Hypertext Literacy: Reading Strategies and Comprehension on the Internet

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Abstract

This paper describes how hypertext has changed how we read and how it has influenced the learning of reading. Based on a comparison between the main features of hypertext and those of printed text, I discuss the strategies that can be applied by hypertext readers to interact with the text and navigate through the complex network of hyperlinks. I also comment on the challenges of hypertext reading and offer some teaching implications in order to support novice hypertext readers.

Introduction

As new technologies emerge, computers have become indispensable tools in our daily life. People search for information and communicate with other people on the Internet. Computers are also used at school and incorporated into the curriculum. In ESL/EFL classes, computers serve as tools for language learners. Since many students read and write texts online for pleasure or as part of their personal lives, activities which are integrated with the Internet or computer software might enhance students' motivation and/or development of their literacy skills (McNabb, 2006, p. 76).

Because of the advent of computer technology, the definition of literacy has changed (Atchison, 2004; Brandl, 2002; Coiro, 2003; Kasper, 2003; McNabb, 2006; Schmar-Dobler, 2003). In addition to the traditional notions of reading, people are now required to comprehend and interact with texts and hypertexts on the Internet. Hypertext is electronic text which is connected with multiple references. While students may be able to search for and gather a lot of information using the World Wide Web, if they do not apply the appropriate reading strategies, they will get "lost in a sea of information" (Kasper, 2003), and become frustrated or give up before they accomplish their tasks (Scott & O'Sullivan, 2005). In order to help novice hypertext readers, teachers need to provide them enough scaffolding and clear explanations of how to read hypertext using appropriate reading strategies and navigate themselves through numerous web pages, hypertexts, and hyperlinks to obtain reliable and useful information. In this paper, I will focus on the features of hypertext as compared with printed text, the advantages and disadvantages of hypertext, reading strategies and comprehension of hypertext and printed text, and pedagogical implications of using hypertext as teaching material. Specifically, I would like to address the following questions:

1. What are the main features of printed text and hypertext?
2. What are the advantages and disadvantages of hypertext?
3. What kinds of reading strategies do students use when they read printed text and hypertext? What aspects of hypertext support the learners' reading comprehension?
4. What kinds of difficulties do students have when they read hypertext? What are learners' attitudes towards printed text and hypertext? What type of text do learners prefer to read, printed text or hypertext?
5. What are the pedagogical implications of using both printed text and hypertext in the classroom?

Features of Printed Texts

Printed reading materials, such as books, newspapers, dictionaries, journals, magazines, and brochures are still indispensable for our lives. Even when the articles from newspapers and journals are posted on the Internet, where they can be downloaded and copied, they are still regarded as printed texts. With English printed texts, people usually start to read from the top left corner

of a page to the bottom right corner (Tseng, 2008a & 2008b). Some people dog ear pages, mark important terms or ideas, or write comments in the margins in order to locate and review information in subsequent readings (McEneaney, 2000, p. 14). Although people use different reading strategies to comprehend books, the text in the book is exactly the same for all readers. Printed text authors carefully construct the meaning of text by thinking of their audience and purpose (McNabb, 2005, p. 114) and revising extensively. McNabb (1997) described printed text authors and readers in the following way:

> Print-based writers are taught to provide readers with a coherent line of reasoning embodied in grammatical sentence structures and paragraphs connected by explicit transitional expressions. Print-based readers are taught to look for the author's thesis or main idea and to comprehend supporting points connected to the thesis in a coherently flowing narrative (p. 49).

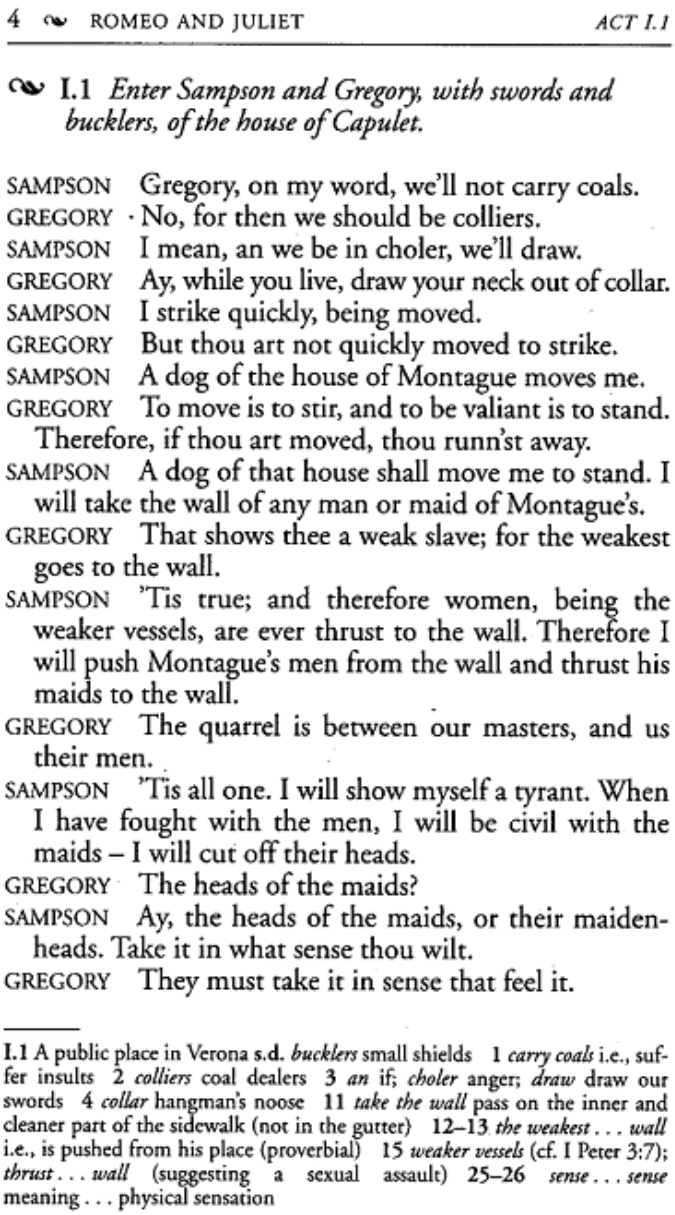
Accordingly, with printed texts, people read in linear fashion, and interaction usually takes place between authors and readers through texts, or between readers and texts. However, reading hypertext is a different matter.

Features of Hypertext

As mentioned above, hypertext is electronic text embedded with links that can take the reader to multiple references. A hypertext "consists of a network, or web, or multiply connected text segment" (Johnson-Eilola, 1994, as cited in McNabb, 1997, p. 51). A typical example of hypertext would be the web pages on the Internet. Like printed text, hypertext includes features such as highlighting or underlining. However, hypertext is much richer. Underlined words and phrases may not just be important but are also links to other websites and additional information. Icons, animated symbols, photographs, cartoons, advertisements, and even audio and video clips can be accessed immediately by readers (Coiro, 2003). On the screen texts, including hypertexts, links, and audio visual effects are available simultaneously and are connected with other texts and web pages. McNabb (1997) noted the features of hypertext from the author's perspective: "The hypertext author may create a variety of hyperlinks representing a multitude of rhetorical strategies involving key words, their synonyms, antonyms, analogies, comparisons, contrasts, associations, etc." (p. 51). Accordingly, unlike the author of printed text, hypertext authors provide their audience a lot of choices in terms of how they read and think about what they read. Kasper (2003) described hypertext readers, unlike printed text readers, as actively engaged with the texts, navigating themselves and choosing a path which is most relevant to their needs and interests. In brief, "with online reading, the reader's purpose and choices, rather than the author's, determine the reading sequence" (McNabb, 2006, p. 76). When people read hypertext, they usually read in non-linear or multi-linear fashion. Their eyes move in a circular motion, and there is no specific starting point and goal for readers as there is with a printed page (Tseng, 2008a & 2008b). Konishi (2003) also described this feature using the word "openendedness" (p. 98). Thus, each reader creates a different narrative.

The following is an example of the contrast between printed text and hypertext. These are two versions of the beginning of Act One of *Romeo and Juliet* written by William Shakespeare, one on paper, and one online (Figure 1 and Figure 2).

Figure 1. Sample of printed text (Shakespeare, *Romeo and Juliet*, the beginning of act 1, scene 1)



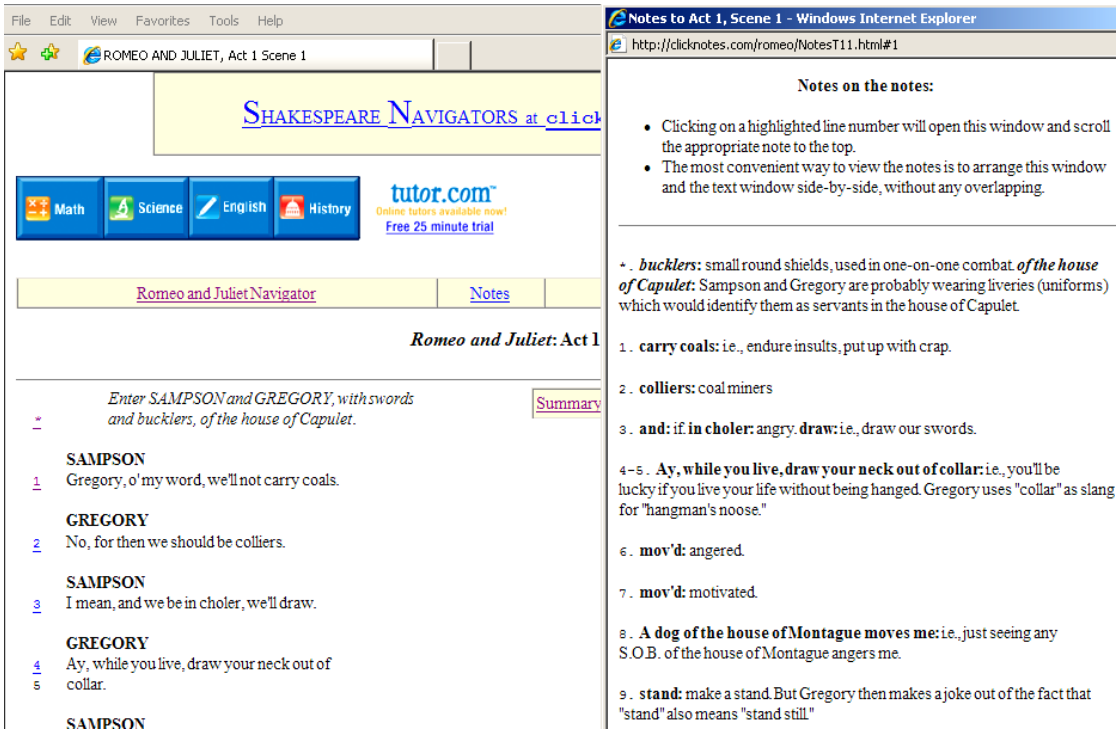
4 ROMEO AND JULIET *ACT I.1*

I.1 *Enter Sampson and Gregory, with swords and bucklers, of the house of Capulet.*

SAMPSON Gregory, on my word, we'll not carry coals.
GREGORY No, for then we should be colliers.
SAMPSON I mean, an we be in choler, we'll draw.
GREGORY Ay, while you live, draw your neck out of collar.
SAMPSON I strike quickly, being moved.
GREGORY But thou art not quickly moved to strike.
SAMPSON A dog of the house of Montague moves me.
GREGORY To move is to stir, and to be valiant is to stand. Therefore, if thou art moved, thou runn'st away.
SAMPSON A dog of that house shall move me to stand. I will take the wall of any man or maid of Montague's.
GREGORY That shows thee a weak slave; for the weakest goes to the wall.
SAMPSON 'Tis true; and therefore women, being the weaker vessels, are ever thrust to the wall. Therefore I will push Montague's men from the wall and thrust his maids to the wall.
GREGORY The quarrel is between our masters, and us their men.
SAMPSON 'Tis all one. I will show myself a tyrant. When I have fought with the men, I will be civil with the maids – I will cut off their heads.
GREGORY The heads of the maids?
SAMPSON Ay, the heads of the maids, or their maidenheads. Take it in what sense thou wilt.
GREGORY They must take it in sense that feel it.

I.1 A public place in Verona **s.d.** *bucklers* small shields **1** *carry coals* i.e., suffer insults **2** *colliers* coal dealers **3** *an* if; *choler* anger; *draw* draw our swords **4** *collar* hangman's noose **11** *take the wall* pass on the inner and cleaner part of the sidewalk (not in the gutter) **12–13** *the weakest . . . wall* i.e., is pushed from his place (proverbial) **15** *weaker vessels* (cf. I Peter 3:7); *thrust . . . wall* (suggesting a sexual assault) **25–26** *sense . . . sense* meaning . . . physical sensation

Figure 2. Sample of hypertext (Shakespeare, *Romeo and Juliet,* the beginning of act 1, scene 1, from Shakespeare Navigator at Clicknotes.com, http://clicknotes.com/romeo/NotesT11.html#1)



In the printed text version of the play, the notes are at the bottom of the page. On the other hand, in the hypertext version of the play, notes pop up on the screen when the reader clicks on a highlighted line number. This makes the hypertext version more interactive, since additional information (the notes) will only appear on demand.

Advantages and Disadvantages of Hypertext

The most distinctive advantage of hypertext is its accessibility. For instance, by using Internet search engines, such as Yahoo! or Google, people are able to obtain lists of hyperlinks which are connected to web pages. In order to obtain a relevant list of choices and locate particular websites, readers need to learn how to enter keywords and narrow down the number of resources that are found (Kasper, 2003). In addition to the search engine tools, by clicking on icons, pictures, or the hyperlinks, which are usually highlighted or underlined, readers are able to locate additional information related to the concepts in the main text. This means that readers are able to search for specific information, collect sources, and move backward and forward among complicated hyperlinks quickly, depending on their needs and goals. Another advantage of hypertext is its effectiveness. Since hypertexts are embedded not only in texts but also in pictures, animations, sounds, and video clips, these rich effects and contents can help students' reading comprehension (Chun & Plass, 1997, p. 64; McNabb, 2006, p. 79). If readers have a high degree of reading comprehension skills, they will enjoy reading on the Internet using these effects of hypertext (Konishi, 2003).

On the other hand, too much information and complicated connections of hypertexts can make readers feel overwhelmed or frustrated. In particular, people who are not familiar with reading hypertexts might be confused when deciding which way to go next, whether to move backward or forward, how to find or collect the information that they want, and when they are spending too much time browsing. Related to this issue, Navarro-Prieto compared the behavior of

high and low skilled web searchers. They found that experienced searchers plan ahead and apply appropriate search strategies based on their knowledge of the Internet (as cited in Scott & O'Sullivan, 2005). Holscher and Strube stated that, unlike the expert searchers, inexperienced searchers, do not plan ahead but rather seem to choose a path through hypertext randomly (as cited in Scott & O'Sullivan, 2005). These studies have useful teaching implications in that it appears that readers need to decide what information they want and how they will find it before they start to search. They also need to be able to apply appropriate reading strategies when they locate information.

Reading Strategies and Comprehension on Hypertext

The studies cited above suggest that it is essential for teachers to know and teach reading strategies for comprehension in order to enhance their students' reading skills and improve their reading habits. It is said that successful readers are able to use reading strategies effectively (Schmar-Dobler, 2003). Then, what types of strategies do successful readers use to comprehend what they read?

One framework of seven strategies for reading comprehension of printed text was developed by Pearson, Roehler, Dole, & Duffy (1992, as cited in Schmar-Dobler, 2003). The seven strategies are activating prior knowledge, monitoring comprehension, repairing comprehension, determining important ideas, synthesizing, drawing inferences, and asking questions. Based on these reading strategies, Schmar-Dobler compared the comprehension strategies used in reading printed books to strategies used in reading on the Internet. In her study, she combined monitor and repair strategies together. In addition, she added another strategy, navigation, in order to describe a skill that readers of the Internet particularly need to employ. Throughout the study, she observed and interviewed adolescent Internet readers in order to elicit some examples of the comprehension strategies that they applied. She asked the students how they applied comprehension strategies to Internet reading, and mentioned an example story told by the readers for each strategy in her article (Schmar-Dobler, 2003). Several comprehension strategies that readers of books and the Internet text used differently in this study are especially interesting. As for monitor and repair comprehension, the readers of Internet text use skimming and scanning skills more than readers of books. Since a lot of information is provided at once on a given page on the Internet, readers need to judge quickly whether the information is relevant for their search or not, reliable or not, or whether they should skip some lines, including hypertexts, or closely read them.[1] Monitor and repair comprehension are especially important strategies for hypertext readers to be able to control their way of reading and make their own narratives. Another related aspect of reading strategies is asking questions. While readers search for certain information on the Internet, they should have some guiding questions in their mind in order to obtain that specific information or avoid getting lost in the "hyperspace." Hypertext readers need to constantly ask questions of themselves to interact with the texts effectively. The other strategy is navigation. Usually every website has different features in terms of its design and organization, so readers need to think and plan how to read the text on the page and weave through the provided hyperlinks when they take a glance at the features of a website. In addition, readers have much more freedom to handle their paths of reading by clicking hypertext and moving backward and forward through the connected links and pages. Throughout this process, people naturally negotiate with the texts to obtain the information that they are looking for. Navigation is a critical strategy for reading and interacting with hypertext and for following the complex nodes of hyperlinks. Table 1 summarizes some of the comparisons that Schmar-Dobler found.

Table 1
Comparison of Reading Strategies (Schmar-Dobler, 2003)

Comprehension strategies	Book	Internet
Activate prior knowledge	Reader recalls experiences and information relating to the topic	Similar strategies used
Monitor and repair comprehension	Reader adjust reading rate depending on the purpose of reading	Skimming and scanning becomes crucial for reading sheer volume of text
Determine important ideas	Reader analyzes text to determine which parts are important for developing an understanding of text	Similar strategies used
Synthesize	Reader sifts important from unimportant details to determine the kernel of an idea	Similar strategies used
Draw inferences	Reader reads between the lines, using background knowledge and text to help fill in the gaps	Similar strategies used
Ask questions	Questions give purpose to reading by monitoring the reader to continue	Guiding question must be in forefront of reader's mind or getting lost or sidetracked is likely
Navigate	Reader uses the features of print text to search for information (e.g. table of contents, glossary, headings)	Reader figures out features of the Internet in order to search for information (e.g. pop-up ads, downloading)

In addition to the study carried out by Schmar-Dobler, Konishi also conducted an empirical study regarding the reading strategies of ESL learners both for printed text and hypertext (2003). The subjects were six Japanese students taking courses in their undergraduate and graduate majors at a university in Australia. She asked them to complete two tasks using the Internet and to think aloud about whatever came to them as they did them. One of the tasks asked students to browse for online newspaper articles published in Melbourne, Australia and choose one article that students were interested in, skim it, and report the main idea of the article to the researcher. Another task required students to find the specific information that was asked for by the researcher. While each student worked on his/her tasks, the computer screen that s/he used was video-recorded, and his/her voice was audio-recorded. With the data Konishi collected, she closely focused on the students' cognitive, meta-cognitive, and navigational strategies. She divided cognitive strategies into two types, local strategies (bottom-up or data-driven process) and global strategies (top-down or conceptually-driven process). Examples of local strategies include commenting on the meaning of words, and making decisions about pronunciation and grammatical cues. Konishi's study (2003) revealed that the more students already knew such language features of English before they did the task, the more they could understand the texts. Examples of global strategies include activating background knowledge, making inferences, checking coherence within a text, examining consistency between two sources, and/or evaluating the truth of what is written. In addition to the knowledge of language features and functions, it is also important for students to read the text using top-down processing in order to understand and interact with the text more closely. These are examples of cognitive strategies that the students applied. Meta-cognitive strategies

should be emphasized when students read hypertext. In this study, students read the text by setting goals for skimming and searching (scanning), monitoring their understanding and searching, and/or revising their strategy use. As Schmar-Dobler (2003) pointed out in her study, such monitoring comprehension and repairing reading strategies would be beneficial for hypertext readers. Regarding navigational strategies, Konishi (2003) found that students applied several navigational strategies and dealt well with some problems encountered while navigating through the Web pages.

The results of the studies carried out by Schmar-Dobler and Konishi overlapped to some extent. Based on their studies, one can conclude that meta-cognitive and navigational strategies are especially helpful for hypertext readers' comprehension and that they compliment cognitive strategies. Teachers might want to focus on these reading strategies in activities incorporate use of the Internet or computer software.

The Challenges of Reading Hypertext on Computer Screens

In addition to the reading strategies of hypertext readers, it is also worthwhile for teachers to understand some challenges and difficulties of reading text on a computer in order to develop and use activities in an appropriate way.

Tseng described the kinds of difficulties EFL learners have when they read text on the Internet (2008a & 2008b). In her study, she mainly focused on physical difficulties of reading text on computer screen. The subjects were EFL learners in Taiwan. The researcher asked them to do some reading comprehension exercises on the Internet. After they finished the exercises, she interviewed the students about difficulties of reading on computer screen. The results showed that half of the students felt eyes-train when they read text on the computer monitors. This observation suggests that teachers need to think ahead about how long students will spend reading texts on the Internet when they assign reading exercises with computers because some students cannot read text for a long period of time. Twenty-five percent of the students said that they easily skipped lines of text or got lost while they were reading texts on computer screen. Since it is easy to go up and down using the scroll bar, students might have gotten lost and taken time to go back to find a certain word or line that they looked for in the text. Eleven percent of the students felt the need for physically marking the text, which they could not do with online reading. These students indicated that, unlike printed text, they could not take notes or underline words or sentences on the monitors.[2] Seven percent of the students stated that they tended to lose attention to the text because of their lack of experience in reading text on computer. Some students said that they just played with the mouse and clicked on the hyperlinks for fun. Finally, three percent of the students mentioned that it was not easy to carry computers everywhere they went. Most of the participants in this study were familiar with reading printed text, not hypertext, so they might have felt uncomfortable with these physical issues. In fact, only four percent of the students said that they did not have any difficulties with reading text on computer screens.

Although these results were from only one study, they revealed that students who are used to reading printed text have some difficulties with reading text on a computer screen. Accordingly, teachers need to keep in mind that novice readers have problems not only with their reading comprehension, but also with the physical strain of reading texts on the Web.

Pedagogical Implications

The results of the studies described above suggest several implications for language teachers. First, teachers themselves should be familiar with hypertext. Before they require students to complete activities using the Internet, they need to learn how to search for specific information on the Internet and read texts comfortably using appropriate reading strategies. In order to learn these things, teachers can monitor their own attitudes, behavior, and success while they are weaving through the hyper-

text so that they realize what the useful functions of hypertext are and what challenges readers face. In class, teachers can be models for their students (Coiro, 2003; McNabb, 2006, p. 78) and explain how to search for information using web browsers and keywords, how to read hypertext using think aloud protocols to illustrate what they mean. At this stage, teachers might want to focus on some useful reading strategies, such as cognitive, meta-cognitive, and navigational strategies in order for students to successfully interact with hypertext (McNamara & Shapiro, 2005, p. 11). Teachers might feel that they are spending much time on these explanations and instructions, yet it is essential for students to understand how to manage the functions of computers, use the Internet, and read hypertext appropriately. While students are working on their tasks using computers, teachers can be facilitators. They observe and monitor their students' work, and whenever students have troubles, teachers can help them.

Another important role of teachers is to select appropriate websites for their students (Brandl, 2002). Whenever teachers use hypertext in class or not, they need to keep in mind that English learners face two challenges while they are reading English text on the Internet: English and the computer. If students face English text which is far beyond their proficiency level and some problems managing computers at the same time, they can be overwhelmed, frustrated, or discouraged about completing activities. Consequently, teachers need to pay close attention to the language on the websites and, at the same time, the content of web pages should be related to the learners' lives or interests in order to maintain motivation (Brandl, 2002). For advanced readers, for example, I would recommend the online articles of the New York Times (www.nytimes.com). Although the articles do not have typical highlighted or underlined hypertexts, readers are able to check the definition of *any* word by double clicking it (double-clicking a word brings up a question mark above it, and clicking on the question takes the reader to a dictionary entry of the word). This function is helpful because learners are not distracted by the different color of the hyperlinks while they are reading the article, and whenever readers need help, they can use the function. In the meanwhile, it is also important for students to find relevant and reliable websites on their own by comparing several web pages and evaluating them in order to acquire critical thinking skills. This is also related to their real life. Teachers also need to have technical skills to help their students cope with computer functions. For example, it is worthwhile to know how to adjust brightness, width, color contrast, and font size on the monitor of computers (Tseng, 2008b). In addition, when students want to find a certain word or line on the website, teachers can help them to find it using search function (by pressing the Control key and the F key, then typing the word or phrase in the "Find" box). It is also important for teachers to check whether URL addresses of websites are current whenever they plan to use websites in class or ask their students to use them at home because they are often updated or replaced. In order to avoid such surprises, teachers are always encouraged to prepare alternative websites and activities.

Although I have focused on hypertext reading, there is also value in hypertext writing. The benefit of hypertext writing is that learners have freedom to express their thoughts and ideas with their favorite writing styles in multilinear fashion (Bräuer, 2001, p. 114). Printed text authors do not (they are constrained by the linear nature of text on paper). In addition, hypertext writers are able to enrich their writing by adding multiple cross-references to their original texts. On the other hand, students might not learn how to maintain coherence in writing so much since hypertexts are written in a nonlinear fashion. It means that hypertext authors may not pay as much attention to conjunctions and transitions for maintaining coherence because there are multiple points of entry and exit (Bräuer, 2001, p. 112). Another disadvantage is that if student writers rely on easily accessible links, and audio and visual aids, they might lose opportunities to express and explain their

ideas in their own words. Accordingly, it is important for teachers to carefully create either paper-based or hypertext writing activities depending on the specific skills of writing they wish their students to try.

Conclusion

Hypertext has changed literacy. Compared to reading printed text, reading hypertext is more complex. Proficient hypertext readers need critical reading skills in order to create their own narratives appropriately by comparing and evaluating websites and weaving through complicated hyperlinks. Language teachers need to teach meta-cognitive and navigational strategies as well as cognitive strategies. Since people read hypertext in non-linear or multi-linear fashion, they need to monitor their reading process carefully, and if needed, repair their strategy use in order to maintain their coherence. It is not enough for teachers to know such useful reading strategies, but they need to teach their students how to apply these strategies effectively. In addition, since computers have become indispensable tools for our lives, and a lot of students prefer to use them, activities which integrated reading with computer use may enhance student motivation for language learning. While information overload is a concern, if students are able to navigate themselves appropriately on the Internet, they will have great opportunities to read a variety of resources and texts written by different authors. Printed texts, of course, still have an important role to play. Therefore, in ESL/EFL classes, teachers might want to integrate use of printed text and hypertext to provide their students with rich and varied reading experiences.

Notes

[1] It is true that readers make similar judgment with printed text; however, with hypertext, these judgments may be needed more frequently and more quickly.

[2] Adobe Acrobat Reader version 8 and later versions allows for review options with which the reader can mark the text by highlighting and inserting comments.

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