# Computerized Input Enhancement versus Computer-assisted Glosses: Do They Affect Vocabulary Recall and Retention?

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*Abstract*—The present study aimed at investigating whether two types of computerized techniques, namely Computerized Input Enhancement (CIE) and Computer-Assisted Marginal Glosses (CAMG) had any significant impact on vocabulary recall and retention of a group of Iranian EFL learners. After designing two programs for the purpose of the study, the CIE group was exposed to texts in which the words were blinking in a different color while for CAMG group the new words were presented in the margins of the texts along with relevant pictures whenever the learners moved the cursor. Subsequently, nine passages with appropriate readability scores were selected and uploaded for further use. Next, 47 pre-intermediate level language learners in two intact classes were selected from a language school in Tehran, Iran and were randomly assigned to two experimental groups. Based on Vocabulary Knowledge Scale (VKS), 42 unknown words from the reading texts were identified. During the treatment, the participants were expected to read the texts and check the meanings of the unknown words. After the treatment, the participants took two posttests (immediate and delayed), the results of which were analyzed through repeated measures ANOVA. A statistically significant difference between the two groups showed that CAMG outperformed CIE.

*Index Terms*—Computerized Input Enhancement (CIE), Computer-Assisted, Marginal Gloss (CAMG), vocabulary learning, vocabulary recall, vocabulary retention

# I. INTRODUCTION

Vocabulary, as one of the components of language learning, has a vital role in improving second language learning, and thus the responsibility of practitioners and language teachers is to expand vocabulary knowledge of second language learners (Schmidt, 2008; Singleton, 1999). One of the ways to foster vocabulary learning is making use of computer technology. According to Garrett (1989), "integration of computer technology in education is the new humanism which has paved the way for the advancement of language learning" (p. 104). Computer Assisted Language learning (CALL), as Beatty (2010) argued, provides opportunities for comprehensible input and encourages comprehensible output which, in turn, aid learners to improve their vocabulary knowledge.

With incorporation of computers and multimedia programs in language learning and teaching, it has become possible to design effective tools for teaching vocabulary while reading a text. Teaching vocabulary through Web-based Language Learning (WBLL) activities has been popularly used in EFL/ESL contexts (Son, 2008). Also, hypermedia as a multidimensional computer tool has been practiced by language teachers to facilitate learning and teaching processes (Cummins, 2008a). Teachers and learners can utilize website resources for various pedagogical purposes to scaffold teacher-student interaction in and outside the classroom (Cummins, 2008b). Use of technology for teaching language skills and sub-skills increasingly gained the interest of the present study's researchers on the basis of the assumption that it could bring about a change to the routines of ordinary classrooms, a condition EFL contexts are in dire need. Thus vocabulary, as a component of language learning which can positively affect learning all four language skills, was selected.

#### A. Input Enhancement

The two non-electronic strategies of vocabulary learning, input enhancement and marginal glosses embedded in certain language textbooks can enhance incidental vocabulary learning (Watanabe, 1997). Input enhancement, as Sharwood Smith (1993) put forward, serves to draw learners' attention to certain linguistic forms in the input that might otherwise go unnoticed or unlearned contributing to the 'input-to-intake' process since it highlights language forms that learners tend to ignore. Input enhancement, also, is in conformity with the theory in SLA that 'noticing' is essential to L2 acquisition (Schmidt, 1995). By input enhancement as some kind of necessary pedagogic intervention, learners' attention is drawn toward target words. However, as Wong (2004) maintained, the impact of different types of input enhancement, the impact of input enhancement on learners' processing input for meaning and form simultaneously, as

well as the way the level of comprehensibility of the input affects learners' processing have not been successfully examined. Input enhancement, as a pedagogical technique, can extort learners' attention to formal features of the input received and hence, can help them improve their language proficiency (Combs, 2004).

Reinders and Ellis (2009) suggested that exposure to input even in its most unobtrusive way (as in input enrichment) can be effective. Izumi (2002) compared the effects of visual input enhancement and output on the acquisition of English relative clause forms by adult English L2 learners. Four treatment groups were formed according to whether learners (a) were presented with enhanced input (b) required to produce output and (c) presented with enhanced input and asked to produce output. The fourth group (control) received no treatment and participated only in the pre- and posttests. Izumi concluded that while visual input enhancement constitute an external attention drawing technique, output constitute an internal attention drawing technique as "learners themselves decide what they find problematic in their production and what they pay attention to in the input" (p. 543). The results of the study revealed that those engaged in the output or output–input treatments outperformed those exposed solely to the input enhancement. Furthermore, those who received visual input enhancement failed to indicate measurable gains in the posttest. Izumi suggested that the instructional benefit of output is much more significant than that of input enhancement.

### B. Computerized and Electronic Glosses

A number of studies conducted to examine the impacts of different types of glosses on second language learners' vocabulary acquisition and retention indicated that single glosses and multiple choice glosses were advantageous to incidental vocabulary learning (Chen, 2002; Rott, William, & Cameron, 2002; Yoshii, 2006). Furthermore, the impacts of electronic glossing on L2 vocabulary acquisition were also addressed in a number of studies. To compare the effects of traditional English marginal gloss and CALL gloss on incidental vocabulary learning, Lage (2008) conducted a study on high-intermediate/low-advanced Spanish students from two sections of the same Spanish course at an American university. To investigate the effect of subject characteristics on gloss access, Lage divided the participants into two groups including traditional English marginal gloss and CALL gloss and asked them to answer three vocabulary posttests in three subsequent weeks and complete a text comprehension test. While the results of this study were not consistent; it was signified that there was no significant difference between vocabulary recall and gloss presentation. In another study, in order to compare the effects of marginal glosses and electronic dictionaries on vocabulary learning, Chang (2002) carried out a study in which the 92 twelfth-grader participants were asked to read a short story with 16 target words in three different conditions including reading with bilingual marginal glosses, reading with electronic dictionaries, and reading with no assistance and answer three vocabulary tests on the 16 target words and a reading comprehension test immediately and with a two-week delay. Although, the results revealed that marginal glosses had greater effect as compared to electronic dictionaries on the immediate test, the positive effect of marginal glosses disappeared on the delayed retention test. The results also showed that participants with bilingual marginal glosses acquired 18% of the target words and retained 2%; participants with electronic dictionary acquired 15% and retained 4%; and those without assistance acquired 3% and retained less than one percent (0.6%) of the target words.

A variety of studies thus far examined the use of computer in teaching vocabulary including studies on multimedia annotations (Yanguas,2009), hyperlinked multimedia documents and computer mediated communication (Son,2008), computerized glosses (Al-Segayer,2001; Bowles,2004), comparing single L2 glosses with multiple choice L2 glosses (Watanabe,1997), recall advantage of glossing by practicing different test conditions (immediate vs. delayed) (Jacobs,1994), and multiple-choice glossing (Hulstihn & Laufer, 2001). Also, some researchers performed comparative studies on single glosses in L1 and L2 (Bell & Le Blanc, as cited in Hee Ko, 2005; Chen 2002; Jacobs, 1994; Huang, 2003). Moreover, in their studies Bell and Leblanc (2000) looked at the type of glossing frequently used for computer-based reading, Yen and Wang (2003) investigated the effect of three gloss types on vocabulary learning, and Bowles (2004) employed think-aloud protocols to compare computerized glosses versus traditional glosses in vocabulary acquisition and text comprehension.

The results of several studies on examining the effect of glossing on reading comprehension and vocabulary learning brought about mixed results, some suggesting that glossing enhanced reading comprehension and vocabulary learning (Hulstijn, Hollander, & Greidanus, 1996; Jacobs, 1994), and others indicating that glossing had little or no effect on reading comprehension (Jacobs, DuFon, & Fong, 1994; Johnson, 1982; Ko, 2005). However, quite recently, the focus shifted from questioning the positive impact of glossing on reading comprehension and vocabulary learning to the language (L1 or L2) of glossing to which learners should be exposed. Son (2008) proposed that "hyperlinked multimedia documents and computer mediated communication (CMC) tools could support language teachers to integrate Web resources into the language classroom" (p.34). Smith and Stacy (2003) emphasized that CMC "has changed the nature of distance from an individual experience that is largely remote and isolated from other students, to one in which the technology can enable more ongoing interaction with fellow students" (p.165). Bell and LeBlanc (2000) studied learners' actual behavior while experiencing L1 and L2 glosses in a computer-based reading course and have come up with their participants' preference for using glosses in L1 since the L2 gloss group "clicked on about twice as many of the words" as did the L2 group (p.279) although no significant difference in comprehension of the participants is detected.

Considering results of the previous studies on vocabulary learning through glosses and input enhancement, the following research questions were put forward:

RQ1. Do CIE and CAMG techniques have any impact on the enhancement of vocabulary recall of Iranian EFL learners?

RQ2. Do CIE and CAMG techniques have any impact on the enhancement of vocabulary retention of Iranian EFL learners?

RQ3. How do Iranian EFL learners perceive learning vocabulary through CIE and CAMG techniques?

# III. METHODOLOGY

## A. Participants

Participants of the present study were 47 pre-intermediate male students within the age range of 19 and 29 who had enrolled in a general English course in a language school in Tehran, Iran. They were members of two intact classes, selected based on convenience sampling, and randomly assigned to two experimental groups, with 23 and 24 students in each group. The classes met three times a week, each session lasting for 90 minutes. The participants were screened by the Key English Test (KET) and were ascertained to be at the same language proficiency level. To examine whether the distribution of participants' scores on the KET was normal prior to the treatment, Shapiro-Wilk test (number of participants<100) was run and indicated that the distributions of scores in both groups were normal.

#### **B.** Instrumentation

The instruments used in this study included Vocabulary Knowledge Scale list (VKS) adapted from Paribakht and Wesche (1997), a vocabulary list consisting of 59 words extracted from the computerized texts which were going to be used during the treatment, a retrospective questionnaire, and a vocabulary posttest (immediate and delayed).

The first instrument used in this study was a list of target words extracted from the reading texts. However, to ensure that the participants did not know the meaning of the words, the adapted VKS list was used to elicit self-perceived and demonstrated knowledge of specific words in written form. The scale ratings ranged from total unfamiliarity, through recognition of the word and some idea of its meaning, to the ability to use the word with semantic accuracy in a sentence. All of the learners were presented with a list of words and asked to point out their level of knowledge for each word by providing a synonym or L1 translation. Having run the VKS list, from among 100 items, 42 words which 80% of the students pointed out as totally unfamiliar were selected for the study.

The second instrument was a vocabulary multiple choice test based on the newly learned target words used as immediate and delayed posttests to compare the effectiveness of the teaching techniques in each of the two groups. The test was piloted with a group of learners similar to the participants of this study after two English language teachers with more than 10 years of experience approved its content. The reliability of the test estimated through Cronbach's alpha showed an acceptable reliability index (r=0.78).

The third instrument was a retrospective questionnaire in Persian (see Appendix A for English version) which was used to elicit the participants' attitude toward the two vocabulary learning techniques. The first draft of the questionnaire was examined and was revised by two experts before administration. The questionnaire consisted of two parts. Part A consisted of 11 yes-no questions and focused on the way the participants perceived the vocabulary learning strategies they had practiced. Part B included two open-ended questions which questioned the features of each of the two techniques.

# C. Materials

With regard to three criteria for text selection, namely complexity, authenticity, and readability (Knight, 1994), nine reading texts from englishforeveryone.org and American English files accessible at (https://elt.oup) were selected and their readability indexes were checked (Table 1). Also, content appropriateness of the texts was checked by two experienced English teachers who were teaching at the same language school. The readability of the texts checked through Flesch Reading Ease Formula showed conformity between the difficulty level of these passages and the ones in the participants' course book.

Ν	Title of the Texts	Number of Selected Words	<b>Readability Score</b>
1	Firefighters	8	80
2	Tunnel	10	60.9
3	To whom it may concern	17	66.1
4	Animals	13	65.3
5	What makes you feel good	2	73.4
6	Queues	2	61.3
7	How to make	2	73.5
8	Short stories	2	80
9	Old river hotel	2	69

Also, two types of home-made computerized programs were used to provide learners with two modes of computerized texts; Computerized Input Enhanced texts (Figure 1) and CAMG texts (Figure 2). The texts were computerized by Auto-Play Media Studio Pro software (Appendix B) by a computer program writer.



Fig. 2 CAMG Text Sample

IV. PROCEDURE

# A. Treatment

Thirty minutes of each 90-minute session was allocated to the treatment of the study; that is, reading and learning new words through CAMG and CIE as two different computerized techniques. In pre-reading phase which took about five minutes, the teacher introduced the topic of the lesson with a short anecdote or a set of questions about the general idea of the text. During the while-reading phase, students began to work with computers. In both groups, students were asked to read the texts and check the meanings of the words. For CIE group, the unknown words were in bold so that students could easily recognize the words they didn't know. The words started to glitter in different colors as soon as students clicked on them. However; for the CAMG group the unknown words were not emphasized; students could click on the words only when they thought they couldn't decipher the meaning of the text due to some unknown words. When students clicked on a word, its definition along with a related picture appeared in the margin. The difference between the two programs was noticing and guessing. In the post-reading phase, which took about five minutes, a few multiple choice reading comprehension questions were given to the learners in the groups.

#### B. Posttests

In order to compare the efficiency of the teaching techniques in each of the groups, a vocabulary test in multiple choice format which included the 42 target words was administered immediately after the completion of the treatment and later, after a two-week interval.

# V. RESULTS

The first step was to check whether the scores were normally distributed in the immediate and delayed posttests. As Table 2 signifies, the distributions of the scores in the immediate posttest for CAMG (statistics= .96, df=24, sig=.56>.05)

and CIE (statistics=.98, df=23, sig=.94>.05) and delayed posttest for CAMG (statistics=.93, df=24, sig=.10>.05) and CIE (statistics=.84, df=23, sig=.002<05) were normal.

TES	TABLE 2 TS OF NORM	2 MALITY		
	Crowns	Shapiro-W	ʻilk	
	Groups	Statistics	df	Sig.
Immediate posttasts	CAMG	.966	24	.567
mineulate positesis	CIE	.983	23	.947
Delayed postfacts	CAMG	.931	24	.105
Delayeu positesis	CIE	.842	23	.002

Tables 3 and 4 show descriptive statistics related to immediate and delayed posttests. As Table3 illustrates, the mean of the groups (M (CAMG) =17.91, M (CIE) =17.43) are close to one another, so it seems both groups performed similarly on the immediate posttest. However, as Table 4 illustrates, the difference between the two groups' means was larger in the delayed posttest (M (CAMG) =17.29, M (CIE) =11.82).

			TA	BLE 3		
DESCRI	PTIVE	STATIST	ics, Voo	CABULAR	y Immediate	POSTTEST
Groups	Ν	Mean	SD	Std. E	Minimum	Maximum
CAMG	24	17.91	8.93	1.82	3	39
CIE	23	17.43	7.50	1.56	4	35
Total	47	17.68	8.18	1.19	3	39
			TA	BLE 4		
DESCR	RIPTIVI	e Statist	fics, Vo	CABULAF	RY DELAYED	Posttest
Groups	Ν	Mean	SD	Std. E	Minimum	Maximum
CAMG	24	17.29	8 40	1.71	4	34

	Total	47	14.61	9.23	1.34	1	40			
In order to statistically compa	are the g	groups	s on the	e two t	ests, R	epeate	d Measures Ana	lysis of Varia	nce (RMAN	OVA)
was run. These results implied t	hat CAN	MG ou	itperfoi	rmed (	CIE as :	far as l	lexical retention	was concerned	d.	

9.40 1.96

1

23 11.82

CIE

40

As Table5 shows, the variances of the groups were homogeneous across groups [F (1, 45) = 0.72, p=0.39>0.05] for the immediate [(F (1, 45) =0.014, p=0.90>0.05] and delayed vocabulary posttests. Therefore, running a RM ANOVA was legitimized with a within-subjects factor (test type) and two levels, vocabulary immediate posttest and vocabulary delayed posttest.

	Тав	le 5				
Номос	GENEITY OF VARIANCES, IM	MEDIATI	E & DELAYED PO	STTESTS		
	Levene Statistic	df1 d	f2 Sig.			
	0.72	1 4	5 0.39			
	.014	1 4	5 0.90			
	TAB RM ANOVA FOR WITH	LE6 HIN-SUBJ	ECTS EFFECTS			
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared (η2)
Factor1*Groups Sphericity Assumed	145.853	1	145.853	5.035	0.030	0.101
Greenhouse-Geisser	145.853	1.000	145.853	5.035	0.030	0.101
Huynh-Feldt	145.853	1.000	145.853	5.035	0.030	0.101
Lower-bound	145.853	1.000	145.853	5.035	0.030	0.101

The results of the within subject effects, shown in Table 6 reveals that the type of treatment in each group had a significant impact on vocabulary retention [F (1, 45) = 5.03, Sig=.03<.05]. Also partial eta square ( $\eta$ =0.10) with a moderate effect size (Cohen, 1988, pp. 284-7) shows that the independent variable in each of the groups accounted for 10% of the overall variance.

Table 7 illustrates the between subject effect verifying the fact that the interception of the participants had a significant impact [F (1, 45), F=205.59, .000<0.05]; that is, there was a significant difference between CAMG and CIE groups, in general.

	RM ANOVA	AFOR	TABLE 7 Between-Subje	ECTS FACT	OR	
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	24407.08	1	24407.08	205.59	.000	.820
groups	207.71	1	207.71	1.75	.193	.037
Error	5342.19	45	118.71			

As Figure 3 indicates, there is no significant difference between the means of the groups in the immediate posttest although the difference in the delayed posttest is significant. That is, CAMG did significantly better in the delayed posttest as compared to CIE group.



Fig. 3 Estimated Marginal Means, Comparison of Two Test Types in Groups

# The Questionnaire

As mentioned earlier, an eleven-item retrospective questionnaire was administered to learn about students' perceptions regarding the use of the techniques. The data obtained from the questionnaire showed that 87% of the participants believed that checking the meaning of the words in marginal glosses made reading task easier. However, while 75% agreed that CAMG was effective for learning vocabulary, 25% believed that the technique did not have any effect at all. Concerning the preference to attend computer-oriented classes, 62% from CAMG group and 56% from CIE group expressed their preference for the techniques as compared to ordinary reading classrooms. As far as working with hypertexts was concerned, 60% of the members of CAMG and 54% of the members in CIE group asserted that they preferred to work with such texts. In general, 64% of the CAMG group and 56% of the CIE group believed that the techniques could enhance their motivation for language learning. Regarding the effect of the techniques on vocabulary retention, 75% of the students in CAMG group and 65% of the students in CIE group thought that the techniques helped them learn the new words better than traditional classes. Additionally, 62% of the students in CAMG group asserted that they preferred the technique to be used in their classes in future; whereas, 47% of the CIE group asserted that they would like to use it again. The data obtained from the questionnaire indicated that 72% in CAMG group and 52% in CIE group believed that it was easy to work with computers with no serious problem. In addition, 70% in CAMG group and 57% in CIE group emphasized that working and learning through the techniques were pleasant and that they enjoyed learning language with the software they used.

# VI. DISCUSSION

The positive answer to the first research question signifies that both techniques had a positive impact on vocabulary recall of the participants and the groups did not show any significant difference in the immediate posttest. This finding authenticates the use technology as an aid in foreign language learning classrooms. Nevertheless, the analysis of the results for the second research question indicated that difference between the groups was significant in delayed posttest and CAMG group outperformed the CIE group. This could, partially, be due to the pictures available in the margins of the reading texts in CAMG group's treatment. In a critical analysis of L2 vocabulary learning techniques, Oxford and Crookall (as cited in Al-Seghayer, 2001), asserted that "most learners are capable of associating new information to concepts in memory by means of meaningful visual images that make learning more efficient"[electronic version]. Pictures in the margins reminded learners of their experience with the real world and helped them form an association. The pairing between the words and pictures seems to enhance retention. That is to say, the coordination of language and pictures in CAMG technique provided an appropriate stipulation for the learners to process language which is the condition for information "to find its way into long-term memory" (Lefrancois, 1982, p.64). Another reason for better performance of the CAMG on the delayed posttest could be found in theories related to brain lateralization. It could be hypothesized that appearance of pictures in the margins along with the definition of the words could stimulate both right and left brain hemispheres work while learners were engaged in processing language.

Another indicative factor for the outperformance of the CAMG group in the delayed posttest could be inferencing. The learners in this group tried to guess the meanings of the words before clicking on them; therefore, it is likely that inferencing as one of the central cognitive processes helped the learners to be more successful in the delayed posttest (Nassaji, 2004). Thus it can be concluded that "making informed guesses about the meanings of unknown words based on the available linguistic and non-linguistic cues in the text" (Nassaji, 2004, p.108) assisted learners in moving the words to their long-term memory. Hence, it can be argued that glosses can provide a wider span of focus for learners as compared to input enhancement technique, and can facilitate reading (Nation, 1990). Likewise, it seems that learners in

CAMG group experienced deeper cognitive involvement while tried to check the meaning of the words available in the glosses; a finding in line with Izumi's (2002) assertion that enhancement "does not necessarily encourage further cognitive processing that may be necessary for acquisition" (p. 567); since enhancement seems to facilitate focus on form.

Accessibility (Aust, Kelley, & Roby, 1993) of marginal glosses and the speed with which participants could check the meanings of the unknown words could be another interpretation for the results of the study. As proposed by Hulstijn, Hollander, and Greidanus, (1996), Jacobs, Dufon, and Hong (1994), and Rott (2007) the possibility of the use of glosses is facilitative for L2 learners' vocabulary learning while reading due to the fact that the definition is easily available in the text.

Also, using computerized marginal glosses boosted learners' motivation for learning the new words more than the CIE group, a conclusion obtained from the participants' answers to the open-ended questions of the retrospective questionnaire. The findings of the present study, also, are in line with some recent studies on multimedia annotations (Chun & Plass, 1996; Davis & Lyman-Hager, 1997; Mart nez-Lage, 1997) which indicated that students who worked with multimedia program had a stronger retention of new words than students who had worked with non-computerized texts. However, the findings of the present study is in contradiction with those of Jacobs, Dufon, and Hong (1994) who found that glossing did not significantly affect recall of intermediate level students and could only be an effective technique when used for students whose proficiency level is above average.

On the other hand, previous studies on the effects of visual input enhancement-both those that used short-term treatments with rather limited exposure to the input (Alanen, 1995; Charaee, 2002; Leow, 1997; Shook, 1994; Williams, 1999), and those that adopted longer-term treatments with a greater amount of input exposure (Doughty, 1988; White, 1998) appeared to have quite mixed results. Two of these studies (Shook, 1994; Williams, 1999) yielded positive findings for the facilitative effects of input enhancement; whereas, four of them (Alanen, 1995; Charaee, 2002; Robinson, 1997; White, 1998) showed only limited effects. Finally in their studies, Doughty (1988) and Leow (1997) found no significant effects at all. The findings of the present study show limited effect of CIE in comparison to CAMG technique.

## VII. CONCLUSION

The findings of the present study confirm the use of technology for teaching vocabulary in EFL classrooms. Moreover, it suggests the use of marginal glosses because of their advantage in retention of the vocabulary. Using glosses, students find an opportunity to read with less interruption for looking up the meanings of the new words from a dictionary and allow for greater autonomy on the part of learners (Hee Ko, 2005). As one of the most challenging tasks for EFL teachers is to bring some change to the routines of their classrooms, implementation of computer-assisted techniques can be beneficial for language learners and can help them in effective vocabulary learning. The change of atmosphere brought by technology into language classrooms can help EFL learners to take a more active role in the process of learning English.

# APPENDIX A. RETROSPECTIVE QUESTIONNAIRE

1. Was it easier to check the meaning of the words through **Computerized Input Enhancement/Computer-Assisted Marginal Gloss** than using online/paper dictionaries?

2. Did the **technique** help you to better understand the texts?

3. Do you like to use **Computerized Input Enhancement/Computer-Assisted Marginal Gloss** texts for practicing reading in the next term?

4. Do you like all of the reading texts in your text book to be computerized?

5. Did **Computerized Input Enhancement/Computer-Assisted Marginal Gloss** texts provide an easy way to find the meaning of the unknown words?

6. Do you think that computerized texts (with highlighted, italicized, and bold / marginalized words) help you remember words easier?

7. Do you think you were more eager to practice reading with computerized texts?

8. Do you think using computers or digitalized tools are more motivating for learning L2 words?

9. Do you think that using computerized texts are an easy way for learning words?

10. Did you enjoy using the technique during the term?

11. What do you generally think about the technique you experienced during your classes?

12. What are some of your recommendations for computerized classes?

#### APPENDIX B

vent variables	s: None	
01 Image.I 02 Image.S 03 Paragra 04	<pre>Load("Image1", "AutoPlay\\Images\\casualties.jpg"); SetVisiDle("Image1", true); aph.SetText("Paragraph2", "someone who is hurt or killed in an accident or w</pre>	Jar\r\n");
<	20	>

Written Program Lines of CAMG



Written Program Lines of CIE

#### REFERENCES

- [1] Alanen, R. (1995). Input enhancement and rule presentation in second language acquisition. In R.Schmidt (ed.), *Attention and awareness in foreign language learning*. Honolulu: University of Hawai'i Press, 259-302.
- [2] Al-Seghayer, K. (2001). The effect of multimedia annotation modes on L2 vocabulary acquisition: A comparative study [Electronic version]. *Language Learning and Technology*, 5.1, 202-232.
- [3] Aust, R., M. J. Kelley & W. Roby (1993). The use of hyper-reference and conventional dictionaries. *Educational Technology Research and Development*. 41.4, 63-73.
- [4] Beatty, K. (2010). Teaching and researching computer-assisted language learning (2nd ed.), Harlow, UK: Pearson.
- [5] Bell, F. & L. LeBlanc (2000). The language of glosses in L2 reading on computer: Learners' preferences. *Hispania*, 83, 274-285.
- [6] Bowles, M. A. (2004). L2 glossing: To CALL or not CALL. Hispania, 87.3, 541-552.
- [7] Chang, S.M. (2002). The roles of marginal glosses and pocket electronic dictionaries in EFL incidental vocabulary learning. M.A. thesis, National Taiwan Normal Universities, Taipei, R.O.C, Taiwan.
- [8] Charaee, M. R. (2002). The effect of input enhancement on structure rule acquisition by Iranian EFL learners. M.A. thesis, Isfahan University, Iran.
- [9] Chen, H. (2002, July-August). Investigating the effects of L1 and L2 glosses on foreign language reading comprehension and vocabulary retention. Paper presented at the annual meeting of the Computer-Assisted Language Instruction Consortium, Davis, CA.
- [10] Chun, D. M. & J. L. Plass (1996). Effects of multimedia annotations on vocabulary acquisition. *The Modern Language Journal*, 80.2, 183-198.
- [11] Cohen, J. W. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.
- [12] Combs, C. (2004).What cognitive processes are triggered by input enhancement. http://journal.tclibrary.org/ojs/index.php/tesol/article/viewPDFInterstitial/68-74 (accessed 1/ 12/ 2012).
- [13] Cummins, J. (2008a). Computer assisted text scaffolding for curriculum access and language learning/acquisition. www.iteachilearn.com/cummins/comptextsum.html (accessed 9/ 15/ 2013).
- [14] Cummins, J. (2008b). E-lective language learning: Design of a computer-assisted text-based ESL/ EFL learning system. www.iteachilearn.com/cummins/elective.html (accessed 4/18/ 2009).
- [15] Davis, J. N. & M. Lyman-Hager (1997). Computers and L2 reading: Student performance, student attitudes. *Foreign Language Annals*, 30.1, 58-72.
- [16] Doughty, C. (1988). The effect of instruction on the acquisition of relativization in English as a second language. Ph.D. dissertation, University of Pennsylvania, USA.
- [17] Garrett, N. (1989). Computers in foreign language teaching and research: A new humanism. In W. H. Graves (ed.), *Computing across the curriculum: Academic perspectives*. McKinney, TX: Academic Computing, 101-139.

- [18] Hee Ko, M. (2005). Glosses, comprehension, and strategy use. *Reading in a Foreign Language*, 17. http://iteachilearn.org/cummins/comptext.html (accessed 3/ 12/ 2012).
- [19] Huang, Y. C. (2003). The effects of vocabulary glosses and example sentences on junior high school EFL students' reading comprehension and vocabulary learning. M.A. thesis. National Cheng-Kung University, Taiwan.
- [20] Hulstijn, J. H. & B. Laufer (2001). Incidental vocabulary acquisition in a second language: The construct of task-induced involvement. *Applied Linguistics*, 22, 1-26.
- [21] Hulstijn, J. H., M. Hollander & T. Greidanus (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.
- [22] Izumi, S. (2002). Output, input enhancement, and the noticing hypothesis: An *experimental* study on ESL relativization. *Studies in Second Language Acquisition*, 24, 541-577.
- [23] Jacobs, G. (1994). What lurks in the margin: Use of vocabulary glosses as a strategy in second language learning. *Issues in Applied Linguistics*, 5, 115-137.
- [24] Jacobs, G. M., P. DuFon & C. H. Hong (1994). L1 and L2 vocabulary glosses in L2 reading passages: Their effectiveness for increasing comprehension and vocabulary knowledge. *Journal of Research in Reading*, 17, 19-28.
- [25] Johnson, P. (1982). Effects on reading comprehension of background knowledge. TESOL Quarterly, 19, 503-516.
- [26] Knight, S. (1994). Dictionary use while reading: The effects on comprehension and vocabulary acquisition for students of different verbal abilities. *The Modern Language Journal* 78.3, 285-297.
- [27] Ko, M. H. (2005). Glosses, comprehension, and strategy use. Reading in a Foreign Language, 17.2, 125-143.
- [28] Lage, T. M. (2008). An exploratory study of computer assisted language learning (CALL) glosses and traditional glosses on incidental vocabulary learning and Spanish literature reading comprehension. M.A. thesis. Iowa State University.
- [29] Lefrancois, G. R. (1982). Psychology for teaching. Belmont, CA: Wadsworth.
- [30] Leow, R. (1997). To simplify or not to simplify: A look at intake. Studies in Second Language Acquisition, 15, 333-55.
- [31] Martinez-Lage, A. (1997). Hypermedia technology for teaching reading. In M. Bush & R. Terry (eds.), *Technology enhanced language learning*. Lincolnwood, IL: National Textbook Company, 121-163.
- [32] Nassaji, H. (2004). The relationship between depth of vocabulary knowledge and L2 learners' lexical inferencing strategy use and success. *The Canadian Modern Language Review*, 1, 107-134.
- [33] Nation, I. S. P. (1990). Teaching and learning vocabulary. Boston: Heinle & Heinle.
- [34] Paribakht, T. S. & M. Wesche (1997). Vocabulary enhancement activities and reading for meaning in second language vocabulary development. In J. Coady & T. Huckin (eds.), *Second language vocabulary acquisition: A rationale for pedagogy*. Cambridge: Cambridge University Press, 174–200.
- [35] Reinders, H. & R. Ellis (2009). The effects of two types of input on intake and the acquisition of implicit and explicit knowledge, in R. Ellis, S. Loewen, C. Elder, R. Erlam, J. Philp & H. Reinders (eds.), *Implicit and explicit knowledge in second language learning testing and teaching*. Bristol: Multilingual Matters, 282-302.
- [36] Robinson, P. (1997). Generalizability and automaticity of second language learning under implicit, incidental, enhanced, and instructed conditions. *Studies in Second Language Acquisition*, *19*, 323-247.
- [37] Rott, S. (2007). The effect of frequency of input enhancements on word learning and text comprehension. Language Learning Journal, 57.2, 165-199.
- [38] Rott, S., J. William & R. Cameron (2002). The effects of multiple-choice L1 glosses and input-output cycles on lexical acquisition and retention. *Language Teaching Research*, 6, 183-222.
- [39] Schmidt, N. (2008). Review article instructed second language vocabulary learning. *Language Teaching Research*, 12. 3, 329–363.
- [40] Schmidt, R. (1995). Consciousness and foreign language: A tutorial on the role of attention and awareness in learning. In R. Schmidt (ed.), Attention and awareness in foreign language teaching and learning. Hawaii: University of Hawaii Press, 12-55.
- [41] Sharwood Smith, M. (1993). Input enhancement in instructed SLA: Theoretical bases. *Studies in Second Language Acquisition*, 15, 165–179.
- [42] Shook, D. (1994). FL/L2 reading, grammatical information, and input-to-intake phenomenon. *Applied Language Learning*, *5*, 57-93.
- [43] Singleton, D. (1999). Exploring the second language mental lexicon. Cambridge: Cambridge University Press.
- [44] Smith, P. & E. Stacy (2003). Socialization through CMC in differently structured environments. In S. Naidu (ed.), *Learning & teaching with technology: Principles and practices*. London: Routledge Falmers, 165-176.
- [45] Son, J. B. (2008). Using Web-based language learning activities. *International Journal of Pedagogies and Learning*, 4.4, 34-43.
- [46] Watanabe, Y. (1997). Input, intake, and retention: Effects of increased processing on incidental learning of foreign language vocabulary. *Studies in Second Language Acquisition*, 19. 3, 287-307.
- [47] White, J. (1998). Getting the learners' attention: A typographical enhanced study. In C. Doughty & J. Williams (eds.), Focuson-form in classroom second language acquisition. NY: Cambridge University Press, 85-113.
- [48] Williams, J. (1999). Memory, attention, and inductive learning. Studies in Second Language Acquisition, 21, 1-48.
- [49] Wong, W. (2004). The nature of processing instruction. In B. Van Patten (ed.), *Processing instruction: Theory, research, and commentary*. Mahwah, NJ: Lawrence Erlbaum, 33-63.
- [50] Yanguas, I. (2009). Multimedia glosses and their effect on L2 text comprehension and vocabulary learning. *Language Learning & Technology*, 13, 48-67.
- [51] Yen, Y., & Wang, C. (2003). Effects of multimedia vocabulary annotations and learning styles on vocabulary learning. CALICO Journal, 21. 1, 131-144.
- [52] Yoshii, M. (2006). L1 and L2 glosses: Their effects on incidental vocabulary learning. *Language Learning and Technology*, 10, 85-101.

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