COMPUTER-BASED VERSUS TRADITIONAL L1 AND L2 GLOSSES

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ABSTRACT

This study aimed at investigating the effects of L1 and L2 glosses and their effectiveness on reading comprehension and vocabulary recall with and without computer to explore whether providing glosses can facilitate reading comprehension and vocabulary acquisition. For this purpose, 180 students who were studying English as a Foreign language (EFL) at Shokouh Language Institute (Urmia Branch, Iran) and were homogeneous according to the results of the proficiency test and identified as intermediate-level learners were selected and randomly assigned to six equivalent groups of participants: 1) computer-based text without gloss (computer-based control group), 2) computer-based L1 (Persian) gloss, 3) computer-based L2 (English) gloss, 4) paper-based text without gloss (traditional control group), 5) paper-based L1 (Persian) gloss, 6) paper-based L2 (English) gloss. Those in groups 1 and 4 had to read the texts with no access to glosses. The remaining four groups received treatment on two passages with 20 glossed words under one of four conditions. According to results of this study, glossing has been shown to be effective in reading comprehension and vocabulary recall but there was no significant difference while the focus was on the type of gloss (Persian or English). Results also showed that the availability of the computer in conducting the study had no effect on the performances of the students. This means that the computer technology had neither improving nor spoiling influences on the Iranian students' performances.

***Key words*:** reading comprehension, vocabulary recall, glossing, computer glosses, traditional glosses

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1. Introduction

Reading, which is claimed to be the main purpose of foreign language teaching in Iran (Rahmani, 2009; Bahmani, 2009), is a very important skill in learning a foreign language. Typically, in some Asian countries, the main purpose of education is for students to pass entrance examinations into high schools and colleges. Although reading comprehension is an essential part of those exams, abilities and strategies needed for reading complicated and longer texts included in higher levels of education are not teachers' and students' concern at this stage (Huang, 2006). Therefore, acquiring and mastering this skill seems complex to many learners and they often find it difficult to exploit this skill in their learning experience.

There is a symbiotic relation between vocabulary knowledge and reading comprehension that is reading serves both the cause and the result of vocabulary acquisition. On one hand, learners should be required to have a minimum size of vocabulary knowledge for text comprehension; on the other hand, they depend on the contextual clues to guess the word meanings correctly. However, language learners are often impeded by large amount of unfamiliar words during language acquisition in both first language (L1) and English as foreign language (EFL) domains. Especially, in EFL context, this issue is more significant in terms of reading, where written text is considered the major source of vocabulary development. Students are frustrated in the comprehension of English textbooks, considering their insufficient vocabulary as the main cause.

For many university or high school students in Iran who study English as a foreign language as part of their general education requirements, reading has long been considered an essential skill. For less proficient second-language (L2), foreign language students, reading in English can be an ordeal experience, often because of the great amount of unknown vocabulary that makes it difficult or even impossible to get the main idea or specific details of a text. In most common reading contexts, second or foreign language readers are likely to encounter unfamiliar words, syntactic structures or topics that require them to consciously or intentionally evaluate and examine alternative sources or use context clues. Therefore, readers need to be ready to observe and control themselves when they read. Otherwise, they should be well-trained to use such cognitive and metacognitive strategies while reading. In the Iranian context where reading comprehension is of prime importance, designing, developing, and implementing a strategy-based method that focuses on when, how, and why a strategy is used seems to be of great significance.

Over the past decades, researchers have investigated many aspects of reading including reading comprehension, reading interest, text difficulty and readability, reading strategies, and vocabulary acquisition and retention.

The significance of this study can, therefore, be argued from these main aspects: presenting new words in context such as a reading text may demonstrate a broader view of how words can be applied and allows students to have a chance of meaning inferring. The use of glosses either in L1 or L2 that are provided somewhere near the text with or without computer (computer-based/ paper-based) makes L2 reading more effective. Vocabulary glosses decrease incorrect meaning inferences from context, draw learners' attention to the unfamiliar words and promote greater use of unsimplified texts that might contain too many difficult words for the readers.

2. Review of the related literature

2.1 The relationship between vocabulary knowledge and reading comprehension

Reading is one of the four language skills that second language learners (SLL) should acquire in their language learning process if they are to become well-rounded users of the target language. The ability to read is seen as the most stable and durable of the second language skills (Rivers, 1981). Language learners acquire most of their vocabulary through reading, particularly if they do not stay in a country where that language is spoken. Reading comprehension is a complex undertaking that involves many levels of processing. Due to the social and economic opportunities it offers, reading is one of the most important skills to be developed among all learners. However, reading in a foreign language can be influenced by many factors that are usually not considered in first language reading (Grabe, 1991). Vocabulary knowledge and its role in reading comprehension has been one of the main areas of focus in second language research for the last twenty years. Both vocabulary knowledge and reading comprehension are closely related, and this relationship is not one-directional, since vocabulary knowledge can help the learner to comprehend written texts and reading can contribute to vocabulary growth (Chall, 1987; Nation, 2001; Stahl, 1990). Some researchers advocate that vocabulary is the most crucial factor in reading comprehension. Cooper (1984) described vocabulary as being the key ingredient to successful reading while other researchers argue that no text comprehension is possible, either in

one's native language or in a foreign language, without understanding the text's vocabulary. They maintain that when the percentage of unknown vocabulary in a given text increases, the possibility of comprehending the text decreases (Hirsh & Nation, 1992; Hu & Nation, 2000; Laufer, 1989, 1992).

Hsueh-Chao and Nation (2000), carried out a study to see what percentage coverage of text was needed for unassisted reading for pleasure. First language learners were asked to read without looking up words. A multiple-choice test and a cued written recall test were used in this experimental research. The researchers found three levels of unknown vocabulary and reading comprehension. Readers who knew 80% of the words did not have a satisfactory comprehension on both of these tests. However, the readers who got 90% and 95% of the running words, most of them did not have adequate comprehension but just some readers did. It was assumed that there are an expected relationship between the level of unknown words and degree of comprehension. So the most fundamental aspect of comprehension is the ability to deal with unfamiliar words encountered in text. Readers who struggle with word-level tasks use up valuable cognitive space that could be allotted to deeper levels of text analysis.

Vocabulary knowledge is one of the best predictors of reading achievement (Richek, 2005). Bromley (2004), in a comprehensive review of research on vocabulary development, concludes that vocabulary knowledge promotes reading fluency, boosts reading comprehension, improves academic achievement, and enhances thinking and communication. Stanovich (1986) describes the cumulative effect of poor reading and vocabulary skills. Children who are poor readers usually also lack a wide vocabulary. When young children struggle with reading, they quite naturally read less than their more able classmates, and therefore, are exposed to fewer new words. This restriction on their vocabulary growth, in turn, makes progress in reading even harder. The effect of these deficits makes learning in general more difficult, and as children progress through the grades, the gap between skilled and less skilled readers becomes increasingly pronounced. So the most fundamental aspect of comprehension is the ability to deal with unfamiliar words encountered in text. Readers who struggle with word-level tasks use up valuable cognitive space that could be allotted to deeper levels of text analysis.

It is not enough to rely on context cues to predict the meaning of new words, since this strategy often results in erroneous or superficial understandings of key terms, especially in content-area reading (Paynter, Bodrova, & Doty, 2005). Mature readers need to possess a basic knowledge of "how words work" and a set of strategies for approaching new words encountered throughout the day.

2.2 Glosses and their functions

Researchers generally agree that the use of vocabulary glosses in L2 reading materials is a common practice and glosses facilitate reading comprehension and vocabulary learning in both printed materials and electronic materials. The use of vocabulary glosses is common in second language materials (Davis, 1989). Bell and LeBlanc (2000) state that glossing is the most common form of text adaptation since it assists the reader in comprehending words and phrases and, therefore, helps second language learners to comprehend reading materials. Gloss is defined as an explanation of the meaning of a word (Pak, 1986) or a brief definition or synonym either in L1 or in L2 (Nation, 2001). The concept of glossing has not been largely studied by researchers until late in last century. Traditionally, a gloss is a definition or meaning for L2 learners to promote reading comprehension. Nation (1983) defined glosses as short definitions. Segler (2001) referred to them as translations or brief explanations of difficult or technical texts (e.g. unusual words) and categorized glosses into textual glosses, pictorial (visual) and aural glosses and various combinations. Roby (1999, p. 96) stated that "glosses are many kinds of attempts to supply what is perceived to be deficient in a reader's procedural or declarative knowledge". Lomicka (1998, p. 41) gave the definition more concretely "typically located in the side or bottom margins, glosses are most often supplied for 'unfamiliar' words, which may help to limit continual dictionary consultation that may hinder and interrupt the L2 reading comprehension process".

Quite recently, the focus has shifted from whether glossing has positive effect on reading comprehension and vocabulary learning to which type of glossing; L1 or L2 is more effective. Results of many studies have brought mixed and conflicting results since the issue of native language (L1) glossing in L2 reading comprehension is an issue of debate (Taylor, 2002). Several studies have found that the difference between L1 and L2 glosses is not significant.

Although there is a controversial debate on glossing in recent literature, glossing is still a common and acceptable aid for many foreign language textbooks (Davis, 1989). It is the easiest way to understand the meanings of words as they appear in context and to help a learner understand reading materials, since glosses are often in the margin on the same page or on another page and learners need not look up the words in a dictionary.

2.3 Vocabulary Retention

In order to strengthen long-term retention of vocabulary knowledge, glosses were devised based on the mental effort hypothesis (Hulstijn, 1992, 2001). As pointed out by Hulstijn (1992), the greater the mental effort required to process the word meaning, the longer acquired words retained in memory. It is thus necessary to trace the retained word knowledge over a period of time. Most of the studies examining gloss effect observe words retained in memory only once in a delayed posttest. (Hulstijn, 1992; Jacobs, et al., 1994; Hulstijn et al., 1996; Watanabe, 1997; Chang, 2002; Rott et al., 2002) To further observe the memory loss over a period of time, some studies measured retention with two delayed posttests subsequent to the immediate posttest (Anderson & Jordan, 1928; Qian, 1996; Chen, 2001; Huang, 2003). The studies of gloss effect on vocabulary retention indicated an attrition of the acquired words from initial learning on the delayed recall (Rott, et al., 2002; Hulstijn, et al., 1996; Watanabe, 1997; Chang, 2002). These findings are not surprising, for retained words can be easily forgotten over time without any reinforcement. For example, Pimsleur (1967) developed a vocabulary memory schedule based on Ebbinghaus's curve of retention and other related theories on retention and forgetting in experimental psychology. It was demonstrated that the probability of remembering the vocabulary items reduced sharply soon after participants' initial learning and then eventually to be forgotten without further practice. Similarly, Griffin (1992, cited in Nation, 2001) found that most forgetting seemed to take place immediately after learning. However, Pimsleur suggested that if the vocabulary items were re-learned for appropriate time intervals, learners' forgetting rate would slow down. This statement was supported by the researchers who discovered that acquired words would be forgotten quickly and immediately after initial learning, but the rate of forgetting slowed down and stabilized over a period of time (Anderson & Jordan, 1928; Qian, 1996; Chen, 2001; Huang, 2003).

Huang (2003) examined different types of gloss effect on vocabulary learning. 262 students at the senior year were recruited from a junior high school for this study. The participants were divided into four groups under different learning situations: Chinese glosses (C-gloss), English glosses (E-gloss), English Glosses with English example sentences (E-gloss-Ex), and No gloss group. Three recall tests were carried out immediately after initial learning, seven days later and fourteen days later: immediate vocabulary recall test (IVRT), first delayed test (FDT), and second delayed test (SDT). The result indicated a similarity of forgetting patterns among the three groups provided with glosses (C-gloss, E-gloss, and E-gloss-Ex). In addition, the lexical retention between IVRT after reading and FDT decreased faster than that between FDT and SDT. In other words, the decrease of retention slows down on each recall respectively. In comparison with the observed patterns from previous studies, the retention rate observed was lower. Huang speculated that it was due to different learning purposes. In Huang's study, the participants were expected to pick up words incidentally, whereas the previous studies instructed the students to memorize the vocabulary items (Anderson & Jordan, 1928; Qian, 1996; Chen, 2001). The students in Haung's study were told to comprehend the reading text when the words were embedded in it while those in previous studies made effort to memorizing words.

2.4 Computer-based glosses and their effects on reading comprehension and vocabulary recall

Computer-based glosses are easily accessible. Further, using software that provides immediate access to L1/L2 glosses is not difficult. Software, such as Hachette dictionnaire Oxford iFinger (1997), can be easily used while consulting online texts. Instead of looking up a word, all learners need to do is either type in a word or simply click on it. There are several studies that have compared traditional, paper-based L1/L2 glosses with computer-based L1/L2 glosses (e.g., Goyette, 1995; Stoehr, 1999). With regard to computer-based effectiveness, Chapelle and Jamieson (1986) wrote, clearly, computer-based effectiveness cannot be looked at as though computer-based represented one form of instruction and all students were in need of that kind of instruction. Given the proliferation of computer technology, use, and skills, there is increasing access to authentic L2 texts. Thus, more research is needed on how computer- mediated reading

comprehension of L2 texts can be enhanced by certain kinds of help such as L1 /L2 glosses (Taylor, 2006).

Hayden (1997) observed that computer L1 and L2 glossing, when presented to readers along with several other options of glossing had a significant effect on L2 reading comprehension.

Moreover, Hayden's results suggested that computer L1/L2 glosses encouraged more look-ups of words.

> The ease and rapidity of access of helps made possible by computer- mediated text may actually promote a greater amount of lookup behaviors, as is associated with bottom-up processing. It is far easier to simply "click" on a word or expression and instantly see a definition than to locate each expression in a printed dictionary. (p. 215)

With the integration of computer and multimedia technology into the field of language learning, a new study, Computer-Assisted Language Learning emerged. Although the approach Computer-Assisted Language Learning is young, computer technology has been involved in promoting the process of language learning due to the fact that it is capable of carrying out more tasks than simply text processors. Many language educators use many features of it to enhance vocabulary development and reading comprehension. Researchers (Beatty, 2005; Hoogeveen, 1995) listed some advantages for the applications of computer and multimedia to language learning.

First, a computer can be useful in promoting interest and readers who enjoy reading tend to read more and are more motivated and comfortable to read.

Second, computer and multimedia can promote autonomous language learning. Learners who can take advantage of multimedia links to explore explanations and peripheral information can somewhat depend less on the teacher-centered classroom. A well-formed computer and multimedia database of materials can also assist those young and second language learners who lack dictionary and library search skill.

Third, it can transmit information quickly and effectively to all students and keep them interested in learning. Computer presentations keep students alert and concentrated.

Last, computer-based materials help students to develop technical and research skills that they cannot get from reading a textbook.

On the other hand, computer-based studies have shown that the L2 is seldom used when put next to the L1. Researchers of computer-based studies (e.g., Davis & Lyman-Hager, 1997; Goyette, 1995; Hayden, 1997; Bell & Leblanc, 2000) all report quantitative results suggesting negligible usage of other types of glosses on L2 reading comprehension by L2 readers. First and second-year learners who have the option of choosing between L1 and L2 glosses generally choose the L1.

In another study, Aweiss (1994) investigated whether there was a causal relationship between L1 Computer-based reading supports and L2 reading comprehension in English-speaking learners of Arabic. Aweiss' results revealed that those with computer-based L1 glosses recalled significantly more pausal units than those without glosses. Stoehr (1999) found that participants with L1 glosses recalled a significantly higher amount of L2 text than those without glosses.

Goyette (1995) observed that learners with L1 glosses did better than those without glosses, although the difference was not significant. Goyette also found that there was no significant difference in amount of reading time in comparing the online with the hard-copy dictionary treatments. Moreover, even though the reading times were comparable, the online dictionary was used significantly more than the hard-copy dictionary.

Goyette (1995) concluded:

> The large differences in the number of words accessed by dictionary condition and by language indicate that, as expected, the speed and ease of access of the on-line dictionary do increase the frequency of dictionary consultation. On-line dictionary look-ups were found to be particularly prevalent in second- language reading. (p. 96)

Different studies have revealed conflicting results about the effect of L1 and L2 glosses on reading comprehension both with and without computer and what type of glosses learners prefer. Thus, the current study aims to address these issues. This study investigated the effects of L1 and

L2 glosses and their effectiveness on reading comprehension and vocabulary recall with and without computer

In order to achieve the goals of this study, the following questions were to be answered:

Q1: Is there any significant difference between the computer and traditional groups?

Q2: Are there any significant differences among English, Persian and no gloss groups?

Q3: Is there any significant interaction between group and gloss type?

3. Method

3.1 Design of the study

This study was of a pretest posttest, quasi-experimental design. In fact, through comparing six groups, this study investigated the possible effects of various gloss conditions (no gloss, L1, L2) with and without computer (computer-based vs. traditional method) on the development of learners' reading comprehension and vocabulary recall.

3.2 Participants

The original pool of participants in this study was 200 EFL learners of Shokuh Language Institute-Urmia Branch between the ages of 18 to 25. A final pool of 180 participants remained after eliminating by means of scoring on the proficiency test. These subjects were identified as intermediate-level EFL learners based on their scores on the proficiency test (SOLUTIONS PLACEMENT TEST , Oxford Exam Support) Therefore, the researcher used six groups of 30 students who were randomly assigned to six equivalent groups of subjects: 1) computer-based text without gloss group (computer-based control group), 2) computer-based L1 (Persian) gloss group, 3) computer-based L2 (English) gloss group, 4) paper-based text without gloss group (traditional control group), 5) paper-based L1 (Persian) gloss group, 6) paper-based L2 (Persian) gloss group. Those in conditions 1 and 4 had to read the text with no access to glosses. These selected subjects were similar in terms of their age range (i.e. 18-25) and proficiency level.

3.3. Instruments

The instruments used in the data elicitation procedures were as follows in which a detailed explanation of each instrument is provided below.

3.3.1 Reading passage and glossed words

First, five reading texts were collected from a number of the ILI Intermediate English series textbooks that were no longer than 350 words. 2 weeks before the main study, a pilot study using 20 randomly selected participants with a background similar to the subjects of the main study was conducted in an effort to determine the most suitable reading texts and verify the appropriateness of all the tests designed for the study. In addition, participants underlined all the unknown words in the text. Only those words which were underlined by more than half of the participants were selected to be glossed. In addition, it also was served to detect any potential problems before the official study took place. After examining the results of the pilot study, the researcher selected two texts which were deemed to be not too easy or too difficult for subjects at intermediate level.

As a result of the pilot test, two texts were selected and 20 words were glossed in each text. In the computer-based experimental condition, the words were hyperlinked. When the participants clicked on them a box appeared with a definition in English (computer-based L2 gloss group), a definition in Persian (computer-based L1 gloss group), and in paper-based experimental condition, the reading texts were adapted into two forms: texts with L1 (Persian) glosses, and texts with L2 (English) glosses, and the glossed words were written in the margins. Glossed words were underlined and boldfaced in the texts. Participants in the traditional control group were exposed to the text with no glosses.

3.3.2 Assessment tasks

The assessment tasks used in data elicitation procedures were as follows:

3.3.2.1 Proficiency test

A proficiency test of receptive skills based on the SOLUTIONS PLACEMENT TEST (Oxford Exam Support) examination papers was administered to identify EFL learner's proficiency level.

This test enables teachers to have a greater understanding of what level their students are at.

It contains:

• 50 multiple choice questions which assess students' knowledge of grammar and vocabulary from elementary to intermediate levels.

• A reading text with 10 graded comprehension questions.

• An optional writing task that assesses students' ability to produce the language. (This section was not included in this research).

The 50 multiple choice questions and the reading task were designed to be done together in a 45-minute lesson.

3.3.3 Production and recognition Tasks

The 40 annotated words in the reading text were the focus of the recognition and production tasks. The production tasks (pretest-, immediate posttest, and delayed posttest) included 20 items (20 target words) in scrambled orders in order to write their equivalent in Persian. The recognition tasks (pretest-, immediate posttest, and delayed posttest) included 20 target words. Given the multiple choice nature of this task, distracters were included in the multiple-choice options.

3.3.3.1 Pretest / immediate and delayed posttest production tasks

The same 20-item production task was utilized in the pretest, immediate and delayed posttests. Participants were given a list of words in English (20 target words) and were asked to write their equivalents in Persian. Participants performed the production task first so that the multiple choice recognition task could provide additional exposure to the target words.

3.3.3.2 Pretest / immediate and delayed posttest recognition tasks

The same 20-item multiple-choice recognition task was utilized in the pretest, immediate and delayed posttests. The target words in English were followed by four possible equivalents in English.

3.3.4 Comprehension task

The comprehension task was administered only in the immediate posttest. It consisted of 20 multiple-choice comprehension questions (10 questions per each reading text) and 10 true or false questions in English (5 questions per each reading text). These questions specifically focused around the glossed words; and a global nature in order to check learners' comprehension ability. Participants were allowed to refer back to an unglossed version of the text to help them answer the comprehension questions if they needed to. The multiple choice comprehension questions used demanded that learners understand the specific meaning of the words glossed in the text, since some of the choices were very close in meaning. The questions also dealing with overall comprehension of the text were aimed at measuring whether participants achieve a clear understanding of events happening in the text.

3.4 Data analysis

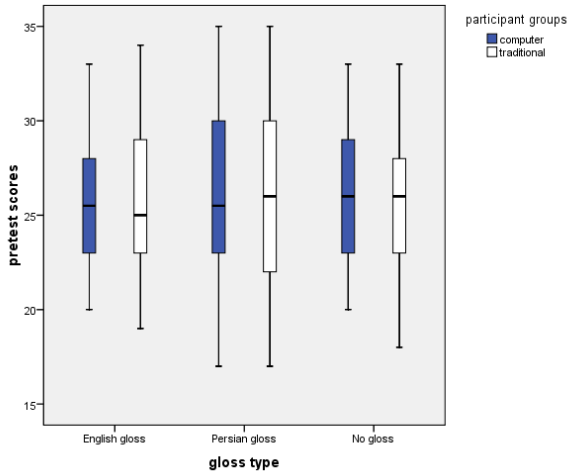
After administrating the immediate posttests, delayed posttests and comprehension task to six groups, there were a set of data to analyze. In order to analyze the obtained data, two-way ANOVA was used to measure the possible effects of both L1 and L2 glosses in computer and paper based conditions on the development of the students' reading comprehension ability and vocabulary recall.

4. Results and analysis

Before carrying out the two-way ANOVA test, it was necessary to check the data for anomalies. For this purpose, the boxplot of the data was checked. The resulting boxplot was checked for

outliers and extreme values. Since there were neither outliers nor extreme values, the data could be analyzed through two-way ANOVA.

Figure 4.1 Boxplot for the scores in the pretest



As stated before, the production and recognition pretests were administrated to assess participants' knowledge of the target words.

The results of the two-way ANOVA showed that there were neither significant main effects nor significant interaction in the pretest scores. This result was acceptable because the groups were homogeneous at the beginning and there was no difference among the groups with regard to their conditions.

Table 4.1 ANOVA for the pretest scores

Source	df	Mean Square	F	Sig.
Intercept	1	121576.022	7186.679	.000
group	1	.022	.001	.971
gloss	2	.706	.042	.959

group * gloss	2	.506	.030	.971
Error	174	16.917		
Total	180			

The results of the ANOVA analysis showed that in all three groups of scores (i.e. reading comprehension, immediate posttest and delayed posttest) there was a significant main effect for the gloss factor. However, there was not a significant main effect for the group factor.

The results also showed that there was not a significant interaction between the two independent variables group and gloss. The following tables show the results.

Table 4.2 ANOVA for the reading comprehension scores

Source	df	Mean Square	F	Sig.
Intercept	1	113100.80	14015.44	.00
group	1	12.80	1.59	.21
gloss	2	427.12	52.93	.00
group * gloss	2	.02	.00	.99
Error	174	8.07		
Total	180			

F_{group} (1, 174) = 1.59; $p > 0.05$

F_{gloss} (2, 174) = 52.93; $p < 0.05$

$F_{group*gloss}$ (2, 174) = 0.00; $p > 0.05$.

Table 4.3 ANOVA for the immediate posttest scores

Source	df	Mean Square	F	Sig.
Intercept	1	175531.34	10379.76	.00
group	1	5.34	.32	.58
gloss	2	1156.36	68.38	.00
group * gloss	2	.56	.03	.97
Error	174	16.91		
Total	180			

F_{group} (1, 174) = 0.32; $p > 0.05$

F_{gloss} (2, 174) = 68.38; $p < 0.05$

$F_{group*gloss}$ (2, 174) = 0.03; $p > 0.05$.

Table 4.4 ANOVA for the delayed posttest scores

Source	df	Mean Square	F	Sig.
Intercept	1	170755.20	9805.31	.00
group	1	3.20	.18	.67
gloss	2	1002.87	57.59	.00
group * gloss	2	.87	.05	.95
Error	174	17.42		
Total	180			

F_{group} (1, 174) = 0.18; $p > 0.05$

F_{gloss} (2, 174) = 57.59; $p < 0.05$

$F_{group*gloss}$ (2, 174) = 0.05; $p > 0.05$.

According to the above tables, the two groups (computer vs. traditional) were not significantly different in the three sets of scores. Therefore, they did not perform differently in the posttests. However, there were significant differences among the three gloss groups (English gloss, Persian gloss and no gloss). This means that the type of the gloss influenced the performances of the participants in the three groups. The interaction between the two independent variables (i.e. group and gloss) was not significant in the three sets of scores.

According to these findings, the first and third null hypotheses are accepted while the second null hypothesis is rejected at p-value less than 0.05.

Post hoc test was performed in order to check where exactly the difference was located in the gloss variable. The following tables show the results of the Tukey post hoc test for the three sets of scores.

Table 4.5 Post hoc test for the reading comprehension

(I) gloss type	(J) gloss type	Mean Difference (I-J)	Std. Error	Sig.
English gloss	Persian gloss	-.93	.52	.17
	No gloss	4.08	.52	.00
Persian gloss	English gloss	.93	.52	.17
	No gloss	5.02	.52	.00

No gloss	English gloss	-4.08	.52	.00
	Persian gloss	-5.02	.52	.00

Table 4.6 Post hoc test for the immediate posttest

(I) gloss type	(J) gloss type	Mean Difference (I-J)	Std. Error	Sig.
English gloss	Persian gloss	-.87	.75	.48
	No gloss	7.13	.75	.00
Persian gloss	English gloss	.87	.75	.48
	No gloss	8.00	.75	.00
No gloss	English gloss	-7.13	.75	.00
	Persian gloss	-8.00	.75	.00

Table 4.7 Post hoc test for the delayed posttest

(I) gloss type	(J) gloss type	Mean Difference (I-J)	Std. Error	Sig.
English gloss	Persian gloss	-.77	.76	.57
	No gloss	6.67	.76	.00

Persian gloss	English gloss	.77	.76	.57
	No gloss	7.43	.76	.00
No gloss	English gloss	-6.67	.76	.00
	Persian gloss	-7.43	.76	.00

The results of the post hoc tests showed that in all three sets of scores there was not a significant difference between the performances of the English and Persian gloss groups but the no gloss group performed differently compared to the other two groups. This means that the presence or lack of gloss was more influential than its type (English or Persian).

Checking the descriptive statistics for the three sets of scores showed that the mean score of the group with no gloss was lower than the mean scores of the groups with English and Persian glosses. Also the mean scores of the groups with Persian glosses were higher than the mean scores of the groups with English glosses but the difference was not significant.

Table 4.8 Descriptive Statistics for the reading comprehension

participant groups	gloss type	Mean	Std. Deviation	N
computer	English gloss	26.37	2.57	30
	Persian gloss	27.33	2.14	30
	No gloss	22.30	3.64	30
	Total	25.33	3.57	90

traditional	English gloss	25.87	2.62	30
	Persian gloss	26.77	2.62	30
	No gloss	21.77	3.20	30
	Total	24.80	3.55	90
Total	English gloss	26.12	2.59	60
	Persian gloss	27.05	2.39	60
	No gloss	22.03	3.41	60
	Total	25.07	3.56	180

Table 4.9 Descriptive Statistics for the immediate posttest

participant groups	**gloss type**	**Mean**	**Std. Deviation**	**N**
computer	English gloss	33.43	4.27	30
	Persian gloss	34.47	3.74	30
	No gloss	26.30	3.77	30
	Total	31.40	5.34	90
traditional	English gloss	33.20	4.39	30
	Persian gloss	33.90	4.72	30
	No gloss	26.07	3.67	30
	Total	31.06	5.53	90

Total	English gloss	33.32	4.30	60
	Persian gloss	34.18	4.23	60
	No gloss	26.18	3.69	60
	Total	31.23	5.42	180

Table 4.10 Descriptive Statistics for the delayed posttest

participant groups	gloss type	Mean	Std. Deviation	N
computer	English gloss	32.87	4.26	30
	Persian gloss	33.80	4.19	30
	No gloss	26.13	3.99	30
	Total	30.93	5.35	90
traditional	English gloss	32.67	4.35	30
	Persian gloss	33.27	4.64	30
	No gloss	26.07	3.53	30
	Total	30.67	5.29	90
Total	English gloss	32.77	4.27	60
	Persian gloss	33.53	4.39	60
	No gloss	26.10	3.74	60
	Total	30.80	5.31	180

5. Discussion

The results showed that computer-based and paper-based groups were not significantly different in the obtained three sets of scores. This finding is supported by the findings of Higgins, Russell, and Hoffmann (2005) who examined differences in performance when two different computer-based test formats and a traditional paper-and-pencil based format were used to present reading passages to 4th grade students. They found no significant differences in test scores across paper and computer delivered modes. They asserted that overall students were neither advantaged nor disadvantaged by the mode of test delivery. Bowles (2004) also in her research about the role of computerized versus paper-based glosses on L2 vocabulary development found that there were no significant differences between computer and paper based groups. These claims can be interpreted in a way that the existence of computer had no effect on the performances of the participants, the fact which was observed in this study as well. What can be inferred is that the availability of the computer can not have any impact on these kinds of studies. Since based on the studies mentioned about this finding, it is thought that the role of the gloss was important and the meaning conveyed by gloss could help learners in both paper and computer forms equally. Although, the technology can have positive effects on the performances on the learners, it had no effect, at least in this study, over the targeted participants from the specific situation. Another interpretation about this finding may be related to the learners' ability or compatibility to use the computers. Since the use of computers is not common in Iranian EFL classes, students do not have enough ability in using computers in test situations to gain the advantages.

The other part of the results showed significant differences among the three gloss groups (English gloss, Persian gloss, and no gloss). This result might refer to the fact that the performances of the participants were influenced by the different natures of the gloss. The results were also analyzed by the post hoc test to provide specific information on the areas in which significant differences happened. The data analysis by post hoc test in three sets of scores (reading comprehension, immediate posttest, and delayed posttest) showed that there was not a significant difference while the focus was on the performances of gloss groups (English and Persian). However, significant differences were found between the no gloss group and gloss groups. These findings are in line with the findings of Huang (2003) who looked at three kinds of gloss conditions (L2 English glosses, L1 Chinese glosses, L2 English glosses plus L2 English example sentences) in

comparison with the control group with no glosses. Her findings revealed that the groups enjoying any of the different types of gloss conditions performed significantly better than the control group. This might be meant that glosses could indeed increase subjects' reading comprehension and vocabulary recall. Cheng and Good (2009) also supported this finding in their study and claimed that subjects in gloss conditions (whether L1 or L2) outperformed subjects in the no-gloss condition. What is inferred from the statements is that the existence of the gloss was more important and effective than the type of gloss; since it seems that there is a positive effect of glosses in facilitating reading comprehension and promoting vocabulary acquisition.

Today, it is common and acceptable that many foreign language textbooks have glosses (Davis, 1989). According to Myong Hee Ko (2005), the usefulness, importance, and priorities of the glossed texts over non-glossed ones are as follow. First, glosses help readers to know the accurate meaning of the unknown word rather than guessing wrongly. Second, glosses can help readers not to be interrupted to look up the meaning of the words from dictionary while they are reading, because glosses provide meanings. Third, glosses might assist readers to connect the new information to the previously learned content to understand the text well. And finally, glosses will allow readers for greater autonomy. Therefore, the fruitful role of the glosses is undeniable and their advantages are more than no glossed texts.

6. Conclusion

This study was a kind of effort to examine the impact of L1 (Persian) gloss, L2 (English) gloss, and no gloss texts on the learners reading comprehension and their vocabulary recall in two different conditions i.e. computer-based and paper-based. It has shed some light on how some Iranian students deal with different types of glossing while they are armed with and without computer technology. Although the current study has been conducted in one institution in one of the cities of Iran, it can be considered as a departure for research on the effect of using these types of glosses on reading comprehension by Iranian students.

One of the main results of the present study was that the availability of the computer in conducting the study had no effect on the performances of the students. This means that the

computer technology had neither improving nor spoiling influences on the Iranian students' performances, despite the fact that computer can be used as one of the educational materials in the process of language learning and teaching so as to facilitate the process and increase the motivation of the learners.

Results also showed no significant difference while the focus was on the type of gloss (Persian or English). This result can be interpreted in a way that the different nature of the gloss had no impact on the performances on the participants and both Persian and English gloss could give similar benefits to the participants and played the same role in their performances. This finding gains confirmation from the findings of Jacobs, Dufon and Hong (1994), Chen (2002), and Yoshii (2006) who claimed that there is no significant difference between L1 and L2 glosses.

However, a significant difference was found while the focus of the study shifted to compare the gloss groups with no gloss one. This finding might be meant that the reading texts should be provided with gloss in order to facilitate the comprehension of the texts by learners and make recalling new vocabulary easy for them.

The foreign and second language learners may have different interpretations of the new vocabulary because of the different cultural backgrounds, therefore glosses sometimes can have crucial role in the process of the right comprehension of the texts.

Glossing has been shown to be effective in developing vocabulary acquisition and reading comprehension in this study. More use of glosses in texts could provide English readers with the support they need to improve their vocabulary and reading skills so that they may become more independent and successful readers.

7. Pedagogical implications

The findings in this study suggest a number of implications. This study reveals that textual glosses should be presented to foreign language learners while they are involved in reading tasks. The presence of gloss may help the students not to have to look up every word in the dictionary. Moreover, the gloss can draw the students' attention to the new words and then they can develop

their own understanding of the new words by resorting to the rich context around those words. In this way, the misunderstanding of the appropriate meaning of the unknown word will not occur.

One of the implications is about the instructors; since, the finding that the differences between the gloss groups and no gloss group were significant shows that the use of gloss and their efficiency in reading materials should be explained by the instructors at the beginning of the course. Instructors can also produce some interesting reading texts including different types of glosses in order to increase learners' interests in learning the unknown words and learners can be encouraged to use different gloss types in reading.

The other implications can go towards the material developers and textbook designers which imply that they should design and provide the kinds of materials which contain gloss in their reading sections. They should consider the role of the gloss in the understanding of the learners about the text and accordingly should try to provide the best-fit-related meaning of the word in the particular kind of text, since one word may have different meanings based on the genre and situation in which it is seen. However, they should be careful about the selection of the words. They can select the words based on the word lists and frequency corpora and gloss the words according to their usefulness and importance in the text.

References

Al-Jabri, S. (2009). The effects of L1 and L2 glosses on reading comprehension and recalling ideas by Saudi students. *Umm Al-Qura University Journal of Social Sciences. 1*(1), 9-27.

Anderson, J. P., & Jordan, A. M. (1928). Learning and retention of Latin words and phrases. *Journal of Educational Psychology*, 19, 485-496.

Aweiss, S. (1994). Situating learning in technology: The case of computer-mediated reading supports. *Journal of Educational Technology Systems*, 23, 63-74.

Bahmani, M. (2009). *The use of meta-cognitive strategies among Iranian EFL learners with varying levels of proficiency in reading comprehension.* Unpublished master's thesis, Urmia University, Urmia.

Beatty. K. (2005). *Teaching and Researching Computer-assisted Language Learning.* Beijing: Foreign Language Teaching and Research Press.

Bell, F. L., & LeBlanc, L. B. (2000). The language of glosses in L2 reading on computer: Learners' preferences. *Hispania*, 83, 274-285.

Bowles, M. A. (2004). L2 glossing: To CALL or not to CALL. *Hispania*, 87(3), 541-552.

Bromley, K. (2004). Rethinking vocabulary instruction. *The Language and Literacy Spectrum*, 14(Spring), 3-12.

Chall, J. S. (1987). Two vocabularies for reading: Recognition and meaning. In M. G. McKeown & M. E. Curtis (Eds.), *The Nature of Vocabulary Acquisition.* Hillsdale, NJ: Erlbaum.

Chang, S. (2002). *The roles of marginal glosses and pocket electronic dictionaries in EFL incidental vocabulary learning*. Unpublished master's thesis, National Taiwan Normal University.

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.

Chen, H. C. (2001). *The effects of guessing from context and translation on English vocabulary retention of junior high school students in Taiwan.* Unpublished master's thesis, National Kaohsiung Normal University.

Chen, H. (2002). 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.

Cheng, Y. H. & Good, R. L. (2009). L1 glosses: Effects on EFL learners' reading comprehension and vocabulary retention. *Reading in a Foreign Language. 21*(2), 119–142.

Cooper, P. L. (1984). The Assessment of Writing Ability: *A Review of Research. Princeton, NJ: Educational Testing Services*

Davis, J. N., & Lyman-Hager, M. A. (1997). Computers and L2 reading: Student performance, student attitudes. *Foreign Language Annals*, 30, 58-72.

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

Grabe, W. (1991). Current developments in second language reading research. *Tesol Quartely*, 25 (3) 375-405

Griffin, G. F. (1992). *Aspects of the psychology of second language vocabulary list learning.* Unpublished doctoral dissertation, University of Warwick, UK.

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

Hachette Dictionnaire Oxford v.2 iFinger [Computer software] (1997). London: *Oxford University Press.*

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.

Higgins, J., Russell, M., & Hoffmann, T. (2005). Examining the effect of computer-based passage presentation on reading test performance. *Journal of Technology, Learning, and Assessment. 3*(4), 5-36

Hirsh, D. & P. Nation. (1992). what vocabulary size is needed to read unsimplified texts for pleasure? *Reading in a Foreign Language* 8 (2), 689-696.

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

Huang, Y. C. (2003). *The effects of vocabulary glosses and example sentences on junior high school EFL students' reading comprehension and vocabulary learning.* Unpublished master's thesis, National Cheng-Kung University, Taiwan.

Huang, S. C. (2006). Reading English for academic purposes –What situational factors may motivate learners to read? *System*, 34, 371–383.

Hu Hsueh-chao, M. & Nation, I.S.P. (2000). Unknown Vocabulary Density and Reading Comprehension. *Reading in a foreign language*, vol. 13 (1).

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. (1992). Retention of inferred and given word meanings: Experiments in incidental vocabulary learning. In P. J. Armaud & H. Bejoint (Eds.), *Vocabulary and applied linguistics* (pp. 113- 125). London: Macmillan.

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

Jacobs, G. Dufon, P. & Hong, F. (1994). L1 and L2 vocabulary glosses in L2 reading passages: Their effects for increasing comprehension and vocabulary knowledge. *Journal of Research in Reading, 17*(1), 19-28.

Laufer, B. (1989). What percentage of text lexis is essential for comprehension? In Ch. Lauren and M. Nordman (Eds), In Special Language: *From Humans Thinking To Thinking Machine* (p. 316-323). *Multilingual Matters*.

Laufer, B. (1992). How much lexis is necessary for reading comprehension? *In*

Vocabulary and Applied Linguistics (Eds), H. Bejoint and P. Arnaud. *Macmillan*, (p.126-132).

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.

Myong Hee Ko (2005) . Glosses, comprehension, and strategy use. *Reading in a Foreign Language*, 17 (2).

Nation, I. S. P. (1983). *Teaching and Learning Vocabulary*. Wellington: English Language Institute, Victoria University.

Nation, I. S. P. (2001). *Learning Vocabulary in Another Language*. Cambridge: Cambridge University Press.

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

Paynter, D., Bodrova, E., & Doty, J. (2005). For the love of words: *Vocabulary instruction that works*. San Francisco: Jossey-Bass.

Pimsleur, P. (1967). A memory schedule. *The Modern Language Journal*, 51, 73-75.

Qian, D. D. (1996). ESL vocabulary acquisition: Contextualization and decontextualization. The Canadian Modern Language Review, 53, 120-142.

Rahmani, M. (2009). *The effect of note-taking Strategy Training on Reading*

Comprehension and Recall of Iranian EFL learners. Unpublished master's thesis, Urmia University, Urmia.

Richek, M. (2005). Words are wonderful: Interactive, time-efficient strategies to teach meaning vocabulary. *The Reading Teacher*, 58(5), 414-423.

Rivers, W.M. (1981). *Teaching Foreign Language Skills* (2nd ed.). Chicago: University of Chicago Press

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., 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/

Stahl, S. A. (1990). Beyond the instrumentalist hypothesis: some relations between word meanings and comprehension. *Technical Report No.505 of the Center for the Study of Reading,* University of Illinois at Urbana- Champaign.

Stanovich, K. (1986). Matthew effect in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly*, 21(4), 360-407.

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.

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

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

Watanabe, Y. (1997). Input, intake, and retention: Effects of increased processing on incidental learning of foreign language vocabulary. *Studies in Second Language Acquisition*, 19, 287-307.

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