A Survey of the Reading Strategies Used by ESL First Year Science Students at the University of Botswana

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One of the major problems faced by speakers of English as a second language is that when they go to college or university, they often find themselves without sufficient academic literacy skills—such as the ability to employ a range of reading strategies in order to distill out the gist—to enable them to navigate their learning more successfully. Over many years of teaching English for Academic Purposes (EAP), I have observed that ESL first year students in different faculties of this university, particularly those in the faculty of science, panic when they are faced with masses of textual material to read. They find it difficult to select the main ideas, and this problem appears to arise from the fact that ESL first year science students seem to think that everything that is written is important. They miss the point that some information can be ignored if one is trying, for example, to dig out the main ideas. And yet we do not know for sure the kinds of strategies the students use to abstract the main ideas and the strategies that individual students prefer. This study, therefore, is an attempt to understand how ESL first year science students use different reading strategies, and how they can be helped, if necessary, to maximize their ability to select the required information.

In this study, I use the term strategy as defined by Chamot (2004). She refers to strategies as "the conscious thoughts and actions that learners take in order to achieve a learning goal" (p. 1). I also accept Sewell's (2003) definition of a strategy as a technique or procedure which a learner adopts intentionally in order to understand the meaning of a text. The point to underscore is that strategies are deliberately used by a learner, unlike skills which are used subconsciously and intuitively (Macaro, 2006). The other point to note about strategies is that, besides cognition, they also involve metacognition, which is a self-monitoring mechanism used by learners to evaluate their encoding processes (Winn & Snyder, 1998; Zhang, 2000). Because metacognition is an internal mechanism, the implication is that in order to identify a learner's reading strategies, the researcher has to rely on the information supplied by the learners through questionnaires, interviews, and other means. Chamot (2004) advises us that self-reporting often fails to account for the various mental activities the readers go through due to the complexity of trying to unravel

one's hidden thoughts or the front that informants put up in order to hide their personal weaknesses.

Literature Review

Current literature on reading suggests that any robust understanding of a written text depends on the use of a variety of strategies, such as recognizing visual configurations and interpreting and integrating the new ideas with the reader's global knowledge. Much of our knowledge about the strategies used for reading is drawn from psycholinguistic views, which suggest that readers' understanding of a text is determined by their background knowledge of the subject (Ellis, 2001; Kintsch, 1998; Nassaji, 2002, 2003). The psycholinguistic view of reading is itself linked with schema theory which suggests that any coherent understanding of a text involves "combining textual information a reader brings to a text" (Widdowson, 1998).

The assumption about the role of "pre-stored" knowledge (the readers' schemata) should, however, be taken cautiously because it provides a rather static view of the role of knowledge, which is at variance with the idea that human knowledge is dynamic. The role played by background knowledge in understanding a text implies that if existing knowledge is not activated, comprehension will fail. Kintsch (1998) disputes the critical role played by prior knowledge, which characterizes understanding of a text as a linear or top-down process. He points out that it disregards the role of lower-level (bottom-up) processes, such as word recognition, that help to facilitate understanding.

Studies on reading suggest that cognition, or the mental process by which knowledge is acquired, plays an important role (e.g. Green & Oxford, 1995; Oxford, 1996). These studies point to the fact that readers can understand information effectively if they pay attention to the strategic use of cognitive and meta-cognitive knowledge. Gagne, Yekovitch, and Yekovitch (1993) have identified three types of knowledge that facilitate the reading of a text: declarative, procedural, and conditional. Declarative knowledge refers to the aspect of "knowing that" and implies an awareness of the type of information to be read. Procedural information refers to the aspect of "knowing how" and relates to knowledge about procedures, rules, and principles involved in reading. Conditional knowledge, on the other hand, refers to the aspect of "knowing when to apply knowledge and why." As can be seen from this characterization of reading, declarative and procedural knowledge approximates with the use of cognition, whereas conditional knowledge is connected with the use of metacognition. The use of these mental processes is essential for reading a text efficiently.

The role of vocabulary in understanding a text is also increasingly drawing the attention of researchers in applied linguistics. Generally, it has been found that a wide vocabulary facilitates the reading of a text (Gass & Selinker, 2001; Pulido, 2004). These

studies suggest that control of vocabulary enables the reader to decode a text, and that better readers tend to have larger pools of vocabulary.

Recently, the issue of reading strategies has been investigated in order to find out how male and female ESL students use them (Chavez, 2001). Generally these studies have shown that there are gender differences with females tending to use more strategies than males (Green & Oxford, 1995). Gender-centered studies on the use of strategies in Malaysia and China (Sy, 1994) support the view that females in these societies favor more metacognitive strategies than males.

However, Phakiti's (2003) study of gender and strategy use in L2 reading of Thai university students gives a different picture. The study negates the widely held view that females use a wider range of metacognitive strategies. His study showed that there were no differences between females and males in their use of strategies. The point to note about these studies is that they do not give consistent information about the strategies preferred by students in different settings, which suggests that there is still need to investigate the strategies preferred by students from different cultural backgrounds. Hence, this study attempts to broaden our understanding of the reading strategies preferred by ESL students at this university, who learn in a language situation in which English is used for educational purposes while their heritage language is used for ordinary conversations.

Research Questions

This study is aimed at establishing the reading strategies used by ESL first year science students at the University of Botswana, for whom the ability to understand scientific information is pivotal to their acquiring the necessary discourse skills in their respective areas of specialization. The following questions were posited. Given a scientific text to read:

1. What are the reading strategies that ESL first year science students use in order to understand a text?
2. What are the reading strategies that ESL first year science students use in order to locate the main points from a scientific text?
3. What are the strategies that ESL science students use in order to understand unfamiliar words and structures?
4. Are there any differences between high-proficiency and low-proficiency students in the reading strategies they use?
5. Are there any gender-related reading strategies preferred?

Methodology

Subjects

One hundred and twenty students out of about six hundred first year science students were selected using a combination of random and purposive sampling techniques. Altogether there were 40 female and 80 male students who all voluntarily agreed to participate in the study. The gender imbalance between female and male students reflects the composition of students in the faculty of science at this university. The students had completed the first semester of their university studies during which time they had been taught, besides their core science subjects, Communication and Study Skills (CSS) covering, among other skills, basic study skills such as note-making, scanning and skimming, summarizing, paraphrasing, listening, reading, and academic writing skills. On average the students had been taught through the medium of English for about 9 years from the fifth grade onwards and were 18-20 years of age.

The majority of the students (94) spoke Setswana, a Bantu language spoken from the western part of South Africa to Botswana and some parts of eastern Namibia and western Zimbabwe. Only 16 students spoke Kalanga as their first language, a language similar to Shona spoken in Zimbabwe. Seven students spoke other African languages while only three used English as their "first" language.

On average the science students had obtained C, D or E grades in their high school examinations of English, such as the Botswana General Certificate of Secondary Education (BGCSE) and the International General Certificate of Secondary Education (IGCSE), which are modeled on the Cambridge Overseas School Certificate. These grades are considered low for admission into the University of Botswana but are condoned because the country requires skills in science-related professions. What this biographic information shows is that many students studying sciences at this university have an inadequate level of competency in English, a language they use for their university education.

Procedures

Instruments

For the data reported in this study, a Likert-format questionnaire and a self-reflective questionnaire were used to measure students' reading strategy use (see Appendices 1 and 2). The researcher administered first the Likert-format questionnaire and two days later during the same week administered the self-reflective questionnaire (see Appendix 2). The self-reflective questionnaire was filled in soon after the students had read a text in class for which they had been asked to summarize its main ideas.

Data Collection

The reading text used for this study was about 640 words long. It talked about the technologies that are likely to curb global warming and meet the world's energy requirements, as well as pointing out the limitations of the technologies. The students were asked to pick global points and to summarize them; and immediately after the students had finished writing their summaries, they were asked to reflect on the strategies they had used and to write down the main four strategies they had used to help them understand the text (see Appendix 2: Self-reflective questionnaire).

This was followed later in the week by an interview of 9 purposively selected students, three each who typified 'high', 'average' and 'low' proficiency students. The classification of the students into these three proficiency levels was based on the marks the students had scored in the summarizing task, their high school grades as well as their first semester results in Communication and Study Skills (CSS). The students who scored between 15 to 20 marks out of 20 were classified as high-proficiency. Those who scored between 10 and 14 were considered average-proficiency while those who scored between 1 and 9 were deemed low-proficiency. To ensure inter-rater reliability, the same 120 summary scripts which this researcher had marked were also marked independently by two other lecturers who teach the same course (CSS). Based on the different marks of the students, it was agreed on the categorization of the proficiency levels with 20 students categorized as high, 48 students as average, and 52 students as low.

Pilot Test

Prior to the main data collection, the research instruments had been pre-tested in a pilot study of ten randomly selected science students, who were later excluded from this study to avoid contaminating the results. Based on the responses of the piloted students, the instruments were revised by simplifying unclear question items.

Data Analysis

The results are presented using descriptive statistics (bar graphs and tables) that show how the data are broadly spread and how they are related in terms of one aspect to the other (Leedy, 1997, p. 252). The Statistical Package for Social Science (SPSS) version 13.0 was used to calculate these measures. As the data were non-experimental in nature, the analysis of variance (ANOVA) and multivariate analysis of variance (MANOVA) tests were not used. Instead the researcher relied on interpretivism, which focuses on deconstructing surface appearances to reveal the hidden meanings of the research phenomena in situ. The findings that follow show the reading strategies the students indicated they use.

Results

Reading Strategies

The reading strategies the students reported to have used were in response to statements 1–15 in the questionnaire (see Appendix 1). In analyzing the students' strategies, the researcher regrouped them into four themes: 1) self-directed attention, 2) scanning and skimming, 3) marginal information-processing strategies, and 4) inappropriate information-processing strategies. The classification of the strategies into these four themes was done merely as a research procedure; but it did not necessarily mean that all the strategies fit neatly into these categories (see Oxford, 1990).

Directed Attention

Self-directed attention (questions 1, 2 and 3) required the students to indicate the strategies they used in order to understand the gist of the text (see Figure 1 below). In answer to the first question, 92 students strongly agreed and 28 agreed that they try to understand first what the text is all about. For the second question, which asks the students to indicate the degree to which they pay attention to the title of a text, the students overwhelmingly indicated that they strongly agree (55) and agree (60) that they first look at the title in order to get the general feel of the text. Regarding the strategy of focusing on key words to get the gist of the text (question 3), 66 and 44 students, respectively, reported that they either strongly agree or agree that they look for key words and phrases that allow them to understand the meaning of the text. This strategy is in keeping with psycholinguistic views of interactive reading which suggest that effective reading involves combining both lower-level visual reading strategies, through word recognition, syntactic and semantic processing, with higher-level strategies that emphasize contextual and background knowledge (Nassaji, 2002, 2003).

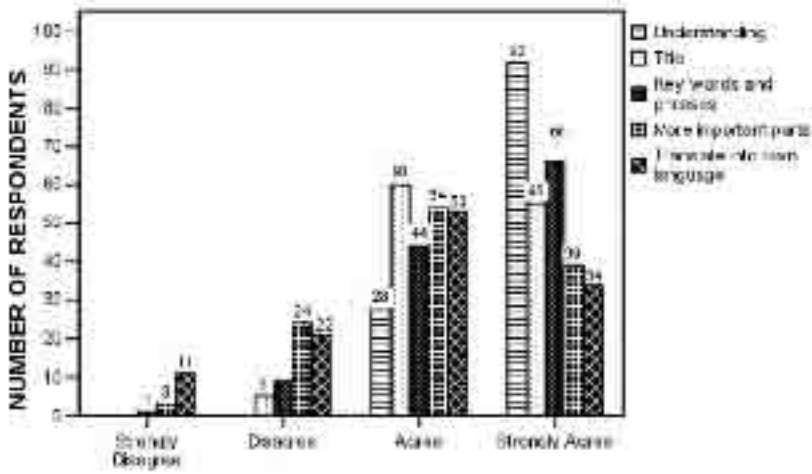

Figure 1: Self-directed Attention and Strategy Use

However, when it comes to determining which parts of a text are more important than others (question 14), a skill that is vitally important for locating the required information, only 39 students indicated that they strongly agree that they use such a strategy, compared with 54 who agreed that they use the strategy. It is not surprising that there were fewer students who strongly agreed that they need to decide which parts are more important than others, because this is a skill that involves the use of higher order thinking skills. The students' limited ability to decide which parts of the text carry the required information confirms the findings of previous studies, particularly those of Schraw (1998), who noted that college students who lack the ability to evaluate their encoding processes miss out essential information, which affects their performance.

Scanning and Skimming

Figure 2 refers to the strategies students reported using for abstracting the main points from a text. These responses refer to questions 4, 5, 6 and 11 of the questionnaire. The students' responses to question 4, which asks whether they first scan and skim, indicates that they generally employ these strategies. The response to question 5, which asks whether they pay attention to the first sentence of each paragraph to get the gist of the text, indicates that 9 students strongly disagreed and 46 students disagreed, which suggests that almost half of the students do not direct their attention to what is signaled by the topic sentence.

Statements 6 and 11, which refer to underlining and making notes of key points, received the highest rating, which indicates that many students preferred these strategies, perhaps because they had already been taught how to use these reading strategies in the preceding semester before they participated in this research task.

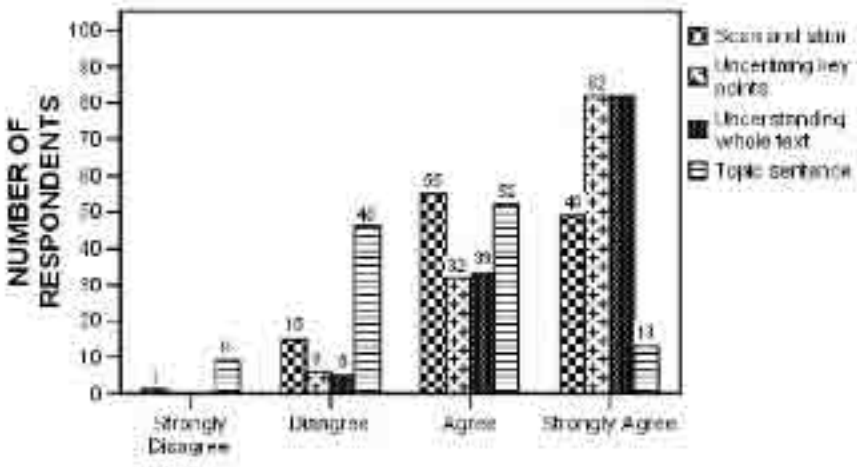

Figure 2: Scanning & Skimming and Strategy Use

The students' responses that they first scan and skim, underline key points and try to understand the meaning of the whole text before summarizing are consistent with Kintsch's (1998) idea of discourse comprehension. He suggests that in reading a text, one first goes through a construction process, whereby the main ideas of the text are constructed through prediction, until the text base is integrated into the reader's global knowledge, forming a coherent mental representation of what the text is about.

Marginal Information Processing Strategies

For operational purposes, statements 9, 12 and 13 are classified as "marginal" reading strategies because they do not necessarily enhance effective reading (see Figure 3). These statements required the students to show the degree to which they focused on words surrounding an unknown word in order to determine its meaning, the extent to which they think about under-the-surface meanings of words, and how they relate the information in the text to what they already know. De Bot, Paribakht, and Wesche (1997) maintain that these strategies are not pivotal to effective reading because readers can still get the gist of a text without understanding the meanings of some of the words in the text including their subtle meanings and without relating the new information to what they already know.

Students' responses to the "marginal" information processing strategies are quite interesting. While 92 students either strongly agreed or agreed that they pay attention to words surrounding an unknown word, the situation is somewhat different when it comes to the extent to which they pay attention to hidden meanings and how they relate the text to prior knowledge. Although 70 students reported that they either strongly agreed or agreed that they thought about the meanings of unknown words, there is a significant

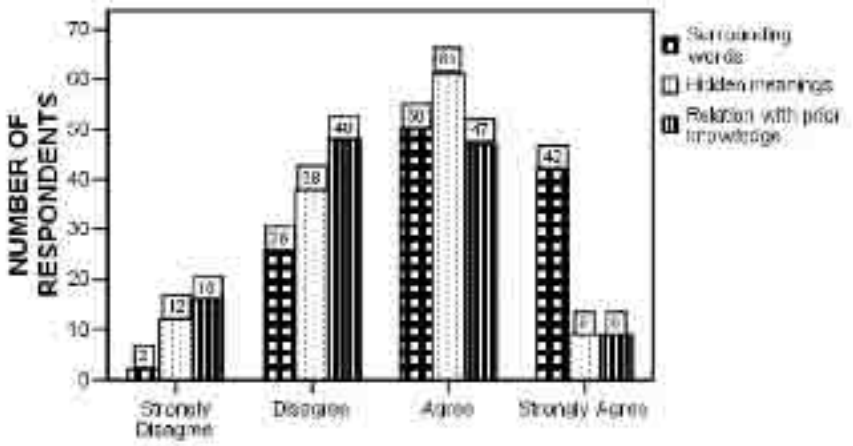

Figure 3: Marginal Information Processing Strategies

number (50) who either or disagreed or strongly disagreed. Similarly, 64 students either disagreed or strongly disagreed that they relate new information to what they already know, while 56 agreed or strongly agreed that they relate new information to previous experiences.

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The fact that over half of the students (64) either disagreed or strongly disagreed about the need to connect new information to what they already know suggests that schema theory (Kintsch and Van Dijk, 1978), which claims that the understanding of a text depends on combining background information with background rhetorical structures (Cook, 1997), may not hold water for all readers. The 64 students who reported that they did not relate new information to prior knowledge (here one needs to be circumspect about self-reporting), fall into the category that Scott (2005) refers to as not conforming to the heuristic principle of building from "resident" to "absent" schemata; that is to say, moving from "old" to "new" knowledge, or as it is known in cognitive psychology, moving from "known" to the "unknown".

Inappropriate Information Processing Strategies

The reading strategies reflected in statements 7, 8, 10 and 15 of the questionnaire (see Figure 4) were considered "inappropriate" because they do not foster efficient reading but are often used by students who do not have expertise in reading. (The classification "inappropriate" is used here for procedural purposes but is not a watertight conceptual framework.) On this issue, the researcher acknowledges the fact that although there are inherently no good or bad strategies (Anderson, 2005), there are, however, strategies which Ellis (1987) calls "less facilitative" because they do not easily promote efficient reading. In this study, these are the strategies which involve a focus on examples and details in the text, the meanings of new words, focusing on the individual meanings of sentences and the translation of the main ideas into the students' primary language.

Figure 4 shows the extent to which the students used inappropriate strategies. With regard to the degree to which they focus on details and examples, 70 students disagreed

or strongly disagreed and 50 agreed or strongly agreed that they use these strategies. On the extent to which they focus on the meaning of new words, similar responses were given: 65 students disagreed or strongly disagreed and 55 agreed or strongly agreed. The students' responses illustrate the point made earlier that the use of strategies is a matter of individual preference, and this is perhaps why more than half of them indicated that they do not focus on details and meanings of new words while nearly half of them do so. This suggests that some students find Kintsch's (1998) bottom-up processing (e.g. word recognition) useful for determining the meaning of the text while others prefer to focus on the global issues.

Regarding what the students do at the sentence level, an overwhelming number (99 out of 120) agreed or strongly agreed that they focus on the meanings of sentences while 21 disagreed. While it may be a good idea to focus on the meanings of individual sentences when reading, in this study it was perhaps counter-productive because the students' main task was to single out from a labyrinth of complex ideas the technologies that could be used to reduce global warming and their limitations. Swales (1990) emphasizes this point by suggesting that any meaningful reading should involve an identification of the main issues, the genre and formal structure, all of which enable the reader to comprehend the gist of the text.

Concerning translation, 87 students (as opposed to 33) agreed or strongly agreed that they translate the main ideas into their first languages in order to understand them better. Ellis (1987) suggests that translating ideas from the second language into one's first language is a compensatory strategy which is used when an L2 learner has a problem in understanding the required information. Although translating into one's first language may help to

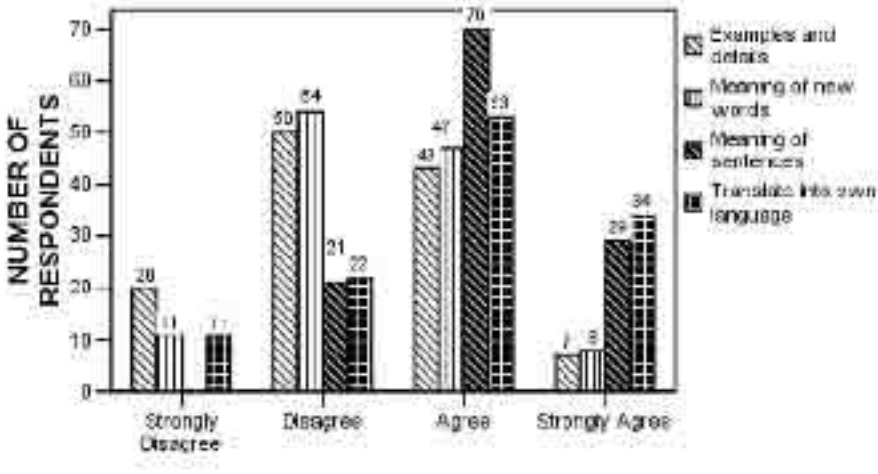

Figure 4: Inappropriate Information Processing Strategies

understand a text, it has three shortcomings. The first is that there is not enough time at college or university to translate all the ideas a student does not fully understand. The second is that students who do not understand the ideas in the second language are likely to translate them inaccurately into their first language. And the third is that translation can make an L2 learner easily regress into the comfort zone of the home language, thereby slowing down the development of strategic competence in the second language.

Students' Self-reported Strategies

An analysis of the strategies the students reported to have used for reading the text shows a remarkable difference between the different levels of proficiency among the students. The self-reflective responses and the information elicited through interviews indicates that, relative to other proficiency groups, high-proficiency students preferred reading strategies such as understanding the task first, scanning and skimming, and noting the required ideas more than average or low-proficiency students (see Tables 1, 2 and 3). This supports the findings of other researchers (Kinnunen & Vauras, 1995; Swanson & De la Paz, 1998; Zhang, 1999, 2000) who reported differences in the use of strategies between proficient and less proficient readers.

The majority of the students from all the proficiency groups, however, reported that they did not pay much attention to the meanings of unfamiliar words in the text, presumably because they had a limited vocabulary. The students' responses further show that there were no major gender-related strategies preferred, except scanning and skimming for which male students tended to use more than females; while more female students reported to have figured out the meanings of new words than males. Overall, the self-reported data in Tables 1, 2 and 3 suggest that there are strategies preferred by students with different proficiency levels; but there is no significant difference in the manner in which they treat new words in order to understand the overall meaning of the text.

Table 1

S*elf-reported Reading Strategies Preferred by High-proficiency Students*

Reading Strategies	Male %	Female %	Total %
Understanding	87% (14/26)	100% (4/4)	90% (18/20)
Scanning & Skimming	81% (13/26)	50% (2/4)	75% (15/20)
Noting	87% (14/26)	100% (4/4)	90% (18/20)
Meaning	13% (2/26)	75% (3/4)	25% (5/20)

Table 2

Self-reported Reading Strategies Preferred by Average-Proficiency Students

Reading Strategies	Male %	Female %	Total %
Understanding	78% (26/33)	47% (7/15)	69% (33/38)
Scanning & Skimming	33% (11/33)	47% (7/15)	38% (18/48)
Noting	58% (9/33)	60% (9/15)	58% (28/48)
Meaning	33% (11/33)	20% (3/15)	29% (14/48)

Table 3

Self-reported Reading Strategies Preferred by Low-Proficiency Students

Reading Strategies	Male %	Female %	Total %
Understanding	48% (15/31)	29% (6/21)	40% (21/52)
Scanning & Skimming	35% (11/31)	29% (6/21)	33% (17/52)
Noting	48% (15/31)	43% (9/21)	46% (24/52)
Meaning	19% (6/31)	24% (5/21)	21% (11/52)

Implications

A number of implications emanate from this study. Firstly, some of the L2 learners' difficulties in extracting the main points (especially the low-proficiency students) suggest that background information in relation to the new information may need to be activated, in order for the learners to be able to process the information more quickly. For example, the ESL readers' prior knowledge can be stimulated by using pre-reading strategies, such as those suggested by Schraw (1998) of "stop, read and think" so that prior knowledge and existing structures can be integrated.

An important implication of this study is that since ESL first year science students of different proficiency levels reported to have used a variety of strategies, lecturers and teachers might find it useful to speak to their students so that they can get feedback on the

strategies the students use in different reading situations. This could be done by asking them to record the strategies they use deliberately. They could also conduct personal interviews with individual students who have problems in understanding their text books, research papers or handouts given in class, so that they can establish exactly the reading strategies their students use. This could help ESL students become more meta-linguistically sophisticated as they would carry out retrospective analyses of themselves as language learners. As the lecturers or teachers interact more frequently with students, it is also possible that they might become more sensitive to students' reading problems, and might begin to appreciate how individual students decipher new textual materials.

An important point that emerges from this study regards the linguistic complexity of the reading materials that are used by ESL students. This study has shown that most of the ESL first year science students, regardless of their proficiency levels, are aware of the strategies they are supposed to use in order to understand what they are reading about. What seems to be the problem is that they find it difficult to understand the texts they read because they are written in an unfamiliar jargon. In order to help the students overcome this problem, there is need to select reading materials so that the students can start with familiar materials that gradually build on their "resident schemata" (Scott, 2005, p. 4) and move on from simple to more complex materials that stretch their imagination.

An equally important implication of this study is that since ESL students reported to have preferred reading strategies that work uniquely for their individual styles, they should be encouraged to use strategies that work for them in different situations. To this end, Cohen (1998) suggests that effective second language pedagogy should include not only task-specific strategies but also a justification of the utility and outcome of the individual strategies. Here, one must concede that individualized pedagogy can be arduous and time-consuming especially where there are large numbers of students involved and teaching time is limited. However, it may be a pragmatic alternative to a situation in which teachers or lecturers do not bother about knowing the strategies their students use because, they assume, students will learn on their own.

Limitations and Recommendations

In a study of this nature which attempts to understand the strategies ESL students use for reading a text, there are bound to be differences in the interpretation of data, particularly where one is dealing with what goes on in the mind of a person. Chamot (2004), for instance, maintains that strategies can only be identified through self-reporting, which may fail to reveal accurately the mental activities involved. Also, there is the problem of trying to classify strategies. In this study, the classifications used are a hybrid of those previously used by other researchers, such as Chamot (1996); Li & Munby (1996) and Oxford (1996, 1999). However, from the first publication of her strategy inventory, Oxford (1990) cautions that particular strategies could be viewed as

related to more than one strategy, such as *planning* versus *directed attention* or *scanning and skimming.* Bearing this in mind, the categories used in this study are more procedural than being watertight.

An issue which future researchers in this area need to monitor carefully is the anonymity of the respondents. In this study the data yielded through the use of a questionnaire, self-reflection and interview tended to give the students a platform for premeditated responses because they had been selected from a larger group, which did not completely hide their identity. As a result, the students tried to look their best by circling reading strategies which probably did not reflect the ones they actually use. Gall, Borg, and Gall (1996) caution that in a situation where the identity of respondents is not fully concealed, they often put on a front—in other words, they give information which does not necessarily reflect their best practice, but which they think pleases the researcher.

Also, what needs to be monitored closely is the students' motivation when participating in a research activity. This research task was not an official test, which means that the results of the task did not contribute to the students' assessment of their Communication and Study Skills course. Given the low-stakes nature of the task, it is possible that the students were not sufficiently motivated to do their best and perhaps a high-stakes task, such as a test whose mark contributes to the final grade, might be ideal for studying the strategies the students use for reading.

Conclusion

The results of this study, notwithstanding their limitations, show that ESL first-year science students at this university are generally aware of the strategies to use for reading. In particular, they either strongly agreed or agreed that they first scan and skim a reading text, focus on the main points and ignore examples and details. However, when the data from the questionnaire were cross-checked against the strategies the students reported to have used, some of their claims, especially those of the low-proficiency and some average students, were not sustained. Instead, there were clear differences between the strategies reported to have been used by high-proficiency students and those preferred by low-proficiency students. This confirms the findings of previous studies that have reported on the inability of low-proficiency students to substantiate and evaluate the strategies they use (Nassaji, 2003).

Also, the survey data do not show significant differences in the strategies preferred by each gender, which is contrary to previous research that reported a wider use of strategies by females than males (Chavez, 2001; Green & Oxford, 1995; Kaylani, 1996). The lack of differentiation in the strategies preferred by each gender in this study could be attributed to the fact that the students had a fairly homogeneous science background. In a nutshell, the data in this study suggest that many average- and low-proficiency ESL first year science students at this university find it difficult to distinguish between

important and unimportant ideas despite their claim of being aware of their strategy use while processing a reading text. This suggests that there is need to help the students recognize the power of consciously using reading strategies that work for them as individuals in different contexts so that they can make their learning quicker, easier, more efficient, and exciting.

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About the Author

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Appendix 1

Questionnaire

READING STRATEGIES USED BY FIRST YEAR SCIENCE STUDENTS AT THE UNIVERSITY OF BOTSWANA

I am conducting a study on the strategies that you use when you read a text. The study is important because it is likely to give us some idea about how you read and the strategies you use to extract the main ideas. It is also important because it will give us information about the aspects for which you need extra help so that you can navigate your learning more successfully.

Kindly complete this questionnaire,

N. B. A strategy is a technique you use or the conscious steps you take to complete a task.

Now read the following items, and **circle** your response in terms of how best the statement describes what you do when reading a written text.

When you are asked to read a text, such as a newspaper article, passage, handout or your text book,

What you do:	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**
1. I try first to understand what I am supposed to do.	1	2	3	4
2. I first look at the title.	1	2	3	4
3. I look for the key words and phrases that allow me to follow the meaning of the text.	1	2	3	4
4. I scan and skim through the whole text in order to get a general idea of what it is all about.	1	2	3	4
5. I look at the first sentence of each paragraph to find out what the text is saying.	1	2	3	4

What you do:	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**
6. I note and underline the key points and ideas.	1	2	3	4
7. I focus on examples and details.	1	2	3	4
8. I focus on the meaning of new words.	1	2	3	4
9. I focus on words surrounding an unknown word in order to determine its meaning.	1	2	3	4
10. I focus on the meaning of sentences.	1	2	3	4
11. I try to understand the whole text before writing anything.	1	2	3	4
12. I think about "under-the-surface" or hidden meanings of new words.	1	2	3	4
13. I try to relate the information to my experiences or to what I already know.	1	2	3	4
14. I determine which parts are more important than others before starting.	1	2	3	4
15. I translate the ideas into my own language in order to understand them better.	1	2	3	4

Appendix 2

Self-reflective Questionnaire

Think again about the strategies or techniques you used in reading the text on the technologies that are likely to control climate changes and their limitations. Now answer the following question in relation to what you did in order to understand the main ideas of the text:

1. What are the main four strategies you used in order to understand the text?

(a)

(b)

(c)

(d)

Thank you so much for sparing your time to answer the questions.