Hypermedia Literacy: An Insight into English as a Foreign Language Online Reading Processes

Literasi Hypermedia: Suatu Penelitian Proses Pembacaan atas Talian dalam Bahasa Inggeris Sebagai Bahasa Asing

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ABSTRACT

The advent of the Internet has generated new ways of reading for knowledge, suggesting that digital literacy is a necessity for students of this new era. Even so, there is still a dearth of knowledge in the field that can provide rich theoretical descriptions of online reading processes of English as a Foreign Language (EFL) readers in the hypertext environment. This article elucidates the perceptual learning styles and the metacognitive reading strategies of English as a Foreign Language students in hypertext reading environment. Their perceived preferred practices were elicited through a questionnaire and interviews, while actual observed online behaviours were recorded with Camtasia Studio 7. Based on these data sources, patterns of reading hypermedia texts on an online reading platform were identified and compared using NVivo 9. The findings indicated that the students' perceived as well as their preferred learning styles and metacognitive reading strategies were mostly not performed or applied by them when they were engaged in the actual hypermedia reading environment. These differences in behaviours were contributed to the reading tasks and hypermedia tools made available by the platform facilitating their reading processes. Most significantly, the study revealed that the types of hypermedia tool available enabled them to modify their previously preferred practices for other ways of reading and comprehending the hypermedia texts. Moreover, the findings have also implied that students reading hypermedia texts online can develop different choices of sensory pathways unique to digital literacy environments. Thus the findings are significant as they contribute towards the currently limited knowledge about electronic literacy and online reading processes.

Keywords: Hypermedia reading; hypertext; EFL learning styles; online reading strategies; digital literacy

ABSTRAK

Kemunculan Internet telah menghasilkan cara baru untuk membaca dan mengakses pengetahuan, sekaligus menggariskan literasi digital sebagai satu keperluan hakiki pelajar era baru kini. Sungguh pun begitu ilmu serta teori mantap yang memberi penerangan kukuh berkenaan proses pembacaan dan kefahaman pelajar bahasa Inggeris-sebagai-bahasa asing dalam persekitaran hiperteks ini masih kurang mantap. Artikel ini menghuraikan persepsi berkenaan laluan deria dan strategi metakognitif pelajar berkenaan semasa membaca hiperteks atas talian. Kedua-dua persepsi amalan pilihan mereka serta tingkah laku sebenar yang diperhatikan berlaku semasa mereka membaca teks hipermedia atas talian, telah dikenalpastikan dan dibandingkan. Persepsi amalan dalam proses membaca dicungkil melalui soal selidik dan sesi temuduga, sementara tingkah laku sebenar semasa membaca atas talian dirakam melalui Camtasia Studio 7. Berdasarkan sumber data ini, corak membaca teks hipermedia atas talian telah dianalisis mengguna Nvivo 9. Dapatan kajian menunjukkan pelajar tidak menggunakan gaya pembelajaran dan strategi metakognitif membaca seperti mengikut persepsi mereka, semasa melakukan pembacaan hipermedia atas talian yang sebenar. Perbezaan persepsi dan tingkah laku sebenar telah berlaku akibat kesan dari jenis tugasan bacaan yang diberi dan juga alat hipermedia yang disediakan. Paling ketara, kajian menunjukkan bahawa amalan strategi yang menjadi pilihan biasa kepada pembaca diubah suai untuk membantu mereka memahami teks

hipermedia dengan lebih berkesan dan efisyen. Justeru itu adanya alat-alat hipermedia dalam platform bacaan atas talian, proses laluan deria seorang pengguna bahasa Inggeris-sebagai-bahasa asing boleh berubah mengikut persekitaran literasi digital yang dibentuk. Oleh itu dapatan kajian ini amatlah bermakna kerana ia menyumbang kepada pengetahuan literasi elektronik dan proses pembacaan atas talian.

Kata kunci: bacaan hipermedia; hiperteks; gaya pembelajaran bahasa Inggeris sebagai bahasa asing; bacaan atas talian; literasi digital

INTRODUCTION

The rapid development of information communication technology (ICT) in the new millennium has expanded the view of literacy, particularly in the academic contexts, where students find themselves increasingly engaged in digital literacies. In essence, a digitally literate person is defined as one who possesses the skills to use ICT to find, understand, evaluate, create, and communicate digital information in a wide variety of formats, requiring both cognitive and technical skills. Accordingly, a web-based inquiry process using the Internet entails online literacy skills and reading strategies to comprehend electronic texts. These types of on-screen informational texts, referred to as hypertexts, incorporate hyperlinks and hypermedia elements. A hypertext document contains other digital text documents which are interconnected and are accessible through hyperlinks that take the form of underlined words and phrases, buttons, and other indicators on the screen. Whereas hypermedia essentially comprises digital texts layered with multimedia elements such as audio, video and graphics which are accessed by hyperlinks as well. As such, this hypermedia rich environment provides users a wider choice, perspectives and access to knowledge in multimodal formats.

As early as 1994 Dryden had argued that hypermedia environments will eventually transform ways of learning and promote appreciation for digital reading in hypertext format. Following on, Patterson (2000:74-80) contends that this can lead to new educational practices for teachers and students, who can use hypertext in new, participative ways in the classroom. Further, Leu et al. (2015) asserts hypertext reading environment creates an interaction between reader and text where the learner apparently has more control over the hypermedia reading environment whilst both the reader and the text are interacting as "active participants" in the reading process.

According to Gervais (2007) as readers adjust to the digital medium, the non-linearity of hypertext may affect the reading process. For example Gervais (2007: 183-202) highlights that it is not clear whether hyperlinked words are read in the same way as print-based words, and that readers must learn how to navigate or manipulate texts on screen to understand and interpret meaning from the texts. Additionally digitization of texts also means that readers have access to great numbers of texts, effectively changing the reader's cultural reading context. However, there is also concern that the deluge of digitized texts necessitates intelligent selection and strategic reading speeds for readers to be able to manage the overflowing information efficiently and effectively. This is why Coiro and Dobler (2007) claim that online reading comprehension as they are applied in education settings is now a critical context for new literacies research in this digital age. In fact latest findings in new literacy studies imply many dimensions of online reading may require new or modified comprehension skills and strategies over and above those required when reading printed books as suggested by Afflerbach and Cho (2009), Hartman, Morsink and Zheng (2010), and Coiro (2011).

The relationship between learning strategies, learning styles and digital reading comprehension has also emerged as an area of interest in the field of digital literacy research. Leu et al. (2015), Hsieh and Dwyer (2009), and Driscoll (2005) in their separate investigations into digital reading consistently revealed that L1 and L2 students with their own learning styles may process information differently in an online environment and that different online reading strategies may influence students' information processing methods. To date, these developments and future directions in hypermedia and hypertext introduces digital reading theory as an emerging area of study that continues to seek a theoretical framework and acceptable body of knowledge.

As hypertext reading becomes more prevalent, it brings into focus an important question— does the hypermedia environment change the way students read? As students do more reading and research online, do they develop different choices of learning styles or sensory pathways unique to digital literacy environments? In the same vein, it is also significant to investigate if the hypermedia literacy practices have brought about transformations in the types of metacognitive reading strategies usually preferred by the students when they do offline reading. These issues are the impetus for the aim of the exploratory study reported here which focuses on the impact of hypermedia literacy on EFL postgraduate students' preferred learning pathways and metacognitive strategies. Hence this study hopes to contribute towards the ever growing need to build knowledge about hypertext reading in hypermedia environments, particularly for EFL or English as a Second Language (ESL) reading contexts, the reader cognition and their online reading processes.

AIM OF STUDY

This study seeks to explore and understand the complex interplay between offline and online reading skills of EFL postgraduate students as they read hypertext documents and research for information on the Internet. In addition, the investigation intends to find out the extent to which these students still apply the same metacognitive strategies they used in print-based texts and to what degree they still exhibit their preferred learning styles or learning sensory pathways. Therefore this study intends to draw attention to the ways of reading online that will reveal whether the EFL reader need to modify, adapt and even apply new strategies and sensory pathways in their reading processes to comprehend informational texts online. Simultaneously, the study will observe the ways the readers use hypermedia tools that are incorporated in the hypertext environment and their relationship with the EFL students' reading comprehension performance.

In summary the study aims to 1) identify EFL postgraduate students' perceptual learning style preferences or sensory pathways; 2) ascertain the hypermedia reading tools used by them while reading academic hypermedia texts; 3) distinguish the metacognitive reading strategies employed by the students while reading academic hypermedia texts; 4) draw the relationships between their preferred learning sensory pathways and the metacognitive reading strategies as well as the hypermedia tools they used while reading academic hypermedia texts.

For the purpose of this study, hypertext is distinguished from Internet text (Corio 2011) and is used to refer to the digital informational texts that are linked within a reading platform called iELLS© or intelligent English Language Literacy system, developed by Hazita et al. (2010) based on previous studies they conducted on reading strategies and preferred language learning styles and strategies of tertiary EFL academic readers. Further clarifications about this reading platform can be found elsewhere in Nor Fariza et al. (2009) and Afendi et al. (2010).

THEORETICAL FRAMEWORK

The ever evolving Internet and continuously advancing information technology present a central challenge for digital literacy theory development. However, digital literacy theory is an emerging area of study and continues to seek a theoretical framework and accepted body of knowledge. Leu et al. (2015:2) is of the view that the "Internet is a Literacy issue". With the Internet, "literacy is not just new today; it is new every day, as additional technologies for literacy regularly and rapidly appear online" (Leu et al. 2015:5). Prior studies (Coiro 2011; Afflerbach & Cho 2010; Hsieh & Dwyer 2009; Nowak 2008; Leu et al. 2008; Gervais 2007; Carusi 2006; Driscoll 2005; Leu et al. 2004) substantiated that as readers adjust to the digital medium, varied online reading strategies are employed to process information. Meanwhile, they noted that students' preferred learning styles appear to influence these information processing methods. Some also inferred that there appears to be a complex relationship between digital reading and offline reading skills that are required when the reader moves from traditional reading to the hypermedia environment (Leu et al. 2015; Afflerbach & Cho 2010; Hartman, Morsink & Zheng 2010; Coiro & Dobler 2007). Researchers in the field of new literacies have yet to develop firm conclusions of these assumptions about the changes that hypertext and hypermedia environments may bring to academic reading and learning, particularly

in the context of EFL or second Language (L2) hypermedia reading processes.

Accordingly, today, views about how to teach and do reading has also changed as realization that the impact of these technological advances are transformative and can disrupt the normal and conventional ways of learning. As stated earlier, a hypermedia environment constitutes diverse forms of media that is presented in both words, pictures and sound, making them multimedia in nature. Currently, the cognitive theory of multimedia learning generated by Mayer (2010) guides analysis and understanding of learning in hypermedia environments. Building on cognitive psychological theories, the multimedia learning theory provides a framework for examining the impact of hypermedia features on the reader's cognitive processes. Nevertheless, multimedia learning in hypermedia environments remain an area of enquiry that requires significant work and greater empirical study. For instance, recent trend in the literature suggests there still remains a broad interest in the effects of hypermedia on types of learner, an effect that has shown to influence performance repeatedly (Mayer 2010). Of related interest to this study is the influence of individual differences in terms of preferred learning styles or sensory pathways and how they influence learning to occur in the multimodal hypermedia context.

Additionally, this study postulates that different modalities of the hypermedia environment serve different perceptual learning styles to use different metacognitive strategies for better and meaningful reading. In the interactive reading theory for multimedia learning, Grabe and Stroller (2002) believe that students benefit from utilizing the multimodal (visual and aural) knowledge presentations when they apply their metacognitions (bottom-up strategies) and the prior knowledge (top-down strategies) to interact with hypermedia texts. Metacognition refers to thinking about thinking or the ability to look at your thinking. Meanwhile, based on Rumelhart's model of interactive reading (1977) the processes involved in reading and comprehension entail the employment of both the sensory pathways or bottom up metacognitive strategies and the thinking aspect of reading or the top-down metacognitive strategies. Consequently, interactive processing according to Rumelhart and McClelland (1982) is essentially cooperative processing wherein information in all types of modality and at all levels of abstraction

synergize together in the process of reading and comprehension. Accordingly Lian (2011) suggests that the constructivist approach informs understanding about metacognism thinking. She expounds that in order to create something new from previous idea or existing product, students should be allowed to be different and reflect on their thinking and values, question, analyse and be open-minded about it. Thus the ability to integrate information from different modes, which is a simultaneous process, is an important aspect of reading multimodal texts in hypermedia environments.

Hence, given the scope of this study its relatedness to the new literacy, multimedia learning and interactive reading theories, this study proffers a tentative digital literacy theoretical framework that is informed by the three aforementioned theoretical perspectives, framed within relevant parameters of their principles and assumptions. The three theories are: The new literacy theory (Leu et al. 2004; Leu et al. 2008), the cognitive theory of multimedia learning (Mayer 2010), and the interactive reading theory (Grabe & Stroller 2002). The theoretical framework for the study that is drawn from the three perspectives outlined above guide the research in identifying and categorizing the research participants' preferred learning sensory pathways and metacognitive reading strategies when reading online and offline, while simultaneously highlighting the hypermedia tools that facilitates reading and comprehending the hypertexts. Through this framework, an analysis of relationship between EFL learning styles, reading strategies and reading comprehension of the multimodal texts is derived, contributing towards hypermedia environment studies for EFL contexts.

The hypermedia environment in this study was provided by the iELLS© or intelligent English Language Literacy system platform, where the postgraduate students have access to hypertext materials for academic reading purposes. The platform was designed based on a model of hypertext learning that are consistent with reading processes and learning strategies, as well as sensory pathways found to be preferred by majority EFL and L2 readers in reading print-based texts (Nor Fariza et al. 2009). Based on these cognitive strategies, corresponding hypermedia reading tools and interfaces are incorporated into iELLS and are organized to help the reader to navigate the academic digital texts. These included tools that

facilitate the readers' sensory pathways, such as sight, hearing, tactile and kinesthetic modes they preferred to use when they read print based texts (Afendi et al. 2010). Underlying iELLS' concept of designing reading interface for EFL academic purposes is the central claim of hypertext theory (Carusi 2006) that hypertext, apart from changing the printed texts into multimodal texts, will have the ability to change the roles of readers, modify the ways that readers read these multimodal texts, and more significantly, better facilitate reading comprehension processes as the reader navigates, manipulates, understands and interpret the texts. Therefore, in its final analysis, the main findings from this study will also contribute towards the design and development of effective hypermedia reading tools and interfaces to improve interactive online reading processes for academic purposes.

METHODOLOGY

This exploratory study was conducted to examine online reading behaviours of EFL postgraduate students when reading academic hypertexts in a hypermedia environment. Simultaneously, the study hopes to reveal new knowledge about the use of the hypermedia tools such as My Notes, Forum, Video Journal, Dictionary and Translation Tools, audio and visual representations, such as graphs, tables, and PowerPoints, to gain insights into the extent to which they facilitate learning styles (sensory pathways) and metacognitive strategies in hypertext reading comprehension processes. Towards this purpose, a case study that uses the mixed method design was employed to enable close examination of the behaviours as well as conduct an in depth inquiry of the related innate cognitive choices that influenced these observed behaviours.

The case study entails a purposive sampling of 11 participants who were selected based on pre-determined criteria. The sampling included EFL postgraduate students majoring in English language studies enrolled at a university where English is also an additional language, rendering the education environment they were studying at as a non-native context to the target language. They comprised 2 males and 9 females ranging between 24 to 45 years of age. However, there is no research interest about their gender in this study. Mainly, the research participants were selected

based on their language proficiency (IELTS score not below 5.5) and their Internet and computer literacy competencies. This is because the study required participants who have adequate computer skills to be able to read the materials in the English language and can complete ICT related tasks on the computer. As part of the selection process, all potential participants were required to take an online computer literacy test. The computer literacy test was adapted from Leu et al. (2008) and measured basic computer skills, knowledge about the Internet, as well as ability to conduct computer based tasks to access, find, manage and generate Internet based information.

Additionally, to identify the students' perceived preferred learning styles, the Perceptual Learning Styles Questionnaire (PLSQ) developed by Reid (1995) was administered to distinguish their six sensory pathway preferences (Visual, Auditory, Kinesthetic, Tactile, Individual, and Group) and their metacognitive reading strategies, prior to reading two academic hypermedia texts. This quantitative data is then compared with analysis of results from the qualitative descriptions of observed reading patterns recorded by Camtasia Studio 7 as analysed by NVivo 9.

Further, to identify the metacognitive reading strategies linked to the above mentioned pathways, the Survey of Online Reading Strategy (SORS) questionnaire, adapted from Anderson's (2005) and Mokhtari & Sheorey (2002) was used to inform about the metacognitive strategies respondents perceive they employ while reading academic hypermedia texts. The SORS was administered before and after the research participants engaged in reading online hypertexts. The strategies are then analysed according to categories grouped by Mokhtari and Sheorey's (2002) for academic reading processes, namely, global reading strategies (GLOB), problem solving strategies (PROB) and support reading strategies (SUP).

Meanwhile, hypermedia reading behaviours are screen recorded to trace and detect the students' reading patterns or navigational pathways in terms of the hypermedia tools they chose to use to facilitate their reading process. This information is then compared with the students' responses from PLSQ and SORS questionnaires. The research observations of these behaviours was conducted in a computer lab at the university to enable the use of desktop computers installed with the Camtasia Studio 7 software necessary to tract their reading

patterns, strategies, and voices, as well as their use of the hypermedia tools of an online reading platform. The Camtasia software recorded these screen recordings (video and audio) generating observational data to be analysed. In the study, Camtasia captured participants reading the hypermedia texts for a total of 16 hours of on screen recordings. The screen recordings were coded, categorized and analysed using the NVivo 9. The results of these recordings were triangulated with the interview data and questionnaires.

An in depth analysis of the behaviours demonstrated was further conducted through stimulated recall or retrospective interview sessions which took place after the reading episodes. Participants were made to recall their reading behaviours based on the recordings by Camtasia, and were asked to explain their choice of behaviours at selected intervals by the researcher. According to Dorney (2007) this stimulated recall increases the effectiveness of data resulting in enhanced reliability. Responses from these stimulated recalls were analysed thematically to gain deeper insights and expanded perspectives of the participants' decision making process and observed preferred choices as they negotiate the hypertexts with the hyperlinks.

FINDINGS

This study investigated online reading processes of EFL postgraduate students with the aforementioned research aims and guided by the following research questions.

1. What are the EFL postgraduate students' perceptual learning style preferences?
2. What hypermedia reading tools were employed by them while reading academic hypermedia texts?
3. What metacognitive reading strategies were employed by them while reading academic hypermedia texts?
4. To what extent do their learning sensory pathways reflect their utilization of the hypermedia reading tools and metacognitive reading strategies while reading academic hypermedia texts?

The following findings from the study bring to light the ways in which EFL readers respond to online reading situations, concomitantly revealing flexible cognitive procedures and strategies that are adapted or modified from their preferred ways of reading printed text. These findings echo related findings from researchers such as Coiro (2011) and Afflerbach and Cho (2010) who postulate that readers apply what they know about reading printed text more flexibly while adapting to diverse and constantly changing online reading situations, as well as on the basis of their purpose of reading. They also imply that the readers must also apply modified and completely new strategies too. Interestingly, triangulated data analysis from the PLSQ, SORS, Camtasia recordings, and interviews conducted in this exploratory study confirm the aforementioned assumptions as evidently explicated below.

As noted previously, the preference of an individual to perceive and process information through one or more of the sensory modalities may influence the reader's meaning-making process. The ability to integrate information from different modes or sensory pathways will have effects on the ways an individual senses, thinks, solves problems and remembers information. In multimodal texts, compared to print based texts, various senses such as sight, hearing, tactile and kinesthetic are more acute and relevant given the characteristics of hypermedia tools that have all kinds of annotations (note taking, highlighting, video, infographics, audio and links). These hypermedia tools can benefit different modes of learnings styles used by readers whose learning sensory modalities are inclined towards visual, auditory, kinaesthetic, and tactile (Afendi et al. 2010). The hypermedia reading environment for this study, iELLS, essentially considers these mentioned features and characteristics of hypermedia.

Table 1 and Table 2 illustrate the findings that demonstrate the differences in their preferred perceptual learning styles when reading printed texts as reported by the research participants, in comparison with their observed sensory pathways as displayed by them when they were navigating and manipulating the hypertexts online. The results for preferred perceptual learning styles obtained from the PLSPQ (Table 1) and the displayed sensory pathways as observed from Camtasia recordings (Table 2) are ranked by averaged scores of number of instances as illustrated below. In effect, these findings address the first two aims and research questions of the study.

As indicated in Table 1, the most preferred learning style among the participants was the tactile learning style which had the highest average score, n=39 instances. The group learning style and kinesthetic learning styles received the second highest score, n=36 instances each; while the third ranked is the visual learning style, which had an average score of n=35. In addition, the auditory learning style (n=34 instances) was the fourth style preferred by the participants. Finally, the scores also revealed that the lowest score (n=28 instances) was received for individual learning style. Therefore, it can be concluded that the overall pattern of preferred learning styles of the 11 Iranian participants was inclined towards a combination of tactile (major preference), group, kinesthetic, visual, auditory to individual (minor preference) sensory pathways.

TABLE 1. Averaged Scores of Instances of Perceived Perceptual Learning Styles
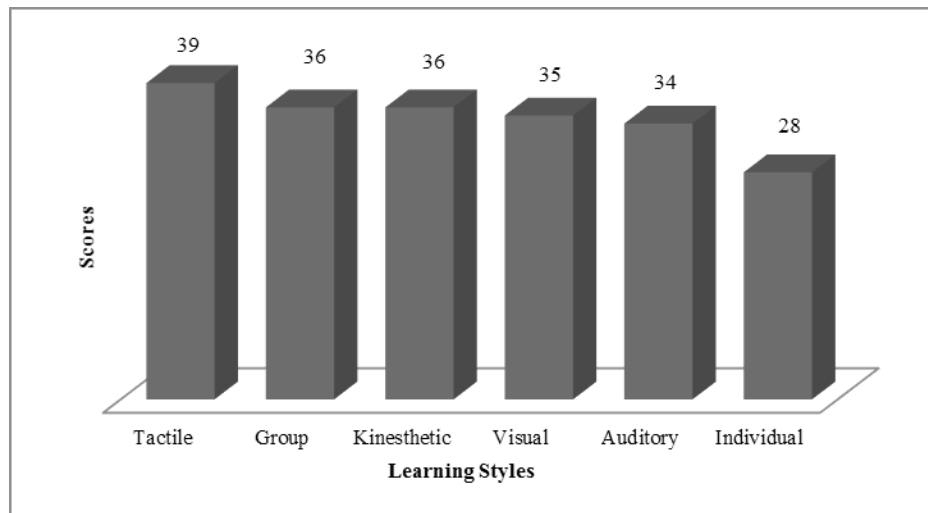
In comparison, as evident in Table 2, when the research participants engage with real hypertext reading in the hypermedia environment their patterns of reading behaviours apparently shifted in terms of preferred use. This modification showed stronger inclination towards using visual and tactile styles (major), before auditory, kinesthetic, group and individual (minor) sensory modalities. Clearly, a comparison between the findings in Table 1 and Table 2 reveals an apparent difference in terms of the preferred use and actual use of learning sensory pathways. This summation was arrived at based on instances of performed sensory pathways observed through usage of hypermedia tools that the participants chose to use when engaged in online reading on the iELLS platform. For example, when a participant chose to use the highlighting and note taking tools, which are designed as support reading strategies tools, they are considered as visual and tactile learners. Meantime, when the participant chose to use the audio tool such as listening to a videotaped reading of the text or view a video to listen to a lecture on a related topic of the same text, it is noted that the participants are demonstrating audio sensory preferences for the former, and a combination of audio as well as visual style preferences for the latter.

Indeed, researchers have discovered that when learners want to focus on process, internalize or remember new and difficult information they utilize different learning styles or pathways. According to Reid (1995), this combination of patterns reflects the preference of the individual to perceive and process information through one or more sensory modalities. Sadler-Smith (1996) explains that this is based on the brain's ability to perceive information through one or a combination of pathways, interact with the learning environment, and process information to make meaning. Therefore, each individual will take advantage of these continuum of pathways based on their own brain system as each deals the way they approach learning a new language or any kind of subjects (Oxford 2003).

Table 2 depicts the recorded behaviours of the research participants gathered through Camtasia Studio 7. The data shows the frequency of usage of hypermedia tools by the readers while reading hypertexts on the iELLS platform. The observed

data were coded and analysed using NVivo 9 to reveal patterns of online learning pathways the readers demonstrated through their choice of hypermedia tools. As stated earlier, this data is compared with the perceived learning styles they claimed earlier they preferred to use when reading print based texts.

TABLE 2. Average Scores of Patterns of Hypermedia Tools Ranked by Instances of Usage
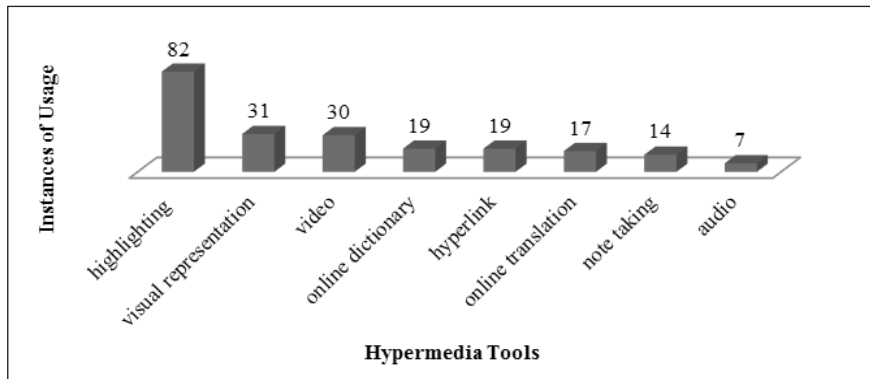
As indicated in Table 2, the readers demonstrated preference for eight hypermedia tools that were available for them on the iELLS platform. The obtained results show that the most used tool was highlighting (n=82 times). Visual representations such as charts, tables, PowerPoints were coded 31 times or instances of usage; while video had 30 instances of usage. Hyperlinks and online dictionary were used with the same instances of usage (n=19 times). Online translation tool was used 17 times by all participants while reading academic hypermedia texts. Meanwhile note taking was used 14 times by all participants. The least used tool was audio tool which was used 6 times only among participants.

Based on the observed data, it is purported that the highest performed sensory pathway observed for online reading is the visual learning style, followed closely by the tactile learning style, while auditory learning style plays a minor role comparatively. Thus, it can be claimed that based on the hypertexts and the purpose of reading online, the participants demonstrated an altered preference of learning styles for visual sensory pathways more than the tactile modality. Table 3 indicates the total number of instances the hypermedia tools were used by all 11 participants as they are grouped into visual, tactile, and auditory sensors. Highlighting, visual representatons, and videos are grouped as visual pathways. When a reader highlights portions of the text he is reading, it denotes that he is visually noticing the importance of the language input and understand its significance for retrieval and reflection for short term to long term understanding (Anderson 2005).

TABLE 3. Pattern of Performed Learning Sensory Pathways in Actual Hypermedia Reading
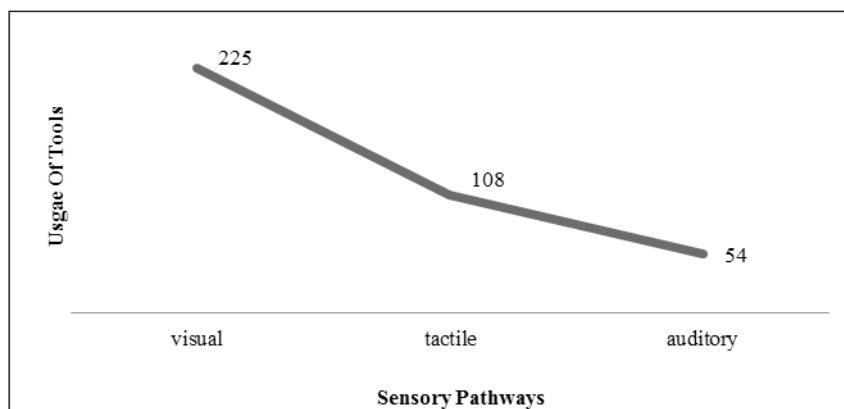
As previously discussed, the manipulation of a text in the reading process entails the readers applying their perceptual learning styles for meaning making which are closely interlinked with their use of metacognitive reading strategies for information processing. The following sections reveal the findings for the third and fourth research aims. Figures 1 and 2 show the average scores from the adapted SORS data which measures the readers' perceived (Figure 1) as well as actual (Figure 2) usage of metacognitive reading strategies (MRS) while reading academic hypermedia texts. The illustrated findings suggest clearly the types of metacognitive strategies the readers apply when manipulating the online texts for understanding and extracting meaning when utilizing PROB, GLOB or SUP strategies. The scores depicted are based on a scale where a mean of 3.5 or higher is categorized as High-level strategy use, while a mean of 2.5-3.5 is Moderate-level user, while 2.4 or lower is Low-level strategy user. According to Mokhtari and Sheorey (2002), GLOB strategies include a top-down approach to the reading task, for example reading with a purpose in mind, skimming and scanning the text to preview the structure of the text in terms of length, organization or info-graphs, and most importantly to gauge author's intent as well as purpose. Whereas, PROB strategies are focused techniques used when readers encounter problems in understanding the textual information. These include adjusting one's reading speed, guessing meanings from context, and re-reading to notice specific parts of the text. Meanwhile, SUP are basically functional aids that provided extended and expanded support mechanisms to the reader such as guided links to reference materials, dictionaries, highlighting, underlining, and note taking.

Figure 1 shows the original pattern of preferred usage of metacognitive reading strategies the readers perceive they would apply when reading online or hypertexts based on their previous practices. Clearly, the data reveals that the readers most often use problem solving strategies (PROB m=3.51), followed closely with global reading strategies (GLOB m=3.48) and less so the support reading strategies (SUP m=2.91). The overall average mean is gauged at m=3.30. This indicates that generally the participants are considered as "Moderate-level users" of online reading strategies.
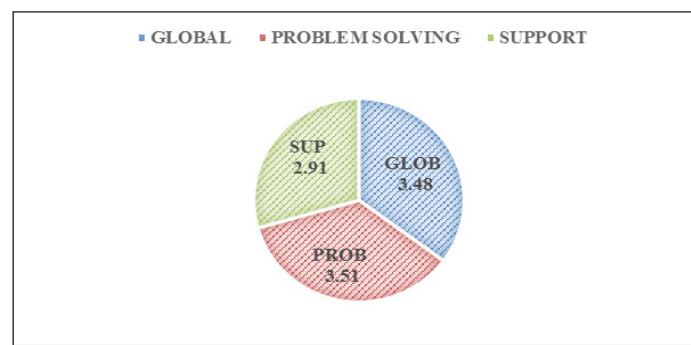

FIGURE 1. Mean Scores of Perceived Usage of Metacognitive Strategies by Category

Additionally, Table 4 lists the specific types of perceived metacognitive strategies from each GLOB, PROB, and SUP categories that were identified by the readers they would more often apply when reading online texts.

Interestingly, not unlike the learning sensory pathways reported previously, a contrasting pattern emerged from the data showing modified differences in the readers' perceived use and actual use of the metacognitive strategies when reading the hypertexts. Figure 2 and Table 5 below indicate these modified uses of the strategies as coded by NVivo 9 when compared with the perceived reading strategies data as indicated in Figure 1 and Table 4.

Figure 2 indicates, in contrast to Figure 1, that majority of the EFL postgraduate students apply SUP strategies when reading academic hypermedia texts. Specifically, 145 actual instances of the SUP strategies usage were coded in real academic hypermedia readings. This is followed by 70 instances of GLOB strategies usage by all of the participants; while the least used strategy, is PROB strategies with only 24 instances of usage.

TABLE 4. Most Frequent Metacognitive Strategies Readers Percieved They Use When Reading Online

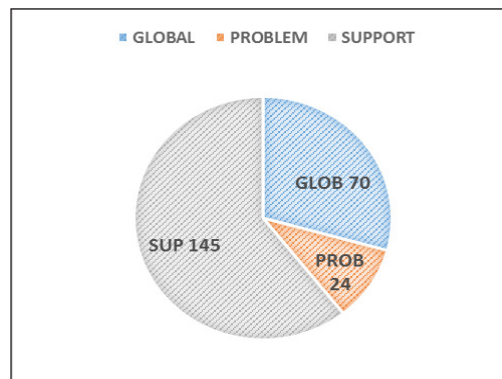| Category	Strategy
GLOB	6. taking an overall view of the on-line text
	17. reading pages on the Internet for academic purposes
	1. having purpose in mind
	27. guessing what the content is about
	5. using prior knowledge
PROB	31. guessing the meaning of unknown words or phrases
	28. re-reading to increase understanding
	16. paying closer attention to reading
SUP	21. paraphrasing for better understanding
	15. using reference materials (e.g. an on-line dictionary)
	25.going back and forth in the on-line text
	12. printing out a hard copy of the on-line for underlining or circling

FIGURE 2. Average Scores of Instances of Actual Usage of Metacognitive Strategies by Category

Specifically, Table 5 indicates that the most frequently performed SUP strategies by the 11 participants is "annotating the text (by highlighting) with 82 instances of usage; followed by "using reference materials such as online dictionary" with 19 instances of usage by all participants. The third most performed SUP among the participants was the "translating into native language" with 17 instances of usage, "taking notes with 14 instances of usage and "reading aloud to understand" with 7 instances of usage. The least performed strategy was "going back and forth in the online text".

Meanwhile, the most frequent GLOB strategies used is "using graphic organizers (tables, figures, pictures) with 31 instances of usage; and the second and third favored strategies with relatively high percentages of usage are "reading pages for academic purposes (19 instances of usage), and "taking an overall view of the text" (with 16

instances of usage) respectively. "Confirming predictions" received only 4 instances of usage, while the least performed was "noting length and organizations" with only one instance of usage by the readers. Whereas for the PROB strategies, it was noted that "re-reading the text" (with 15 instances of usage) and "reading slowly and carefully" (with 11 instances of usage) were the only main strategies used in the academic hypermedia reading process.

The results of this study that show an inclination towards a higher use of the SUP strategies on actual online reading supports findings by other researchers including Pressley (2000), Mokhtari and Sheorey (2002) and Tracey and Morrow (2006), in their comparative studies between good readers and proficiency challenged readers, as well as native student readers and ESL/EFL student readers. Pressley (2000) had found that the use of supportive reading strategies are typical

TABLE 5. Most Frequent Metacognitive Strategies Readers Actually Used When Reading Online

Performed Metacognitive Reading Strategies	Instances of usage among participants
SUPPORT STRATEGIES:	
Annotating the Text by Highlighting	82
Using Reference Materials	19
Translating into Native Language	17
Taking Notes	14
Reading Aloud	7
Going Back and Forth in the Online Text	1
TOTAL	140
GLOBAL STRATEGIES:	
Using Graphical Organizers	31
Reading Pages for Academic Purposes	19
Taking an Overall View	16
Confirming Predictions	4
Noting Length and Organization	1
TOTAL	71
PROBLEM SOLVING STRATEGIES:	
Re-Reading the Text	15
Reading Slowly and Carefully	11
TOTAL	26

compensatory tools used by less proficient readers to enhance their comprehension; whereas Mokhtari & Sheorey (2002) in similar studies found major distinction between the native readers in contrast to the non-native readers, where the mean of usage of the SUP strategies were significantly higher for the latter group. Later, Tracey and Morrow (2006) reiterated that the dependence on these SUP strategies characterizes less matured and less efficient readers from good readers as well as more experienced readers.

In sum, it can be tentatively concluded that the overall findings suggest that the participants' pattern of perceptual learning style preferences or sensory pathways as well as the metacognitive reading strategies they use to manipulate and comprehend the texts were modified when they perform online reading of the hypertexts in contrast with their perceived preferred ways of reading printed texts as well as online readings. The findings also suggest that the readers demonstrated a continuum of sensory pathways that alternates from visual, tactile, auditory, kinesthetic, group and individual ways of doing reading as directed by their purposes for reading and while doing different reading tasks as they endeavor to comprehend and interpret the information presented to them. Similarly, the findings for usage of online metacognitive

reading strategies in this study alluded to the conclusion that the use of online metacognitive reading strategies are dependent on the choice of hypermedia tools available and the altered perceptual learning pathways that the readers may strategically apply or use when navigating online hypertexts or digital readings. It is also suggested that these choices are influenced by their level of proficiency as well as their purpose for doing the reading task. Thus results of this exploratory study can provide important evidence to support the notion that reading digital texts in an enhanced hypermedia environment can possibly change the nature of reading and the processes it entails.

CONCLUSIONS

To date, new literacy studies that investigate the nature of online reading processes as well as reading comprehension skills to help us understand the extent to which the hypermedia environment impacts on them are still emerging. In essence, this study which explored the use and applications of online reading strategies and learning styles by selected EFL postgraduate students can inform the said field, albeit to a limited extent. As pointed out earlier, findings from this exploratory case study

suggest that patterns of offline reading strategies and preferred learning pathways appear to have modified or altered when the readers navigate reading online texts. However, these findings are limited to a closed Internet environment as the students were reading hypertexts introduced through a hypermedia environment, the iELLS, which was interfaced with hypermedia tools, designed based on the phenomenology of reading strategies and learning styles of good EFL readers (Affendi et al. 2010). Nonetheless, results from this findings can be the impetus for further research on larger samples of diverse learners interacting with texts in open networked information environments.

Generally, the results indicated that hypermedia tools have a significant influence on the choices of strategies employed. This suggests that it is important to understand and teach these applications of online literacy strategies that contribute mainly to reading comprehension in complex online informational contexts, where readers continue to learn to manipulate texts on screen as they adapt to the digital reading environment. Pandian and Baboo (2015:231) advocate for a collaborative effort between teachers and researchers to build new pedagogical practices that include multimodal skills that are aligned with developments in students' digital lifeworlds. Yet as we seek to understand aspects of digital reading and the extent to which it is similar or different to offline reading phenomenology, it is recommended that we situate these new literacy practices on a continuum from which we can view similarities and differences between offline and online reading comprehension skills, and the extent to which any of these will transfer, modify or transform to generate new strategies and skills in the way the millennial reader will do reading.

In relation to this study, the findings provided preliminary evidence to suggest that the cases of EFL postgraduate students investigated demonstrated application of online strategic approaches assisted by the hypermedia tools. They claim that this had reduced their level of uncertainty while reading the text, which previously pervaded their self-confidence when they read printed text individually. This is because the hypertexts with the hypermedia interfaces helped provide them with plausible appropriate reading paths, as well as facilitated in

managing the received information. Consequently, the outcomes of this study simultaneously suggests new opportunities for the development of digital reading tools which can enhance critical reading processes in a hypermedia environment. The hypermedia designer needs to recognize the diversity in terms of preferences, and ease of use. Moreover, the designer should place emphasis on the use of metacognitive reading strategies, as it was evident in this study that the students could monitor and evaluate their own learning processes and they can distinguish what, when, and why they need certain tools which also represented selected offline reading strategies.

As the immediacy of accessing information through the utilization of multimedia makes online literacy skills imperative for all students in an education environment, an understanding of the students' preferred sensory pathways and metacognitive reading strategies in hypermedia environment as revealed in this study, will allow hypermedia designers to make informed decisions on the selection and incorporation of tools for academic digital texts. This is a priority for non-native academic readers especially as these tools will enable them to become more autonomous and independent readers. While it is impossible to accurately predict what the shape or pathways of online literacy will entail in the near future as these new literacies continuously evolve, online research and comprehension such as this study, has to be central for learning in the new millennium to prepare our EFL students for the imminent future ways of meaning making.

Hence, in this 21st century, reading digital texts online for the postgraduate student is no longer a non-option. As pointed out by Coiro (2015), digital readers must continuously make decisions about how to summarize key details and prioritize information, when to move between hyperlinks and sites to clarify and deepen understanding and determine what information has value and relates to the ideas that are forming in the reader. Therefore it can be concluded that effective online reading requires applications of critical reading strategies that are beyond the level required by the printed text as reiterated by Coiro (2015) and Konnikova (2014).

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