Hypermedia Reading Materials: Undergraduate Perceptions and Features Affecting their Reading Comprehension

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Abstract: Due to the potential of the Internet and blended learning environment, students, especially L2 learners, are often required to read references available online. A study was conducted to identify the perceptions of L2 learners comprising TESL undergraduates towards TESL-related hypermedia reading materials and the factors contributing to their reading comprehension. This case study involved eleven third-year undergraduate TESL students enrolled in a course called 'Teaching of Reading Skills in an ESL Context'. Data was collected using Think Aloud Protocol, semi-structured interviews, and reflective notes. The findings of this study revealed various participants' perceptions regarding hypermedia reading materials. Among the factors that improved their reading comprehension include the design of the hypermedia materials and content in terms of the manner in which information was displayed. The participants highlighted the difficulties associated with reading long hypertexts and expressed preference for texts which come in point-form format. Other features cited as being helpful in their reading were the inclusion of pictures, tables, diagrams, audio materials, and videos along with the text. Some other features included hyperlinks and glossaries provided by the websites that the students found beneficial in helping them understand the text. Other less favorable aspects of reading hypermedia materials included advertisements on the websites, easy access to social media websites, and poor Internet connection and bandwidth speed. These were reported to affect the reading process in such a way that they distracted the participants' concentration, and this ultimately affected reading comprehension to a certain degree. It is hoped that these findings could provide insights for course developers in developing or selecting websites to suit their teaching and learning purposes.

Keywords: TESL students' perceptions, hypermedia reading materials, reading comprehension.

1. Introduction

Day-to-day use of e-learning platforms in the field of education is becoming increasingly widespread. Students benefit in many ways through the use of technology in the teaching and learning process, in that there is access to learning materials on the Internet that assist them in the process of acquiring knowledge (Ally, 2004). Since students today are expected to become more active in searching for information and additional materials from a variety of sources, e-learning has become an almost indispensable part of the daily teaching and learning process (Sirkema, 2007). Living in the world of advanced technology has exposed students to Computer Assisted Language Learning (Beatty, 2003) as one of the sources for language learning and for obtaining additional materials, particularly reading materials. The abundance and variety of hypermedia reading materials have presented L2 students with easy access to information and knowledge for application not only for learning the English language but also for various other purposes. Comprehension of the materials thus is important to the learning process. However, reading strategies with hypermedia materials differ from reading the traditional printed texts. Additionally, according to Anstey and Bull (2006), reading hypermedia documents requires the students to be selective in choosing materials most suited to the learning requirement at hand, as hypermedia materials come in numerous forms ranging from basic electronic texts to audio and video forms. There is therefore a need to look further into e-learning as it relates to hypermedia reading materials and reading comprehension, in particular where academic needs are concerned. At the National University of Malaysia, a case in point involves the academic and university requirements of TESL students. In their third year of studies, these students are required to take a course called Teaching of Reading Skills in an ESL Context which aims to introduce, equip, and drill students with the main features and aspects of reading theories, research, and related instructional approaches as well as techniques associated with the ESL teaching and learning process. For this purpose, much of the main reading assignment includes the reading of hypermedia materials. For the students, seeking and understanding hypermedia materials is a significant aspect of the coursework. However, e-learning as it relates to hypermedia reading materials has not been extensively explored in terms of how much and in what way it helps students complete their coursework.

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Thus, a study was carried out to gather the students' perceptions towards hypermedia reading materials and identifying factors contributing to their reading comprehension.

The decision to choose TESL students as the participants in this study was seen as relevant because there was an important need for them to comprehend the hypermedia materials as a main point of reference to do the course. Two research questions were identified: First, what are the perceptions of third-year undergraduate TESL students toward the hypermedia reading materials, and second, what are the factors that contribute to their comprehension of the hypermedia reading materials? It is hoped that results of the study could provide insights into the efficacy of hypermedia materials and identify ways that could help both educators and students choose suitable reading materials appropriate for the course requirements. The results gained from this study would provide the information that is useful for teachers, particularly course designers, in their teaching career in terms of teaching their future students effective strategies for reading hypermedia materials.

2. Literature Review

This section will first review the literature on the important components related to online reading and the advantages and disadvantages of online reading. It will then examine the processes involved in online reading comprehension. A review of the related theory in online reading and past studies will also be discussed.

2.1 Electronic Literacies, Hypertext, and Hypermedia: Advantages and Disadvantages

Since the introduction of technology in the process of teaching and learning, the concept of 'electronic literacies' is no longer a new phenomenon to students. This concept includes "using computer[s], interaction through computer-mediated communication (CMC), understanding multimedia information as well as locating and evaluating online resources" (Park and Kim, 2011, p.2157). Based on the same concept, terms such as hypertext and hypermedia come into play. According to Farkas (2004), hypertext is defined as a text with links or hyperlinks. The links or hyperlinks provided may offer the users either another section or page of the website or maybe another new website (Warschauer, 1999). On the other hand, the term hypermedia is referred to the extended version of hypertext, whereby users will encounter other forms of materials such as pictures, audio, video, animation, or all of these in one combined material known as multimedia (Ketabi, Ghavamnia and Rezazadeh, 2012). This implies that students can read, refer to, and learn not only from a simple electronic text but also from various kinds of materials. As mentioned earlier, reading any online references or learning material is unique and differs from the traditional printed text, as readers are able to choose any of the materials by 'interacting with the machine' (Barnes, 1994, p.27). As hypermedia reading comes in numerous nonlinear forms, students cannot treat it the same way as a printed text that they can review page by page. Barnes (1994) stated that students would have to learn navigational skills and become active learners in searching for information.

A number of studies have been conducted that explore the advantages and disadvantages of online reading. Since a large part of hypermedia reading involves hypertext, the advantages and disadvantages mentioned in these studies focused more on hypertext reading processes. According to Teeler and Gray (2000), hypertext is well formatted, easy to look at, and easily downloaded and saved to be read at any time and anywhere, even without an Internet connection. Furthermore, to help readers with better comprehension of the reading materials, hypertext is often equipped with pictures and graphics, including interactive hyperlinks, which enable readers to 'go places' and access other materials related to the same or similar topics of interest. In other words, reading takes place in a 'non-linear path' (Tseng, 2010, p.97). Readers can jump from one reading material to another and go back to the previous reading material. The hyperlinks provided also allow readers to have access to other support materials that are not available off the Internet. Despite these advantages, Nielsen (1995, p.154) pointed out that "reading from a computer screen is about 30% slower than reading from paper." Troffer (2001) listed a few difficulties or challenges associated with reading from a computer screen: (a) the screen resolution is low as compared to printed text and (b) on-screen reading can lead to eyestrain. Britt and Gabrys (2001) also indicated that online reading could be more troublesome as a result of many factors. One factor is that, unlike reading a book, which a reader flips from one page to another in a linear manner, a reader needs to read hypertext in nonlinear manner. This refers to the practice of jumping from one website to another. Another factor is that a reader needs to use his cognitive abilities more in reading hypertext in comparison to reading a book, as he needs to select which block, website, or hyperlink that he prefers to read. Despite the benefits of non-linear reading for students, the reading process could be

affected, as online reading materials "remove text devices that typically build coherence in learner texts" (Tseng, 2010, p.97). Tseng (2010) added that students are also required to become 'cognitively active' and 'perform double the task' in order to comprehend the reading materials, as online texts are normally created from 'building blocks of several shorter ones.'

2.2 The Process of Online Reading Comprehension

Readers are required to adopt new skills and strategies as they go through the process of online reading comprehension (Cairo and Dobler, 2007). There are at least five processing practices involved during online research and comprehension that can help readers increase their reading comprehension (Leu, Zawilinski, Forzani, Timbrell 2014). The first process of online reading comprehension is reading to construct useful questions. An individual reads on the Internet for many reasons, such as to look for information, expand knowledge, solve problems, or answer questions. Reading that is guided by questions often allows the readers to prompt and refine useful questions and finally meet their reading goals (Taboda and Guthrie, 2006). Secondly, online reading involves reading to locate information. This requires readers to generate a few new reading strategies and skills which involve understanding every single bit of information, including the title, developing effective keyword strategies (Eagleton and Guinee, 2002), demonstrating skills in choosing useful websites (Henry, 2006), and scanning for information related to the topic (Route, 2006). Third, as suggested by Burbules and Callister (2000), online reading comprehension involves critically evaluating online information in which case there is a need for readers to evaluate the level of accuracy, reliability, and biasness of the information. Often with Internet materials, the information can be ideologically biased or inaccurate; thus, critical evaluation is crucial. Fourth, the reading process also involves reading to synthesize information from various sources. The Internet offers an abundance of reading materials, and due to this 'gift', readers are faced with the challenge of synthesizing all of the information gathered until the information most relevant to the reading objectives are found (Jenkins, 2006). Dole et al. (1991) added that, in order to do this successfully, 'awareness of the reading process together with an understanding of the text' is needed (as cited in Castek et al., 2011, p.95). Lastly, successful online reading comprehension involves the ability to communicate on the Internet (Britt and Gabrys, 2001). An interactive space is open to the readers in that there is made available a range of online tools through which to ask and answer questions on the Internet. Research suggests that this process of communication is linked to aspects of online reading comprehension (Boyd and Ellison, 2008).

2.3 Related Past Studies

To date, some studies in both local and international contexts have been conducted on the topic of reading hypermedia materials, but very few have examined the subject from the point of view of reading comprehension, particularly among TESL undergraduates. In the local context, Maslawati, Harieza, and Shahizan (2015) conducted a study involving first-year off-campus students registered in the Allied Sciences Faculty enrolled in an English course called English for Life Sciences. The objective of the study was to examine the students' perceptions regarding the designed hypermedia and comprehension questions. Results showed that the participants of the study did not like any hypermedia reading materials which were considered 'too lengthy,' and thus tended to avoid such materials. In addition, reading hypermedia materials containing small-sized words with a narrow gap between the lines was also regarded as problematic. Another study done by Tseng (2010) looked at the effects of online reading on the students' reading process among a group of 88 students enrolled in a first-year Freshman English course at a university situated in the northern region of Taiwan. The results revealed that the students disliked hypermedia reading materials that had a bright background, as it led to eyestrain. This was a similar issue raised by Leonard (1985), who found that a person could become uncomfortable while glaring at a bright screen too closely or over a period of time. Morris (2009) supported Tseng's (2010) findings whereby an individual reading from the screen which featured a dark letter font against a light-colored background could experience eyestrain. Gilbert (2014) investigated learners' interaction with printed and web-based text. His study, which focused on eight learners of English as a second language of a private language school in an urban area, utilized three types of research instruments, namely interviews, reading workshops, and participants' diaries. His findings showed that, during the process of reading, searching, and collecting information from the Internet, the participants involved in the study found the design of the websites such as the use of bright text color and images attracted them to particular websites, thus motivating them to search for more hypermedia materials. However, they also mentioned the distraction and annoyance caused by pop-ups and flashing text appearing on screen. In brief, these studies suggest that the comments regarding hypermedia reading materials mostly related to the content and design of the materials. In addition, external factors such as advertisements and other distractions also played a part in the reading process. The question is this: how similar or different are the perceptions toward hypermedia

reading materials among TESL undergraduate students within the Malaysian context? What are the factors contributing to their reading comprehension with respect to hypermedia reading materials?

2.4 Related Theory

According to Maslawati (2012), where hypermedia reading is concerned, teachers, facilitators, and experts are no longer the sole sources of knowledge for students. This means that, in the context of hypermedia reading, students need to become mentally active and initiate their own reading patterns (Yahya, 2008). Thus, through hypermedia reading, students will get the opportunity to explore, derive meaning, and extend their own comprehension of the reading materials resulting in active development of knowledge rather than passive. Tobias and Duffy (2009) and Beatty (2003) have both stated that the use of technology in education, especially as a source of knowledge, has become part of the learning process since the creation of CALL, further demonstrating the need for students to adapt to this new learning environment. It can be seen therefore that the most relevant learning theory related to this study is the cognitive constructivist theory. The construction of new knowledge occurs when students go through an adaptation process whereby they need to accommodate the newly acquired knowledge with their previous or existing knowledge (Maslawati, 2012). Indirectly, they develop more in-depth knowledge, which in turn leads to better hypermedia reading comprehension. Furthermore, online or hypermedia reading requires students to become active readers during the reading process in which they are encouraged to seek answers to questions online without being restricted to the classroom or the need to get assistance from the teacher. With the variety of sources available, students have the opportunity to control and choose their reading materials as long as they are related to the course requirements (Herman and Gomez, 2009).

3. Methodology

This study employed a qualitative research adopting the case study method. This is considered appropriate as the researchers were interested in obtaining a better and more in-depth understanding of the participants' hypermedia reading process and their perceptions rather than just the outcome of hypermedia reading (Yin, 2009; Creswell, 2009). In this study, the researchers' aim was to describe TESL students' reading process and their perceptions toward the hypermedia reading materials. In order to create a more natural setting for the online reading process, data collection was conducted in the lecturer's room at a time convenient to the participants. This was mostly conducted in the evening. The main data collection tool was the Think Aloud Protocol (TAP). Semi-structured interviews were carried out, and participants' reflective notes were taken for triangulation purposes.

3.1 Participants and Settings

The participants for this study consisted of TESL students, selected on the basis that they fulfilled the criteria of the study. There were 28 third-year undergraduate TESL students at the National University of Malaysia enrolled in the Teaching of Reading Skills in an ESL Context, a required course for their degree. For this study, twelve students volunteered to participate, but only eleven of them, all female students aged between 22-24 years old, remained committed until the end of the study. These students obtained either Band 3 or 4 in the Malaysian University English Test (MUET), and thus can be considered modest and competent users of English, respectively. To conform to the research ethics, only volunteers were included as research participants (Merriam, 2009). Even though there were only eleven participants, the data collected from them was considered sufficient, as the purpose of a qualitative study is to obtain in-depth information so that a deeper understanding of the phenomenon at hand can be obtained. The participants were also given pseudonyms to maintain anonymity and confidentiality in regard to the ethics of a qualitative study (Given, 2008).

3.2 Data Collection Tools

Think Aloud Protocols (TAP)

Think Aloud Protocol (TAP) was the main data collection technique in view of a few benefits it offers. Ketabi, Ghavamnia, and Rezazadeh (2012) states that, by using TAP, researchers can access more in-depth information as participants are verbalizing their reading and expressing their views aloud during the course of the actual activity. In the case of this study, the online reading was an ongoing task revolving around the topic Reading Models, which was one of the topics discussed in the course. As the reading assigned came from any TESL-related hypermedia texts, which the participants could access at any given time, there was a need to capture the reading process as the participants were engaging with the materials. TAP was considered an appropriate way to accomplish this. The participants were allowed to express their thoughts orally either in English, Malay,

or a mixture of both languages as they went through the TAP process. According to Perakyla (2000), students should feel comfortable and confident expressing their opinions without having to be accurate in the language used. The TAP session lasted around 30 minutes for every participant and was recorded using a digital voice recorder. The recordings were transcribed verbatim.

Semi-structured Interviews
The second data collection method employed was semi-structured interview with each participant. The interview was carried out simultaneously during the TAP session. The reason for doing so was to encourage the participants to actively express their thoughts during the hypermedia reading process. This is because, without much probing, the participants tend to become silent during the whole process of the TAP/interview. The study was interested in obtaining more detailed information regarding the participants' general overview of the hypermedia reading process as well as their thoughts regarding their own reading process. In addition, the interview also functioned as a means to triangulate the researchers' observations with the participants' expressed opinions (Patton, 1990). The interviews were also recorded and transcribed verbatim.

Reflective Notes
The participants in this study were also requested to write reflective notes after the TAP/interview session. The students were told that they could write about their perceptions, thoughts, and feelings regarding the hypermedia reading materials, problems encountered, and how they solved them. The function of reflective notes is to capture in writing information concerning the participants' thoughts, perceptions, feelings, needs, or fears that could not be captured during the TAP/interview session. In addition, Ortlipp (2008) states that participants become consciously aware of their actions when they write reflective notes apart from the freedom of writing down everything that they felt during the TAP/interview session.

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The process of data analysis in this study involved three main phases, which were data transcribing, data coding (encoding scheme), and data analysis. Dornyei (2007) describes the process of transferring the data from audio into textual form as transcribing. For this purpose, the researchers transcribed all of the TAP/interview data of all eleven participants and afterwards coded and categorized the data into themes and subthemes. This whole process of encoding the data into different categories or themes involved rearranging, recoding, restructuring, and interpreting the data using Nvivo 10. The next step was to compare the categories/themes across data for triangulation purposes. Further details on the themes and subthemes will be given below in the findings section.

4. Findings and Discussion

In general, the participants' perceptions toward the hypermedia reading materials were varied. The researchers have categorized the data into two main themes, each with its own subthemes.

4.1 Content and Design of the Hypermedia Reading Materials

Length of the hypermedia reading materials
With reference to the content, four participants stated that they did not like lengthy hypermedia reading materials. This is illustrated in the following comments from two of the participants, obtained from their reflective notes and interviews:

> *"I don't like something in a long text" (Participant H).*

> *"…if the text is longer, I don't like it," and "If the text happen to be a long passage that needs me to scroll up and down to move to another page, I became confused easily and might end up missing some important points while reading it" (Participant I).*

The comments above showed that, for the participants, lengthy hypermedia reading materials could affect their concentration, which resulted in some loss of comprehension. In this case, Participant I further mentioned in the interview that long passages contained some words that she could not understand, and when enquired, she further stated that, "*Short sentences just stated the main points or main idea." This is a statement which is supported by other participants. For example, Participant E in her reflective notes said that "simple point (form) is easier for me to understand rather than reading long sentences.*"

A few other participants also mentioned a similar problem, such as Participant G, who pointed out that she preferred the text to be "in a point" form. It appears thus far that understanding of the hypermedia reading materials among the participants was facilitated by the arrangement of the content consisting of point form of only main ideas. To the participants, it would be easier to understand these kinds of hypermedia texts compared to lengthy ones that comprised the main idea, explanation, and examples in continuous prose, which they found rather confusing. The physical need to constantly scroll up and down added to this difficulty. The findings of this study were similar to those of the study conducted by Maslawati, Harieza and Shahizan (2015). When choosing hypermedia reading materials, students were likely to avoid any lengthy materials and opted to choose those that are presented in point forms. It is not clear from the responses whether the difficulties above were language related. However, it can be implied from comments such as 'long words' and "words that I do not understand" that some language problem was involved to a slight degree.

Additional Materials: Picture/Table/Diagram/Audio/Video

From the participants' TAP/interview session and reflective notes, it was found that additional materials provided on the Internet such as pictures, tables, diagrams, and audio and video features contributed to the participants' comprehension of the hypermedia reading texts. As stated by participant J in her reflective notes:

> *"So when I do not understand the passage, I will watch the video provided. It improves my comprehension."*

Participant C agreed saying that:

> *"I think when I look at the diagram first, I might have better understanding when I read the text."*

Both responses indicated the usefulness of additional materials to the text such as diagram, audio or video in helping the participants obtain a better understanding of the hypermedia reading materials. In line with the cognitive constructivist theory, by referring to these additional materials made available on the websites, students were able to construct new knowledge by relating it (picture/table/diagram/video/audio) with previous knowledge, either from the existing texts or other previous ones. This process in turn helps students to build more in depth knowledge of the subject (Maslawati, 2012). It is believed that the participants in the present study went through a similar process, as reflected in the following comments:

> *"Basically images are like extension of the paragraph. Instead of having a paragraph like hundred words, I rather have mind maps with main ideas and sometimes I can relate it with my previous lesson so that I can understand the reading materials better" (Participant G).*

Despite these advantages, a few participants found certain tables or diagrams accompanying the reading materials to be confusing and troubling. For example, Participant F found that a few images were "*not really helpful*" because of their small size and non-editable format ("…*when I click it doesn't get any bigger*"). Where tables were provided, it was found that they could not be understood. As stated by Participant F, "…*there is no words. I cannot understand the table*."

What these findings suggest is that participants had the opportunity to be more selective in choosing suitable materials as for their reading preferences. The choice to access additional materials such as videos to supplement the hypermedia texts is an instance of this freedom. The participants, however, were also required to be smart in choosing the materials that would help them comprehend the topic related to their course requirements (Herman and Gomez, 2009).

Hyperlink and Gloss

The findings of the study also show that the hyperlinks or glosses provided on the websites helped facilitate better understanding of the reading materials. As noted by Nation (2001), learners might interpret certain difficult words incorrectly, thus leading to a misinterpretation of the content. Clicking on the textual glossaries

normally would provide learners with an accurate meaning of the relevant word. This was also pointed out by Participant J in her reflective notes:

> *"I also click the hyperlink provided in the website because it contains more information about what I want to know and also certain words that have underline (gloss) because actually it has additional information about that word. The hyperlinks and that underline words are helpful as I often click it, it gives more specific information about some key words."*

As TESL students were required to read numerous L2 reading materials, they were likely to encounter some difficult words. For learners with limited vocabulary, the hyperlink and glossaries can help them understand the topic being discussed as comprehensible information of the words is available to the learners (Garrett-Rucks, Howles and Lake, 2015). Basically, the strategy of using hyperlinks and glosses helped the participants with the comprehension of the hypermedia reading materials.

Color and Size of the Fonts

When the participants were asked about the design of the hypermedia reading materials, the majority highlighted some issues regarding the color and size of the font. There were mixed reactions to color. For example, the interview responses of Participants D and E indicated the following:

> *"It's a little bit childish; with pink and flowers but I think it's okay. It attracts me" (Participant D).*

> *"… the font is colorful and bright, which have attracted my attention to read" (Participant E).*

These findings were similar to Gilbert's (2014), in which the research participants were attracted to reading hypermedia reading materials with bright text colors. On the other hand, other participants were less enthusiastic. As noted by Participants I and F in their reflective notes:

> *"…but the use of so many colors can be distracting too because I might get confused in distinguishing the main ideas of the text from its supporting details and examples."*

> *"…the font is too small, I think. I think if it's bigger, it will help me more."*

In the case of Participant I, the different colors affected her concentration while reading. Further probing showed that the font size added to the difficulties of reading experienced with color. The combined effect resulted in eyestrain and eye fatigue, as participants reported having to really squint their eyes to read. It was also reported that they had to stop reading momentarily to "rub their eyes" before continuing. The loss of concentration experienced by the participants could affect the comprehension of the hypermedia reading materials. This can clearly be seen in the case of Participant I. Such a problem is further heightened given the fact that reading a hypermedia material is different from reading a printed text. According to Nelson (1992), with hypermedia texts, the eyes move in circular motion because readers read the information in scattered bits and pieces and not in a straight line from left to right as they do when reading the printed texts (Maslawati, Harieza and Shahizan, 2015).

4.2 Other Challenges

In comprehending the hypermedia reading materials, the design and its content were not the only challenges. There were also the advertisements to contend with, easy access to social media websites, problems with Internet connection, and physical issues such as sore eyes. It is believed that these matters could also affect the participants' hypermedia reading comprehension. In the case of advertisements and other pop-ups, most of the participants reported becoming distracted and losing focus and understanding. Gilbert (2014) also noted similar findings. Some of the comments obtained from the reflective notes of participants B and E included:

> *"There are some advertisement shows beside the text that make me distracted" (Participant B).*
> *"I am easily distracted by the ads at that particular time of reading" (Participant E).*

With the participants the strategies to reduce these distractions included choosing websites which had minimal or zero amount of advertisement, or installing Adblock extension into their computer. Another way was by simply closing the website and choosing another related hypermedia reading materials.

Easy access to social media websites could also be another cause of disruption. Three participants revealed that they tend to go to social media websites such as Facebook and Twitter, resulting in a loss in concentration and eventually affecting reading comprehension. As noted by Participant J:

> *"…usually I will open one or two tabs for social media site like Twitter and Facebook. If I get bored of reading the articles or journals, I will switch to my social media tab."*

The issue with social websites is that the majority of the participants used them solely for fun, to communicate with friends for other reasons than to discuss the reading materials. As stated by Lenhart et al. (2007), teenagers use and treat online social media websites as a venue for social interaction – a place where they can share their thoughts, tell stories, and interact with others. In this study, only Participant B made use of online social media websites to share her reading materials with her classmates.

Another challenge confronting the participants was bandwidth speed or Internet connection. As hypermedia reading required a good Internet connection, any problem with connection and speed could disrupt their reading sessions. Four participants stated that slow bandwidth speed was de-motivating and caused them to lose interest while reading. Participant F had the following to say in the interview:

> *"…when there is some problem with the internet, I became lazy to do anything related to researching."*

Participant D also agreed, saying that, "*It (slow internet connection) will de-motivate my interest to read*." The findings corroborated Park and Bonk's (2007) findings, whereby it was found that one of the challenges of reading in an online environment was the problem with the Internet connection or bandwidth speed.

5. Conclusion

The researchers were able to shed light on two research questions of this study: (1) What were TESL students' perceptions towards hypermedia reading materials and (2) what were the factors contributing to their reading comprehension?

There are a few major features of hypermedia materials that affect students' level of reading comprehension as well as their reading interest, namely the presence of audiovisual materials, glossaries and annotations, and the design of the websites. Among the main results drawn from this case study is the preference among the students for hypermedia materials which consisted of diagrams and videos, as they helped them to enhance their understanding of the reading materials. These features also enhanced the students' understanding on the topic they were required to learn, in particular among visual and auditory learners. The second important feature is the availability of glossaries and annotations. Glossaries and annotations provide more detailed information, definitions, or explanations of unfamiliar words in the text. These features seemed to be essential for students because vocabulary is the most comprehensive and most difficult aspect of English for second language users. They also help readers understand the sentences better. Thus, they are more motivated to continue reading if their comprehension is high. They would skip the website if the jargon was too difficult for their proficiency level.

The layout of the website, specifically its design, color, font size, table, and diagrams, also affect the students' reading. A website, which is too crowded with information and advertisements, resulted in readers losing concentration. Pop-up advertisements are always known to annoy readers and distract them from their reading. The small-sized fonts, especially those below 11 point, and glaring background colors would impede students' reading interest, because after some time they would experience eye fatigue. Furthermore, websites which consist of a text or texts which are too long require the students to scroll up and down the pages. The display of tables and diagrams with little or no accompanying description like keys and labels would also adversely affect reading comprehension.

Other challenges are unstable Internet connection and low bandwidth. Low bandwidth often results in poor video quality, and thus students are not able to watch videos on YouTube or other websites easily. The slow loading and choppy video quality results in students' loss of interest. These findings could be reported to the relevant authority in order to resolve the Internet problems. Better Internet connection and bandwidth are important to accommodate students' needs to obtain instructional information online.

These findings could provide some guidelines for course designers when selecting hypermedia materials for their students to read or watch. The course designers may need to further add some features into the hypermedia materials like glossaries, annotations, tables, and diagrams to enable students to read more efficiently. The findings could also provide some insights to the course designers regarding the selection of materials with simpler and shorter sentences, appropriate font size (specifically font size 12 to 14), appropriate colors for the background, and proper use and labeling of diagrams.

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