The Relationship between the Reading Strategies and Language Background of Thai Science Students in Performing Summary Tests

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ABSTRACT

This article examines the relationship between the reading strategies and language background of thirty Thai science students in performing English for Academic Purposes (EAP) summary tests. A 2*2 analysis of covariance* was employed, with the pretest as the covariate. Although no significant relationships were found, the data suggested that training in top-level rhetorical organization of expository texts might enhance Thai science students' reading comprehension. It was also noted that students proficient in general English could transfer their language skills across content.

INTRODUCTION

Schema-based, top-down processing during reading has been a primary focus for second language teaching in recent years because it has been considered an important factor in reading strategies. Research on expository prose has provided evidence that knowledge and use of textual organization can discriminate skilled readers from less-skilled readers because comprehension is determined not only by the local effects of sentences or paragraphs but by the rhetorical organization of a text. Carrell (1984:89) defined a formal schema as "background knowledge of the rhetorical structures of different types of texts." She also pointed out that according to the schema theory, reading comprehension is a function of the reader's processing and activating the appropriate formal and content schemata in interaction with a text. The schema employed to comprehend a text acts like an outline which guides the reader in organizing the text during the process of encoding into memory. Similarly, during recall, the skilled reader activates this same kind of superordinate schema

which began the encoding and uses it to retrieve information from stored memory about the text.

Instruction in top-level rhetorical organization of expository texts has been thought to enhance reading comprehension. Taylor and Beach (1984) and Carrell (1985) claim that reading comprehension can be significantly facilitated by explicitly teaching readers about expository text structure and by teaching various strategies for identifying and utilizing that structure during the reading process.

In the context of English for specific purposes (ESP), Hudson (1991) examined whether the emphasis on reading for content improved reading comprehension as well as knowledge of reading grammar and general reading ability in an ESP reading project. He concluded that the content comprehension approach can improve reading comprehension as well as knowledge of reading grammar and general ability to read English for science and technology among the Chemical Engineering undergraduate students at the Universided de Guadalajara in Mexico.

Although research has shown that L1 and L2 readers have benefited from formal instruction in the top-level rhetorical organization of expository texts, few studies have been reported about the transfer of skills from general English to academic English, especially in the context of teaching ESP expository prose to Thai students. This study therefore aims to answer the following 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?

METHOD

Subjects

Thirty subjects participated in this study. They were all third-year science students enrolled in the

English for Academic Purposes (EAP) Course at the Chulalongkorn University Language Institute in 1993. Their major areas of study were Chemistry and Chemical Engineering. The subjects were divided into four groups based on their language background and reading strategies. As regards language background, previous grades from the two general Foundation English Courses were used to differentiate the subjects into low proficiency (grades C and D) and high proficiency (grades A and B). Regarding reading strategies, a check-list of strategies for processing top-level rhetorical organization (see Appendix One) was employed to classify the subjects into less-skilled readers and skilled readers. The check-list was completed at the beginning of the course. Those who scored from 60% up were considered skilled readers while less skilled readers were those who scored below the passing criterion. Figure 1 presents the number of subjects in each category.

Figure 1   Number of subjects in each category

| | | Reading Strategies | |
		Less-skilled Readers	Skilled readers
Language background	Low proficiency	8	8
	High proficiency	8	6**

The EAP Course

The study was conducted during a ten-week period from June-September 1993 in twenty successive two-hour sessions during the students' regular EAP classes. The course covered these five units: Science News, Hi-Tech Innovations, Energy, Problems with the Atmosphere, and Outer Space. Reading Skills and language functions included 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. Although there were five units, only the units on "Energy" and "Problems with the Atmosphere" emphasized summary-writing skills.

Testing procedures

At the beginning of the course, the subjects were administered a pre-test (see Appendix Two) during the class period prior to teaching in June and a post-test (the same form) during the last class period in September. The test lasted fifty minutes. During the final exam the subjects did another summary test (see Appendix Three). The contents of the two tests were similar. The pre-test was on "A Buildup of Gases" with an explicit topic sentence, whereas the final summary test was on "Ozone Depletion" with an implicit topic sentence. The pre-test was used as the covariate in the analysis.

Scoring

All the tests were graded using the same criteria, namely, content and language. The content component covered the topic sentence and main ideas while the language component was evaluated for grammar and organization. Content and language received equal weight.

RESULTS

A 2*2 (Reading Strategies * Language Background) analysis of covariance was conducted by SPSSPC (a powerful software package for microcomputer data management and analysis). Table 1 presents average scores of the summary tests.

Skilled readers scored higher than less-skilled readers on both the summary post-test and the final summary test when content was used as the criterion. As regards language background, students with high proficiency in English outperformed those with low proficiency.

To answer the first research question — "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?" — a two-way analysis of covariance was

performed. The results indicated that reading strategies and language background of Thai science students worked independently as predictors of performance on EAP summary post-test and EAP final summary test when content is the criterion. The F-values were .18 and 1.07 respectively. In addition, there was no significant difference between the mean scores of the skilled readers and less-skilled readers. This suggests that although the students differed in their reading strategies from the beginning, they were not significantly different at the end of the semester. Both groups could understand the main ideas of the texts related to their field of study. Thus, the reading skills taught in the EAP class might benefit less-skilled readers in comprehending EAP texts.

To answer the second research question "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?" a two-way analysis of covariance was carried out. The results showed that the observed factors (reading strategies and language background) did not work interdependently. The F-value for the EAP summary post-test was .61 and that of the EAP final summary test was .39. It was also found that the mean scores of the students with high proficiency in general English were significantly higher than those of students with less proficiency on the EAP final summary tests (F 14.05, p .001). Thus, language background in general English had an effect on language performance on the EAP achievement test. The students who scored high in general English outperformed those who were less proficient.

DISCUSSION

The fact that reading strategies ("formal schemata") did not appear to affect the students' performance on the EAP summary tests when either content or language was used as the criterion might be due to a failure of the checklist to accurately reflect students' reading behaviors. Also, differences in the final summary and post-test scores may have been due to a difference in difficulty between the two tests. Both of these factors could affect the reliability of the instrument.

Table 1

Average Scores of the Summary Tests

Tests	Reading Strategies		Language Background	
	Less-skilled	Skilled	Low	High
1. Current scores in the summary post-test	3.84	4.47	4.02	4.26
2. Language scores in the summary post test	3.25	3.47	3.23	3.49
3. Content scores in the final summary test	3.23	3.19	3.06	3.39
4. Language scores in the final summary test	2.97	3.18	2.53	3.68

Note: the maximum possible score for each component was five.

In addition, the data showed no significant relationships between reading strategies and language background. This suggests that these two components work independently rather than interdependently in an EAP course. Another intervening factor could be "technical content schema," a term defined by Hudson (1991: 86) as knowledge of content from courses that students have already taken. Technical content schema of science students may play a greater role than their language background in comprehending scientific text. In other words, less-proficient students in general English might understand technical texts if they are exposed to more texts related to their field of study. However, due to the small size of the sample in the present study, further research studies using more subjects should be carried out.

When judging the students' language performance on the EAP summary tests, language background in general English had an effect on their writing skills when language was used as the criterion. This supports Prapphal's 1990 report that there were relationships between subskills of general English and EAP tests. It seems that all language subskills, regardless of content, are significantly related. It appears that students with high proficiency in general English could maintain their proficiency and transfer some language skills across content.

CONCLUSIONS

This study examined reading strategies or "formal schemata" and language background as predictors of performance on EAP summary tests of thirty third-year science students. It was found that the two factors worked independently rather than interdependently when content and language were used as criteria. Skilled readers and less-skilled readers did not differ significantly in performing EAP summary tests at the end of the EAP course. This implies that exposure to more EAP texts might enhance Thai science students' reading comprehension, especially for less-skilled readers. The study also suggests that more proficient students were able to transfer some general English language skills to academic English.

NOTES

* There are two factors in the study: reading strategies and language background. Each factor or manipulated variable consists of two levels. The two levels of the first factor are less-skilled readers and skilled readers and those of the second factor are low proficiency and high proficiency in general English. In the analysis, the pre-test is used as the covariate to make sure that the subjects are not significantly different from the start.

In order to calculate the F-value, the pre-test is assessed first, then the factors, and lastly the interactions. If the F-value is found to be significant, there is the relationship between the predictor and the criterion.

** Two students from the original total of 32 were excluded from the analysis because one did not take the final summary test due to illness, and the other did not complete the final summary test.

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APPENDIX ONE — READING STRATEGIES CHECK-LIST

Name: _____ Registration No.: _____ Department: _____

GPA: _____ FE I Grade: _____ FE II Grade: _____

Interest in English: very little _____   little _____ moderate

                       great _____ very great _____

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A. Pre-Reading Activities

Which of the following activities do you do before you start reading an English article? Put a ✓ under the appropriate column.

	YES	NO
1. Read the title of the article.		
2. Look at the illustrations.		
3. Read the first paragraph.		
4. Read the last paragraph.		
5. Ask some questions about the title.		
6. Other activities: (please specify) _____		

B. During-Reading Activities

Which of the following activities do you do while you are reading an English article? Put a ✓ under the appropriate column.

	YES	NO
1. Don't pay equal attention to every sentence.		
2. Find the topic sentence of each paragraph.		
3. Find the hierarchy of the sentences in each paragraph.		
4. Find the answer to the question raised before reading.		
5. Make symbols to show the relationships between main ideas and supporting details.		
6. Other activities: (please specify) _____		

C. Post-Reading Activities

Which of the following activities do you do after you read an English article? Put a ✓ under the appropriate column.

	YES	NO
1. Check whether you have found the answer to the questions raised.		
2. Write an outline of the article.		
3. Check whether the outline relates to the title.		
4. Check whether the major ideas support the main ideas.		
5. Rewrite the outline to make it correspond to the content.		
6. Other activities: (please specify) _____		

APPENDIX TWO — THE POST TEST

Read the following text and summarize it in your own words in about four or five sentences.

A Buildup of Gases

The greenhouse effect is caused by a buildup of carbon dioxide and certain other gases in the Earth's atmosphere. These gases trap heat in much the same way that the glass of a greenhouse does. The gases allow sunlight to pass through the air and warm the Earth, but they don't allow the heat to escape back into space.

Some carbon dioxide has long been present in the atmosphere. In fact, the atmosphere's ability to trap heat probably allowed life to develop on Earth — if some of the sun's warmth weren't retained, the planet would be cold and lifeless.

For at least the past 100,000 years, carbon dioxide levels were relatively stable. Carbon dioxide is produced by animals — you release some every time you exhale. It's also released when living things decay. But it is absorbed by plants, which use it to make food. Thus, living things have helped to keep carbon dioxide in balance.

Now carbon dioxide levels are increasing because of people. Carbon dioxide is produced when fossil fuels such as coal, oil, and gasoline are burned in homes, cars, factories, and power plants. As the world's population has increased, so has the use of fossil fuels and so has the output of carbon dioxide. And the carbon dioxide has accumulated in the atmosphere, forming a kind of "blanket" around the Earth.

Other gases that contribute to the greenhouse effect — methane, nitrous oxide, chlorofluorocarbons (CFC's) — are also being released in greater amounts by industry and agriculture. And meanwhile, vast areas of forests have been cleared to make room for farms and towns — destroying trees that otherwise would help absorb carbon dioxide. In many areas, forests have been burned away, producing even more greenhouse gases.

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APPENDIX THREE — THE FINAL SUMMARY TEST

Read the following text:

Basically, ozone is a rare form of the gas oxygen — but unlike the commonly found oxygen molecules, which are made up of two oxygen atoms linked together and denoted by the chemical symbol $O2$, the molecules of ozone are each formed of three oxygen atoms which are represented by the symbol $O3$ and the gas is, volume for volume, more dense than pure oxygen.

Oxygen and ozone in the atmosphere are closely interrelated. Oxygen is constantly being broken down into its constituent atoms, which then link up with other free oxygen atoms to form ozone. This in turn breaks to reform oxygen. This formation-destruction-regeneration cycle is constantly taking place, and the amount of ozone present at any time depends on the balance between the forces that create it and those that destroy it.

The conversion of oxygen to ozone progresses more quickly when sunlight is present while the reverse process, responsible for the breakdown of ozone to free oxygen, is hastened by the presence of chlorofluorocarbons known as CFCs, the chemicals widely used in industry. Only over the last 50 years have human beings been producing large quantities of CFC, but concentrations of it in the atmosphere have been increasing by about five percent each year.

What is so significant about the gas ozone, which is present in greatest amounts in the layer of the earth's atmosphere called the stratosphere — about 15 to 50 kilometres above ground level — is this: Ozone absorbs most of the harmful ultra-violet rays of the sun, thus preventing them from reaching the earth's surface. The dangerous effect on human beings of depleting the layer of ozone in

Summarize the preceding text in your own words in about five sentences. Also include a topic sentence in your summary. (12 points)

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