Comparing EFL Learners' Reading Comprehension Between Hypertext and Printed Text

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Abstract

The purpose of this study was to investigate the effects of reading printed text and hypertext on the EFL learners' reading comprehension. Text on the web pages changed the way people read, and the computer and electronic texts made reading an experience that was less linear or consecutive and more spatial (Bolter, 1998). Therefore, how did computers change the way EFL learners read? Forty-six Taiwanese students joined this study, and they were equally divided into two groups: the Experimental Group and the Control Group. Students in the Experimental Group read the hypertext through the computer screens while the Control Group read the printed text on paper. The research procedures were (1) to give students some related vocabulary, and pictures to predict the articles, (2) to give them four articles to read, and (3) to test their skimming skill, scanning skill, and vocabulary knowledge through reading comprehension questions. The results show that students in the Experimental Group achieved lower scores in questions requiring skimming and scanning skills, but they scored higher in vocabulary questions that they had to guess the unknown words from the context. The elements that influenced students the most when reading hypertext were the uncomfortable physical responses such as eyestrain and headaches.

Keywords: Linear, Hypertext, Skimming, Scanning, Reading Skills

Introduction

Reading hypertext on the computer is different from reading printed text on paper. Purves (1998) stated that printed text is read in two-dimensional spaces. In this way, the two-dimensional nature of printed text may limit conceptual space, as readers are led through the text linearly. It means that readers begin reading at the top of the page, and they may be conditioned to think hierarchically out of their reading habit. When looking at text on a computer screen, readers can open a number of different documents or web pages and move back and forth between them at the same time. On the screen, there are many spaces. Readers can go into any one of the spaces by clicking the mouse. They can also drag the spaces around the screen, save them inside each other, or link them with other spaces. From the experience of most Taiwanese students, the reading-skill training they receive is traditionally focused on printed text. When reading hypertext on computers, the reading skills that are dedicated to enhancing reading comprehension of printed text should also play a useful role in facilitating the reading of hypertext. Therefore, the present study aimed to investigate how students read between hypertext and printed text, to compare

reading skills via paper and computer screens, and to find out the elements that affect students in reading hypertext.

Review of Literature

The original concept for hypertext was first proposed by Vannevar Bush in a 1945 Atlantic Monthly magazine. Bush (1991) pointed out the problem that a rapidly growing number of published articles made it impossible for scientists to read, synthesize, and react to them. He argued that new methods must be developed for reading and annotating research papers, books, and scientific records.

In the 1960s, the term "hypertext" was coined by Ted Nelson, a research fellow of the Oxford Internet Institute. Nelson gives his first paper at the American National Conference of the Association of Computing Machinery (ACM). It was around this time that he coined the term "hypertext" (Keep, McLaughlin, & Palmar, 2004). Nelson proposed a system that was very similar to today's Web; a global network that stored "billions of quickly accessible and interlinked documents with non-sequential reading and writing" (Bellamy, 1999, p. 6). His ultimate vision was for this system to be capable of storing and representing the creative and scientific production of humanity.

Barnes (1994) states that hypertext is unique. This is because it enables readers to pick and choose blocks of text by interacting with the machine. It is a way of organizing information and browsing through electronic texts stored on individual computers and networks. Hypertext now includes "a wide range of computer applications such as interactive books, encyclopedias, online reference indexes, and other forms of nonlinear reading and writing which are created by means of computer technology" (p. 26). To read documents, readers cannot turn page by page as they do on a printed book. They have to learn to navigate and explore the electronic text. She said, "learning text navigational skills transforms readers into active information explorers" (p. 26).

A typical hypertext document opens with a top-level menu or homepage. On selecting or clicking highlighted or colored words or phrases on the hypertext document, a further screen which includes more words and images comes out, and so on, potentially indefinitely (McHoul & Roe, 1996). Intrator (2000) points out that hypertext can be seen as a kind of informational environment where ideas are knitted together in different ways.

Many researchers have explored the differences between traditional reading (linear) and hypertext reading (nonlinear) processes. Ojala (2000) states that reading is no longer a linear activity. A print document encourages readers to start at the top left-hand corner and finish at the bottom right-hand corner, but electronic information encourages a completely different style. The eyes of readers move in a circular motion rather than a straight line. However, in such a nonlinear reading context, it remains basic to sort out the truth from the false, reality from fantasy, to discern cause and effect, and to apply critical thinking skills.

As Jones and Fortescue (1991) mention the computer is used as "informant", a role that takes advantage of the computer's ability to store large amounts of information on disks. Why has reading a computer screen become a more realistic assignment? Teeler and Gray (2000) answered that hypertext is well-formatted, easy to look at, and often broken up by relevant pictures and graphics that aid comprehension. Hypertext can be

printed out, easily saved, or read offline. Also, hypertext has interactive links, allowing learners to read the way the mind often thinks, in a non-linear path. The links can involve interplay with other readers, the author, or the publisher. They can lead to support materials that are not available off the Internet.

Bolter (1991) studies how text on the pages has changed the way learners read and how the computer and electronic text make reading an experience that is less linear or consecutive and more spatial. Also reading electronic text makes reading more performative. It means that in electronic writing space, all texts are like dramas or musical scores. When readers "perform" the text, they read for themselves, or for another reader who may then choose to perform the first reader's text for others. Thus, reading is more than a linguistic performance. Besides visual and auditory, it is even kinesthetic and tactile when the readers explore a text by making their own decisions. There are many choices of response and interpretative performance of one's own with hypertext.

To investigate the differences between reading hypertext on the computers and printed text on paper for Taiwanese students who learn English as a foreign language, the present study attempted to answer the following four research questions:

1. How did EFL students perform in reading printed text and hypertext? Did they read better on paper or computer?
2. How did EFL students perform differently in their use of skimming skills, scanning skills, and guessing unknown words from the context?
3. What factors affected the reading proficiency of students when reading hypertext?
4. What were the major difficulties of reading hypertext?

Methodology

The current study investigated the reading performance of students on the Internet and reading comprehension between printed text and hypertext. A reading comprehension test and a questionnaire were administered to acquire data needed to answer research questions.

Participants: Forty-six students joined this study. They were equally divided into two groups, the Experimental Group, and the Control Group, according to their scores in the 'Reading Section' of GEPT (General English Proficiency Test, Elementary Level). The participants in the Experimental Group viewed the pictures and read articles shown on the computer screens while the ones in the Control Group looked at the pictures and read articles printed on the paper.

Materials: Four articles were used in this study. Three of them were adopted from the book "Master GEPT (General English Proficiency Test) Cloze & Reading" written by Osman (2002), and one was from "Issues for Today" written by Smith, L. C., and Mare, N. N. (1990). Some of the questions were modified to conform to the purpose of the study that tested their skimming, scanning skills, and vocabulary knowledge. The topics included animal, E-commerce, tourism, and the justice system. There were 120 words in Article I, 144 words in Article II, 291 words in Article III, and 241 words in Article IV. Three parts were included in each article: pictures & relevant vocabulary, text, and five

reading comprehension questions. The reading activities or skills required in a school context usually include prediction, guessing the unknown words, scanning, skimming, and critical reading (Clarke & Silberstein, 1987; Nuttall, 1996; Brown, 2001). Based on these skills, this reading comprehension test contained five questions. The skimming skill was first required to understand the general ideas of the passage. To skim a passage, participants need to go through the reading material quickly to get the gist of the text (Grellet, 1981). Example questions were "What is the main idea of this passage?" "The passage says..." Next, participants were asked three questions regarding the use of scanning skills. They had to locate specific information in the passage and tried to find the answers. "In the first paragraph ..." "What would be the best definition of …" "Which of the following statement is not true…" One question was used to ask participants to infer the meaning of a certain word from the context. It is the most important of the vocabulary attack skills. Some techniques were synonyms in apposition, antonym, cause and effect, association, description, and example (Clarke & Silberstein, 1987). An example question was "What does the word "exotic" mean?" Participants had to go back to the passage, locate the word, and try to guess the meaning of the words from the context.

Procedure: The participants were tested on their reading skills after being asked to read four articles. Before reading the content of each article, they were given pictures and relevant vocabulary to help them predict the articles. Then the participants read the articles and then answered five reading comprehension questions containing the requirement of using skimming skill, scanning skill, and guessing unknown words from the context. After finishing Article I, they followed the same pattern on Article II, Article III, and Article IV. After finishing the four articles, they were asked to fill out a questionnaire regarding the reading comprehension questions.

Design: The participants in the Control Group were given a nine-page paper test. They answered each question page after page. The participants in the Experimental Group were looking at the pictures, text, and questions on the computer screens. They were given separate answer sheets. After finishing the test, all students were asked to fill out a questionnaire printed on the paper.

Results and Discussions

In the section on reading comprehension questions, Table 1 shows the results. Participants in the Control Group received a higher average score (51.47) than those in the Experimental Group (46.96) after reading the four articles. The Control Group scored higher in questions regarding skimming skills and scanning skills, but they received lower scores in vocabulary knowledge than those in the Experimental Group.

Table 1:
Results of Reading Comprehension Questions

Scores	All Questions	Skimming Questions	Scanning Questions	Vocabulary Question
The Experimental Group	46.96	9.34	9.7	8.48
The Control Group	51.47	9.4	11.11	7.2

Participants in the Control Group performed better in reading printed text, especially on the reading skills of skimming and scanning, but not on vocabulary questions. To elicit the reasons why the participants in the Experimental Group received lower scores while reading hypertext on the computer screens, a questionnaire was used. From Table 2, among the four articles, about 55% of participants chose Article II as the most difficult one, and the next difficult one was Article IV. All of them commented that there were too many unfamiliar words in these two articles, and some of them said that the topics were not quite accessible to them. On the other hand, Article I was the easiest one for participants. Only 2.6% of participants chose it as the most difficult one.

Table 2:
Comparison of the Difficulty Among Article I, Article II, Article III, and Article IV

	Article I	Article II	Article III	Article IV
The Experimental Group	4%	43%	8%	39%
The Control Group	0%	64%	5%	17%
Total	2.6%	55%	7.8%	31.5%

Among the five questions in each article, Question 1 (Q1) tested the skimming skills of students, Questions 2 to 4 (Q2-4) tested their scanning skills and Question 5 (Q5) tested their vocabulary knowledge. Participants were asked to identify the most difficult question. Table 3 shows the results. About 14.8% of students thought Q1 as the most difficult question, 64.7% of them chose Q 2 to 4, and 20.2% chose Q5. For the Experimental Group, about 11.6% of participants chose Q1 as a difficult question whereas 19% of participants in the Control Group chose Q1. To compare it with their test results, the Control Group outperformed the Experimental Group although they regarded skimming questions as a difficult question. From Q2 to Q4, the Control Group also performed better than the Experimental Group. However, for Q5, which tested vocabulary knowledge, the Control Group thought it was easy, but they did not do as well as the Experimental Group

Table 3:
Relative Difficulty Levels of Q1, Q2, Q3, Q4, and Q5

	Q1	Q2	Q3	Q4	Q5
The Experimental Group	11.6%	20.9%	20.9%	23.2%	23.2%
The Control Group	19%	9.6%	24%	30.6%	16%
Total	14.8%	16.2%	22.2%	26.3%	20.2%

Furthermore, participants were asked some questions regarding their preferences for reading via computer screens or paper.

1. What factors affected reading via computer screens? About 26.4% of participants chose the size of the font, 24.5% of them chose the background color of the web pages, and 47.3% chose the downloading speed.
2. In the background color of web pages, about 35% of participants chose a dark background with white words, 60% of them chose white background with black words and 5% chose either way. It might be speculated that students extended their reading inclination to computer screens because most of the paper was white and the printing color was black.
3. Participants were asked whether they preferred to read texts through computer screens or paper. In the Control Group, 18% of them chose screens and 82% of them chose paper whereas, in the Experimental Group, 17% of them chose screens and 83% of them chose paper. Entirely, 31% of the entire class chose to screen, and 69 of them chose paper. For participants, they still preferred to read texts on paper instead of computer screens.

To find the elements that affected participants while reading hypertex on the computer screens, their responses were analyzed and categorized as shown in Table 4.

Table 4:
Elements That Affect Hypertext Reading

Elements	Percentage	Ranking
Uncomfortable physical responses (Eyestrain, headaches, radiation...etc.)	78%	1
No marks on computer screens (Underline, take notes)	18.8%	2
Scrollbar	8.7%	3
Reading habit	5%	4
Sense of distance	5%	4
Thinking process	5%	4
Too many hyperlinks	3.5%	5
Portability (the text on web pages is not portable)	1.7	6

In the first ranking, about 78% of participants thought their eyes got tired or they got headaches upon reading hypertext on the computer screens for a long period. The uncomfortableness made them feel not reading any text anymore. Also, because of the computer classroom set-up, they were sitting in front of or behind other computers, and it made them very distractive feeling the radiation and heat emitting from other computers. The second-ranking fell on the reason that participants could not underline any sentences or leave notes on the computer screens. 18.8% of participants thought that reading hypertext on the computer screens was not the same as they read text on paper. For EFL students, to read line by line, some students even used a ruler and put it on the computer screen to help them read the articles more effectively without skipping lines. The third element that affected reading on the computer screens was the scroll bar. It was noticed that some students even put fingers on the computer screens to point out certain words, but when they used scroll bars to move up and down the web pages, they got lost where they were earlier. The fourth-ranking that affected reading hypertext was students' reading habits, sense of distance, and thinking process. Students used to read English on textbooks or paper. They used hands to open the books and read page after page. They described that they could touch the paper and the English words, but when they read hypertext on the computer screens, the words were "hidden" inside the monitors. Students could not "touch" the words. They commented that it gave them a sense of distance. Also, unlike reading page after page, they clicked hyperlinks to go to the next page. They found they were playing with the mouse, and clicked hyperlinks for fun, not for reading. The other elements that affected reading hypertext were the number of hyperlinks and portability of computers. Students mentioned that they could bring handouts, papers or books anywhere they want to go, but they had to find a computer to access the Internet. The computer was not as convenient as paper in this way.

The reasons why participants in the Experimental Group received lower scores were much related to factors that affected them when they read hypertext. It was found that participants had to use the scroll bar to move up and down to read the whole text throughout the experiment. This could be a possible reason for their lower scores in this section. It was also the same reason why they achieved lower scores in the scanning section because some of them used cursors or their fingers to highlight particular sentences. However, in vocabulary knowledge, participants in the Experimental Group made higher scores than the ones in the Control Group. It was puzzling because if it was difficult to read a particular sentence while answering scanning questions, why they scored higher in vocabulary questions? While asking students how they answered Q5 in each article, some students said that it was easy to use mouse or fingers to point, select or highlight one word than to a whole sentence on web pages. Also, about 78% of participants said their eyes got very tired and strained while reading texts on computer screens during the test. The other factors impeding reading hypertext included sizes of the words, the background color of the web pages, and the absence of notes or marks on the computer screens. From the results, it can be speculated that students were used to reading text on paper that usually contained black words on a white background. On the other hand, there were many different fonts and background colors on web pages. The format did not conform to their "old" reading habit, and the color and background distracted their attention when reading. Therefore, almost 60% of students preferred to read via paper instead of computer screens.

Pedagogical Implications

The pedagogical implications of this study for hypertext reading involve at least three issues. First, the importance of selecting web pages for students: There are too many different kinds of web pages on the Internet. They serve as good resources for leading students into a new topic or doing critical thinking. However, some of them have a fancy background and pictures, but they are not designed for educational or language learning purposes. Teachers should screen or choose appropriate web sites, which provide clear instructions, and proper content. Thus, students do not need to waste time searching for websites, but instead focusing on reading the content of the websites. Second, the importance of setting up computer screens and web pages: Students felt tired reading from computer screens. They can be taught to adjust the brightness, width, and color contrast on the monitor, and enlarge the font size on the menu bar of Internet Explorer (I.E.) or Netscape browsers by themselves to find the most suitable screens for their eyes. The third, the importance of teaching students how to read hypertext: Students are used to reading on paper, but they are not familiar with reading hypertext. One reason is that it is different from their usual reading habit on paper and the other is they do not know how to read hypertext on web pages. Therefore, schools could provide courses that train students on how to look for information on the Internet and how to read hypertext effectively.

Conclusions

EFL students face two new things: English and computers. While they still have difficulties in reading English, they would feel nervous to read English on computers. As mentioned by Patterson (1999), it is important to bring up the notion that reading hypertext is a different experience for students. The results of this study also confirmed that students made poor performance when they read hypertext. Most students tried to read hypertext the way they did on paper, but uncomfortable physical responses, the absence of notes and marks, and the scroll bar impeded their reading comprehension on the computer screens. Therefore, EFL teachers must recognize it and help students handle with hypertext and think reflectively about the meanings they are constructing from hypertext. It is as much as we teachers do with reading printed text.

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