HYPERTEXT VERSUS FOOTNOTES: HIGH SCHOOL ENGLISH LEARNERS' ONLINE READING RECALL

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ABSTRACT

This study considers forty adolescent English Language Learners who read a passage online containing additional information available through either hypertext links or footnotes. Participants were attending a special high school for English learners at the time of the study. Two versions of the text were offered, one with hypertext and the other with footnotes, and participants were randomly assigned to the footnote or hypertext condition. Answers to multiple choice questions showed no significant difference between groups in recall of the reading under the two conditions, in contrast with an earlier study of learners in higher education settings whose recall of reading with hypertext was significantly lower than with footnotes. Learners' ratings of perceived comprehensibility of the 2 texts was also not significantly different. Additional interpretive data came from focus group interviews involving all of the participants.

"I believe that reading on the Internet is different, and our definition of reading comprehension needs to reflect those differences." (Coiro, 2003, p. 464)

INTRODUCTION

With the expansion of technology, texts on the Internet often replace traditional paper-based readings. This change requires a revision of our understanding regarding "The New Literacies" (Leu et al., 2007), a construct that recognizes a change in what reading entails when it takes place on the Internet (Allen & Seaman, 2013), creating a special challenge for language learners (Winke & Goertler, 2008). Part of this change includes the shift of additional information from footnotes to hypertext links although footnotes do continue to be used in some online texts such as online scholarly journal articles which may offer enrichment via hypertext and/or footnotes. Furthermore, since second language (L2) learners process the written word in a distinctive way, their experiences may be different from those of native peers (Meskill, 2008; Warschauer & Liaw, 2010). Grabe (2009) lists the role of hypertext in online reading among the challenges posed for readers (Leu et al., 2009). The potential influence of online texts containing hyperlinks on reader comprehension was also highlighted by Spires and Estes (2002). Fotos and Browne (2004) correctly predicted that the use of computer-based forms like hypertext is actively influencing "our practices of literacy and expression" (p. 70). Furthermore, reading hypertext has been identified as crucial for English learners today (Chavangklang, 2008).

Because technology development has continued to accelerate (Welch, 2013), the comfort and experience of online readers has increased for younger generations (Andersen, 2002). Older adults are often considered "digital immigrants" while younger generations who have grown up with computers are "digital natives" (Prensky, 2012). The assumption that young people are familiar with technology and are competent to use it is also reflected in teachers' perceptions (Jalkanen, 2015a). Alternatively, readers who can process conventional text may experience both cognitive and emotional challenges when confronted with Internet texts (Eagleton & Guinee, 2002). Even digital natives may require support in effective online reading, particularly in L2 settings (Lai & Morrison, 2013). "Hypertext and interactive features can offer too many choices…that may distract and disorient otherwise strong readers." (Coiro, 2003, p. 462). Our study contributes to the conversation regarding online reading by comparing how adolescent English learners comprehend and recall additional information in an online text, provided either through hypertext links or footnotes. We compare our data to a previous study with college-level learners.

BACKGROUND

The ultimate goal of comprehension is central to reading for L2 learners, whether in print or online (Anderson, 2013). Variables relevant to reading comprehension include text accessibility (Sharp, 2003), background knowledge (Alexander, 2005), readability (Sharp, 2003), and the use of cognitive and metacognitive strategies (Taki, 2016). Furthermore, reading nonlinear digital texts has been identified as an area in need of attention (Chifari et al., 2010; Coiro & Dobler, 2007). For English language learners (ELLs), the challenges may be even greater. Although successful reading strategies can potentially transfer from L1 (the first language) to L2 (Cummins, 2000), an L2 proficiency threshold is required (Rodriguez, 2010). Several other studies have investigated adolescent ELLs' Internet-based literacy activities (Lam, 2000; Rubinstein-Avila, 2001). Since hyperlinks are ubiquitous in Internet texts, investigating their impact on the reading process of non-natives is crucial (De Ridder, 2000).

Hypertext versus Linear Text

Fotos and Browne (2004) define hypertext as "a medium for representing information as a network of linked informational 'chunks' that exists online and can be accessed in any order" (p. 83). Footnotes read online mirror those found in paper-based text. Accordingly, Kahn (2012) lists navigating hypertext among the skills needed for success in achieving digital literacy.

Although reading supplementary information via footnotes or hypertext involves similar processes such as identifying familiar words and patterns (Niederhauser & Shapiro, 2003), the experiences are distinctive, since hypertext is non-linear, often taking the reader to another screen (or screens) from which the reader must return to continue with the basic text (Sasson-Henry, 2007; Parker, 2008). The potential of hypertext to be supportive of the reading process through efficient presentation of enriching information may be counterbalanced by the danger that changing screens could cause distraction (Schmar-Dobler, 2003).

Research in Support of Hypertext

Hypertext proponents emphasize its ability to create an active role for the reader (Chorney, 2005) with the potential to promote interaction (Ercetin, 2003). Flexibility and learner control have also been identified among the positive

qualities of hypertext (Chou & Liu, 2005). However, a range of variables and alternative cues and text patterns have been shown to influence the contribution of hypertext information to learners' knowledge (Goldman et al., 2012; Landow, 2006).

From a pedagogical perspective, Lee and Tedder (2004) point out that hypertext allows us to tailor information to the needs of different learners. Zumbach (2006) reported that comprehension of passages containing hypertext was more successful than reading linear text alone and connected hypertext with the creation of complex schemata, enhancing cognitive flexibility. Thus, researchers have hypothesized that comprehension of hypertext may be associated with deep cognitive engagement (Ensslin, 2006).

Reading alternative forms of hypertext has also produced differential results (Shapiro, 1998). Three alternate hypertext formats used by young adults were considered by Chen and Yen (2013); pop-ups were associated with enhanced performance, and learner proficiency was found to be significant for outcomes.

Hypertext Challenges

Despite its positive potential, critics note that hypertext can present a range of difficulties (Chen & Yen, 2013; Sakar & Ercetin, 2005). Researchers comment that the reader must decide whether or not to click on a link without actually knowing in advance what information may be offered (Otter & Johnson, 2000), and Brandl (2002) expresses the concern that hypertext structure can distract readers from the primary reading. Similarly, Coiro et al. (2008) report teachers' observations that hypertext can interfere with "the flow of the comprehension process" (p. 311). For example, DeStefano and LeFevre (2007) found that more links (and thus more options for decision-making) added to the cognitive load of the reader. This is particularly acute for learners with low verbal ability (Wallen et al., 2005). Findings suggest that hypertext taxes readers' working memory (Shapiro & Niederhauser, 2004) and tends to constrain their experience of coherence (DeStefano & LeFevre, 2007). In addition, Son (2003) contrasted the effect of reading paper text and online with and without hypertext for undergraduate Korean L2 readers whose L1 was English or Japanese. Some learners commented that in the hypertext condition, they did not like having to change screens while reading.

Ebsworth and McDonell (2013) and McDonell (2006) compared college-level native and non-native English speakers reading on the Internet. In the study,

one passage contained supplementary information in footnote form while another of comparable difficulty contained supplementary information in hypertext links. Based on a cued recall procedure, both groups remembered significantly more in the footnote condition as compared with the hypertext alternative.

Hypertext and Younger Readers

In a text about new literacies and Internet usage by adolescents, Coiro et al. (2008) highlight the need for research on this age group. MacDonald (2005) reported that middle school children found reading hypertext more difficult than linear text, and Niederhauser et al. (2000) commented that students who used links to compare and contrast material were less effective in their reading than in other conditions. Rasmusson and Eklund (2013) compared Internet reading strategies of children aged 10 versus aged 15-16. The older children were more successful at choosing from among Internet options for retrieving meaning. Despite the effective use of hyperlinks among the more successful Internet readers, some learners lost track of the path to finding what they were looking for. Furthermore, Morrison's (2004) study with 5th graders showed that these younger learners were more vulnerable to particular hypertext alternatives than older more experienced students.

Prior Knowledge, Interest and Experience

Background knowledge is acknowledged as significant in reading comprehension (Ariew & Ercetin, 2004; Fisher & Frey, 2009; Horiba & Fukaya, 2015). Calisir and Gurel (2003) showed that mixed hypertext produced better post-reading recall than traditional linear text for readers with low subject-area knowledge. In contrast, Salmerón et al. (2005) report that readers with low subject-area knowledge retained more information when reading linear texts while readers with high subject-area knowledge benefited most from nonlinear texts, a finding confirmed by Amadieu et al. (2008). Zumbach (2006) suggests that experts have more prior knowledge and schema around which they can organize new information from the hypertext. Novices who lack such schema benefit more from text with a linear format.

Yao (2006) addressed alternative presentation formats for college undergraduates (aged 18-25) and noted an interaction between format, previous knowledge, and perceived cognitive load. Yao identified a positive influence of the college students' greater experience with computers over time as compared

with research on elementary school learners in the literature. Previous experience with computers also related to perceived cognitive load reduction.

In addition, an interaction effect between readers' prior knowledge and strategies for selecting hypertext is suggested by Salmerón et al. (2006). Selecting links with an expected semantic relationship to a text was more useful for those with low prior knowledge than choosing links based on interest. In the current study, participants' background regarding the passage to be read was assessed; all study participants had some background knowledge of the material. Finally, interest in topic in a hypermedia environment has been shown to be influential for foreign language learners (Akbulut, 2008). This was considered in our pilot and confirmed through participant response.

Summary

Viewed collectively, the literature is inconclusive, indicating that learners may be helped and/or hindered by reading hypertext links on the Internet. Our study seeks to add to the research by addressing these conflicting results as they may apply to ELLs in a high school setting. As noted, this paper is an extension of the earlier work by Ebsworth and McDonell (2013). While the initial study's participants were attending college, the current participants are adolescent English learners in high school.

RESEARCH QUESTIONS

The current study compares linear reading of a single passage on the computer with additional information offered through footnotes versus hypertext.

(1) Is there a significant difference between the recall accuracy of computer-based linear text with footnotes versus computer-based reading with hypertext for English language learners in a high school setting?
(2) What insights regarding this process are offered by focus group interviews of participants?

MATERIALS AND METHODS

A mixed design (Creswell, 2008) was used to explore the research questions. Quantitative data measuring text recall were interpreted through post-hoc focus

group interviews, described below. Ease of comprehension was also evaluated based on learners' perceptions of the readings.

Participants

Forty students all attending a public (state funded) high school for English language learners in the Northeastern United States participated. They represented 2 intact classes whose students were from grades 9 to 12; classes were content focused and merged grade levels. A questionnaire included demographics and reading background, exploring participants' familiarity and experiences with computers as well as their views regarding reading in alternative formats (Appendix A).

The students' native languages were varied (18 in all). The most common languages were: Spanish (10 participants), Mandarin (6), Polish (6), and Bengali (3). Six participants reported speaking a third language. The population had studied English for an average of 5.5 years (SD=2.64), with a range of 2-15 years. This included an average of 2 years of study before entry into the U.S. (SD=2.8) and 3.4 years within the U.S. (SD=1.6).

Materials

The reading for the study was adapted from Wikipedia, which offered authentic text (Nunan, 1991) designed to be viewed on a computer. A single text was chosen on animation, a topic that discussions with some students and teachers had identified as of potential interest. (See Appendix B.) Advertisements were considered distracting and were removed. The reading contained 289 words and 5 paragraphs. The Flesch Reading Score was 37.6 and Flesch-Kincaid grade level was 14.0 (Flesch-Kincaid, 2010). Although these scores indicate appropriateness for undergraduate college-level readers, a brief pilot showed that interested high school students could understand the essential meaning of the reading. The higher-level text was chosen in order to ensure that comprehension and recall would discriminate sufficiently among readers of the two formats. Additional information was accessed by readers through either hypertext links or footnotes. The footnotes were placed at the end of the entire text so that readers needed to scroll down to see them; the links took students completely out of the frame of text they were reading to supplemental information contained on another screen (with no additional links on that screen).

Procedure

Classes were held in a lab where every student had a computer. The text types (with footnotes or hypertext) were randomly assigned to the students with equal numbers in the FG (footnote group) and the HG (Hypertext group).

Immediately after the reading, students briefly responded to their impressions of text via three 5- point scales in terms of: ease of comprehension, topic familiarity (was there new information) and level of interest (Appendix C). Students then answered 13 multiple-choice questions regarding what they recalled about the passage. Four of the questions referred to supplementary information that had been presented via either footnotes or hypertext links (Appendix D).

The decision to use multiple choice questions was informed by the previous study (Ebsworth & McDonell, 2013; McDonell, 2006) which along with pilot testing had revealed that requiring participants to reproduce the information in the text productively in English was difficult for some and could interfere with their success in recall of material that had been understood when it was read. Pilot testing also determined that students of the same ages and similar linguistic and cultural backgrounds who had not read the passage were unable to correctly respond to the questions simply based on general knowledge or common sense. All students had sufficient time to complete the task in the 45 minutes allotted.

Each group of students and their teachers met with the first author for a focus-group interview later in the day, to enrich our understanding of the quantitative data (Lindlof & Taylor, 2002). These interviews were semi-structured (Seidman, 1998) in order to allow for new insights to emerge. The researcher confirmed with each teacher who was present that her field notes were an accurate representation of the conversation. (See Appendix E for guiding questions.) These data were analyzed recursively to identify salient themes. These themes and interpretations were triangulated with an expert in second language learning and technology who was also familiar with the setting, referenced below.

Limitations

Participants were a non-random sample of high school ELLs with a range of English reading experience. They had achieved from low intermediate to advanced English proficiency. Therefore, we may not extrapolate from this

sample to others who have not reached a similar level of academic English and may be studying in other settings. Also, although we do have learners' subjective views of the comprehensibility of what they read, the quantitative data is limited to their recall. It is theoretically possible to comprehend a text that one cannot fully recall, but comprehension is a necessary condition for successful recall. In addition, the hypertext links in this study took readers to a separate page. Results for other types of hypertext remain a question for future research.

RESULTS

Reading Preferences

Participants reported reading a variety of materials in both English and their native languages in their daily lives with no significant preference for first language or English reading. (L1 reading: M=3.40, SD=1.65; English reading: M=3.63, SD= 1.33 where 1= strong agreement and 5= strong disagreement). In general, most reported some experience reading on the Internet and rated their enjoyment of reading on the Internet positively, at a level of 2.07 (SD=1.35).

Quantitative Response to the Text

Participants rated ease of understanding the reading as: (1) very easy; (2) easy; (3) neither easy nor hard; (4) hard; or (5) very hard. The students found the text between (2) easy to understand and (3) neither easy nor hard (M=2.40, SD=0.84). The FG reported understanding at 2.45 on average (SD=0.83). The HG reported understanding at 2.35 on average (SD=0.88). Thus, the participants experienced the text as relatively accessible. A t-test for independent samples showed between-group difference was not significant (t=0.37, df=38, p=0.71).

Prior knowledge of topic was evaluated through responses on a five-point scale (1) all new information; (2) mostly new; (3) some new information; (4) a little; (5) no new information. Data revealed that the mean of new information encountered in the reading was 2.8 (SD=0.82). Thus, participants had some background to support the reading but also encountered a moderate amount of new information. The HG group scored 2.95 (SD=1.0) on amount of new information and the FG group scored 2.65 (SD=0.59). A t-test for independent samples showed this difference was not significant (t= -1.16, df=38, p=0.25).

Finally, students rated their interest in the topic on a 5-point scale (1) very interesting; (2) interesting; (3) not interesting or boring; (4) boring; (5) very boring. Overall, participants rated their interest in the text at 2.25 (SD=0.74), interesting. The FG group (FG) rated interest at 2.35 (SD=0.81); the HG group (HG) rated it at 2.15 (SD=0.67). A t-test for independent samples showed this difference was not significant (t=0.85, p=0.40).

Quantitative Recall Results

The independent variable was text type with additional information in footnotes or hypertext. The dependent variable was the number of multiple-choice items answered correctly, based on understanding and recall of information from the text.

Regarding accuracy of recall, of the 13 questions posed, the total score correct for all the participants was 8.73 (SD=2.14). The students who read the text with footnotes scored M=8.90 (SD=1.92). The score for the students who read the version with hypertext links was M=8.55 (SD=2.37). A t-test for independent samples showed this difference did not reach significance (t=0.513, df=38, p=0.61).

The recall score for the 4 questions that focused on the additional information provided in the two formats was consistent with the general results. The number correct for FG was 2.45 (SD=1.00) the HG group scored a bit lower, M=2.00 (SD=1.12). However, a t-test for independent samples showed that this difference did not reach significance (t=1.34, df=38, p=0.19).

Thus, while descriptive data showed a slight advantage on average for the footnote group both for total responses and responses only based on the additional information, these between-group differences were not significantly distinctive.

Insights from Qualitative Data

The comments of the participants and their teachers helped us to interpret the quantitative data and gave us deeper insights into their perspectives. On the whole, the focus-group comments were additive but consistent with the quantitative data. Focus-group data were recorded using field notes since taping was considered problematic in this setting. Students and teachers were more comfortable dispensing with recordings. The identities of specific students were

not noted. Data were analyzed recursively to identify themes (Savin-Baden & Major, 2013). Data analysis was shared with an experienced bilingual teacher/researcher interested in technology who confirmed the thematic interpretation. The few problematic issues were resolved by consensus.

Ease of reading

In the interviews, most of the English language learners confirmed that the readings had not posed great difficulty for them. "The reading wasn't very hard-compare with some book we have to read for school is too difficult."

Ease of recall

Several students said that they experienced challenges in recalling some of the information in the text, while others were more confident that they remembered what they had read well enough to answer most of the multiple choice questions correctly. "I understand when I read but can't remember later for test questions." versus "No problem to read and answer at the end; it was pretty easy."

Vocabulary

Several students commented that they encountered some new vocabulary, but few felt that this had interfered with their general comprehension of the passage. "I find some new words but I get main idea." "I see some words about animation I do not know but can still understand reading."

Response to footnotes

There was considerable variety in the responses of individual learners to the task. Some of those who had read the footnoted version said that they had not paid equal attention to the information contained in the footnotes because they believed footnotes tended to be supplementary rather than central to the text. "Footnotes give much more information. Sometimes I don't read." A few students, however, said they always checked footnotes carefully, as on occasion crucial information was found there and even occasionally had appeared in tests that "counted" in their classes. "I am careful always to look at all footnotes. Sometimes they have ideas we should not miss."

Response to hypertext

Students who had read the hypertext version varied in their responses. There was general agreement that going from screen to screen was experienced as an interruption but not necessarily to the same degree for all. Students differed as to how difficult it was to go back to the stream of thought contained in the original

text after they had read the hypertext. Note the following comments: "Using the link is fine and gives more information for us." versus "Clicking changes picture and is confusion for me." More of the students whose English appeared less fluent and relatively lower in proficiency made similar comments focused on the challenges posed for them by the use of hypertext. As was true of the college students in the earlier study (Ebsworth & McDonell, 2013), several learners commented that they took the hypertext links hoping that the additional information would enhance their understanding of the text itself. "I click always because maybe important information is there."

General reading experiences: time and language

In terms of general reading experiences, our study participants complained that they had to spend so much time reading for school in English that they had little time for recreational reading in any language. "Every day we have too much to read for homework. It just cannot get done." Some said they regularly read content in their native languages to support their English reading, understanding, and memory. "I get books in Spanish and read in both; it helps." As was reflected in the background questionnaire, preferences for reading on paper versus online appeared to be idiosyncratic rather than associated with any of the variables considered in our study.

DISCUSSION

Adolescents have been singled out in the literature as a group with a positive disposition towards reading on the Internet (Coiro, 2012). Our background questionnaire supported this view, consistent with the characterization of this population as comfortable with Internet reading. Nevertheless, some participants commented on the necessity to read a substantial amount of Internet-based text for school as a requirement for class and the resulting lack of time for recreational reading. In fact, Cornelius et al. (2014) report that some learners can become overwhelmed by too much technology. It is also the case that we did not ask students how they felt about playing games or chat on the Internet or other social media. Based on the literature (Alvermann et al., 2012), it is possible that such a question would have produced an even more enthusiastic response from this group of digital natives and could account for the higher rating of general Internet reading vs L1/L2 reading, perhaps understood as academic.

Several students commented on encountering new vocabulary in the reading, which they believed did not interfere with their general understanding. This is an

ideal context in which to be introduced to new L2 lexical items and expressions. Such opportunities illustrate the view of Cobb (2009) who lists hypertext resources among the ways computers can assist non-natives to enhance their second language lexicons as their L2 reading develops.

The concern that hypertext can be distracting and disorienting for readers (Chun & Plass, 2000) was reflected by some learners in the interviews. Nevertheless, for our participants, the quantitative data on recall did not show a statistically significant difference between groups, supporting Strambi and Bouvet (2003) who did not believe hypertext would be confusing or distracting for learners. As our study was a replication with some adaptation from earlier work with college-level learners, the fact that there was no significant difference for the younger participants in reading and recalling the two text types as compared with more mature counterparts is provocative.

Furthermore, while all our participants were young enough to qualify potentially as digital natives, Warschauer et al. (2004) have reminded us that the availability of computers to learners as a practical matter is variable, and we must be careful not to extrapolate from the experiences of those with ready access to computers to others for whom such access is a luxury. The "digital divide" relates not only to different computer accessibility associated with age and social group membership, but also to expertise in using computers for academic knowledge as opposed to leisure activities (Ilomäki et al., 2012). Indeed, Guo, Dobson, and Petrina (2008) along with Bennett, Maton and Kervin (2008) are among those who point out that the variable of age is not sufficient to predict degree of digital literacy.

As noted above, impressionistically, the students who expressed a higher level of frustration with hypertext did not speak English as fluently as those for whom the hypertext was less of a distraction. This could also be related to the research relating hypertext challenge to verbal ability (Wallen et al., 2005). These results echo a study of split attention in comprehension tasks (Yeung, 1999) which suggested an increase in readers' cognitive load for lower ability ESL high school learners compared with higher ability high school readers and college students. Yao (2006) also reported that verbal ability and proficiency are among the learner variables that "interact with the effects of annotations" (p. 94).

However, since the learners' classes in the current study were heterogeneous in terms of English proficiency, this must remain a subjective observation on the part of the researchers. Furthermore, it should also be noted that since our study

had several constraints, in particular the small numbers (20 per group) and the use of intact classes, this research needs to be replicated with random samples from a much larger population. Relative second language proficiency must also be formally evaluated so that comparisons can be made with greater authority.

CONCLUSION AND IMPLICATIONS

Grabe (2009) has pointed out that automaticity is a component of reading fluency, and the ELLs in our study had achieved this in English to varying degrees. Future research should consider whether degree of English proficiency would have an impact on learners' relative ease or difficulty in understanding and retaining information contained in hypertext, as suggested by our qualitative data. Goldman et al. (2012) also identified that "better and poorer learners" make differential use of Internet resources. Not only should additional research consider such individual differences, but also differentiated instruction using strategic approaches geared to where students begin in their Internet reading is called for.

Kasper (2000) studied ELLs in a community college who worked in focus groups on particular content areas. While she found that students' hypertext use had the potential to be more interactive than linear text, she cautioned that without instruction, hypertext could overwhelm learners and have negative consequences. This recognition underscores the potential of metacognitive strategy use to support reading comprehension for language learners (Anderson, 2013).

It is also the case that hypertext and hypermedia have a range of realizations in the digital world and may differ in context and density (Richards, 2000). Future research must consider users' responses to more complex and variable versions of hypertext and hypermedia. It was also clear from the qualitative data in our study that there was substantial variation in the comfort of different learners using hypertext options online. This relates to the issue of sensitivity to cognitive load for second language learners, which must always be a central consideration in effective instructional design (Mayer & Moreno, 2003).

It is important that teachers of emergent bilinguals pay close attention to the needs of students who are less comfortable with technology and provide appropriate strategies to all in order to support their online reading success (Atchison, 2004; Barrette, 2001). Students with lower proficiency or older

learners may require extra support. In research into teaching approaches to encourage more successful Internet reading and information gathering, Azevedo and Cromley (2004) found that undergraduates who received specialized training in self regulation and strategic choices in hypermedia environments were more effective than peer controls on various dimensions including planning, monitoring, and strategy use.

Zenotz (2012) demonstrated that carefully scaffolded metacognitive strategy training was effective in facilitating greater online reading comprehension for EFL college students. Additional evidence for the effectiveness of strategy training for online reading comprehension is widely reported (Salmerón et al., 2005). Also studies by several researchers reveal that learners are able to do better in reading comprehension after having developed reading strategies through CALL lessons (Naphadorn, 2007; Simthamnimit; 2004; Suwanabubph, 2002). Chavangklang (2008) reports that CALL-based strategy training in Internet reading was successful in enhancing hypertext comprehension for Thai college EFL learners. Not only did their reading scores improve after the intervention, but also they expressed positive views regarding the strategy training in post hoc interviews. Similarly, Dehghanpour and Hashemian (2015) taught web-based strategies for online reading to high school EFL learners and reported improvement in reading comprehension of hypertext.

The use of strategies is also associated with the development of learner awareness. Coiro (2011) used think-alouds to increase student awareness and engaged in using Internet options for effective online reading. Several researchers report an association between readers' control over alternatives and their perceived cognitive load (Morrison, 2004; van Merrienboer et al., 2002; Yao, 2006). Since it would appear that younger learners with lower L2 proficiency and older learners are relatively more challenged in terms of comprehension and recall of additional information provided through hypertext links that take them to a different screen, it could be helpful for teachers to offer alternative versions of online texts, some with either hypertext formats or footnotes, depending on the choice and comfort of the learner. Not only will the particular type of enrichment be potentially helpful, assuming the material is not redundant for the reader (Darabi & Nelson, 2004; Le Bohec 2005), but also learners' sense of personal choice may reduce their cognitive load, enhancing comprehension.

As the digital world evolves, teachers must continually revisit pedagogical designs to incorporate technology appropriate for their learners (Jalkanen,

2015b). Unfortunately, classroom-based studies reveal that not all teachers are equally prepared to offer technological support (Ebsworth et al., 2010). Nevertheless, more and more content is being delivered through digital media, and students express interest in using digital resources. "But how many digital immigrants are prepared to teach it?" (Prensky, 2001, p. 4). Teacher preparation programs should include extensive experience in how to address the technological needs of language learners including strategies for using hypertext, and continuing professional development must also be offered in the field.

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APPENDIX A

Background Questionnaire

1) What is your native language?
2) Besides English and your native language, what additional language(s) do you speak?
3) How long did you study English outside the United States?
   (   )years (   )months
4) How long have you studied English in the United States?
   (   )years (   )months

5) I read on the Internet.
☐1-very often
☐2-often
☐3-sometimes
☐4-occasionally
☐5-never

6) I like to read on the Internet.
☐1-strongly agree
☐2-agree
☐3-neither agree nor disagree
☐4-disagree
☐5-strongly disagree

7) I like reading books.
☐1-strongly agree
☐2-agree
☐3-neither agree nor disagree
☐4-disagree
☐5-strongly disagree

8) I like reading newspapers.
☐1-strongly agree
☐2-agree
☐3-neither agree nor disagree
☐4-disagree
☐5-strongly disagree

9) I read magazines.
☐1-strongly agree
☐2-agree
☐3-neither agree nor disagree
☐4-disagree
☐5-strongly disagree

10) I read in my first language.
☐1-strongly agree
☐2-agree
☐3-neither agree nor disagree
☐4-disagree
☐5-strongly disagree

11) I read in English.
☐1-strongly agree
☐2-agree
☐3-neither agree nor disagree
☐4-disagree
☐5-strongly disagree

12) I read in both English and my first language.
☐1-strongly agree
☐2-agree
☐3-neither agree nor disagree
☐4-disagree
☐5-strongly disagree

APPENDIX B

Reading and Additional Information in Footnotes or Hypertext

Animation (CARTOONS)

Main article: <u>Animation</u>

Animation is the technique in which each frame (single video picture) of a film is produced one at a time. Each frame of film can be created as a computer graphic, by taking a photograph of an image that has been drawn first, or by making small changes to a model again and again, and taking a picture of the result each time with a special <u>animation camera</u>(1).

Since most animation is now produced on computers, new animation cameras are not widely manufactured. Video cameras and scanners have taken their place. When the frames are strung together and the resulting film is viewed at a speed of 16 or more frames per second, there is an illusion of continuous movement, due to the <u>persistence of vision</u>(2). Generating such a film takes a lot of work and time, though the development of <u>computer animation</u>(3) has made the process much faster.

Because animation is very time-consuming and often very expensive to produce, the majority of animation for TV and movies comes from professional animation studios. However, the field of independent animation has existed at least since the 1950s, with animation being produced by independent studios and sometimes by a single person.

<u>Limited animation</u>(4) is a way of increasing production and decreasing costs of animation by using "short cuts" in the animation process. This method was made popular by Hanna-Barbera, and adapted by other studios as cartoons changed from being watched mostly in movie theaters to being shown mostly on television.

Although most animation studios are now using computer technologies in their productions, there is still a specific style of animation that depends on film. *Cameraless animation* is painted and drawn directly onto pieces of film, and then run through a projector.

Additional Information in Footnotes or Hypertext:

*1. An **animation camera** is a* movie camera *specially adapted for* frame-by-frame *shooting* animation *or* stop motion. *It consists of a camera body with lens and film magazines, a stand that allows the camera to be raised and lowered, and a table, often with both top and underneath lighting. The artwork to be photographed is placed on this table.*

*2. According to the theory of **persistence of vision**, the retina of the human eye retains an image for about a tenth of a second. Persistence of vision causes the illusion of motion when a series of individual film images are displayed quickly, one after the other.*

*3. **Computerized animation** is the art of creating moving images via the use of computers. To create the impression of movement, an image is displayed on the computer screen then quickly replaced by a new image that is similar to the previous image, but shifted slightly. This technique is identical to how the illusion of movement is achieved with television and motion pictures.*

*4. **Limited animation** is a process of making* animated cartoons *that do not follow a "realistic" approach like that used in the short cartoons and feature films of* Walt Disney *from the* 1930s *and* 1940s. *However, this "realistic" style of animation was very time-consuming and expensive. "Limited" animation creates the same effect, but at a much lower cost.*

APPENDIX C

Response to the Text

1) How easy was it to understand the reading?

☐1-very easy to understand
☐2-easy to understand
☐3-neither easy nor hard to understand
☐4-hard to understand
☐5-very hard to understand

2) How much new information was there in the reading?

☐1-all new information
☐2-mostly new information
☐3-some new information
☐4-a little new information
☐5-no new information

3) How interesting did you find the reading?

☐1-very interesting
☐2-interesting
☐3-not interesting or boring
☐4-boring
☐5-very boring

APPENDIX D

Reading Recall Questions

(The questions with a "*" mark are presented through either hypertext links or footnotes. In the student version, there will not be "*" marks before the questions)

Please answer each question based on the reading.

1) According to the reading, what is a frame in animation?
a) one video picture
b) one cartoon in a paper
c) a video that is moving
d) an artistic picture

2) What does the animation technique involve?
a) Changing people to cartoon characters
b) Producing individual frames to be used in the animation
c) Making cartoons funny.
d) Showing pictures on television.

3) How fast should the frames be shown?
a) at least 6 frames per second
b) less than 6 frames per second
c) at least 16 frames per second
d) less than 16 frames per second

*4) What is persistence of vision?
a) The human eye focuses on bright moving images
b) The retina of the human eye keeps an image for 1/10 of a second
c) The human eye can change focus in 1/20 of a second
d) The human eye goes back to attractive images in a second

5) How does persistence of vision relate to animation?
a) It gives the impression of continuous movement
b) It makes the eye better able to view animation
c) It gives the impression of greater movement
d) It makes the eye persist in viewing images

*6) What is an animation camera?
a) a digital video camera with a still life adjustment
b) a special camera with a table, used for frame by frame shooting
c) a camera with a special distance adjustment for drawings
d) a special digital camera for use with computers

7) How is most animation done now?
a) mostly on computers
b) mostly using special cameras
c) mostly using drawings
d) mostly at independent studios

*8) Computerized animation
a) is based on a completely new approach to animation
b) uses based on stop-motion photography
c) is a global approach to animation
d) uses the same principles as traditional animation

9) Why does most animation today come from professional studios?
a) the animations are more creative
b) producing animation takes a lot of time and money
c) the machines used take up a lot of room
d) individuals can not compete

10) The biggest advantage of computer animation compared to the past is
a)   It can be done faster than before
b)   It can be done at a distance
c)   It can use paintings
d)   It does not require artistic training

11) Cameraless animation refers to
a) Not using images from a camera
b) Images painted and drawn directly onto pieces of film
c) Not using a projector
d) Using stop motion photography

*12) Limited animation
a) Uses expensive short cuts but saves time
b) Is not very expensive
c) Is very realistic
d) Does not use short cuts

13) A realistic approach to animation
a) Was not expensive
b) Was used by Disney
c) Was quick and easy
d) Was used by Hanna-Barbera

APPENDIX E

Focus group Questions

1. When and what do you usually read in school? Out of school? What do you like to read?
2. (if not answered already) What do you read in a regular book? What do read on the computer? Do you ever read in your first language(s)?
3. How did you feel about the reading activity in class?
4. How well did you feel you understood the reading?
5. How easy was it to remember the reading and answer the questions?
6. For those of you who had footnotes, did you read them? Why? Do you usually read footnotes?
7. For those of you how had links, did you click on the links? Why or why not? If you clicked on the links, what was it like?
8. Can you share anything more about the reading activity in class?