The Reading Matrix © 2014
Volume 14, Number 2, September 2014

Effects on and Predictability of Computer-mediated Glosses in Reading Comprehension of EFL College Students

Abdullah A. Melhi
King Khalid University

ABSTRACT

Prior research indicated that computer-mediated glosses had an overall medium effect on second language reading comprehension. This study investigated the effects of computer-mediated glosses on reading comprehension. It also investigated the predictive power index of the e-glosses use with regard to reading comprehension performance, from a stepwise multiple regression analysis. A quasi-experimental method, involving the nonequivalent, pretest-posttest design was employed for this study. Participants were randomly assigned to an experimental group (n = 17) and a control group (n = 21). Participants in the experimental group were provided with a computer-mediated dictionary condition, doing their readings with e-glosses available as hypertext links to unfamiliar lexicon. The control group accessed the same reading texts in textbooks without any additional dictionary or glossary explanations available to them. ANCOVA analysis showed that the instructional method integrating e-glosses in computer-based instruction effected significant improvement in the experimental participants' reading comprehension. Furthermore, Stepwise Multiple Regression Analysis suggests that the use of hypertext-rich e-glosses can be predictive of improved reading comprehension performance. Pedagogical implications of the study are discussed at the end.

INTRODUCTION

In the area of English as a second and/or foreign language, there is a recognizable hub of research momentum into the effects of glosses on reading, writing, and vocabulary development (Abraham, 2008; Aldosari & Mekheimer, 2010; Bruton, 2007; Liu & Lin, 2011; Paas, van Gog, & Sweller, 2010; Sweller, 2010; Yoshii, 2006). An exhaustive review of pertinent research in this line revealed that the method and format of gloss presentation can either facilitate or hinder the cognitive processing of learning tasks, and hence ease or impede specific language learning tasks/skills. For example, integrating glosses into reading comprehension texts (integrated format) can possibly reduce extraneous cognitive loads and boost up the working memory capacity, resulting in the improvement of germane cognitive loads; this eventually leads up to better reading comprehension (Paas, van Gog, & Sweller, 2010; Sweller, 2010; Liu & Lin, 2011). In this vein, too, prior research in this area indicated that though reading texts in reading and comprehension courses are intended to develop students' reading comprehension strategies,

the process of looking up words in a dictionary can be helpful in facilitating reading comprehension, and more significantly, in inducing incidental vocabulary learning (Krashen, 1982, 1989; Nation & Carter, 1989; Hulstijn, Hollander, & Greidanus, 1996; Yeung, Jin, & Sweller, 1997; Rott, 1999; O'Keeffe, McCarthy, & Carter, 2007).

Accruing research amassed concerning the potential benefits of extensive use of dictionaries in language learning (Knight, 1994; Uzawa, 1996; Bruton, 2007; Liu & Lin, 2011; Mekheimer, 2012). Yet, some of these research findings are contradictory. The pros and cons of dictionary use for facilitating or impeding specific language learning skills or tasks reverberate with the cognitive science literature. In particular, as far as the cognitive load theory is concerned, the arguments for or against the use of glosses relate somehow to the effect of cognitive load on the working memory, which in turn, affects rehearsing, recalling, and retention of new vocabulary while reading for comprehension (Craik & Lockhart, 1972; Anderson, 1995; Hulstijn, 2001; Barrouillet, Bernardin, Vergauwe, & Camos, 2007; Camos Lagner, & Barrouillet, 2009; Barrouillet & Camos, 2010; Ward, Tan, & Grenfell-Essam, 2010; Kim, Byun, Lee, Gaillard, & Theodore, 2011; Peters, 2007). Research findings differ, however, on the basis of learners' proficiency level. Some have revealed that low, non-significant correlations existed between time spent on reading English and English reading comprehension for low-proficiency learners, while correlations for high-proficiency learners were moderate and significant, given that the working memory is still taxed by word decoding processes (Hulstijn, Hollander, & Greidanus, 1996; Pichette, 2005).

Nevertheless, computer-mediated dictionaries including pop-up, marginal, and hypertext glosses or even online type-in dictionaries, can ease reading comprehension because of the ease with which the meanings of lexical items can be captured and the less extraneous cognitive loads they pose on learning tasks (AbuSeileek, 2011; Aldosari & Mekheimer, 2010; Liu & Lin, 2011; Davies, 1989; Mekheimer, 2012). Pertinently, Liu and Lin (2011) tacitly observed that "due to the convenience, readers might be more willing to use computer-mediated dictionaries, thereby exposing themselves to more words" (p. 374).

As for the effect size of e-dictionaries in synthesis research, Abraham (2008) particularly addressed the effects of computer-mediated glosses in language learning:

> Computer-mediated glosses had an overall medium effect on second language reading comprehension and a large effect on incidental vocabulary learning. Mean effect sizes varied from medium to large depending upon the level of instruction, text type, and assessment tasks. (p. 199)

E-glossaries can be some sort of e-dictionaries. Lexically defined, a gloss is a brief explanation (as in the margin or between the lines of a text, or "typically located in the side or bottom margins as Lomicka (1998) explains) of a difficult or obscure word or expression. In concept, Nation (2001) defines a gloss as a brief definition or synonym provided in the target language or the native language of the learners; Pak (1986) defines it as an explanation of word meanings deemed to be unfamiliar to the learners at the phase they learn the language. Segler (2001) further defines it as short definitions of difficult or technical lexicon or translations of supposedly unfamilar vocabulary; in this way, according to Segler (2001), there are textual glosses, pictorial glosses, and aural glosses. In this vein, Roby (1999) extends this definition of Segler in the framework of the cognitive reading comprehension theory as follows: "glosses are many kinds of attempts to supply what is perceived to be deficient in a reader"s procedural or declarative knowledge" (p. 96).

Using glosses on the margins of reading passages or as glossaries below reading texts was used for pedagogical purposes, but the effects of glossing on making reading texts accessible or in inducing vocabulary learning has not been broadly researched. Extant research dealt with the positive effects of glossing with regard to improving reading comprehension and vocabulary learning. Furthermore, research momentum addressed which type of vocabulary is more effective: providing glossaries in the native language of learners or glossing in the target language (Davis, 1989; Luo, 1993; Pak, 1986; Rott, Williams, & Cameron, 2002; Taylor, 2002; 2006). The sparse studies available in literature reviews indicate that using L1 or L2 glossing is insignificant as regards the type of glossing.

According to Hu, Vongpumivitch, Chang, and Liou (2014), there is even more paucity in research on the effects of e-glosses on incidental English vocabulary learning and reading comprehension. Literature indicated that the use of electronic glossing is more convenient and more easily accessible for learners in computerized learning environments, given the availability of special glossing software. Prior research compared conventional glossing techniques with e-glossing in terms of the effects of each type (Chapelle & Jamieson, 1986; Goyette, 1995; Hayden, 1997; Stoehr, 1999; Taylor, 2006). E-glosses in computer-based instruction showed vague results in terms of effectiveness of e-glossing versus traditional typed-in glosses on paper-based texts as regards incidental vocabulary acquisition or vocabulary retention in the long run; this even differed when glossing was provided in the L1 or the L2 of the learners (Hayden, 1997; Fageeh & Mekheimer, 2011). For reading comprehension, e-glosses were more effective for enhancing reading comprehension (Taylor, 2006). Prior research (Beatty, 2005; Hoogeveen, 1995) suggested some benefits of e-glosses, such as arousing interest in reading materials and making these materials more accessible, more comfortable, and more motivating for readers. E-glossing can also promote self-directional language learning. Furthermore, e-glosses can provide quick references for readers to effciently get the meanings of unfamilar words whose obfuscation can hinder text comprehension. In this line, prior research suggested that e-glosses with their pop-up and/or hypertext function can make easy access to the meanings of difficult or unfamiliar vocabulary by reducing extraneous cognitive load on the part of the learners (Yeung, Jin, & Sweller, 1997; Sweller, 2010; Liu & Lin, 2011)

The present study builds on this prior research and seeks to identify the effects of e-glosses on reading comprehension as well as to identify the predictability of reading comprehension abilities on the basis of using e-glosses. Therfeore, the present study seeks to address the following research questions in a Saudi EFL college setting:

1. How effective is the computer-mediated dictionary (in this study, the e-gloss) to the improvement of reading comprehension?
2. Can the use of a computer-mediated dictionary predict the reading comprehension capacity of EFL college students? If yes, how much can it predict that?

METHODOLOGY

Method

A quasi-experimental design was adapted for this study, involving the nonequivalent, pretest-posttest design. This design was selected for testing the effectiveness of a computer-mediated dictionary-based reading comprehension, the treatment of which was utilized during

the first second of the academic year 2010. Participants assigned to the experimental group were subjected to the reading instruction in a computer lab using e-glosses; while the control group received no aid to vocabulary study but the traditional way of presenting meanings to unfamiliar lexicon by the teacher. The computer-mediated dictionary condition utilized computer screens for all assigned readings, with e-glosses available as hypertext links to vocabulary items and idioms thought to pose some hindrance to reading comprehension because they were generally deemed unfamiliar to the students. Once the cursor moves up the word or idiom, an e-gloss with possible meanings pops up to the reader. The control group accessed the same reading texts in textbooks without any additional dictionary or glossary explanations available to them.

Statistical analysis of Co-variance (ANCOVA) was also utilized to compare the performance of experimental and control participants, control for any extraneous variables, and add extra power to the significance test. This statistical method of analysis corrects pretest and posttest means to eschew pretesting differences in the sample of the study. In other words, corrected means can verify equivalence between the experimental group and the comparison group; therefore, ANCOVA controls for any threats to internal or external validity of the findings.

Participants

The participants were 38 EFL students enrolled in an English language and translation BA programme in a Saudi university, studying reading comprehension as an essential language skill course in four levels; at the time of the study, the students were in the second level (Reading II). Participants were randomly assigned to an experimental group (n = 17) and a control group (n = 21). All the participants were males, aged between 16 and 17 years, whose native language is Arabic. They have been learning English for at least eight years, and were equated on their proficiency level and socio-economic and educational levels. The population of the study (all the students enrolled during this semester in Reading I) were given an IELTS test to assess their proficiency. The selected sample obtained a mean score in the range of 4 to 6. They were also graduates of governmental pre-university schools, which taught the same curricula and English language learning programs.

Furthermore, the socio-economic status (SES) was assessed for each student in the study population, using the Kuppuswamy SES scale (updated version of 2007) which collated information about the education and occupation of the head of the family and per capita income per month. Students selected for the sample were, on the whole, from the lower middle class (11–15 on the scale). The rationale for this procedure in sampling had been to ensure that participants in the study were equated on socio-economo-educational standards at the initiation of the research, given that this factor could influence the results upon providing the treatment.

Instrumentation and Procedures

Thirty multiple-choice items, designed for checking comprehension of a reading passage excerpted from the book, but not studied before by the participants in this study, were developed by the researcher, and adjudicated by three instructors in the English Department for interrater validity. Administered to a similar sample from the department, other than the participants, the test was assessed for item discrimination and reliability. Items that had too high or too low scores were taken away; thus five items were eliminated. Students received four points for each correct

answer and no points for each incorrect answer; hence, the maximum total score was 100. The reliability estimate for internal consistency of the reading test was 0.81 based on Kuder-Richardson formula 20 (Brown & Abeywickrama, 2010).

Before the experiment started, the participants had been randomly assigned to their groups. They then completed the reading comprehension test in one session. After a break of thirty minutes, the experimental participants reconvened for a practice session in which the members of this group were guided as to how to use the e-gloss in their learning. The experimental group received the treatment in an e-learning lab. The e-learning lab was a technology-based medium of Blackboard (i.e., Blackboard facilities, facilities of the online dictionary, and in virtual classrooms). The learning management system of Blackboard was used to provide electronic access to reading texts synchronously or asynchronously in the form of Blackboard Collaborate sessions or Tegrity sessions of video lectures for the experimental group. The researcher-instructor made use of the features of Blackboard-enabled e-labs, including Announcements, Assignments, and Course Instructor email features as well as Blackboard Collaborate sessions and Tegrity sessions for interactive lecturing. According to Mekheimer (2012), "The LMS of Blackboard was used since it consisted of the tools used for class management and for student administration and progress tracking. In addition to these standard LMS tools, the system has other additional features and tools necessary for continuous assessments, which were implemented during the study as effective learning features" (p. 326).

In the no-treatment condition, which occurred in a conventional classroom setting, the teacher presented unfamilar vocabulary in the reading passages at the start of each lecture, asked some of them to read them, followed by self-help drill and practice exercises. No dictionary work was involved in this condition. Instruction in the reading classes, with students remaining in the two conditions (e-gloss and no-dictionary groups) to which they had been assigned, continued for one semester (16 weeks, three hours per week). One week after the end of the experiment, all the participants in the experimental condition and the control group were post-tested using the same reading comprehension test.

FINDINGS

Since this study aimed at recognizing the effectiveness of computer-mediated dictionary use in enhancing and predicting reading comprehension, a reading comprehension instructional program was conducted on the use of computer-mediated dictionary work in the e-learning lab. The *Well Read Level II* (Dobiecka & Wiederholt, 2008) coursebook was computerized (i.e., reading texts were type-set and difficult vocabulary was hypertextualized to the experimental group). To this end, ANCOVA was used to answer the first research question: how effective is the e-gloss to the improvement of reading comprehension? The means have been adjusted for the pre-test covariate (reading comprehension), with pretesting mean scores considered. Table 1 below summarizes the posttest adjusted means of the participants' reading comprehension scores in both the experimental and control groups.

Data in the table above show that there are face differences in the performance of the participants in the two groups. To recognize whether these face differences are statistically significant ($\alpha = 0.5$), ANCOVA was manipulated for the posttest scores of both groups, given that differences on pretesting in the performance of both groups' participants were considered

and adjusted. Table 2 below shows the results of ANCOVA for the differences between the means scores of both groups upon posttesting in reading comprehension.

Table 1. Posttest Adjusted Means of the Participants' Reading Comprehension Scores in Both the Experimental and Control Group

Group	Adjusted Means
Experimental	98.7647
Control	91.6190

The data in Table 2 above show that the instructional method integrating e-glosses in computer-based instruction had a significant effect on the amount of improvement in the experimental participants' reading comprehension capacity; the F ratio had a significance value of 33.000 (alpha = 0.000). This suggests that the e-gloss-based reading instruction had a positive effect on developing overall reading comprehension performance of the experimental participants noticeably. This is shown clearly in the differences between the mean scores of the experimental participants compared to their control peers; the differences were to the advantage of experimental participants as the mean scores of the experimental participants reached 98.7647, but the mean scores of the control participants reached 91.6190 as shown in Table 1 above.

Table 2. ANCOVA Results for the Differences Between the Means Scores of Both Groups Upon Posttesting in Reading Comprehension

Source of Variance	Sum of Squares	*df*	Mean Squares	*F*	Sig.
Pretest	1872.332	1	1872.332	146.381	0.000
Groups	432.958	1	432.958	33.849	0.000
Error	447.679	35	12.791		
Total	2752,969	37			

Note. * Significant at $\alpha = 0.000$

Finally, to answer the second research question of the present study, suggesting that the use of e-glosses can be predictive of improved reading comprehension performance, a Stepwise Multiple Regression Analysis was conducted. Findings show that the beta value (ß) is -0.646, being significant at 0.01. This reveals that the use of e-glosses contributed a 41.8 % of variance in the students' reading comprehension improved performance in the present study, where F = 9.32, significant at 0.01. Table 3 below shows the findings of the regression analysis.

Table 3. Stepwise Multiple Regression Analysis Results

Independent Variable (Use of e-glosses)	R	R^2	Contribution Percentage	B	Standard Error B	Beta	*F*	Sig.
Reading Comprehension Capacity	- 0.65	0.418	41.8	- 0.321	0.105	- 0.646	9.32	0.01

The regression line expresses the best prediction of the dependent variable (reading comprehension), given the independent variable (use of computer-mediated dictionary or e-glossing as it is used in this study). From this, a regression equation to predict the reading

comprehension capacity of students was constructed, given our population characteristics and using computer-mediated glosses. This equation reads: reading comprehension capacity = 68.619 - 0.321.

According to the above table, the relationship between the two variables, namely the use of e-glosses as an independent variable and reading comprehension as a dependent variable, bore out a coefficient of -0.321. The value of the *F* statistic of the above output is **9.32** with a significance of 0.01. Since the significance is less than 0.01, it can be deduced that at 99% of significance level, there is certainty that e-glossing can be significantly beneficial to reading comprehension. In addition, a positive linear relationship exists between e-glosses and reading comprehension. The regression equation deduced for predicting the correlation between e-glosses and and reading comprehension is as follows: Y= 68.619 +(- 0.321)* e-glosses.

This means that the squared semi-partial correlation of Y (reading comprehension) with a predictor X (i.e., use of e-glossing) is equal to the increase in R^2 when adding X1 as a predictor to the regression with all remaining predictors. This may be taken as the unique contribution of using e-glossing to the proportion of variance explained by all predictors possible to intervene with easing reading comprehension. Here, the semi-partial correlation is the correlation of Y (reading comprehension) with the residuals from regression where e-glossing is the predicted variable responsible for improving reading comprehension.

DISCUSSION AND ANALYSIS

The present study was based on the assumption that the use and integration of e-glossing into reading classes can help improve reading comprehension performance. This assumption, drawn from a review of pertinent literature, is grounded in the hypothetical assumption that the method and format of presenting vocabulary during reading can possibly lead to noticeable enhancement not only in reading comprehension, but also in unplanned vocabulary acquisition as suggested in the study of Fageeh and Mekheimer (2011). Though this hypothesis has been subjected to empirical investigation in prior research which investigated and compared the effects of different types of dictionaries, few studies have found that computer-mediated dictionaries (e-glossing in this study) have more favorable effects than no aids at all or traditional printed glosses in the margins on enhancing reading comprehension and inducing lexical acquisition, both purposive and incidental over other types of printed glossing in paper-based reading texts; this finding is commensurate with prior research findings by Yoshii (2006), Bruton (2007), Abraham (2008), and Aldosari and Mekheimer (2010).

In improving reading comprehension and incidental vocabulary development, few studies have established the effectiveness of computer-mediated dictionaries, including e-glosses (Liu & Lin, 2011; Paas, van Gog, & Sweller, 2010; Sweller, 2010). The present study, in congruence with this prior ressearch, indicated that the use of e-glosses had been effective in enhancing reading comprehension capacity in college students. Researchers attribute this to the facility with which online readers access and process lexical information in some computer-mediated glossaries than others (see, for example, Acha, 2009; Liu & Lin, 2011; Peters, 2007; Sweller, 2010; and Yoshii, 2006). More specifically, Liu and Lin (2011) ascribe this facility to cognitive factors; pop-up and similar hypertextual annotations render the right meanings more easy to capture, thus posing less extraneous cognitive loads on the learning process and the working memory of learners. Due to this cognitive convenience of pop-up dictionaries and hypertextual

lexical annotations afforded by computer-mediated aids, more cognitive resources are freed up for facilitating comprehension.

Considering such cognitive processing benefits of pop-ups and hypertextual lexical annotations, the present study considered this type of lexical aid as more advantageous to other types of computer-mediated dictionaries. Thus, the current investigation was empirically controlled to particularly test the effectiveness of using e-glosses in easing and triggering active reading comprehension, manipulating a non-equivalent pretest/posttest control group quasi experimental design. The purpose has been two-fold: first, to control for internal and external validity threats, using ANCOVA and to control for the extraneous covariates that might affect the results of the study, leading to possibly misinterpreted generalizations; second, the study sought to identify the predictability of effective reading comprehension, given the use of e-glosses integrated with screen reading, manipulating a stepwise multiple regression analysis. ANCOVA results showed that the use of e-glosses induced better reading comprehension performance which consistently uphold prior research findings (AbuSeileek, 2011; Aldosari & Mekheimer, 2010; Paas, van Gog, & Sweller, 2010; Sweller, 2010; Liu & Lin, 2011). The available literature to date has provided evidence from the cognitive approach to the study of language learning, indicating that using hypertext glosses in the e-dictionary treatment helped to reduce extraneous cognitive load, thus making available more time for the experimental participants to concentrate on text reading and reading comprehension (Yeung, Jin, & Sweller, 1997; Sweller, 2010; Liu & Lin, 2011). By eliminating or lessening the extraneous cognitive load which results from repetitive, tedious, and tiresome look-ups at glossaries or dictionaries as in the medium of computer-based glossing, could help optimize the reading medium of the computer-mediated dictionary for the experimental group, which, in turn, facilitated reading comprehension and vocabulary learning in the present study, the results of which resonate with prior research findings (Yoshii, 2006; Peters, 2007; Acha, 2009).

Further, findings from the current investigation showed that the use of e-glosses helps to predict and explain the reading comprehension abilities of students. A plausible explanation from the literature of reading and schema theory suggests that the use of easily accessible lexical knowledge from e-glossing available by a click of the mouse can better enhance reading comprehension (Kledecka-Nadera, 2001; Hudson, 1982). As it was established in relevant literature, fluent, comprehensible reading should entail both skilful decoding and relating information to prior knowledge (Eskey, 1988) made easy by making accessible meanings of unfamiliar vocabulary in time without wasting readers' time on look-ups in paper dictionaries or imposing extra extraneous cognitive processing loads for uncovering the meanings of unfamiliar vocabulary in eternal resources. According to Carrell, Devine, and Eskey (1988), what needs to be taken into consideration is that so many EFL readers are meaning-centred, and that these meaning-centred readers demonstrate good to excellent recall and comprehension of text.

In this vein, the study's findings implicitly suggest that distance and effort exerted in locating words in the reading text and in a particular type of dictionary may equally induce some sort of extraneous cognitive load interfering with text understanding or vocabulary learning in what is known as the principle of "proximity" between glossed words and gloss during the reading process; this finding is also consistent with prior research findings by Paas, van Gog, and Sweller (2010), AbuSeileek (2011), Yeung, Jin, and Sweller (1997), and Liu and Lin (2011).

CONCLUSIONS AND IMPLICATIONS

This study agrees with prior research suggesting the need for extensive vocabulary knowledge for reading (Alderson & Urquhart, 1984; Singer, 1981). It is implied that good readers are not good simply because they are better predictors, or make better use of context; they do need to see the meanings of unseen vocabulary to be accessible easily without external factors that add up to the difficulty of cognitively processing the reading materials, such as is the case with distractions brought about by the look-ups in printed dictionaries. It is also implied that contextual interpretation of lexical items is only a part of the vocabulary skills needed for fluent reading, and may actually interfere if a student overrelies on this strategy (Stanovich 1992).

Pedagogical implications of the present study indicate that teachers do need to devote time and effort to reading comprehension strategies which involve incidental vocabulary pick-ups from glossing in the easiest and less cognitively demanding ways. Equally important, some time must be devoted in the reading class to bottom-up concerns such as the rapid and accurate identification of lexical and grammatical forms (Sinclair, 2004). Even students who have developed strong top-down skills in their native languages may not be able to transfer these higher-level skills to an EFL context until they have developed a stronger bottom-up foundation of basic identification skills. Reading of any kind of text must be treated as real reading, that is, reading for meaning. No student should ever be forced or encouraged to limit him/herself to decoding skills. This is also consistent with established research in reading (Eskey & Grabe, 1988).

This study contributes to a growing body of research on reading comprehension strategies (Mekheimer, 2012; Liu & Lin, 2011; Aldosari & Mekehimer, 2010; AbuSeileek, 2011) bearing convincing evidence to the finding that hypertext glosses can improve reading comprehension and vocabulary learning and, furthermore, that the reading ability can be improved using e-glosses. It seems that these findings are likely to occur in EFL contexts, but still more cumulative evidence needs to be collected from further studies on the same issue to support the findings of this study.

***Abdullah M. Al-Melhi**, (Ph.D., Michigan State University, 1999) is an Assistant Professor of Applied Linguistics and Dean of the Faculty of Languages and Translation at Abha, King Khalid University, KSA. His main research interests include reading comprehension and reading/writing integration.*

Email: abdullah.almelhi@yahoo.com

REFERENCES

Abraham, L. B. (2008). Computer-mediated glosses in second language reading comprehension and vocabulary learning: A meta-analysis. *Computer Assisted Language Learning*, *21*(3), 199–226.

AbuSeileek, A. (2011). Hypermedia annotation presentation: The effect of location and type on the EFL learners' achievement in reading comprehension and vocabulary acquisition. *Computers & Education*, *57*(1), 1281–1291.

Acha, J. (2009). The effectiveness of multimedia programmes in children's vocabulary learning. *British Journal of Educational Technology, 40* (1), 23-31.

Alderson, J. C., & Urquhart, A. H. (1984). Introduction: What is reading? In Alderson and Urquhart (Eds.), *Reading in a Foreign Language (xv-xxviii)*. London: Longman.

Aldosari, H., & Mekheimer, M. (2010, April). *Utilisation of English-English online dictionaries for enhancing culture-specific translation skills in college students*. Paper presented at the International Conference of Suleyman Demirel University: Building Cultural Bridges: Integrating Languages, Linguistics, Literature and Translation into Education, Almaty, Kazakhstan.

Anderson, J. R. (1995). *Cognitive psychology and its implications (4th Ed.).* New York, NY: Freeman.

Barrouillet, P., & Camos, V. (2010). Working memory and executive control: A Time-Based Resource-Sharing account. *Psychologica Belgica*, *50*, 353–382.

Barrouillet, P., Bernardin, S., Portrat, S., Vergauwe, E., & Camos, V. (2007). Time and cognitive load in working memory. *Journal of Experimental Psychology*: *Learning, Memory, and Cognition*, *33*, 570–585.

Beatty. K. (2005). *Teaching and researching computer-assisted language learning*. Beijing: Foreign Language Teaching and Research Press.

Brown, H., & Abeywickrama, P. (2010). *Language assessment: Principles and classroom practices* (2nd Ed.). Pearson Education ESL.

Bruton, A. (2007). Vocabulary learning from dictionary reference in collaborative EFL translational writing. *System*, *35*, 353–367.

Camos, V., Lagner, P., & Barrouillet, P. (2009). Two maintenance mechanisms of verbal information in working memory. *Journal of Memory and Language*, *61*, 457–469.

Carrell, P. L. (1988a) Some causes of text-boundedness and schema interference in ESL reading. In P. L. Carrell, J. Devine, & D. E. Eskey (Eds.), *Interactive approaches to second language reading* (pp.101-13). Cambridge: Cambridge University Press.

Carrell, P. L. (1988b). Interactive text processing: Implications for ESL/second language reading classrooms. In P. L. Carrell, J. Devine, & D. E. Eskey (Eds.), *Interactive approaches to second language readi*ng (pp. 239–259). Cambridge: Cambridge University Press.

Carrell, P. L., Devine, J., & Eskey, D. E. (Eds.) (1988). *Interactive approaches to second language reading*. Cambridge: Cambridge University Press.

Chapelle, C., & Jamieson, J. (1986). Computer-assisted language learning as a predictor of success in acquiring English as a second language. *TESOL Quarterly, 20*, 27-47.

Craik, F., & Lockhart, R. (1972). Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behaviour*, *11*(6), 671–684.

Davies, N. (1989). Facilitating effects of marginal glosses on foreign language reading. *Modern Language Journal*, *73*, 41–48.

Davis, J. N. (1989). Facilitating effects of marginal glosses on foreign language reading. *The Modern Language Journal*, *73*(1), 41-48.

Dobiecka, K., & Wiederholt, K. (2008). *Well Read 2: Skills and strategies for reading*. New York, NY: Oxford University Press.

Eskey, D. E. (1988). Holding in the bottom: An interactive approach to the language problems of second language readers. In P. L. Carrell, J. Devine, & D. E. Eskey (Eds.), *Interactive approaches to second language readi*ng (pp. 93-100). Cambridge: Cambridge University Press.

Eskey, D. E., & Grabe, W. (1988). Interactive models for second language reading: Perspectives on instruction. In P. L. Carrell, J. Devine, & D. E. Eskey (Eds.), *Interactive approaches to second language readi*ng (pp. 221-238). Cambridge: Cambridge University Press.

Fageeh, A., & Mekheimer, M. (2011). EFL learners' vocabulary acquisition in translational writing. *Journal of Language Teaching and Research*, *2*(4), 918-928.

Goyette, E. S. (1995). *The effects of dictionary usage on text comprehension*. (Doctoral dissertation, University of McGill, 1995) Dissertation Abstracts International,57, 4264A.

Hayden, S. (1997). *An investigation into the effect and patterns of usage of a computermediated text in reading comprehension in French*. Unpublished Doctoral Dissertation, University of Pennsylvania.

Hoogeveen (1995). Toward a new multimedia paradigm: Is multimedia assisted instruction really effective? *System, 28* (4), 113-115.

Hu, S., Vongpumivitch, V., Chang, J., & Liou, H. (2014). The effects of L1 and L2 e-glosses on incidental vocabulary learning of junior high-school English students. *ReCALL: The Journal of EUROCALL, 26* (1), 80-99.

Hudson, T. (1982). The effects of induced schemata on the "short circuit" in L2 reading: Non-decoding factors in L2 reading performance. *Language Learning, 32*, 1-31.

Hulstijn, J. H., Hollander, M., & Greidanus, T. (1996). Incidental vocabulary learning by advanced foreign language students: The influence of marginal glosses, dictionary use, and reoccurrence of unknown words. *The Modern Language Journal*, *80*(3), 327–339.

Hulstijn, J. H. (2001). Intentional and incidental second language vocabulary learning: A reappraisal of elaboration, rehearsal and automaticity. In P. Robinson (Ed.), *Cognition and second language instruction* (pp. 258–286). Cambridge: Cambridge University Press.

Kim, K., Byun, E., Lee, S., Gaillard, W., & Theodore, W. (2011). Verbal working memory of Korean–English bilinguals: An fMRI study. *Journal of Neurolinguistics, 24*(1), 1-13.

Kledecka-Nadera, A. (2001). *Application of computer-assisted language learning in the development of reading comprehension skills*. Retrieved January 29, 2012 from http://ifa.amu.edu.pl/fa/files/ifa/papers/kledecka/kledecka-mgr.htm.

Knight, S. (1994). Dictionary use while reading: The effect on comprehension and vocabulary acquisition for students of differential verbal-abilities. *Modern Language Journal*, *78*(3), 285–299.

Krashen, S. (1982). *Principles and practice in second language acquisition*. New York, NY: Pergamon.

Krashen, S. (1989). We acquire vocabulary and spelling by reading: Additional evidence for input hypothesis. *Modern Language Journal*, *73*, 440–463.

Liu, T., & Lin, P. (2011). What comes with technological convenience? Exploring the behaviours and performances of learning with computer-mediated dictionaries. *Computers in Human Behaviour, 27*(1), 373–383.

Lomicka, L. L. (1998). "To gloss or not to gloss": An investigation of reading comprehension on line. *Language Learning & Technology, 1*(2), 41-50.

Luo, J. (1993). *A study of the effects of marginal glosses on the reading comprehension of intermediate college students of French*. Unpublished doctoral dissertation, University of Pennsylvania, Pennsylvania.

Mekheimer, M. (2012). Assessing aptitude and attitude development upon teaching translation skills using LMS and an online dictionary. *CALICO Journal, 29*(2), 321-340.

Nation, I. S. P. (2001). *Learning vocabulary in another language.* Cambridge: Cambridge University Press.

Nation, P., & Carter, R. (Eds.) (1989). *Vocabulary acquisition. Special issue of AILA* [Association Internationale de Linguistique Appliquée] *Review*, 6. University of Nottingham: London.

O'Keeffe, A., McCarthy, M., & Carter, R. (2007). *From corpus to classroom: Language use and language teaching*. Cambridge: Cambridge University Press.

Paas, F., van Gog, T., & Sweller, J. (2010). Cognitive load theory: New conceptualizations, specifications, and integrated research perspectives. *Educational Psychology Review*, *22*, 115–121.

Pak, J. (1986). The effect of vocabulary glossing on ESL reading comprehension. Unpublished manuscript, University of Hawaii at Manoa.

Peters, E. (2007). Manipulating L2 learners' online dictionary use and its effect on L2 word retention. *Language Learning & Technology*, *11*(2), 36–58.

Pichette, F. (2005). Time spent on reading and reading comprehension in second language learning. *The Canadian Modern Language Review*, *62*(2), 243–262.

Roby, W. B. (1999). "What's in a gloss?"A commentary on Lara L. Lomicka"s "To gloss or not to gloss": An investigation of reading comprehension online. *Language Learning & Technology, 2*(2), 94-101.

Rott, S. (1999). The effect of exposure frequency on intermediate language learners' incidental vocabulary acquisition and retention through reading. *Studies in Second Language Acquisition*, *21*, 589–619.

Rott, S., Williams, J., & Cameron, R. (2002). The effect of multiple-choice L1 glosses and input-output cycles on lexical acquisition and retention. *Language Teaching Research, 6*, 183-222.

Segler, T. M. (2001). *PhD research proposal: Second language vocabulary acquisition and learning strategies in ICALL environment*. Available at http://www.dai.ed.ac.uk/homes/thomass/ newprop.pdf

Sinclair, J. M. (2004). *Trust the text, corpus and discourse*. London: Routledge.

Singer, H. (1981). Instruction in reading acquisition. In O. Tzeng & H. Singer (Eds.), *Perception of print* (pp. 291-312). Hillsdale, NJ: Lawrence Erlbaum Associates.

Stanovich, K. E. (1992). Speculations on the causes and consequences of individual differences in early reading acquisition. In P. Gough, L. Ehri, & R. Treiman (Eds.), *Reading acquisition* (pp. 307-342). Hillsdale, NJ: Lawrence Erlbaum Associates.

Stoehr, L. E. (1999). *The effects of built-in comprehension aids in a CALL program on student-readers' understanding of a foreign language*. (Doctoral dissertation, University of Texas at Austin, 1999) Dissertation Abstracts International, 4353-A.

Sweller, J. (2010). Element interactivity and intrinsic, extraneous, and germane cognitive load. *Educational Psychology Review*, *22*, 123–138.

Taylor, A. (2006). The effects of CALL versus traditional L1 glosses on L2 reading comprehension. *CALICO Journal, 23*(2), 309-318.

Taylor, A. M. (2002). *A meta-analysis on the effects of L1 glosses on L2 reading comprehension*. Unpublished doctoral dissertation, Purdue University.

Uzawa, K. (1996). Second language learners' process of L1 writing, L2 writing, and translation from L1 to L2. *Journal of Second Language Writing, 5*, 271–294.

Ward, G., Tan, L., & Grenfell-Essam, R. (2010). Examining the relationship between free recall and immediate serial recall: The effects of list length and output order. *Journal of Experimental Psychology: Learning, Memory, & Cognition*, *36*, 1207–1241.

Yeung, A. S., Jin, P., & Sweller, J. (1997). Cognitive load and learner expertise: Split attention and redundancy effects in reading with explanatory notes. *Contemporary Educational Psychology*, *23*, 1–21.

Yoshii, M. (2006). L1 and L2 glosses: Their effects on incidental vocabulary learning. *Language Learning & Technology*, *10*(3), 85–101.