

Reading on the Internet: A Case Study

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Abstract

This paper reports on the online reading strategies used by four EFL learners. These four participants, with diverse language proficiencies and computer skills, were chosen to complete online reading tasks. Their navigation behaviors observed in videotaping and interview data were transcribed and coded. Four types of strategies were generated: Navigating strategies, Information-gathering strategies, Interface-changing strategies, and Usability problem-reporting strategies. These strategies assisted readers in navigating online texts smoothly, finding relevant information to build up background knowledge, establishing a personal environment to facilitate online reading, and making suggestions for user-friendly Web design. The results also showed that students with better computer skills used comparatively more strategies than those with average computer skills. They were more able to personalize the reading environment for increased motivation and to utilize multimedia features for better comprehension. Even lower proficiency students with better computer skills could increase their background knowledge and language learning repertoires by searching outwards and communicating with peers.

Key Words: Web-based reading, second language reading, reading strategy

INTRODUCTION

A growing body of research has suggested that students require new comprehension strategies to read and learn from text on the Internet (Coiro, 2005; Coiro & Dobler, 2007; Sutherland-Smith, 2002). Reading is not restricted to printed materials only; instead, students need to frequently consult online materials to find information and to meet this emerging literacy demand. The new text format introduced by the Internet provides both new supports and new challenges (Coiro, 2003). Students may take advantage of graphics, images, and audio-visual content to understand a text, but they may be confused or overwhelmed by the vast amounts of information and varied forms of presentation online. To cope with electronic texts, which encompass online navigation, digital media, and authentic computer-mediated communication, students need more than paper-reading strategies; they need to be equipped with specific strategies, such as the ability to navigate, and the skill to make critical decisions among a complex combination of hyperlinks to find the information they want.

Despite this increased use of online information technologies, little is known about the reading patterns that EFL learners display in reading digital texts. Moreover, despite the importance of mastering online reading strategies to cope with the reading difficulties mentioned above, EFL learners in Taiwan are reported to be overwhelmed with English materials on the Internet (Chen, 2004). In this information age, it has become urgent to investigate how EFL readers read online. The purpose of this study is therefore to delineate

EFL learners' patterns of online reading strategies. The Internet is a fast-growing medium for reading and writing, and learners' reading behaviors with this new medium have not yet been fully explored. Understanding the online reading strategy patterns of EFL learners will inform reading teachers how best to prepare students to cope with new forms of reading in a digital age.

RESEARCH BACKGROUND

Digital media have revolutionized reading and writing practices and have given rise to a new kind of literacy that encompasses online reading, online navigation and research, hypermedia interpretation, and many-to-many synchronous and asynchronous communication. Computers are not only a tool for language learning but an essential medium of literacy and language use (Beatty, 2003). With the rise of the Internet, reading no longer only involves readers' interpretation of the text and writers' stance in a paper-reading environment; instead, when a third factor, technology, has been added into reading, reading demands more critical reading skills to incorporate evaluation of the Internet's abundant visual and non-textual features (Coiro, 2005; Coiro & Dobler, 2007; Coiro, Karchmer, & Walpole, 2006; Reinking, McKenna, Labbo, & Keiffer, 1998; Shetzer & Warschauer, 2000; Sutherland-Smith, 2002). Knowing how to access information on the Web, Web literacy, is "an ability to recognize and assess a wide range of rhetorical situations and an attentiveness to the information conveyed in the source's non-textual features" (Sorapure, Inglesby, & Yatchison, 1998, p. 410), and this skill has become paramount in the

digital age. This shift of pen-and-paper writing to digital text production has prompted teachers to wonder whether students use different strategies in reading printed texts and digital texts.

Recent research in hypermedia reading strategies has focused on three lines of inquiry. The first line of research focuses on students' use of glossaries to assist in reading comprehension. The second line of inquiry investigates individual differences in the use of reading strategies in hypermedia reading. The third area of research focuses specifically on L2 readers' strategy use in a Web-based reading environment.

The Use of Glosses

Modern technology has made every possible learning tool available at the click of a mouse. Various kinds of help functions can be readily accessed to improve learning in a multimedia learning environment. These help buttons are referred to as annotations or glosses. These hypertextual links can take readers to dictionary definitions, translations, and grammatical and cultural elaborations through multiple sources of media, such as text, picture, sound, and video. Research has confirmed that multimedia annotation is effective in supporting different aspects of language learning, including vocabulary, listening, and general reading comprehension (Chun & Plass, 1996; Lomicka, 1998).

Recent studies suggest that lower level students access annotations more than higher level students do in order to compensate for their challenged language proficiency (Chun, 2001; Ercetin, 2003); in contrast, higher level students pay more attention to reading the

text itself than using annotation and glosses (Chun, 2001). Easy access and salient features of annotation promote reading comprehension and increase the chances for students to look up information (Chun & Plass, 1996; Lomicka, 1998). A combination of media—text, graphics, and video—proves to be more effective in facilitating reading processes (Ercetin, 2003).

Individual Differences

Research on individual differences in hypermedia involves investigating such variables as language abilities (Dillion & Gabbard, 1998; Mayer, 1997) and computer skills (Nielsen, 1994, 1997; Nielson & Morkes, 1997). Dillon and Gabbard (1998) concluded that high-ability learners will perform better than low-ability ones no matter what media is used. However, hypermedia applications can offer techniques, such as explicit cues, that are helpful in guiding less proficient learners to perform better.

With regard to research on different computer techniques used on the Web, Nielsen (1994) investigated how technologically-savvy Web users (those who had extensive Web experiences prior to the experiment) read commercial Web sites. It was found that despite their highly technical knowledge on Web reading, they still experienced difficulties in locating information necessary for completing the assigned tasks. Nielsen and Morkes (1997) conducted another study to compare how technical and non-technical users read and found specific information on a designated Web site chosen by the researchers. The study also surveyed participants' comments on the interface design and contents of this Web site. The results indicated that students enjoyed searching for information but spent

unnecessary time navigating through the Web site or even got lost during the course of navigating. This situation was especially true for non-technical users.

The above research leads to the issue of usability, an attribute that assesses how easy interfaces are to use (Nielsen, 1996). The implication is that before engaging students in Web-reading, there is a need for Web designers to improve ease-of-use during the design process and for teachers to observe and monitor how well students comprehend online texts (McNabb, 2006). To ensure user-friendly interfaces, Web designers need to avoid (1) using overly literal search engines that are unable to handle typos, plurals, and other variants of search terms, (2) showing non-scannable texts without subheads, highlighted keywords, and bulleted lists, (3) displaying fixed font size, (4) not changing the color of visited links, and (5) designing pages that look like advertisements with banners and pop-ups (Nielsen, 1996).

Labeling Online Reading Strategies

Compared to the abundant research on L2 paper-reading strategies, there are relatively few empirical studies on online reading strategies. Recent studies have focused on labeling reading strategies used by ESL/EFL learners in an online reading environment, manifested by qualitative investigation (think-aloud) (Elshair, 2002; Konishi, 2003) and quantitative analysis (Anderson, 2003; Huang, Chern, & Lin, 2006, 2009). Elshair (2002) investigated reading strategies used by seven graduate students in reading texts published in online educational Web sites. Data analysis revealed

two sets of strategy use: 19 Web-related strategies, including searching Web sites for related information, changing text appearance, browsing/navigating, and evaluating Web site design; and 19 text-related strategies, including basic reading, text-reader interaction, paraphrasing, and personal identification. Among the Web-based reading strategies, a common strategy used for approaching an online text was “sequential reading” because readers wished to read quickly through the text and to go from the beginning to the end in order to avoid unnecessary navigation. Another commonly used strategy was a “modifying strategy,” which included changing the text’s appearance and changing Web site features. The other common strategy used by average readers, but not by experienced ones, was to search other Web sites for related information. This tendency has been confirmed by previous findings that the most experienced and least experienced users will not surf to find extra information because the former does not need to and the latter does not know how to do it (Aleksander, 2001).

Another qualitative investigation of learners’ online reading strategy use is by Konishi (2003), who looked into the actual Web-based reading behaviors of Japanese learners of English in Australia. The think-aloud and videotaped data revealed three categories: (1) cognitive strategies, including local (bottom-up) and global (top-down) strategies, (2) metacognitive strategies, and (3) navigation strategies.

Anderson (2003) investigated online reading strategies in a foreign language by recruiting 131 EFL college students in Costa Rica and 116 ESL learners from Brigham Young University in the United States. The instrument was the Online Survey of Reading

Strategies (OSORS), which was an adapted version of The Survey of Reading Strategies (SORS) (Mokhtari & Reichard, 2002). The results showed that eight out of the 12 most frequently used strategies were problem-solving strategies, and seven of the 12 least-used strategies were support reading strategies. The most frequently used strategies were: trying to get back on track when losing concentration; rereading the text to increase understanding when it became difficult; and paying closer attention when the online text became difficult.

Huang, Chern, and Lin (2006, 2009) have investigated EFL learners' online reading strategy use via a Web-based reading strategy program, which featured 15 strategy buttons echoing reading strategy patterns found in L2 reading literature. In their studies, the act of clicking on a certain strategy function button online was traced to reflect a reader's particular strategy use. Thirty Applied English majors, divided into a High group and a Low group based on their language proficiency, were asked to read a total of four authentic online texts of two difficulty levels. The results showed that Support strategies made up the overwhelming proportion of strategy use, and Problem-solving strategies were used the least. Additionally, the High group and the Low group differed not only in their use of strategy types, but also in their strategy use sequences, with the High group using strategies more effectively.

This research is thus a follow-up study and uses a qualitative approach to document what some (Coiro, 2003; Huang et. al., 2006, 2009; Leu, Kinzer, Coiro, & Cammack, 2004) have suggested are new types of online reading strategies necessary to learn within this interactive and relatively new digital reading environment.

METHODOLOGY

Prior to the start of this study, a technology-enhanced reading program—*English Reading Online* (<http://cai.iem.sju.edu.tw/josephine/>)¹—was constructed to collect students' reading strategy use (Huang et. al., 2006, 2009). It was based on research findings from (1) component reading skills (Grabe, 1991), (2) language learning strategies (O'Malley & Chamot, 1990; Oxford, 1990) and reading strategies (Mokhtari & Reichard, 2002, 2004; Sheorey & Mokhtari, 2001), and (3) current Web-based reading programs in Taiwan (Chang, Wang, & Huang, 2003; Chen, 2004; Sun, 2003). This online reading program provided 15 strategy tools to facilitate students' reading, and the action of clicking on a certain strategy function button online was traced to reflect a reader's particular strategy use. There were 15 strategy buttons: Global strategy design, which are intentional techniques that readers use to monitor or manage their reading, including setting a purpose for reading, previewing text content, predicting what a specific text is about, etc. (Mokhtari & Reichard, 2004), provided students with previews, keywords, and outlines of the reading texts as well as chances to make predictions. Problem-solving strategy mechanisms, which are localized actions that readers use to work directly with the text (Sheorey & Mokhtari, 2001), included online summary services, reading-rate training, text-to-speech software, and semantic mapping tools. Support strategy functions, which are basic support mechanisms or tools that sustain readers' responsiveness to reading (Mokhtari & Reichard, 2004), were

¹ Visitors may use "guest" as username and password to log in.

provided by online dictionaries, online grammar resources, an online translation mechanism, highlighting tools, and individualized electronic notebooks. Socio-affective strategies, which help readers constantly monitor their own emotional temperature and enable them to seek opportunities to interact with others in the learning process (O'Malley & Chamot, 1990), were displayed by online chatrooms, discussion boards, email services, and music boxes.

To investigate whether text difficulty influenced strategy use, four texts were divided into two sets—one set was approximately at students' suitable level (e.g., an article about the movie *Finding Nemo*, history of Pyramid), and the other was slightly above their level (e.g., travel to the Taj Mahal, and the holiday St. Patrick's Day). Articles were read in the order of difficulty. In determining the difficulty level of texts, every article was analyzed through *Readability*, a software program which contains various formulas to evaluate the text. The decision regarding the range of text difficulty was made by examining textbooks that participants studied in the previous semester. For instance, one of the textbooks used by participants in the previous semester was *ACTIVE Skills for Reading—Book Two*. After checking readability and pilot testing passages, it was therefore decided that the two online texts aimed at the students' level was between Level 6-7 under the topics of movie and history, and the two challenging texts were between Level 9-10 under the topic of travel and holidays.

The four participants in this qualitative study were chosen from 30 sophomore English majors at a university of science and technology in northern Taiwan who had earlier been divided into two groups (one High-proficiency group and one Low-proficiency group)

based on their performance on a sample TOEFL test. The scores of the High-proficiency group and the Low-proficiency ranged from 481 to 409, and 384 to 315 respectively. In Huang et. al.'s (2006, 2009) studies, a general online reading strategy pattern of the 30 participants had been obtained via quantitative approach. To further investigate how English proficiency and computer skills influence students' strategy use in reading easy and difficult texts, this study used a qualitative approach to observe these four participants in close sets. To make a comparison on a fair basis, special attention was given to choosing participants from the High- and the Low-proficiency groups with different English proficiency and computer skills. Two students were selected from the High-proficiency group. One, James², was representative of the higher English proficiency learners whose score on the TOEFL test was one of the highest in the High-proficiency group. The other, Chris³, was representative of learners with fluent computer skills based on the results of computer usage and time on computer-related activities stated in the background questionnaire, as well as from interview data about computer literacy in the semi-structured interview. Likewise, two students were selected from the Low-proficiency group. One, Amber⁴, was chosen for her relatively lower English proficiency, and the other, Tim⁵, was chosen for his comparatively good computer skills. To compare how students read texts of different difficulty levels, Article 1 (*Finding Nemo*) was chosen as the easiest one according to the readability test, whereas

² Pseudo names were used.

³ Pseudo names were used.

⁴ Pseudo names were used.

⁵ Pseudo names were used.

Article 4 (“St. Patrick’s Day”) was selected for its highest difficulty level.

Prior to formal meetings, an orientation was launched to familiarize students with all of the fifteen strategy function buttons within *English Reading Online*. The videotape software (*ViewletCAM*) was activated once the students were ready to start the reading task. Students were instructed to read through the text and were encouraged to freely explore the strategy functions in their process of reading. However, they could still decide whether to use those reading aids or not.

Students’ strategy use data was tracked via a computer tracking system within *English Reading Online* and their navigation path was captured through *ViewletCAM*. The four reading texts were arranged in order of difficulty. In the first and second meetings, student read texts of their own level—an article about the movie of “*Finding Nemo*” and an article about the history of the pyramids. In the third and fourth meetings, students read challenging texts—an article about traveling to the Taj Mahal and an article about the St. Patrick’s holiday. To simulate real classroom settings, all of the reading tasks were completed within two-hour regular class meetings. In addition, after each meeting, the researcher collected the video files of each participant, went over them, found the particular segments that were worthy of further investigation, and arranged semi-structured interview sessions with each student within 3 to 4 days after completing the target lesson. Students coming in pairs were interviewed four times, each of which lasted for ten to fifteen minutes. During each interview session, students were asked general questions

about their perceptions of the on-line reading process and the text difficulty. They were asked specific questions related to the use of icon links and tabs in their navigation history. It was not until the end of the last meeting that students completed the post-task survey to answer questions regarding their evaluation of this reading program, and to fill out a final reflection form to think about their strategy use during the reading task.

Qualitative analyses were conducted on the data gathered through videotape of screens and semi-structured interviews. With regard to videotape of screens, the videotaped data was viewed three times. The first time, the researcher looked for the online reading strategy support devices that were pre-designed in the program, including the clicking of the 15 strategy buttons and the hyperlinks provided in the texts. The second time, the researcher looked for mechanisms that readers employed to facilitate reading comprehension or meaning construction, such as linking outwards to find extra reference links or online resources, including e-referencing tools, dictionaries, and bbs/discussion boards. Finally, while viewing the tape the third time, the researcher examined if readers personalized the interface to make reading more relaxing and customized, such as changing the Web-features, using the tab, highlighting the text, using bold face, adjusting the scrolling range, and using the cursor to follow along the text (Elshair, 2002). Based on the researcher's in-class observation of how students completed the online reading tasks and analyses of the videotaped screens, four cases were chosen due to their representative traits of having diverse language proficiencies and special strategies in accessing online texts. The navigation behaviors of these four participants were transcribed

and coded.

With regard to the analyses of semi-structured interviews, the coding procedure was based on Tesch's (1990) qualitative research. The five phases were (1) transcribing the data, (2) summarizing and filtering the data, (3) segmenting or dividing data into meaningful units, (4) organizing data into categories, and (5) coding or sorting segments into categories.

RESULTS

This section will start with how the representative cases in the High-proficiency group, James and Chris, read both easy and difficult texts online. This will be followed by the Low group cases, Amber and Tim.

Case 1: James—A High-Group Student with Average Computer Skills

James, a 19-year-old sophomore English major, had the highest score for the TOEFL sample test. As for computer skills, he was not a frequent user of the computer, with only one to three hours per week. He used computers mostly for academic purposes, such as word processing, and for finding relevant information for school reports. He preferred paper reading to online reading because online reading caused eye strain with the small size of words and distracting pop-up advertisements. Paper reading gave him a sense of security because he could feel the ownership of the book, on which he could mark down any notes he liked. With virtual books on the Internet,

note-taking was impossible.

The results of videotaping and semi-structured interviews during James' reading of the easy and difficult texts will be described from three dimensions: how James perceived the text in terms of topic and difficulty level, his use of strategy buttons and links, and other navigational behaviors that were captured in *ViewletCam*. First, James thought the easy text ("*Finding Nemo*"), with a topic on the movie, was interesting because he has long been a movie lover. The article was not difficult at all because it contained only a few new words and its sentence structure was not complicated. Before James used any strategy buttons, his first step to understand the text was to gain a general understanding—paying attention to the length of the text, the titles, and the overall theme of the article by scrolling up and down the original article. He read the text quickly for the first time without looking up words in the dictionary. The second time, he read carefully into each detail, looked up unknown words (*secluded*, *cul-de-sac*, *reef*, *Samaritan*, *sewer*, and *triumph*), and made comments on them.

The strategy buttons James used included Keyword, Preview, Highlight, and Notebook. Keyword and Preview were used first to gain a general picture of the text. He expressed that Highlight helped him see the text in chunks, and Notebook helped him review the new words that he had annotated. Both tools helped him understand the text and memorize the content better. Another point worth mentioning is that James thought using his own electronic dictionary was more convenient than using online dictionaries when annotating new words. Overall, James' navigation was static—he stayed primarily in one window (the Highlight window). He didn't click on any of the links provided in the text, nor did he go to other Web pages to find related

information.

Thus, in reading the easy text, James went directly to read the original article in English without using many tools provided in the program—only with the assistance of Keyword, Preview, Highlight, and Notebook. The use of his own electronic dictionary instead of online dictionaries provided in the program indicated his reading habit was not affected by the change of medium: from printed to online texts. Reading on the Internet was seen as a means to an end for James or an activity to help him complete the assignment. He was an able Internet reader, but he did not perceive the Internet as a useful tool for his daily life. He felt content with his own strategies in approaching online texts: using his own dictionary to look up words he did not understand. He may not frequently employ various online resources and tools to help him, but he was certainly capable of doing so.

With regard to the difficult text, “St. Patrick’s Day,” the interview showed that James was quite interested in reading this article because he thought the religious origin of this holiday would bring something new to him. As for the difficulty level of this article, he thought the article was not too difficult and did not have too many new words although it was rated as the most difficult one and posed challenges to most of the other students.

As for the use of strategy function keys, the videotape showed that James used Highlight for a longer time and more often than other strategy buttons. The function of “Highlight” showed titled texts from the original article and was supposed to help students take notes. However, from the interview, it was found that James did not use this

function; instead, he tried to see the article in the outlined format to help him understand how the text was organized. In addition to Highlight, the videotape showed that James also used Preview, Prediction, Highlight, Notebook, Translation, Summary, and Outline. Among these function keys, James expressed in the interview that Preview was helpful to him because he could grab the main idea of the text easily. James did not use the online dictionaries provided by *English Reading Online*. He admitted that he used his pocket dictionary to look up words, just as he did for reading the easy text. As for Translation, he didn't rely on it for the understanding of the whole text; he only used it to double-check what he had comprehended.

With regard to the links provided in the text, the videotape showed that James tried the one with a lyre icon, which was about Irish music traditions. He commented in the interview that from this link, he knew how Irish people struggled to hold on to their heritage and history by passing stories and songs from generation to generation. He said he would like to explore more links, such as the one with a shamrock icon and that of a snake icon. However, most of the links did not show up instantly as there might have been an overload of the server. In addition to the pre-defined strategies designed in *English Reading Online*, other strategies that James used included moving the cursor along the words to, perhaps, assist him in keeping track of what he read and patiently skimming through the original text.

In summary, in reading the most difficult article, James was quite a global reader. He did a lot of scanning and skimming in the very beginning of the reading to gain a general understanding of the

text. He didn't use dictionaries to look up every unfamiliar word, and he increased his guessing when the text became difficult. Hyperlinks might have provided him with more related information; however, the unexpected interruption in transmission of images discouraged him from exploring more links. He preferred to read the article by himself than try ready-made tools online.

Case 2: Chris—A High-Group Student with Good Computer Skills

Chris was a fluent computer user who spent most of his leisure time, about three hours per day, on the Internet. He was an engineering major during his junior college years, from which he had learned computer-related skills. He surfed the Net for the latest news, played online games, talked on BBS, and sent emails. Surprisingly, the interview showed that he preferred reading printed texts to online texts. He thought he could bring printed texts along with him, but online texts could only be accessed via networks. Additionally, in reading online materials, he was easily carried away by a variety of new and fresh activities online, such as hyperlinks, BBS, chatrooms, MSN, and entertainment news. It happened all the time that he wasted much time surfing and playing around rather than reading assigned materials. Chris, despite the fact that his English proficiency was about equal to the average among the High-proficiency group students, was reserved about his English skills. He thought learning English was quite difficult and that he hadn't mastered any reading skills.

Videotaping and semi-structured interviews revealed Chris' view on the text, his use of strategy buttons and links, and other

navigation behaviors. First, the easy text, *Finding Nemo*, was just about the level of the textbook he was studying—that is, not too difficult. Although he hadn't seen the movie before he read this article, he knew it was about a story of a lost clown fish.

The videotape showed that the strategy buttons Chris used included Keyword, Preview, Dictionary, Highlighting, and Question. Among these tools, Keyword and Preview were tried first and were perceived useful in order to gain a general picture of the text. During the interview, he said that Dictionary was the most useful among all the strategies. In addition to vocabulary, his understanding of the overall structure of the text was achieved by his use of the Highlight strategy button, a device to see the text in an outlined format. Chatroom, a forum to discuss with peers, was helpful when he was stuck in understanding the meaning. With regard to the use of links, Chris commented that the hyperlink provided in the story helped him refresh his memory of the movie "*Finding Nemo*" and prepared his background knowledge for reading the text.

Chris also used other devices that were not pre-designed in this program to help him read. The most obvious one was his use of music. Instead of trying the music provided in the Music button, the videotape showed that he went to Mai Kuraki Music Station to listen to his favorite music. By listening to the music, he commented in the interview that he felt much more relaxed in a task-oriented classroom. Another way he tackled the text was to ask questions. For example, when Chris could not understand the meaning of the sentence, "*With a strong desire to return to his father and the encouragement from his new friends in the fish tank, he took an amazing step of faith,*" he

posted his questions on to the BBS station⁶ to ask for a Chinese translation of this sentence, and was glad the response⁷ helped him arrive at the meaning. Another strategy that helped him approach Web-based reading was his use of KKMAN browser. This browser enabled him to switch between Web pages easily.

In summary, Chris' advanced computer experience helped him easily and quickly switch between the tag-pages to find the target he wanted. He also adjusted the interface to certain user preferences, such as his behavior of constantly changing the song from the music list and the usage of the KKMAN browser. The strategy buttons of Keyword, Preview, Highlighting, links to a trailer, along with BBS dictionaries, asynchronous communication with people on the BBS station, and his favorite music Web site assisted him in the process of reading. His unique Web navigating behaviors, such as getting involved in BBS talk and using additional browsers, will be further discussed later.

With regard to the difficult text, "St. Patrick's Day," Chris thought this article was the most difficult among all. After glancing at the article, he found there were a lot of new words he didn't know. He was not familiar with the topic, either. The first paragraph was quite clear to him—he knew that this holiday had a religious origin. He also

⁶ This bbs station (bbs://ppt.cc) was founded by National Taiwan University and contains many discussion threads, such as News, Language Learning, Politics, etc.

⁷ Shortly after Chris posted his message, he got a response translating his posted message, "Wèi le huí dào fù qīn shēn biān, zài yú gāng lǐ xīn péng yǒu de zhī chí xià, tā jué dìng kuà chū yí bù zài chū fa" (Romanization of Chinese, "為了回到父親身邊, 在魚缸裏新朋友的支援下, 他決定跨出一步再出發。")

perceived that the Irish people with a lower social status in the American society tried to make themselves visible by celebrating this religious holiday. However, the next few paragraphs were difficult to him. When the text became difficult, he used the Translation service. He read the Chinese translation first and went back to the original text to check if the translated text made sense.

In addition to Translation, other strategy buttons Chris used included Preview, Highlight, and Dictionary. Chris clicked on Preview first and read through the introduction of the text to understand the main idea of the text. As for Dictionary and Highlight, Chris commented that the use of these strategy buttons gave him the chance to note down new words, helping him better memorize the content and write his recall. This was also the reason why most of his recall was from the first two paragraphs. He also commented that the hyperlink of the snake gave him the background of how Irish people were converted to Christianity. Although the content of the link was not directly related to the article, he was happy to read new information about the religious root of this holiday.

Overall, Chris' knowledge of this article came from the time when he was switching between the "Highlight" text and the *Yahoo! dictionary* service for Chinese meanings of the unknown words. He also read the original article, but it was obvious that he got a deeper understanding of the article after he started searching for the meanings using the dictionary.

Case 3: Amber—A Low-Group Student with Average Computer Skills

Amber was at the bottom three of the TOEFL sample test in the Low-proficiency group. Her average recall score was the lowest

among all. She was reserved about her English reading skills, and her motivation for learning English was about average. As for her computer skills, she was an average user of computers, and she spent more than three hours a week surfing online, mostly reading emails from friends or chatting on MSN. As for paper and online reading, she thought the major difference was that online reading contained more information than paper-based reading. In doing online research about interesting topics, she thought electronic references allowed her to conduct research more easily, and in new and different ways from traditional research. However, she does not spend as much time reading online texts as she does for novels. She felt she would easily suffer from eye strain if she stared at the screen for a long time. Below are the results of how Amber read the easy and difficult texts captured by videotaping and interview.

With regard to the easy text, Amber, a lover of movies, was happy to know that “*Finding Nemo*” was the assigned reading task. She was very familiar with this topic because she had seen this movie before and she had also written a report about it for another class assignment last semester. Her confidence in her own understanding of the text “*Finding Nemo*” shortened the time of her actual reading. The background knowledge that she obtained from the movie, “*Finding Nemo*,” helped her finish the recall.

The videotape showed that Amber’s use of strategy buttons was limited to Dictionary and Keyword. The use of *Yahoo! Kimo* dictionary played an important role in her understanding of the text. She commented that she felt safer when she first looked up the words she didn’t understand before she went on to read articles. Keyword

was only used mostly towards the end of her reading. She commented in her interview that she needed more help from the Keyword strategy button. It would be better if the program could pre-annotate more new words onto the side of the text. In this way, when she moved the cursor along the text, she could see all the words with their Chinese equivalents. Additionally, Amber didn't click any of the hyperlinks provided in the text, nor did she search more Web sites to find related information. She thought she had enough background knowledge to help her complete the reading task.

In conclusion, Amber's understanding of the text came from her experience and memory of the movie itself. This could be seen from her recall even before she had finished reading the article. Other than that, vocabulary knowledge was the major concern for Amber in decoding the text.

With regard to the difficult text, "St. Patrick's Day," Amber commented in the interview that this article was more difficult than she could imagine. She thought the vocabulary used in this text and the cultural background of this topic were beyond her level. From the videotape, it was found that Amber tried several tools and switched between strategy buttons, Windows Messenger chat-sessions, and the original text. Her use of strategy buttons included Music, Dictionary, Summary, Translation, Keyword, Preview, and Chatroom. Amber commented in the interview that Music helped relieve tension, especially when she was carrying out a challenging task. The next tool she used was *Yahoo! Kimo Dictionary*, which, according to Amber, helped her move a step forward towards understanding the text. She also reported that Summary helped her see a shortened version of the text, and the use of Preview and Keyword toward the

end of her reading process helped her grab the main idea of the text. However, she was not confident of her interpretation of the text, even in reading a short summarized text or text preview; therefore, she resorted to Translation, mostly translating what she saw from the Summary and Preview into Chinese.

Amber's use of Chatroom and Music was helpful in the reading process. After trying all the possible tools, such as Keyword, Translation, Summary and Dictionary, she still couldn't arrive at the meaning. She then went to Chatroom, installed Chinese typing software⁸ to help her type faster, stayed lurking, and observed what had been discussed. After reading the chatroom logs indicating the whole article was related to a religious holiday⁹, she felt much more relieved and went on to read the article again. Listening to foreign songs provided by the Music button had the same effect of removing affective filters in reading; that is, music gave her a sense of relaxation in reading and eased her tension.

In summary, Amber tried several tools during her attempt to accomplish this assignment. The function of Chatroom and Music, though not directly related to her understanding of the text, was especially important to her in the affective domain. Finding a place online where people gathered together and participated in informative discussions gave Amber a sense of security. From the videotaping and interviews, it was found that her reading strategies were mostly dependent on Translation; that is, she translated what she got from

⁸ Wúxiāmǐ, Romanization of Chinese, 無蝦米.

⁹ The videotape showed that the messages were "The topic of the text was St. Patrick's Day" from Mandy, "The Day was related to religion" from Lu Lu, "I'm waiting for your answer" from 999, etc.

Preview and Summary into Chinese. Her constant referring back and forth between Chinese and English, while providing her some convenience, deprived her of the enjoyment of reading the text itself.

Case 4: Tim—A Low-Group Student with Good Computer Skills

Tim was a professional computer user due to his part-time work as an engineer and his background as an electronic communications major. He was comfortable with Web site navigation, and his use of the Web encompassed a wide variety of activities, such as playing online games, hosting a discussion board, watching online news programs, and exchanging emails. He spent three hours a day on the Internet, most of which was devoted to leisure activities, such as reading news or listening to songs. Although he belonged to the Low-proficiency group due to his lowest score on the TOEFL sample test, he was quite confident about his English reading skills and he enjoyed learning English. The following describes how Tim read the easy and difficult texts gathered from videotape and semi-structured interviews.

In reading the easy text, “*Finding Nemo*,” the videotape showed that Tim first got his desktop ready by opening a tag-page in the KKMANN browser¹⁰ to <http://www.google.com.tw/>. He then tried

¹⁰ “Tag-page” is a feature in many recent browsers: it serves like an additional browser window in a traditional browser like Internet Explorer version 6.

Google to spot a good number of Web pages about “*Finding Nemo*.”¹¹ Tim commented that using his favorite browser KKMANN made his online reading experience pleasant. In addition, the Web sites he searched prepared him for the reading of the text.

The videotape showed that the strategy buttons Tim used were Highlight followed by Keyword. During the interview, Tim expressed that Highlight helped him see the hyperlinked outline of the text, whereas Keyword helped him to know important words before reading. In addition to the use of strategy buttons provided in the program, Tim glanced at the photos gathered from the link at the bottom of the page. He found pictures helped him link what he already knew to the new article.

During the interview, Tim expressed his preference for using Google as a search engine as it could easily find the exact target. Google displayed the results in the order of relevance and the number of visitors to those sites. Another comment he made was regarding program design. Tim noticed that the interface was not very friendly. The popup window that was originally designed to count the number of strategies that students used was annoying to him. Also, the uploading of files was a problem, which might have been due to server overload.

In summary, Tim was an adept computer user whose reading strategies were deeply influenced by his computer skills. Instead of

¹¹ These Web pages included English Web sites (“*Pixar—Finding Nemo*” <http://www.pixar.com/featurefilms/nemo/> and “*Finding Nemo* 2003” <http://www.imdb.com/title/tt0266543/>) as well as Chinese Web sites (“*Hǎi Dǐ Zǒng Dòng Yuán*” 海底總動員 *Finding Nemo* http://big5.xinhuanet.com/gate/big5/news.xinhuanet.com/ent/2003-06-03/content_901363.htm and “【*Hǎi Dǐ Zǒng Dòng Yuán*】〈*Finding Nemo*〉<2003>” (http://disney.jbug.net/mvdata/data/Finding_Nemo.htm).

reading the given article, he resorted to searching for additional information first. In his search habit, he quickly moved back and forth between the online articles. He was quite confident that the search engine, Google, could find the most relevant article. Among all of the Web pages he searched, he read more Chinese pages than English ones. The additional information gained from linking outwards to related Web sites gave him necessary background knowledge and sustained his interest in reading. However, his overuse of his computer knowledge in searching back and forth diverted his attention from reading the article itself. During the short time he actually devoted himself to reading the article, his use of strategy buttons was limited to Highlight and Keywords. The former helped him annotate the text, whereas the latter gave him necessary vocabulary before reading the text. He expressed his willingness to try more tools in his next assignment.

After reading the difficult text, "St. Patrick's Day," Tim commented that he was overwhelmed by the length of the text and the large number of unknown words. Due to his lack of understanding of the religious background of this holiday, Tim felt insecure if he could read this article all alone without additional help. It could be interpreted that Tim was feeling scared because he lacked the necessary schemata to understand the article. Therefore, he began to search for additional information to build up his schemata, such as links to a Chinese site about the origin of this holiday (<http://www.epochtimes.com/b5/4/3/18/n487444.htm>), and an English site (<http://www.ep66.idv.tw/patrick.htm/>) on the history of St. Patrick's Day shown in the videotaped data. These two links were reported by Tim in the interview as the most useful in helping him

understand the text as the former provided religious background of this holiday in L1 and the later gave useful religion-related keywords.

For example, Tim commented that his understanding of what shamrocks symbolize on “St. Patrick’s Day” was not from the link that was originally listed in the text, but from the external links that he searched himself. Although most of the Web sites that Tim searched were written in Chinese, he indicated that these Web sites were very helpful in preparing him to understand the text. In addition to building up schemata, the act of reading additional information gave Tim a chance to confirm if what was stated in the text was true. This could be shown from his act of switching back and forth between the original text and the articles he found from Google search. It appeared that he was trying to determine if there were some related concepts between them. His use of search engines to find related information about the given text will be discussed later.

During the course of reading, Tim’s Web-browsing speed was quite fast. He quickly went through the links that he chose, went back to the articles when finding the article was still difficult for him, and then went on to read other articles¹². For his Web behavior, he could do many things simultaneously, switching between tag pages. He was restless and ambitious to digest the information he wanted. Another

¹² The video showed Tim’s quick navigating behavior in which he quickly browsed through (<http://www.epochtimes.com/b5/4/3/18/n487444.htm>) and then switched to the third Web site that he opened through the Google search result (<http://big5.china.com.cn/chinese/zhuanti/174031.htm>). He briefly read through the Web page and returned to the Google search result. He clicked the link <http://www.ep66.idv.tw/patrick.htm> (titled “St. Patrick’s Day”). While the Web site was loading, he closed the Keyword section and returned to the BBS site (scumotor.com.tw), and then stayed at the BBS site for about 3 minutes.

Web behavior was that his initial set-up of his reading environment¹³ made his reading more pleasant and personalized.

In summary, Tim, with the best computer skills in the Low-proficiency group, did not bother to read the original article at all during his work on the most difficult article. He got the original article translated into Chinese, but he did not really spend time trying to understand the original article with the assistance of the Chinese translation. The general direction on how Tim dealt with assignment was that he looked into the translation of the original article, searched for Chinese sites that could assist him, and then clicked on various sites looking, perhaps, for something fun. In other words, most of the student's time was spent on looking for something fun and having fun, and the time he spent on understanding the original article was relatively very little. However, if Tim could combine his zest for efficiently locating information he wanted with his efforts in reading, one could expect that his computer skills would be an asset in assisting his understanding of the original text.

Other Online Strategies Emerging from the Four Cases

The four chosen participants' navigation behaviors found in videotaping and interview data were transcribed and coded. Four types of strategies were generated: Navigating strategies, Information-gathering strategies, Interface-changing strategies, and Usability problem-reporting strategies.

Navigating strategy. Navigating strategies refer to those that

¹³ Tim started with using the KMAN browser that had the BBS site (scumotor.com.tw). He next opened the MSN Messenger (version 6.2) and then turned off the customer survey located at the top of the MSN Messenger window.

readers used when they navigated through the text. This category was subdivided into two parts: Random-navigating strategy and Targeted-navigating strategy. Random-navigating strategies included using the back button, moving between Web pages, connecting pictures with the text, adjusting the scrolling range, and switching between windows. When using this type of strategy, the only aim that readers had in mind was to navigate through the text, retrieve what they read, and return back to the original content. For example, Chris switched between different tag-pages of the KKMANN browser and also switched between different windows of the Internet Explorer browser. What he did was only to get back to the content he was reading—a natural response in online reading.

Targeted-navigating strategy is the act of navigating with a targeted entity in mind, including moving the cursor along the words, selecting unknown words, and highlighting certain sections of the text. For example, James moved his cursor along the words and very often selected the words as, perhaps, an assistance to read better. Tim highlighted some of the words to help him concentrate on reading.

Information-gathering strategy. Different from Navigating strategy, which is simply to navigate through the text, Information-gathering strategies are used when readers aim to search for related information. The major difference between Navigating strategies and Information-gathering strategies is that the former consists of behaviors that readers employ to move successfully between pages in reading, while, the latter describes the actions that readers use to build up their background knowledge by searching for additional information. To fulfill the reading task at the end of the

Web-surfing, students needed to build up their schemata. They needed to consult extra information to prepare themselves for the reading text. This additional information was in the form of pictures, videos, and extra links. Strategies in this category included using specific keywords and linking outside the current Web site to access information in another Web site. For example, Tim linked to many Chinese Web sites to browse through related information about St. Patrick's Day to get necessary background knowledge. This type of goal-oriented strategy was particularly helpful in guiding students to find knowledge on the Internet.

Interface-changing strategy. Personalizing strategies were those techniques that readers used to tailor-make their reading environment according to personal preference. These strategies included changing the screen saver, changing the background of the screen, loading software that they were familiar with, using the browser that they were accustomed to, changing the font of the text, and changing the color of the words. For example, Tim changed his primary browser to the KKMAN browser, which had a tag-page feature. Chris made <http://tw.yahoo.com/> as the default page of the Internet Explorer browser. Tim also turned off the MSN Messenger survey immediately to avoid disruption. Amber even took the time to download and install the Wúxiāmǐ (Chinese typing) to make her Chinese typing easier. In general, students wanted to personalize the delivery and presentation of the content to make their online reading more comfortable.

Usability problem-reporting strategy. Usability problem-reporting strategy refers to reporting on the Web site effectiveness and problems while surfing the Web site to complete a particular task (Elshair,

2002). This includes complaints about (1) links, (2) advertisements, (3) user-friendliness of the program, and (4) font size. This type of strategy provided readers a means to express their complaints about ill-designed Web sites. When readers can evaluate sites in terms of text design and functions, they will have a better chance to adapt themselves to an online reading environment. For example, students expressed their dissatisfaction with being interrupted when clicking hyperlinks, their distrust of online technology, and their strong feelings about being disturbed by pop-up advertisements. Students were intimidated by the vast links online. Below are two interview excerpts translated from Chinese in gist. For example,

I don't like to be interrupted during the process of reading, and thus I don't really like links all over the place in an article. Links really make me anxious because I know I have to click them for more information, yet I hate to be interrupted. Although it's possible to click the links afterwards, I might have lost interest in the links by the time I am done reading the article at hand. In brief, I don't like articles filled with links. (James, interviewed on November 23, 2004)

I liked printed materials more than texts displayed on screen. The primary reason is that I can draw, highlight, underline, and do whatever I want on printed materials, but I cannot do any of these with online materials. I also find myself distrusting technology even though I spend a lot of time with computers. Although there were tools for me to use, I didn't really trust them, and maybe this is what software engineers could work on in the future: to improve the sense of trust humans have toward machines. And this is also what, I believe, English-teaching software must accomplish. (Chris, interviewed on December 1, 2004)

When I saw the small words on the computer, I felt dizzy. (Amber, interviewed on December 7, 2004)

Table 1 shows the results of the four participants' use of strategies. It was found that Navigating strategies were used by all four participants. Information-gathering strategies and Interface-changing strategies were used mostly by Chris and Tim, which was representative of High- and Low-proficiency groups with good computer skills. As for Usability problem-reporting strategies, participants used them in varying degrees.

DISCUSSION AND CONCLUSION

Aside from the four pre-defined strategy types (Global, Problem-solving, Support, and Socio-affective) (Huang et al., 2006, 2009), qualitative investigation into these four chosen participants yielded four additional strategy types, including Navigating strategies, Information-gathering strategies, Interface-changing strategies, and Usability problem-reporting strategies. These strategies were unique assets in assisting readers to approach online texts.

For example, Navigating strategies helped readers navigate online texts smoothly by moving between pages one after another, connecting pictures with the text, adjusting the scrolling range, switching between windows, and moving the cursor along the words. These strategies helped readers successfully access online texts where chunks of information were linked multi-sequentially (Konishi, 2003; McNabb, 2006).

Table 1
Results of Other Strategy Usage by Four Participants

Category	Strategy	James	Chris	Amber	Tim
Navigating strategy	Using back button	*	*	*	*
	Moving between Web pages one after another	*	*	*	*
	Adjusting scrolling range	*	*	*	*
	Switching between windows	*	*	*	*
	Moving the cursor along the word	*	*	*	*
	Selecting unknown words	*	*	*	*
	Highlighting certain sections	*	*	*	*
Information-gathering strategy	Using specific keyword		*		*
	Searching Web sites for related information		*		*
Interface-changing strategy	Changing the screen saver				*
	Changing the background of the screen		*	*	*
	Loading familiar software		*		*
	Using favorite browser		*		*
	Changing the font of the text		*	*	*
	Changing the color of the words		*	*	*
Usability problem-reporting strategy	Complaining about the link	*	*		*
	Complaining about advertisement problems	*		*	
	Addressing user-friendliness of the program	*	*	*	*
	Reporting the small size of words			*	

Note. * = Use of strategy in this category

Information-gathering strategies allowed readers to critically evaluate information on a Web page, monitor their pathways, and reduce the chance of becoming disoriented amid irrelevant information (Coiro, 2005; Shetzer & Warschauer, 2000). With the tactics of using special keywords to search Web sites, readers had a better chance of finding the information they wanted and engaging themselves in the Internet text with a deeper understanding. One interesting phenomenon was that these types of strategies were mostly adopted by more experienced computer users because their prior knowledge of hypertext structures helped them know the way around while reading online texts (Aleksander, 2001).

Interface-changing strategies, on the other hand, assisted readers in building up a pleasant reading environment according to their own preference. By loading the software they were familiar with and using the browser they were accustomed to, readers made their online reading experience more comfortable and in turn increased their motivation for reading (Guthrie & Wigfield, 2000; O'Malley & Chamot, 1990; Oxford, 1990).

Usability problem-reporting strategies provided readers a means to state their complaints about ill-designed Web sites and to express their need for a more user-friendly Web design. The occurrence of Usability problem-reporting strategies also confirmed previous usability research that usability problems, such as non-adjustable font sizes, flashy pop-up advertisements, disorganized links, and overly literal search engines can affect reading performance (Nielsen, 1994, 1997; Nielsen & Morkes, 1997). These strategies have reminded Web designers to improve ease-of-use during the design process (Elshair, 2002). Aside from the unique contribution to

Web navigation, the use of the above four additional strategies were influenced more by the students' computer skills and background knowledge than by proficiency levels.

In addition to discovering major online reading strategy patterns, this study also reveals essential factors influencing strategy use, including language proficiency and computer skill.

Language Proficiency

Language proficiency accounted for differences in strategy use. First, strategy types varied with language proficiency, with the High-proficiency group tending to use Global strategies, whereas the Low-proficiency group resorted to Socio-affective strategies. James and Chris, both from the High-proficiency group, used comparatively more Global strategies than Amber and Tim, both from the Low-proficiency group. On the other hand, the use of Socio-affective strategies like Chatroom and Music Box was more important to the Low-proficiency group than to the High-proficiency group. For example, the use of Chatroom was found among the Low group students. However, the act of logging onto chatrooms was virtually absent for James, a student from the High group. James, with his own confidence in language, read the texts directly without discussing with peers. Amber and Tim, on the other hand, relied heavily on Chatroom in the process of reading. To Amber, her major confidence and interest in continuing to read the text were gained from her discussion with classmates. Likewise, the strategy of listening to music was used by Amber and Tim, but was not utilized by James. It seems that music released the tension in these two low EFL proficiency learners. In

conclusion, the Chatroom's capabilities in bringing global peers together in brainstorming ideas and in creating a socially supportive environment (Chun, 1994; Warschauer, 1996), and the healing power of music to relieve tension (Oxford, 1990) seemed to be most appreciated by low achievers. High achievers, on the other hand, would rather adopt careful mental planning and monitoring of their reading than interact with others.

Second, sequences of strategy use differed with language proficiency, with the High group using strategies more effectively than the Low group. Unlike students from the High-proficiency group (James and Chris), who tried Global strategies (Preview and Keyword) in the very beginning of reading to help them get an overview of the study, students from the Low-proficiency group (Amber and Tim) used Global strategies almost until the end of the task. Amber and Tim regarded looking up new words as the first step towards understanding the text. Different from the High-proficiency group, who used Global strategies effectively, it appears that the Low-proficiency group fail to read globally first to gain the main idea of the text. This discovery about different time sequences used by the High and Low-proficiency groups is interesting because previous studies mostly focused on the frequencies and scarcely touched upon the sequence of strategy use. As Anderson (1991) points out, good readers differentiate from poor readers not only in terms of the amount of strategies and the quality of strategies, but also in their ability to choose strategies at the right time under the right situations.

Third, purposes for using Support strategies differed with language proficiency, with the High-proficiency group using strategies more appropriately. For example, James, a High-proficiency

group student, used the translation software purely for reference and to double-check his understanding, and he used it only when the text became difficult. Even when he used it, he did not entirely rely upon it. Instead, he read by himself and used Translator only to make a parallel comparison of his understanding of the text and the translated text. However, for students in the Low-proficiency group, such as Amber and Tim, the act of directly copying-and-pasting results from the translator without carefully thinking about the appropriateness of the translated content prevented them from understanding the text. It was found that Amber and Tim kept using the translator even when they thought the text was not difficult. The reason behind their actions may be due to their need for quick understanding of the text. Translators provided such convenience. It seems that the High-proficiency group used Translation not just for meaning but for learning, whereas the Low-proficiency group used Translation at the expense of building automaticity in going directly from form to meaning in the L2 (Hubbard, 2000).

In addition, the High and Low-proficiency groups also differed in the way they checked dictionaries. For example, more proficient students like James and Chris read the text the first time by themselves without looking up words in the dictionaries. They tried to independently process as much text as possible. However, Low group students tended to use dictionaries once they encountered reading problems. They preferred to look up every unfamiliar word rather than infer meaning from the context. It seems that higher level students pay more attention to the actual reading activity and explore the text itself (Chun, 2001). Even in using multimedia aids, such as

annotation, more proficient readers appear to use these aids more appropriately than less proficient ones (Dillon & Gabbard, 1998). Lower level students who have the habit of consulting dictionaries to cope with reading difficulties may find hypertext glossaries an even stronger temptation (Hubbard, 2000).

Computer Skills

Among the four types of additional strategies (Navigating strategies, Information-gathering strategies, Interface-changing strategies, and Usability problem-reporting strategies), it was found that students with better computer skills used comparatively more strategies than those who exhibited average computers skills. In addition, students with better computer skills also used these strategies more effectively to assist in their comprehension, which could be reflected in their use of Interface-changing strategies, Information-gathering strategies, multimedia features of online texts, and prior experience with Internet reading.

With regard to Interface-changing strategies, the common feature shared between students with good computer skills like Chris and Tim was that they were fastidious about the user interface. Both Chris and Tim liked to change their browser to KKMANT, play their favorite music, and change the colors of the font. Although these strategies did not directly contribute to reading comprehension, students who were advanced and frequent computer users were strongly affected by these features when they read online (Elshair, 2002). These personalized strategies, which tailor-made their reading environment according to their preference, have made online reading more

comfortable. When the online reading environment becomes pleasant, learning effects will be increased (Bulter-Pascoe & Wiburg, 2003).

Regarding Information-gathering strategies, students with better computer skills had good chances to find information to build up their background knowledge. For example, Chris and Tim used precise keywords to search for information, decided on the spot whether the information suited their need, and quickly switched back and forth between Web pages to expand their knowledge about the given topics (articles about the movie “*Finding Nemo*” and the national holiday St. Patrick’s Day). This shows that online reading requires a different set of strategies from printed reading (Coiro & Dobler, 2007; Coiro, Karchmer, & Walpole, 2006; Shetzer & Warschauer, 2000), and computer skills are a factor determining successful online navigation. In online texts where information is presented non-linearly, computer skills and Web navigation tactics enable readers like Tim and Chris to scaffold their learning and increase their language learning repertoires by using search engines effectively, finding the desired information by scanning and skimming, and, finally, making critical decisions as to whether to stay on a given Web page or to go back to the search engine to start another new search. Moreover, the act of searching for related information was especially beneficial for Tim, a student with limited language proficiency. He expanded his knowledge about a given topic, St. Patrick’s Day, by searching for additional information and thus built up his reading confidence. It appears that Tim’s greater background knowledge, gained from searching for additional information compensated for his lack of syntactic control over the language.

Information-gathering strategies facilitated online reading not only because these strategies helped readers search for related information by using precise keywords and critically evaluating information, but also because these strategies increased readers' social interaction with global peers to have their problems solved. For example, when Chris had trouble interpreting the meaning of a sentence, he posted his questions and received a satisfying response from online users that could help him arrive at the meaning. In an era when the Internet and other ICTs are quickly becoming the central technology for a global community, those who are well-prepared for synchronous and asynchronous communication have a better chance to empower themselves to find solutions to their problems (Leu et al., 2004).

Besides using Information searching strategies to search for related information and to interact with peers, Chris and Tim, with advanced computer skills and years of experience in online reading, also took advantage of multimedia features such as animation and pictures to boost their comprehension and increase their motivation for reading. For example, Chris's knowledge about the religious roots of St. Patrick's Day stemmed from the picture of a snake symbolizing the pagan tradition. Tim's knowledge about "*Finding Nemo*" was refreshed by a short movie clip on the *Pixar* Web site. It seems that sounds and graphics that further explain or elaborate on the meaning of the text support students' reading development (Mayer, 1997). The visual and verbal presentation of the materials through multimedia goes hand in hand to produce meaningful learning.

In addition to the use of precise keywords in finding needed information, prior experience with Internet reading determined the success of Chris' and Tim's Internet search. Their knowledge about

how to define a keyword, as well as their knowledge about navigating the Internet, contributed to their accurate path for reading. Chris knew very well from his previous experiences on BBS talk where to post his questions to get helpful answers. Tim knew how to select among various links generated by the Google search based on his prior knowledge of a good tourist Web site that he had visited before. Both students' prior knowledge of how to use search engines efficiently, how to use a precise keyword, and how to select the links all contributed to their successful search. These results suggest that computer skills are a factor in determining students' successful online reading performance.

In conclusion, computer skills influence strategy use because they can make the reading environment more personalized and therefore increase students' motivation for reading. Computer skills also facilitate the building of background knowledge by helping students search for related information, resolve their reading problems through interacting with global peers, and improve their reading comprehension by utilizing multimedia features. An analysis of Tim's adeptness in manipulating information to search outwards for relevant information and Chris' endeavors to seek help from his global peers suggests that the interactivity of the digital text—typical in such activities as hyper linking, quick referencing, and synchronous and asynchronous communication—substantially empowers readers to find solutions to their problems (Coiro & Dobler, 2007; McNabb, 2006; Sutherland-Smith, 2002). These two case studies demonstrate that in Internet reading, students with good computer skills have better chances to make good use of communication tools to enrich

their understanding of the text.

This study provides empirical evidence of how EFL learners approached online reading and how language proficiency, computer skills, and background knowledge influenced their strategy use. However, there are still some limitations of this study. First, participants were drawn from the same school, thus findings can only be applied to similar groups. Second, students should be given more time in completing each reading task to see if they could use more or fewer strategies in reading online texts. In an era where meaning is typically presented in multiple media forms, the findings of this study can enrich our understanding of how students approach online texts.

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網路閱讀之個案研究

摘要

本文探討四位以英語為外語學習者網路閱讀策略之使用。這四位具有不同語言程度及電腦技巧的學生，必須完成網路閱讀任務，其閱讀過程由螢幕追蹤軟體錄下，並接受事後訪談。質性探討所衍生出的策略有瀏覽策略、資訊收集策略、介面改變策略，以及使用問題報告策略。這些策略可以幫助學生順暢瀏覽網站，運用新知增加背景知識，建立個人化閱讀環境，及提供更友善的網路設計。結果亦顯示有較佳的電腦技巧的同學，會使用較多策略。而且，他們會將閱讀環境個人化，以增強閱讀動機，並且會運用多媒體的特點來增進閱讀理解。特別對低成就的同學而言，有了較好的電腦技巧，可以透過向外搜尋資訊及與同儕溝通，來增加背景知識及語言學習知能。

關鍵詞：網路閱讀 第二外語閱讀 閱讀策略