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Hypermedia Reading Strategies Used by Persian Graduate Students in TEFL: A Think-Aloud Study

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ABSTRACT

This study investigated the cognitive strategies used by Persian EFL (English as a foreign language) graduate students while reading a hypermedia text. Prior to the start of the study, the Nelson-Denny Reading Test was used in order to measure the reading ability of the students. Data was collected through think-aloud protocols, and the strategies used by the proficient group and the less-proficient group were compared. A semi-structured interview was also conducted. Results indicate that there was a considerable difference in the strategies used between the two groups; strategies used by the proficient group were mainly skimming and using prior knowledge. In contrast, the less-proficient group mostly used paraphrasing, translation into L1, and referring to the dictionary as major cognitive and metacognitive strategies.

INTRODUCTION

Many have argued that reading is the most important academic language skill for second language students (Grabe & Stoller, 2001). The ability to read, in any language, requires that the reader draw information from a text and combine it with previous information and expectations. Reading is thus a complex cognitive activity. Unlike our first spoken language, which one might say "comes for free," nothing is free with respect to reading in a second language, and learning to read in a second language (L2) requires considerable cognitive effort and a lengthy learning process. If a person is not taught to read in one way or another (e.g., by a teacher, a parent, or a sibling), that person will not learn to read.

The birth of reading-strategy research was introduced in 1975 in an article by Rubin who defined reading strategies as the techniques or devices which a learner may use to acquire knowledge. Chamot (1987) defined 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. Oxford (1990) states that learning strategies are specific actions taken by the learner to make learning easier, faster, more enjoyable, more self-directed, more effective, and more transferable to new situations. Reading strategies can be defined as plans for solving problems encountered in constructing meaning. They range from *bottom-up* vocabulary strategies, such as looking up an unknown word in the dictionary, to more comprehensive actions, such as connecting what is being read to the reader's background knowledge.

Second language reading research began to focus on reading strategies in the late 1970's and early 1980's. The effective use of reading strategies has been recognized as an important way to increase reading comprehension, and studies have focused on paper-reading strategies used by EFL/ESL learners (Anderson, 1991; Block, 1986; Hosenfeld, 1977). For example, Block studied generally non-proficient EFL students and observed that some readers were more successful than others. Using think-aloud protocols to elicit reading strategies, Block found that the more successful readers used more 'general' strategies. Hosenfeld (1977) also endeavored to discover the reading strategies of successful and unsuccessful L2 students of French, Spanish, and German. However, relatively few studies have reported on L2 online reading strategies. With the increase of content on the World Wide Web and the rise of technology, online reading has become a prominent source of input for people, especially EFL students.

Since the 1980's, there has been an increased focus on reading and learning from hypertext (Shapiro & Niederhauser, 2004). Hypertext is just like ordinary text, but has added features such as pictures, graphs, charts, audio, video, electronic dictionaries, and animation. Hypertext is flexible because the reader can choose from many options, other than just reading the printed text.

The purpose of this study was twofold: First, this study aimed to identify the strategies used by EFL graduate students while reading a hypermedia text. The second purpose was to examine differences between strategies used by the proficient and less-proficient groups. Two questions were formulated: (1) What are the hypertext reading strategies used by EFL graduate students? (2) Is there a difference between the strategies used by the proficient and less proficient groups?

LITERATURE REVIEW

Classification of Language-Learning Strategies

Strategies are those specific attacks that we make on a given problem (Brown, 2000, p. 122). They are the moment-by-moment techniques we employ to solve problems when confronted by second language input and output. Since 1975, various theorists have contributed to the definition of language-learning strategies (Anderson, 1991; Block, 1986; Oxford, 1990; Sheorey & Mokhtari, 2001). Different models have been proposed to categorize and create a hierarchy of strategies on the basis of how they relate to the learner and the task, and how they are employed in the learning process. This section reviews major models that have emerged in the field thus far and includes Rubin's (1975) classification of *direct* and *indirect* strategies; Oxford's (1990) six-category strategy model; O'Malley and Chamot's (1990) four-category strategy taxonomy, and Cohen's (1998) distinction between learning and using strategies.

In her research, Rubin (1981) noticed a distinction between processes which contributed *directly* to learning, and processes which contributed *indirectly* to learning, and henceforth classified strategies as direct strategies and indirect strategies. Direct strategies are subcategorized into clarification/verification, monitoring, memorization, inductive/deductive inferencing, and practice. Indirect strategies are subcategorized into creating opportunities for practice and employing production tricks.

Oxford's (1990) strategy taxonomy includes six categories: memory, cognitive, meta-cognitive, compensation, social, and affective strategies. In defining subsets of language-learning strategies, O'Malley and Chamot (1990) proposed three strategy categories: metacognitive, cognitive, and social/affective strategies.

Cohen (1998) broadly defines second language learner strategies as encompassing both second language-learning and second language-use strategies. In his viewpoint, language-learning and language-use strategies are those processes which are consciously selected by

learners, and which may result in action taken to enhance the production of a second (or foreign) language through the storage, retention, recall, and application of information about that language. In Cohen's model, language-learning strategies include those used for identifying the material that needs to be learned, distinguishing it from other material if needed, grouping it for easier learning, having repeated contact with the material, and formally committing the material to memory when it does not seem to be acquired naturally. Language-use strategies include four subsets: retrieval strategies, rehearsal strategies, cover strategies, and communication strategies.

Hypermedia and L2 Reading Strategies

Hypermedia refers to computer-based applications that provide information in a nonlinear way through multiple types of resources such as text, graphics, sound, video, and animation. It is suggested that hypermedia is potentially useful for L2 reading because a given text can be made comprehensible for L2 readers by annotating it with multiple types of media in the form of glossaries (Davis, 1989). Compared with the abundant research into L2 paper-reading strategies, relatively few empirical studies have explored online-reading strategies. However, since the 1980's, there has been an increased focus on reading and learning using hypertext (Shapiro & Niederhauser, 2004). Other than the text and the reader, in hypermedia, there is an additional factor—the Internet's abundant visual and non-textual features. According to Leu and Reinking (1996) use of strategies is especially important in reading hypertext or hypermedia documents because the reader is involved in a constant decision-making process in their reading order and the sources of information they use. Of course, one thing to remember is that readers may transfer their print-based reading skills to hypermedia reading, but they will also need to use additional strategies in order to deal with the features of this environment.

Anderson (2003) compared the online metacognitive reading strategies used by 131 EFL and 116 ESL learners with different proficiency levels. Results indicated that the most frequently used strategy was rereading difficult text, and the least frequently reported strategy was translating into L1. Chun (2001) asked twenty-three university students studying German to read a hypermedia text, and those students used online dictionaries every time they encountered a new word.

Reading Strategy Assessment

Since the 1980's, research on learning strategies has increased, focusing on the effectiveness of strategies for learning (O'Malley & Chamot, 1990). Strategy use is an unobservable mental process (Chamot, 2007); therefore, researchers have relied on self-reporting or verbalization to tap into readers' internal cognitive processes, which cannot be easily measured. Even though self-reporting has been argued in terms of veridicality and incompleteness, it still gives useful information about internal cognitive processes such as reading strategies (Anderson, 2003). There are several commonly used self-reporting assessment methods: retrospective interviews, stimulated-recall interviews, observations, questionnaires, strategy checklists, written diaries and journals, and think-aloud protocols (Lee, 2007). Each assessment technique has its appropriate uses, and each has its limitations.

Verbal protocols usually happen concurrently while reading a text, and this method has been used to discover what readers do while reading with or without prompts like, *keep talking*, *how did you solve that?*, *why did you laugh?*, *what made you stop here?*, and *what are you thinking now?* (Chamot, 2007). This method has been widely used because researchers believe that learners can report what is in their working memory (Ericson & Simon, 1993), and that reporting while doing a task gives more and better information than reporting what they did retrospectively (Kuusela & Paul, 2000). Strategy questionnaires help identify typical strategies

used by individuals that can be integrated into group results, and a wide array of strategies can be measured by them. Nonetheless, questionnaires are not useful for identifying specific strategies on a given language task at a given time, but they can identify typical strategies used on specific tasks over a period of time, depending on how the questions are asked.

While many researchers have reported the effectiveness of verbal protocols to assess reading strategies, there are also many studies showing the adverse influences on the validity of the data (Branch, 2000; Kuusela & Paul, 2000; Leighton, 2004). Producing verbal protocols while doing a task may be too much of a burden on some students (Branch, 2000); other students may not have appropriate words to express what they are doing, or they may unwittingly misreport what they are doing. In other words, limited language skills may cause students, especially when they are young, to fail to report what they are doing (Singhal, 2001). Overall, however, protocol analysis seems to help in understanding readers' strategies, both in L1 and in L2 (Anderson, 2001).

METHODOLOGY

Materials

The hypermedia text used in this study was retrieved from Microsoft Encarta (2008, a digital multimedia encyclopedia published by Microsoft Corporation from 1993 to 2009, now closed) on the topic of sleep. This hypermedia text was filled with annotations such as pictures, charts, sounds, and highlighted words (which linked the reader to more detailed definitions of that particular word), an electronic dictionary, as well as links to many other sites related to the topic. The text consisted of 2,353 words, including the passages relating to the annotations.

Instruments

Questionnaires

Since it was difficult for most students to verbalize their thoughts and processes and read at the same time, it was thought that the participants might not verbalize all the processes. Therefore, for a better analysis of the results (prior to the think-aloud protocols), a questionnaire (see Appendix) was used to see what pre-reading, while-reading, and post-reading strategies the readers used while reading the hypermedia text. The participants answered questions, choosing from numbers 1 to 5 based on a Likert scale (5 = *Always true of me*, 4 = *Usually true of me*, 3 = *Sometimes true of me*, 2 = *Rarely true of me*, 1 = *Never true of me*).

Think-Aloud Protocols

The main data-collection technique used in this study was the think-aloud. One advantage of this technique over other strategy assessment types is that it could identify, in depth, the strategies used in a given, ongoing task. However, it is not useful for identifying "typical" strategies used more generally (Lee, 2007). In this study, all the participants used their mother tongue (Persian) to verbalize their thoughts and strategies. Each participant was given an explanation of what they were expected to do, and were shown a sample of a hypermedia text with which they would be working.

Interviews

A semi-structured interview, adapted from Akyel and Erçetin (2009), was used in this study. The interviews were conducted immediately after the think-aloud protocols in order to see what the students thought about the experience, as well as what the positive and negative points of the hypermedia reading experience was in their perspective.

Participants and Procedure

Twenty-three EFL graduate students from the Department of Linguistics at an Iranian university completed the Nelson-Denny Reading Test. The answer sheets of the students who scored below 30 and of the students who scored above 30 were separated, and from each set four were randomly selected, to have a total of eight study participants (all of whom completed a consent form that ensured they were willing to participate in the research project), four of which were less proficient and four of which were proficient. All of the participants, whose ages ranged between 20 and 28 years, were familiar with using the Internet and had a PC at home, spending a minimum of two hours on the Internet every day. They also mentioned using computers for writing emails, preparing PowerPoint presentations for their classes, and using MS Word for typing assignments. Thus, it was deduced that the participants were familiar with working on the computer.

A sample hypermedia text was given as a practice task; working on laptops, they were shown that by clicking on the pictures, the highlighted words, and the links on the sides of the pages, they would get additional information. The researcher also showed the participants how they were to read and think aloud at the same time. Thereafter, each participant read the hypermedia text in separate sessions, and everything was recorded by an MP4 to be transcribed later on. In addition to recording whatever was being said, the researcher also took notes on things that could not be recorded, such as a smile, movement of the eyes, movement of the mouse, looking at the annotations, etc. At the end of the session, each participant was interviewed.

Data Analysis

Anderson's (1991) inventory of reading strategies was used as a starting point, as Anderson's inventory is a synthesis of the previously developed taxonomies. In that context, the think-aloud protocols were transcribed, divided into segments, coded, and analyzed. Using existing coding systems developed for a previous study has some advantages: (1) the coding system already exists, is documented, and has the prestige of published acceptance, and (2) the study becomes part of a set which uses a common coding system and for which data comparisons can readily be made (Brown & Rodgers, 2004). After coding the propositions, frequencies and percentages for each strategy were calculated, thereby measuring their cognitive processes.

RESULTS

Processing Strategies

The protocols were transcribed generating a total of 379 strategies by the participants. The strategies used were: referring to annotations, referring to the glossary to find out the lexical meaning, using background knowledge, rereading, formulating a question, paraphrasing in L1/L2, making predictions, and skipping/skimming. Among the cognitive strategies used by the

participants, paraphrasing into L1/L2 had the highest percentage (23.7%). The least-used cognitive strategy as shown in Table 1 was formulating a question in relation to the text (4%).

Table 1. Cognitive Strategies Used by Participants

Cognitive Strategies	*N*	%
Refer to annotations to get background information	30	8%
Refer to glossary to find out about lexical meaning	20	5.3%
Use background knowledge	50	13.2%
Reread	65	17.2%
Formulate a question	15	4%
Paraphrase into L1/L2	90	23.7%
Make predictions	45	12%
Skip/skim	64	17%
Total	**379**	**100%**

The participants were put into two groups, proficient and less proficient, based on the results of the Nelson-Denny Reading Test. A comparison of cognitive strategies indicated that the most frequently used strategy by the proficient learners was skipping/skimming, where as the less-proficient readers mostly paraphrased sentences into L1/L2 and reread.

Table 2. Cognitive Strategies Used by Proficient and Less-Proficient Participants

Cognitive Strategies	Proficient Group		Less Proficient		Total	%
Refer to annotation to get background information	22	5.8%	8	2.2%	30	8%
Refer to glossary to find out about lexical meaning	6	1.6%	14	3.7%	20	5.3%
Use background knowledge	33	8.7%	17	4.5%	50	13.2%
Reread	31	8.2%	34	9%	65	17.2%
Formulate a question	7	1.85%	8	2.2%	15	4.05%
Paraphrase into L1/L2	33	8.7%	57	15.1%	90	23.8%
Make predictions	29	7.65%	16	4.2%	45	11.85%
Skip/skim	52	13.72%	12	3.2%	64	16.92%
Total	**213**	**56.22%**	**166**	**44.1%**	**379**	**100%**

Participant Questionnaires

After collecting the questionnaires and examining them, the results were promising. All eight participants had reported that they generally used reading strategies prior, during, and after reading a hypermedia text, and the results were parallel to what they reported. One of the statements on the questionnaire was reading without looking up every unknown word in the dictionary. In relation to this particular example, the participants truly used this strategy in a way that was identical to their self-report given in the questionnaire prior to the think-aloud protocols.

Participant Interviews

Following the think-aloud protocols, each participant was asked five questions regarding the reading experience: (1) Did you read the whole text? (2) Would you prefer to read the same text in a linear format? (3) What was the most interesting feature of this reading experience? (4) Was moving through the text easy or difficult?, and (5) Were the annotations useful?

Regarding the first question, none of the participants had read the whole text completely. All eight students specifically mentioned that they skipped the scientific parts of the text because they thought it was not important for the overall comprehension. In addition, the participants skipped parts they considered uninteresting. In the second question, six of the participants said they enjoyed reading in a hypermedia setting because it was attractive, fun, and more motivating. In contrast, two participants said the hypermedia reading experience was difficult and stressful because it was unusual and they were not used to it. Third, the most interesting of the features for the participants were the colorful pictures, the charts and graphs related to the topic, the electronic dictionary on the side of the page (that enabled them to look up any word they wished), and being able to move through the text easily with a mouse.

Regarding the fourth question, it seemed that moving through the text was difficult for all except two. One possibility for such difficulty could be the result of not being used to reading on the computer. Every time they referred to an annotation of some kind in the text, it would take too long for the participants to restart reading because they could not find their original reading place. Some participants also mentioned that because of this, they neglected to look at different annotations so that they would not lose their place in the hypermedia text.

As to the usefulness of the annotations, although all the participants—without exception—enjoyed the colorful pictures, charts, graphs, and the electronic dictionary, they did not use all of them. As shown in Table 1, only 8% of the cognitive strategies used were related to referring to annotations for additional information. There might be several reasons for this: The first, and perhaps the most important, reason is that Persian learners are generally not familiar with reading a hypermedia text. This is due to the fact that the schooling system in Iran is still based on face-to-face instruction; online instruction has yet to find its place in schools and universities. Equally, Persian students have access to computers and the World Wide Web, but not often in a formal class under the supervision of an instructor with explicit guidance. Secondly, it could be argued that students bring to a hypermedia setting the same strategies they use in a printed text, and because annotations are absent in a printed text, they rarely pay attention to the annotations in a hypermedia text. Finally, most Persian learners usually read for an academic purpose rather than for pleasure, and some might mistakenly believe that looking at annotations is a waste of time; instead of spending their time on pictures and charts, they focus more on the written text that, in their opinion, will have more information to give.

DISCUSSION

This study investigated cognitive strategies used by Persian EFL graduate students while reading a hypermedia text. Although the findings of other studies in this field have shown the frequent use of annotations in order to get background information (Davis & Lyman-Hager, 1997; Erçetin, 2003; Lomicka, 1998), to our surprise, only 8% of the information-processing techniques used by the graduate students in this study were related to referring to annotations. During the interviews, the participants said that they did not think the annotations would be useful. One of the proficient participants said, “I didn’t think anything useful would be found in the annotations.” Another participant said, “We always read black and white texts, so we are not used to looking at pictures, let alone trying to extract information from them.”

Another infrequent strategy (4%) used by the participants was formulating questions. One possibility for the low use of this strategy might be that Iranian students have always been taught to listen to their teachers and professors and memorize what they say because that will be the only thing on the exam. Students have not learned about critical thinking or formulating questions in their minds or testing hypothesis about the situations around them.

Contrary to Chun's (2001) study, where students continually referred to the glossary to look up the meaning of the unknown words, referring to the glossary in this study was only at 5.3%. The possible reason for the infrequent use of this strategy became clear during the interviews as all of the participants said they had a hard time reading the hypertext because they kept on losing their place: "I resisted using the glossary for the most part," or "I didn't refer to it at all because I was afraid of not being able to find my place in the hypermedia text once I had found the meaning of the word," were sentiments seen in all of the interviews, without exception. We should add that the participants who looked up words in the glossary all took more than 15 seconds to get back to their original place to continue reading, so they tended not to do it.

CONCLUSION

From this study it can be concluded that readers need to be aware of reading strategies, to know what a strategy is, how a strategy can be used, when or where it can be used, and why a particular strategy is used. Strategic knowledge is a crucial asset in any skill, particularly in reading, and incorporating strategy-instruction programs in courses could be a solution to the challenge of familiarizing Persian L2 learners with reading strategies. The participants of this study rarely paid attention to the annotations of the hypermedia text. Tables 1 and 2 show only 8% of the cognitive strategies used by the participants were referring to annotations. Based on the result of the present study, there is a strong need to familiarize Iranian students (especially graduate students) with hypermedia annotations and, more importantly, there must be explicit instruction on how to refer to annotations, and the benefits of pictures, graphs, charts, colored icons, and the many links need to successively be emphasized.

As far as limitations are concerned, the following points must be taken into consideration: First, the findings cannot be generalized because of the low number of participants. Second, not having access to a special lab in order to teach thinking-aloud and verbalizing in a thorough manner was another drawback. Third, since there was a time and space constraint for conducting the think-aloud protocols with each student, the researcher had to explain everything very quickly to the participants, and, therefore, there was no opportunity for them to ask questions and get more acquainted with the procedure. Finally, metacognitive strategies were not analyzed in this study.

An important area for further research could be on awareness raising when working with hypermedia text; if students are not aware of breakdowns in comprehension, they cannot use metacognitive and cognitive strategies properly. But once strategies are taught in an orderly manner, each student will know when and where to use them for a better understanding of hypermedia texts.

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APPENDIX

This questionnaire was used prior to conducting the think-aloud protocol. Students rated each statement according to the 1-5 Likert scale below.

Name: _____ Age: _____

Always true of me: 5
Usually true of me: 4
Sometimes true of me: 3
Rarely true of me: 2
Never true of me: 1

Pre-Reading Strategies

1. Reading the title and imagining what the text might be about ___
2. Looking at illustration/pictures and trying to guess how they are related to the text ___
3. Skimming the text quickly to get information ___
4. Reading the first line of every paragraph to understand what the text is about ___
5. Thinking about previous knowledge on the topic of the text ___

While-Reading Strategies

6. Reading without looking up every unknown word in the dictionary ___
7. Using a dictionary for the important words ___
8. Guessing the meaning of a word from the context ___
9. Remembering a new word by thinking of a situation in which the word might be used ___
10. Skipping some of the unknown words ___
11. Rereading a sentence ___
12. Considering the other sentences in the paragraph to figure out the meaning of a sentence ___
13. Reading without translating word for word ___
14. Having a picture of the events in the text in mind ___
15. Thinking aloud during the reading ___
16. Paying attention to words or phrases that show how the text is organized ___
17. Taking notes on the important points of the text ___
18. Making guesses about what will come next based on the information given on the text ___

Post-Reading Strategies

19. Classifying the words according to their meaning ___
20. Classifying the words according to their grammatical categories ___
21. Summarizing the main idea ___
22. Rereading the text to remedy comprehension failures ___
23. Rereading the text to remember the important points ___