



The Impact of Using Multimedia Glosses on Vocabulary Acquisition: The Case of Iranian Intermediate EFL Learners

AhmadReza Nikbakht

Department of English Language and Literature, Yazd University, Iran
ahmadreza13771385@gmail.com

Golnar Mazdayasna  (Corresponding Author)

Department of English Language and Literature, Yazd University, Iran
gmazdayasna@yazd.ac.ir

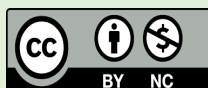
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Abstract

This study aimed to explore the effect of multimedia glosses on the vocabulary acquisition of Iranian intermediate EFL learners. The program employed in this study provided the learners with glosses for words in the form of sounds and videos. The participants were 40 intermediate EFL learners studying English at a private institute in Esfahan. The participants were assigned to experimental and control groups. Participants were given the exact reading context from a software called "Tell Me More." The experimental group had access to multimedia glosses for unknown words. The learners were granted access to the glosses by clicking on the highlighted words. The control group, regarding the clarification of the unknown word lexis, received help from the researcher through the conventional method and had access to a dictionary. After 10 sessions, a vocabulary test was given to experimental and control groups. The application of an independent t-test indicated that the performance of the participants exposed to multimedia glosses was significantly superior to that of the control group. The present study offers valuable insights for CALL material designers in selecting the optimal combination of modalities to facilitate L2 vocabulary acquisition.

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Introduction

In learning and teaching a foreign language, vocabulary plays a crucial role. It is a factor that connects the four skills of listening, speaking, writing, and reading. To have a good communication in one language, students need to learn a sufficient number of words and know how to use them efficiently. Several recently conducted researches have dealt with lexical difficulties of learners. Scholars have shown that lexical difficulties commonly interfere with communication; in other words, communication fails when people cannot use the words properly. So, there is a growth of interest in word as a constituent of every language.

On the other hand, some scholars, like Boyle (2002) and Uberman (1998), have stated that learners get tired of studying vocabulary in traditional approaches such as writing words on paper, rehearsing, or studying passively through the teacher's explanations. The recent efforts to improve language learning have involved computer technology. After introducing computers into second/foreign language education, many teachers and scholars have agreed that this technology holds significant potential for language learning and teaching (Nation, 2006). This idea leads to what is known as Computer-Assisted Language Learning. Although this domain is still young, most of the language teachers approve of its role because computers can perform various tasks. Therefore, they are more than solely text processors. The computer can select, organize, and present multiple sensory components (Levy, 1997). Computers can handle a range of activities and carry out programmed functions at a fantastic speed. In the EFL context, there is no doubt that vocabulary supports the four skills, speaking, listening, writing, and reading and lack of vocabulary understanding is an obstacle to learning. Therefore, EFL vocabularies learning and teaching are mostly emphasized. Similarly, if EFL educators are became familiar with effective strategies for teaching new words, they could enhance students' proficiency in the four skills.

Because of the significance of vocabulary enrichment in EFL learning and teaching, current years have seen increased interest in studies on L2 vocabulary learning and reading comprehension within CALL learning environment in which a student can use the aid of glosses. One crucial issue is the impact of such learning environments and multimedia glosses on vocabulary learning compared to traditional texts on paper. As a domain of investigation, SLA can benefit from an extensive range of principles. Gloss studies have indicated that learners' language input needs to draw their attention and engage them in the discussion of meaning. The attainability of different glosses suggests intelligible content for unknown vocabularies during the reading procedure and assists L2 learners learn unknown vocabulary. At the same time, learning unfamiliar words happens due to multiple inputs for unknown vocabularies during the reading process and helps L2 learners to learn unknown vocabulary. For example, the language learners recognize the unknown vocabularies for the first time when observing them in reading contexts, then face with them when inspecting the glosses, and lastly see them when returning to the reading (Paivio, 1971). Moreover, regarding the cognitive explanation of SLA, gloss drew the learners' attention to the meaning and form of the unknown words. This procedure facilitates second language learning because conscious concentration on the target form aids the learners notice the meaning and form. This notification can help the

unfamiliar word to become more accessible in terms of comprehension and acquisition for the learner. On the other hand, Horn (2001) believes that to create actual linguistics of visual language, we must come up with novel ideas that concentrate on how vocabularies and images work together. In fact, because of the usage of multimedia glosses in EFL vocabulary acquisition, the dual coding theory (Paivio, 1971) was selected as the theoretical framework, indicating to students the underlying cognitive processes when they read an authentic English language text.

This research aimed to explore how the participants learn some unknown English vocabulary in a computer-assisted environment which provides facilities in the form of sound (i.e., pronunciation), videos, and English definitions. This investigation was designed to extend teachers' awareness of the use of multimedia learning in a second language learning environment and provide information for designing CALL environments in SLA. This research addresses the following research question:

Do multimedia glosses significantly affect vocabulary acquisition of Iranian intermediate EFL learners?

The null hypothesis of the current research is that Using multimedia glosses has no significant impact on the vocabulary acquisition of Iranian intermediate EFL learners.

1. Literature review

One of the challenging aspects of learning and teaching a foreign language, specifically in an EFL context, is learning and teaching of unfamiliar vocabulary. Laufer (1997) believes that vocabulary acquisition is at the heart of language learning and teaching. With words, speakers can communicate with each other in one language. In past years, teaching vocabulary was neglected because it was thought that vocabulary could be left to take care of itself (Decarrico 1998, cited in cycle – Murcia, 2001). Allen (1982) related the neglect of vocabulary to three significant reasons. First, many felt that one should find out how the words work with each other in English sentences; so, grammar must be emphasized more than words; second, some methodologists stated that the concepts of the word could not be sufficiently instructed, therefore it was better to evade teaching them. Third, some scholars feared that exposure to many vocabularies might make the language learners make sentence construction mistakes. But any experienced instructor knows that even when learners have more or less good knowledge of English grammar, they still encounter masses of unfamiliar words as they continue to learn. Even though vocabulary teaching was avoided, to a great extent, in particular language teaching approaches for some decades, there is now an extended acceptance on the need for students to enhance their knowledge of words (Allen, 1982; Boyle, 2002). Channell (1988) claimed that, there is a crucial need for teaching methods for vocabulary learning as a particular learning action since the lexicon that organizes the mental vocabulary in a speaker's mind appears to be an independent thing in processing. Also, Carter (1992, pp. 152-153) asserted that much more word should be instructed and learned as a distinct process rather than part of a grammar activities. Laufer (1997) also mentions that if fluency is found out as the ability to communicate a meaning quickly and comprehensibly, then vocabulary accuracy and adequacy matter more than grammatical correctness (quoted in Zimmerman, 1997). Even

though vocabulary has been the topic of many investigations, few types of research have shown the practical techniques of vocabulary instruction. So, it is essential to please the excellent vocabulary teaching approach. Glynn (1998, cited in Kumar & Lightner, 2007) claims that students' understanding and motivation are a continuous challenge for classroom teachers and the basis of various research endeavors. A considerable body of literature indicates that new interventions, such as multimedia teaching, simulations, game, and interactive activities, are useful teaching approaches.

Based on lexicographer Werner Hullen (1989, cited in Roby, 1999) Early glosses and annotations were mostly learner-generated. Medieval students made these marginal scribbling as they struggled with Latin content. Annotations produced by instructors came much later.

Unlike common marginal glossing in the printed form, the new computerized gloss is more fascinating, as stated by Lomika (1998), since the computer's capacity provides teachers and students with storing more widespread glossing than a printed form. Moreover, a computerized gloss does not interrupt the reading activity; the researcher thinks this feature may be more exciting and usable. In multimedia environments, the meaning required for the target or unknown items is hidden until the reader clicks on that word. Mayer (2000 cited in Mayer et al., 2009) believes that one of the functions of a multimedia learning environment is to assist students build a connection between two forms of mental representation systems: the verbal and the visual one; these connections are more easily built when both verbal and visual materials are presented simultaneously. Lomicka (1998) also states that computerized glossing effectively aids L2 vocabulary acquisition and reading comprehension. Teachers and learners can benefit from glossing delivered through the computer. In such situations, students can have access to glosses which are provided for unknown vocabulary items. They also can reach a list of items which are prepared before. Various from common glosses, multimedia glosses are not limited to textual data. Instead, multiple modalities can be used to show words information in reading comprehensions, like auditory mode (sound) and visual mode (text, picture, and video) (Chun & Plass, 1997). Hyperlinks usually indicate words with glosses in the reading texts. The students can access different gloss types in a pop-up window by clicking the hyperlink. If a pop-up window is utilized, it does not cover the text section where the annotated word presents. It is done to avoid any interference with the reading procedure. Considering the works on vocabulary learning concerning multimedia, we can see various results. Roby (1991 cited in Roby, 1999), who compared the application of dictionaries and glosses on computer and paper, noticed no differences between the four experimental groups (i.e., paper dictionary, paper dictionary and glosses, computer dictionary, computer dictionary, and glosses) in terms of vocabulary learning.

On the other hand, Lomicka (1998) stated that participants in complete glossing condition (i.e., L1 translation, L2 definitions, and pronunciations, images, references, and questions) have considerably higher scores in vocabulary and reading comprehension tests than participants in common glossing (i.e., L1 translation and L2 definitions) and no annotation conditions. Sakar & Ercetin (2005) suggested that the impacts of glosses have a relationship with learning mode. It means that the degree of effectiveness of different modes of glosses depends on the learners' preferences, which vary from one learner to another. As an example, language learners of

German were given a story that consisted of visual glosses (picture or video representing the word) and verbal glosses (translation of vocabularies). The participants were sorted as visualizers and verbalizers based on their use of glosses. It was inferred that the participants remembered propositions better if they involved their preferred gloss mode. Taylor (2006) suggests that the effectiveness of multimedia gloss might be connected to the level of the students. That is, glossing could have a different effect on learning depending on the level of learners.

Najjar (1995) concluded that students improved their scores in terms of vocabulary learning by implementing animated picture books. It indicated that animated picture books and multimedia which benefited just from pictures (and not videos), facilitate students' learning. He continued that the student's attitude toward English language learning improved after using animated picture books. It showed that multimedia enhanced EFL young students' attitudes about English learning and competence. To put in a nutshell, easy access to glosses may decrease study time, but it is evident whether they facilitate vocabulary learning. The issue gets more complicated when it is investigated concerning individual differences factors such as proficiency level, learning style, and verbal ability.

2. Materials and methods

2.1. Participants

The participants in this research were selected from 50 intermediate EFL students from a private language institute. They were enrolled in the English class at this institute. To homogenize the participants and ensure their level of proficiency, a Nelson test (version 4,154 C) was given to the participants. The participants ranged from 18 to 22; only male learners participated in this study. After analyzing the collected data, 40 participants whose scores were found to be one standard deviation below and above the mean were chosen to participate in this study. They were assigned to 20 participants control and 20 participants experimental groups. Although the researcher held one introductory session to clarify the project and its usage for the participants, almost all announced being comfortable using computers and having basic software skills. They showed no problem reading a multimedia-based English content on the computer, and some expressed that they frequently read online web-based texts.

2.2. Materials

The first material was the computer through which computerized reading texts and multimedia gloss were presented. The second material was the multimedia program as treatment. It was designed to help EFL students learn vocabulary at various levels. The program provided students with glosses for unknown words via hypermedia links in video and audio. The glosses were utilized to help the learning of unknown words. Multimedia glosses gave students glosses for unknown words via hypermedia links in audio and video modes. The third material was reading the text through which the new vocabulary will be presented. One is computerized reading text, and the other is in traditional printed form. Moreover, the last material was a paper dictionary used by the control group as a text-only gloss.

2.3. Instruments

The first instrument was the Nelson test. The researcher tried to homogenize the participants to ensure their proficiency level. To fulfil the aim, the researcher used a standard text. Nelson English language test (version 4, 150 C) was given to a group of 50 intermediate learners to homogenize the learners based on their proficiency. The reliability index of the test was estimated through Kuder-Richardson 21.

Participants in these two groups took a pre-test consisting of intermediate vocabulary items. This test was piloted on the same level language learners in the institute, and the institute administrators already did the IF & ID of this test; they had optimal IF & ID. According to Kuder-Richardson 21, the test's reliability was .78. The third instrument was the post-test used to measure the progress of learners' vocabulary learning. Since the pre-test and post-test interval was sufficient, the post-test was the same as the pre-test but with slightly different wording. For example, the teacher changed the tenses or the names, but the choices were the same.

2.4. Data collection and analysis

This investigation was conducted in the private language institute in Esfahan. The participants were enrolled in the English class at this institute. They were at an intermediate level. These institutes define the intermediate level based on the Oxford placement test at the beginning and the achievement test or final exam at the end of each semester. The institute provides EFL classes at various proficiency levels, from beginning to advance. They offer curricula following students' academic and professional requirements. Nearly all of the participants showed a similar tendency to learn English and their native language was Farsi. Instructors attempted to use authentic and meaningful content. They used original text, such as Readers Digest, Viva Magazine, etc., to improve students' reading comprehension ability and use different techniques to enhance their vocabulary competence. The institutes' curriculum offered classes at 6 proficiency levels: basic, elementary, pre-intermediate, intermediate, high-intermediate and advanced. The students were assigned to different levels based on their performance on the Oxford English placement test, which had 20 listening items, 30 grammar items, 30 vocabulary items, and 20 reading items. The first issue to consider is that these language learners should be homogenized, and then those whose marks are closer to the mean should be selected for the two groups. To fulfil this aim, the researcher used a standard test. Nelson English language test was given to a group of 50 intermediate learners to homogenize the participants. This was done by calculating the descriptive statistics of the gathered data. The Nelson test scores' mean, mode, median, and standard deviation were computed. Then, the 40 participants whose score was two standard deviations below and above the mean were chosen. The rest of the participants remained in the classrooms without knowing that their post-test papers were not included in the statistical procedure of the research. The selected learners were divided into two groups, one as an experimental group and one as a control group. As the total number of students chosen was 40, two groups of 20 participants were assigned. Before starting the project, one introduction session was arranged with all students. In this session, the researcher explained the project, what exactly the project was, why the researcher was doing the research project, and the probable time of administration. One session, of course, was

dedicated to introducing the program itself. Since the students had the right to be informed about the project fully, the researcher told them about the necessities and goals of this research. It was done to have participants' full participation. Of course, the researcher avoided sharing the information, such as the kind of multimedia and its name, the content, and vocabulary tests. The English class the participants enrolled in was held twice a week. They did not have any pre-determined course book, and the instructors chose the materials; the study was done during their regular class time as a complementary activity to enhance their vocabulary competence. It was done in 30 minutes at the end of each class session. To choose the vocabularies that were new and unknown to learners, a list of 65 words was given to control and experimental groups before treatment sessions. Learners needed to recognize familiar words and write down their Persian translations. There were 15 words that students could recognize their meaning and concepts. Consequently, 50 words were chosen for this research. Two days before the treatment, a vocabulary test containing 20 items was given to all the subjects as a pre-test. According to Kuder- Richardson 21, the test's reliability was .78. In both groups, 50 new vocabularies were taught during ten sessions (five weeks). The unknown words were presented in a short paragraph. The control group received the text in which unknown words were highlighted. The teacher read the paragraph and gave the meaning of unknown words, synonyms, and antonyms. The gloss looks up learners went to the language laboratory. The computers in the laboratory were prepared to present multimedia glosses. The software had been installed before they came into the lab. The experimental group received the text containing unknown words through the computers. They read the text, and when encountering an unknown word, they clicked on it to access available glosses, either audio (pronunciation) or video. The screen was divided into two parts the right section was used for reading text paragraph by paragraph, and the left section was used for glossing. When EFL learners clicked on an unknown word, they could see a small circle, leading to pronouncing those words. On the left section of the screen, there was a video. The students could watch the video when reading the paragraph and simultaneously listen to a native speaker reading the paragraph. Besides the picture of the unknown word, and a brief definition of the word, they could see textual explanation in the dictionary area and listen to the spoken explanation simultaneously and see a picture of that word. After ten instruction sessions, a post-test was administered in both two groups to investigate the possible effect. After gaining the scores from the pre-test and post-test, the independent t-test was used to see whether there was a considerable difference between either group's means of the pre-test and post-test.

2. 5. Design of the Study

This research examined the impact of multimedia glosses on L2 vocabulary learning. Students' vocabulary learning was compared using two groups. One with multimedia glosses, the experimental group, and the other without them, the control group. In other words, the study was designed to examine two different learning conditions (providing different multimedia glosses to unfamiliar words and not providing multimedia glosses) on vocabulary acquisition. The design of this research was a quasi-experimental design with pre-test and post-test. The researcher instructed control and experimental groups the vocabulary items, except that the experimental group received treatment. The control group had access to only the paper dictionary. In the last session, a post-test was administered to measure the treatment's effect.

The difference between the mean of the pre-test and the post-test of the control group scores and between the mean of the pre-and post-test for the experimental group scores will be analyzed. After collecting the data, an independent t-test was used to compare and contrast the performance of the two groups in the post-test.

3. Results

3.1. Results of the Test of Homogeneity

At the beginning of this research, the researcher administered a Nelson test to 50 participants. The test was administered to homogenize the learners; its findings are revealed in the following table:

Table 1. Descriptive statistic for Nelson test

Test	N	Mean	Variance	K-R21
Nelson	50	37.12	24.85	.82

Based on the table 1, the mean of Nelson test was 37.12. 40 students whose scores fall within one standard deviation above and below the mean were chosen.

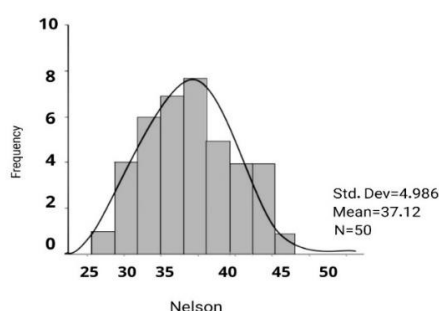


Figure 1. Histogram for the Nelson test

Figure 1 displays the frequencies of the learners' scores on the Nelson test. The curve line imposed on the histogram shows the normal distribution of the data. Since a few cases fell above or below the curve, it can be claimed that the distribution does not violate the normality assumption. The most frequent score –mode falls in the middle of the graph, i.e., the highest bar which was about 37. The mean score for the data was 37.12. It is close to the mode of the data, again proving that the data enjoy a normal distribution.

3.2. Results of the Pre-test

Descriptive statistics for the two groups are displayed in table 2.

Table 2. Descriptive Statistic of the Pre-test of Vocabulary

Group	N	Mean	St. Deviation	St. Error Mean
Control	20	15.45	4.87	1.089
experimental	20	16.05	4.04	.905

The mean scores for the control and experimental groups are 15.45 and 16.05. In addition, the descriptive statistics reveal that the standard deviations for the control and experimental groups were 4.87 and 4.04. A t-test was given to the control and experimental groups before the treatment to demonstrate the homogeneity of these two groups. An independent t-test was run to compare and contrast the means scores of the control and experimental groups on the pre-test.

Table 3. *Independent sample t-test of Vocabulary Pre-test*

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.85	.37	.42	39	.67	.60	1.41	-2.26	3.46
Equal variances are not assumed.			.42	37.75	.67	.60	1.41	-2.27	3.47

The t-observed value was .42 (table 3). This amount of t-value at 39 degrees of freedom was lower than the critical t-value (2.02); so, the difference between the means of the groups obtained from the pre-test is not significant, indicating that both groups were similar before the start of the treatment sessions. The sample t-test for equality of means reveals that the significant value was .67, greater than $p = .05$, so there was no significant difference between the groups in the pre-test. It should be mentioned that the two groups are homogenous in terms of their variances on the pre-test. The Levene's homogeneity test of variances $f = .85$ has a probability of .37. The probability associated with the Levene's F was much higher than the significance level proposed by the researcher, i.e., .05, which is the reason, why the first row of table 3, "Equal variances not assumed," is reported. Consequently, the study participants were homogenous in terms of variance in their vocabulary knowledge prior to the beginning of the research project.

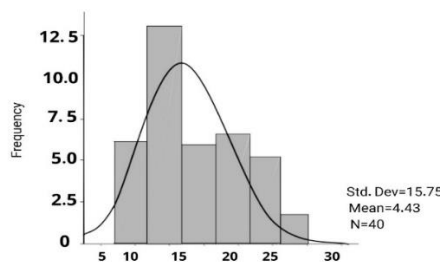


Figure 2. *Histogram for the pre-test*

Figure 2 displays the frequencies of the students' scores on the pretest of compatibility. The heavy left tail of the graph indicates that most of the students' scores on the pretest of compatibility were lower than the mean of 15.75. The mean was higher than the mode of about

13 to 14. These findings indicate that the most of the learners gathered at the end of the histogram because of their low-level knowledge of compatibility.

3.3. Results of the Post-test

Descriptive statistics for the two groups are displayed in table 4.

Table 4. Descriptive Statistics of the Post-test of Vocabulary

Group	N	Mean	St. Deviation	St. Error Mean
Control	20	31.95	6.79	1.519
Experimental	20	37.90	6.56	1.467

The mean scores after ten sessions of treatment for the control group and experimental group were 31.95 and 37.90. There was a considerable difference between the mean scores of these two groups. An independent t-test was run to compare and contrast the means scores of the control and experimental groups on the post-test to prove the impact of multimedia glosses on vocabulary acquisition.

Table 5. Independent sample T-test of Vocabulary Post-test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.07	.80	2.81	39	.008	.60	2.11	1.67	10.22
Equal variances not assumed			2.81	36.95	.008	.60	2.11	1.67	10.22

The t- observed value was 2.81 (table 5). This amount of t-value at 39 degrees of freedom was higher than the critical t-value, (2.02); the sample t-test for equality of means shows that the significant value was .008, which is less than $p = .05$, ($P = .008 < .05$, $.80$), so there was a considerable difference between the two groups in post-test. So, learners in the experimental group outperformed those in the control group. It should be mentioned that the two groups are homogenous in terms of their variances on the post-test. The Levene's test of homogeneity of variances $F = .07$ has a probability of .80, which is much higher than the significance level of .05. Therefore, it is claimed that both groups were homogeneous in terms of their variances. That is the reason, why the first row of table 5, Equal variances not assumed, is reported.

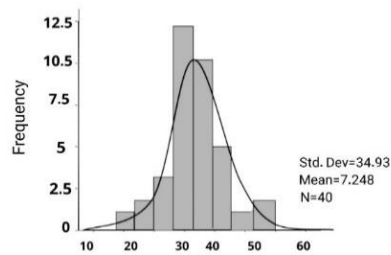


Figure 3. Histogram for the post-test

Figure 3 displays the frequencies of the students' scores on the posttest of compatibility. The heavy center and right sections of the graph indicates that most of the students' scores on the pretest of compatibility were close to higher than the mean of 34.93. The mean and mode are very close to each other indicating an almost normal distribution on the posttest. These findings indicate that the majority of the students improved their compatibility knowledge due to the treatment administered. Therefore, it can be concluded that the null hypothesis of the study, using multimedia glosses does not have any considerable impact on vocabulary acquisition was rejected.

3.4. Results of the Hypothesis of the Research

As demonstrated in table 4, the descriptive statistics indicated that the mean scores for the control and experimental groups were 31.95 and 37.90. The t-test also revealed that a significant mean difference between control and experimental groups. The significance was .008, and $P=.008 < .05$. Since the observed t-value of 2.81 exceeded its critical value, it can be claimed that there was a considerable difference between the control group and experimental group mean scores on the post-test. So, we can reject the null-hypothesis. That is to say, Multimedia glosses enhanced the mean score of the experimental group. Data analysis indicated that the experimental group outperformed the control group in learning vocabulary. These findings provided an answer to the question of the investigation: Do multimedia glosses significantly affect vocabulary acquisition of Iranian intermediate EFL learners?

4. Discussion and Conclusion

The researcher tried to determine any possible effect of the Multimedia Glosses on L2 vocabulary acquisition. To reach the desired results, the researcher used two different learning conditions. One group of participants was chosen according to a standard test and then categorized into two groups. As mentioned above, two groups were given the exact reading text from a software called "Tell Me More." Then the researcher utilized t-test analysis to determine the difference among the two groups' means. The goal of this research was to examine the impact of multimedia glosses on vocabulary acquisition of Iranian intermediate EFL learners. In this regard, a research question was proposed: Do multimedia glosses significantly affect vocabulary acquisition of Iranian intermediate EFL learners?

So, based on the above research, the following null hypothesis was introduced:

Using multimedia glosses has no significant effect on the vocabulary acquisition of Iranian pre-intermediate EFL learners.

The study reports the beneficial effects of using the multimedia environment and glosses in vocabulary acquisition of Iranian intermediate learners. Of course, some other researchers reported the advantages of simultaneously using different modalities, such as audio, video, pictures, and vocabulary learning students at adult levels (Mayer & Moreno, 1998). This study successfully confirms that using two different modalities, videos and sound, can activate both visual and auditory working memory and be the reason for better responses to vocabulary tests.

The results show this clearly. To test the hypothesis, from 50 intermediate students, through the administration of the Nelson test, 40 subjects whose scores fell one standard deviation below and above the mean were chosen; the rest of the learners remained in class but dropped from the study. The groups were intact and not randomly selected. 20 subjects were assigned to the experimental and 20 subjects were assigned to the control group. Both groups mentioned above were given the same reading texts taken from a software called "Tell Me More." The experimental group had access to multimedia glosses for unknown words, which were glossed in either phonetic representation (in the form of pronunciation) or videos. The learners in this study accessed the glosses by clicking on the highlighted words. Regarding the clarification of the unknown word lexis, the control group received help from the teacher through the conventional method and had access to a dictionary. After 10 sessions of such treatment, a vocabulary test was administered to the two groups. The application of an independent t-test indicates that the performance of participants exposed to multimedia glosses was significantly superior to that of the control group. To ensure any considerable change in the improvement of two groups of subjects after exposure to the treatment sessions, the performance of each group at the pre-test of vocabulary was compared with the performance at the post-test of vocabulary. It shown a significant increase in subjects' performance in the experimental group; that means the participants in the experimental group benefited from the treatment sessions. Moreover, the post-test findings enabled the researcher to reject the null hypothesis of the current study, and therefore the question of this investigation was answered appropriately. The finding of this study also is in line with Mayer (2001), who confirmed that presenting materials visually can improve learners' learning. The findings also are consistent with Mayer (2001, 2), who claimed that presenting material visually as well as verbally can affect positively learners' learning and retention of the materials. The findings of the current investigation, also support Mayer & Anderson (1998), who pointed out that the use of multimedia leads to better performance on subsequent problem-solving tests than the students who just read the same information with additional details inserted in the materials. The results of this study also support the findings by Kost, Foss, & Lenzini 1999; Brett, 1998; Lomicka, 1998; Chanier & Selva, 1998; Ellis, 1995; Mayer & Anderson, 1991; who stressed the importance of multimedia in facilitating the learning.

A further explanation for the present results is that multimedia glosses might have responded to participants' preferences to use technology in learning which might have a positive effect on their vocabulary learning. This explanation has been supported by many

previous studies which found a significant impact on using technology on vocabulary learning (Alavinia & Qoitassi, 2013; Alemi, Sarab, & Lari, 2012; Chen & Chung, 2012; Fehr et al., 2012; Hayati, Jalilifar, & Mashhadi, 2013; Korat & Shamir, 2012; Maftoon, Hamidi, & Sarem, 2015; Mahsefat & Homaie, 2012; Nikoopour & Kazemi, 2014; Sun & Yang, 2012; Wang & Shih, 2015; Ward & Williams-Rossi, 2012; Yanguas, 2012).

Another explanation for the results of this study is the use of video in the glosses. In this context, Aldera and Mohsen (2013), Jelani and Boers (2018) as well as Cokely found out that using videos is an effective means that can improve vocabulary acquisition. This explanation is supported by the assumptions of the GTML (Mayer, 2005) which assumes that the working memory has a limited capacity, therefore there should be a simultaneous processing of verbal and visual information (Türk & Erçetin, 2012).

Another possible explanation is the use of pictures in the multimedia glosses. The inclusion of pictorial glosses better shows the underlying meanings to students (Morett, 2019; Shalmani & Razmjoo, 2015) as well as enhances learners' retention of word meaning (Boers et al., 2017); thereby leading to better vocabulary gains (Türk & Erçetin, 2012). This explanation is in tune with the assumptions of the DCT (Paivio, 2007) which proposes that vocabulary glossed with both text and pictures are acquired better than those glossed with text only (Sadoski & Paivio, 2013). According to this theory, pictures are more easily retrieved from memory than are words and recall is enhanced thanks to word-image association (Reed, 2010).

Finally, the improvement in vocabulary acquisition and retention in the present study may have resulted from the positive learning atmosphere that accompanied the use of the multimedia glosses as participants had the opportunity to select the medium, they liked while they were looking for the meaning of the glossed words. They could select among text, pictures, audio files, and video clips. This might have been suitable for participants with different preferences and learning styles, so that information can be offered to learners in the mode they prefer or need. This explanation agrees with Tight's (2010) idea that vocabulary instruction through multiple modalities is beneficial for learners of different style preferences. It also goes in harmony with the principles of Gardner's MIT which emphasizes the necessity to provide learners with material presented in multiple ways and modes to facilitate effective learning (Gardner, 2011).

5. Pedagogical Implications

The current research adds to the growing research in multimedia gloss studies in second language acquisition. Previous multimedia gloss studies have compared text-picture to text-or pictures-only gloss (Yoshii, 2006). However, audio and video gloss, as a complementary sensory modality from text gloss at the intermediate level, has never been studied before. The present research work fills this gap in the literature. This study provided the much-needed information on the impact of multimedia gloss on L2 vocabulary learning. They compare multimedia gloss/annotation to traditional text-only gloss and shed light on using various dual glosses for L2 learning. This study has established that audio-video gloss is better than text-only gloss in facilitating L2 vocabulary learning. This contribution has been made by identifying the modality effect of two sensory modalities: video and audio. Moreover, the

current study has determined that intermediate students work better with multimedia gloss in multimedia environments. Although this study has contributed significantly to multimedia gloss research in second language acquisition, some questions remain unanswered, such as the long-term effects of different dual multimedia glosses (audio-video vs. video picture or video-text) on L2 vocabulary acquisition. The above implications could be considered theoretical ones. However, beside the contributions and implications for second language acquisition, especially in multimedia gloss research, current research carried pedagogical implications. First, the study provides some valuable suggestion for CALL material designers in choosing the right combination of modalities in facilitating L2 vocabulary learning. This study confirmed that audio-video combinations facilitate L2 vocabulary learning more effectively than text-only gloss. In designing multimedia materials in multimedia environments, this result could be helpful when making decisions about presenting information in different environments. This could also inform language instructors, administrators, and authorities in making decisions about effective multimedia programs. It could be more of a help in deciding what to do to enhance L2 reading comprehension.

6. Suggestions for Further Research

According to Selinger and Shohomy (1989, 245), “the nature of research is such that the more answers are obtained, the more question arise. Curiosity in second language acquisition, as in other disciplines, leads researchers to more problems, more questions, and more areas of research”. Since research is an ongoing activity that is only partially completed, each piece raises additional questions for more research. Consequently, other questions in this area need further investigation. The following suggestions provide several topics that can guide further studies in the future.

1. The setting selected for this study was a private language institute in Esfahan. The same procedure could be used in other settings, such as schools, universities, and cities.
2. The current study examined the effect of multimedia glosses on vocabulary acquisition; future studies can be done on reading comprehension.
3. The effect of multimedia glosses in vocabulary learning and its relation to other areas of language, such as listening, writing, or speaking, can be subject to further research.
4. The present study dealt with EFL learners; other students in other areas, such as ESL or ESP, can be examined using the same procedure.
5. Future research can be done on the impact of multimedia programs on learners’ motivation in language instruction.
6. The findings of the current study are based on a small trial consisting mainly of young male participants. The response of young female students is unknown, which can be investigated in the future.
7. It is recommended that similar investigations be conducted to examine the effect of multimedia programs on foreign language learning. Future studies should consider involving more participants, increasing research time, and employing a course that allows technology.
8. The current study may be replicated by having native speakers as the participants.

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