below. The suggested paragraph in the brackets for each item will help you find the answer. Write your answers in the spaces numbered 41-45 on the answer sheet.

คำสั่ง: ให้นักศึกษาหาคำศัพท์จากเนื้อเรื่องที่อ่าน ที่มีความหมายตรงกับคำนิยามที่ให้ไว้เพียง<u>**หนึ่งคำ**</u> แล้วเขียน คำตอบลงในกระดาษคำตอบ ข้อ 41-45 โดยคำศัพท์ที่ต้องการจะอยู่ในย่อหน้าต่าง ๆ ที่ให้ไว้ในวงเล็บท้าย ประโยค

41. forcing (a drug or other liquid) into somebody/something with a syringe (paragraph **A**)

42. mass of cells forming the body of an animal or a plant (paragraph **B**)

43. person who is receiving medical treatment, especially in a hospital (paragraph **B**)

44. process or manner of treating somebody (paragraph **D**)

45. the organ that pumps blood through the body (paragraph **B**)

Questions 46-50

Instructions: Write the word or words each pronoun refers to in the spaces numbered 46-50 on the answer sheet.

คำสั่ง: ให้นักศึกษาเขียนคำนามจากเนื้อเรื่องที่อ่าน แทนคำสรรพนามในข้อ 46-50 ลงในกระดาษคำตอบ โดย คำนามที่ต้องการจะอยู่ในย่อหน้าต่าง ๆ ที่ให้ไว้ในวงเล็บท้ายประโยค

46.   'they' (paragraph **C**) refers to _____

47.   'who' (paragraph **D**) refers to _____

48.   'they' (paragraph **F**) refers to _____

49.   'They' (paragraph **G**) refers to _____

50.   'We" (paragraph **E**) refers to _____

APPENDIX D

A Sample Interview Script (The Translated Version)

Interviewer: **Rakchanok Saengpakdeejit**
Interviewee: **Ubon 1**
Date: **June 1ˢᵗ, 2008**
Time: **09.20 a.m.**
Place: **Ubon Ratchathani University, Ubon Ratchathani, Thailand**

....

Ubon 1:	Good morning.
Me:	Good morning. Please take a seat.
Ubon 1:	Thank you.
Me:	First of all, could you please tell me what your name is?
Ubon 1:	My nickname?
Me:	Any names. Both nickname and first name are ok.
Ubon 1:	My nickname is Pieak.
Me:	Ok. Pieak. May I call you Pieak?
Ubon 1:	Yes.
Me:	What is your faculty? And what year?
Ubon 1:	The faculty of Engineering. The fourth year.
Me:	OK. The faculty of Engineering. And what is your major?
Ubon 1:	Industrial engineering.
Me:	Before Ubon 1dying in this university, what school did you graduate from?
Ubon 1:	I graduated from Leangnoktha School.
Me:	Is it private-run or state-run school?
Ubon 1:	State-run school. It is the main school in my town.
Me:	How many English courses have you enrolled since the first year?
Ubon 1:	Ummm… Three courses. Three courses altogether. Nine credits.
Me:	Three courses. Nine credits. OK. And are these three courses compulsory courses?
Ubon 1:	Yes.
Me:	Is this course the third one?
Ubon 1:	Yes. I have already passed the first two courses. English for Engineering is the third one.
Me:	Is this course only one course which you enroll in this semester?
Ubon 1:	Yes.
Me:	And how many hours a week have you Ubon 1died this course?
Ubon 1:	Three hours a week.
Me:	When do you Ubon 1dy?
Ubon 1:	Two day a week. The first day of a week is today—Wednesday. Ummm 2 pm. Oh! No! 9-11 am. And on Friday, 9-10 am.

Me:	Do you think it is enough to Ubon 1dy 3 hours a week?
Ubon 1:	I think it is enough.
Me:	Why?
Ubon 1:	Umm. I will feel bored if I have to Ubon 1dy more. On the other hand, I won't understand the lesson if I Ubon 1dy less than this. And it is ok to Ubon 1dy 2 hours on Wednesday. The teacher always teaches on Wednesday. And it is only one hour on Friday. The teacher will let us asking any questions.
Me:	Ummm. It can be said that three hours is enough for you. It is not too much.
Ubon 1:	Yes.
Me:	Can you tell me what your level of reading proficiency is; low, medium or high?
Ubon 1:	Let me think…ummm high, medium or low? I think my ability is medium? Me: Why do you think that your ability is medium?
Ubon 1:	For me…ummm. It is not very difficult. For my opinion, if I am more active, I can read better. But I myself think that it is impossible. I don't open my mind.
Me:	Ummm. Don't open your mind? What do you mean?
Ubon 1:	I don't open my mind to learn. In the past, I always thought that it was not my mother language so I didn't' pay attention to English. But after I have been trained for work, my thought has also been changed. It is important for our daily lives.
Me:	Umm… You mean your thought is changed because of having been a trainee.
Ubon 1:	Yes. It causes me more active.
Me:	Ok. It is good. After being a trainee, you have a different idea about English. Do you think reading English is important for your life?
Ubon 1:	Yes, especially for educated people. I think reading is important because we have to use this skill everyday.
Me:	How is it important for your life? Can you explain, please?
Ubon 1:	If I graduate and work as an engineer, I have to use English for communication. At least, now we must be able to use internet to send files, e-mails. Moreover, when the foreigners will visit use, English must also be used as the international language.
Me:	OK. And how about now? As a Ubon 1dent, do you use this skill?
Ubon 1:	Not often. I don't use this skill often. I normally use reading in the class. Sometimes I present my project in English. Some words cannot be translated in Thai; therefore, I must use them in English. And in my field of Ubon 1dy, there are a lot of technical terms that must be used in English.
Me:	OK. Technical terms.
Ubon 1:	Yes.
Me:	It means that you must use English reading.
Ubon 1:	Of course.
Me:	And do you think it is important for your future work?
Ubon 1:	Of course.

Me:	How is it important?
Ubon 1:	English is the international language. We must use. If you cannot use English, you will face with problems in work. Moreover, you will be seen as a Ubon 1pid engineer if you can't use English.
Me:	OH! Ubon 1pid engineer?
Ubon 1:	Yes.
Me:	It shows that English is very important in your field of Ubon 1dy.
Ubon 1:	Yes.
Me:	Anything more that you think that important for you future work?
Ubon 1:	Ummm. Japanese is also important because there are a lot of Japan companies. However, I think English is more international.
Me:	Is reading English difficult?
Ubon 1:	Very difficult.
Me:	Difficult?
Ubon 1:	Yes… but… I think it is difficult. I think many people think that it is difficult because they aren't interested in this skill.
Me:	Why do you think that reading English is difficult?
Ubon 1:	Our thought. We think that it is difficult, so it is difficult.
Me:	I see. You mean problem happens from yourself.
Ubon 1:	Yes. Moreover, in this semester, I have to learn seven subjects altogether. Sometimes, I cannot manage what I should do firstly. In a week, I don't Ubon 1dy on one or two subject, but seven subjects; therefore, I don't have enough time to prepare my Ubon 1dy. It causes me not to understand the lesson.
Me:	Do you have any problems with reading English?
Ubon 1:	Yes, I do.
Me	Please tell me your problems?
Ubon 1:	Normally, we know what English vowels are; A, E, I, O, U. But we don't know how to read and pronounce.
Me:	DO you mean you have the problem with pronunciation?
Ubon 1:	Yes.
Me:	How about reading for understanding? DO you think you have problems with this skill?
Ubon 1:	Understanding? Yes…I do.
Me:	Can you explain what your problems are?
Ubon 1:	Not enough knowledge in reading English.
Me:	Not enough knowledge?
Ubon 1:	Yes.
Me:	If I ask you to read one English reading text, do you think that you have problems in reading?
Ubon 1:	Of course.
Me:	What are your problems?
Ubon 1:	Self-confidence.
Me:	Self-confidence? How? Can you explain?
Ubon 1:	Umm. When I look at the text, then I feel blur. And I think that I must be unable to understand it.
Me:	When you read alone, nobody makes you lose confidence.

Ubon 1:	Yes…ummm…. I don't know how to tell you.
Me:	Then, please tell me what problems you found while doing an actual reading are.
Ubon 1:	Problems? Umm… If I am not familiar with some vocabularies, I cannot understand what I read.
Me:	Do you mean you encounter a vocabulary difficulty?
Ubon 1:	Yes.
Me:	What else?
Ubon 1:	Umm… If I know the meanings of unknown words, I think other problems are not too difficult.
Me:	When you encounter unknown words, how do you solve that problem?
Ubon 1:	I skip some words.
Me:	It means that because of vocabulary problem, you found reading is difficult, aren't you?
Ubon 1:	Yes, I am.
Me:	Besides the vocabulary problem, do you have another problem?
Ubon 1:	Ummm…(smile) I don't know.
Me:	Do you mean you don't have other problems in reading?
Ubon 1:	(Laugh) If I know the meaning of every words, I guess I can understand what I read.
Me:	How do you solve this problem?
Ubon 1:	I have to look for its meaning and try to remember it.
Me:	Remember?
Ubon 1:	Yes.
Me:	How do you do to know its meaning?
Ubon 1:	I try to use that word more often in my daily life.
Me:	I see. But I would like to know how do you do to know its meaning?
Ubon 1:	Consulting a dictionary?
Me:	What else?
Ubon 1:	Asking.
Me:	Who will you ask?
Ubon 1:	My teacher.
Me:	Before coming to class, how do you prepare for the class?
Ubon 1:	Ummm…. (smile)
Me:	Before coming to the English Class, how do you do in advance?
Ubon 1:	Normally, I do nothing before class?
Me:	Nothing?
Ubon 1:	No, nothing (smile). I carry my book and pen before coming to class.
Me:	How about while studying in class? What do you do to help you understand the lesson while studying in class?
Ubon 1:	Paying attention to the teacher.
Me:	Anything else?
Ubon 1:	Reading the textbook.
Me:	Are there any activities in class?
Ubon 1:	Yes.
Me:	Do you join those activities?
Ubon 1:	Sure.

Me:	What do you do after class?
Ubon 1:	Nothing.
Me:	What will you do about the lesson you have just learnt?
Ubon 1:	Umm… Normally, I do nothing about the lesson I have just learnt (laugh).
Me:	Nothing?
Ubon 1:	I sometimes reread the short note I took. However, I always do the assignment.
Me:	So you sometimes revise what you have learnt.
Ubon 1:	Yes, I do because I need to prepare for the examination.
Me:	Umm. Generally, do you think what can help you to improve your reading ability?
Ubon 1:	Vocabulary is very important. If I know the meaning of vocabulary appearing in the text, I am sure that I can understand what I read.
Me:	(laugh) Your only one problem in reading is vocabulary.
Ubon 1:	(Smile)
Me:	Before you starting reading, what will you do with the reading text?
Ubon 1:	I will skim roughly and underline unknown words found in the texts. Then I will look for their meanings.
Me:	Anything else?
Ubon 1:	No, that's all.
Me:	After having finished skimming, what will you do next?
Ubon 1:	I will read all text.
Me:	Anything else?
Ubon 1:	While reading, I will think about what I have known about that. It can help me understand what I read.
Me:	Anything else?
Ubon 1:	If there is an exercise, I will do it.
Me:	If there is no exercise, what will you do next?
Ubon 1:	I will do a summary of what I read and make notes of unknown vocabulary items.
Me:	Is there anything else that you do after having finished reading?
Ubon 1:	No.
Me:	OK. Now we come to the last question. Can you tell me about your feeling towards English course?
Ubon 1:	Teacher is very important for studying English. If the teacher is very strict, I will get bored with that course. If the teacher understands each student's characteristics, I feel comfortable to learn that course.
Me:	Anything else to share?
Ubon 1:	No.
Me:	Thanks so much for your answer. Good bye.
Ubon 1:	You're welcome. Good bye.

CURRICULUM VITAE

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