

**THE EFFECT OF MULTIMEDIA VOCABULARY  
PRESENTATION BEFORE AND WHILE READING THE TEXT  
ON READING COMPREHENSION AND VOCABULARY  
RETENTION**

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**ABSTRACT**

This research was conducted to investigate the effect of multimedia vocabulary presentation before and while reading the text on reading comprehension and vocabulary retention. Sixty three first grade Iranian high schools students between 15 and 17 years of age were randomly selected for the study. An experimental design with three groups was used. One class of 21 students were the control group and received traditional way of presenting words and the other two classes of 21 students each served as experimental groups. For the first experimental group (BR group), the image, audio, L1 translation, and a sentence context of whole new words were presented one by one before reading the text. For the second experimental group (WR group), new words were presented while the students were reading the text at the simple click of a mouse on the highlighted target vocabulary. The results show that both multimedia presentation of words before and while reading the text enhanced vocabulary development and reading comprehension of the learners in immediate vocabulary and reading comprehension tests as well as in delayed vocabulary tests. However, presentation of the words while reading the texts seemed to be more effective than the presentation of words before reading the texts.

**Key words:** multimedia, vocabulary, reading comprehension, vocabulary retention

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## Introduction

The recent development in computer technology in language learning has created the opportunity and need for investigating the effect of multimedia on language learning and teaching. Multimedia that is a combination of audio, video, image, text, and graphics has been argued to enhance comprehensible input (Plass & Jones, 2005). This supports Paivio's (1986, 1991, 2007) Dual Coding Theory which declared that a combination of imagery and verbal information mends the process of information. In general, multimedia glosses were found to be helpful to several aspects of language learning (e.g., Brett, 1997; Hulstijn et al., 1996). The details in using CALL such as how and when to use the different types of media including text, audio, pictures, and video to enhance the quality of language learning have been the areas of concern and interest among researchers (Al-Seghayer, 2001; Nelson, 2006; Yanguas, 2009 ). In line with this trend, the present study investigates the relative efficacy of two different ways (times) of presenting new words of a reading text in multimedia environment: first, presenting the image, audio, L1 translation, and a sentence context of whole new vocabulary items one by one before reading the text. Second, presenting them while the students are reading the text at the simple click of a mouse on the highlighted target words, in vocabulary recall and reading comprehension.

## Research Objectives

This study tries to answer two questions regarding two important factors: the first one is whether multimedia vocabulary presentation before and while reading the text has any significant effect on reading comprehension, and the second question is whether multimedia vocabulary presentations before and while reading the text have any significant effect on vocabulary retention.

## Literature Review

Reading in a second or foreign language is considered to be a meaningful language-learning activity, be it on screen or on paper. Indeed, to comprehend a text, learners interact with different types of semantic, syntactic, and cultural information that can be processed and possibly learned or remembered. Moreover, many second-language specialists see reading as a successful means of acquiring new vocabulary (e.g., Krashen, 1989). This kind of vocabulary learning, where the vocabulary learning is improved during normal reading activities, is referred to as incidental

vocabulary learning (e.g., Hulstijn et al., 1996; Sternberg, 1987). Incidental vocabulary learning has been stated as the learning of new vocabularies during listening or reading activities when the general goal of the activity is comprehension rather than explicitly learning those new words (Hulstijn et al. 1996). These authors investigated whether providing glosses and repeating the same words in a text could compensate the small gains found from incidental vocabulary learning. The researchers assumed that frequency of occurrence had a greater positive effect on learning vocabulary incidentally, both when the word had been looked up in the dictionary and when the gloss had been accessed than when no meaning of the word was available. In addition, marginal glosses better fostered incidental vocabulary learning, given that sometimes students did not use the dictionary. When dictionaries were used, the results were as well as with glosses. However, half of the glossed words looked up between one and three times within the text were forgotten. Generally, this study promoted the convinced role of annotations on incidental vocabulary learning.

The literature related to multimedia annotations consists of their presentation through text, audio, video, and pictures. In utilizing multimedia annotations, Davis (1989) noted that glossing through hypertext are invisible for not interrupting the reading process and users can focus on what they are reading. Moreover, Jacobs (1994) believes glossing created by computers is an effective way for facilitating L2 vocabulary acquisition. Learners, teachers, and researchers alike can benefit from glossing delivered through the computer. Chun and Plass (1996) emphasized that presenting lexical items with different types of media enhance the chance of recall cues and increases the probability of retention. The logic is that because of coding words in two modes, they are learned better than those coded only in one mode. Dual coding helps learners build two types of recall cues in memory, and accommodates more paths for retrieval.

Lyman-Hager et al. (1993) investigated the effect of a multimedia program on vocabulary acquisition. The results showed that students who worked with the multimedia program learn vocabulary better than those who were exposed to non-computerized text. In addition to the learners' performance, Lyman-Hager and Davis (1996) also studied participants' attitudes towards computerized L2 reading glosses. The results did not show a significant relationship between computer use and comprehension but revealed positive attitudes toward the computerized glosses. They finally concluded that the positive attitude toward the computer-glossed format was based on the learners' clear understanding of text because of lack of

interruption that usually happens by conventional dictionary use. Furthermore, computer glosses contained more material than a dictionary and make learners more independent by trying to find definitions by themselves.

Rott et al. (2002) investigated the impact of a first language (L1) multiple choice glosses and L2 text reconstruction on lexical acquisition and retention and text comprehension. They found that multiple choice glossing led to better immediate performance both receptively and productively but caused only receptive retention. Additionally, Jacobs et al. (1994) made a comparison between the impact of L1 and L2 glosses in reading comprehension. The results showed that regarding giving definitions, there was no significant difference between L1 and L2 glosses in immediate and delayed vocabulary tests. However, in the recognition test, the L1 gloss group performed significantly better on the delayed vocabulary test. Therefore, more studies are necessary to investigate the effect of glosses to verify the results of previous studies and to supply higher insights into this area.

### Methodology

A total of 63 students from three homogeneous classes in Qaen, Iran participated in the study. They were first grade high school students between 15 and 17 years of age. One class of 21 students consisted of the control group and received traditional way of presenting words. And the other two classes of 21 students each served as experimental groups. For the first experimental group (BR group), the image, audio, L1 translation, and a sentence context of whole new words were presented one by one before reading the text. For the Second experimental group (WR group), new words were presented while the students were reading the text, at the simple click of a mouse on the highlighted target vocabulary. Materials used in the study consisted of five last texts of Iranian High School English Book 1, and an interactive multimedia computer program (Microsoft PowerPoint) that was designed by the researcher to enhance L2 vocabulary acquisition by providing readers with the meaning of a target word via hypermedia links to multiple modalities.

A vocabulary test containing 40 multiple-choice items and a reading comprehension test containing 25 multiple choice items selected from the course passages were developed by the researcher. The expert views were taken to validate the test and it was also piloted to improve questions, format and clarity before they were presented to the groups. The only difference of the

pre-test post-test and delayed post-test was that the order of questions was changed to wipe out the probable recall of the answers.

In the first session, the two pre-tests on vocabulary and reading comprehension were administered to the subjects in all three groups one week before the experiment in order to determine if they are homogeneous before the treatment. Since this study consisted of three distinct ways to vocabulary presenting, three kinds of presentation were used, for BR group, the image, audio, L1 translation, and a sentence context of whole new words were presented one by one before reading the text. For WR group, new words were presented while the students were reading the text, at the students' simple click of the mouse on the highlighted target vocabulary. For control group, new words were presented in traditional ways like translating or writing synonyms or antonyms of the new vocabulary on the board by the teacher. Then in all three groups each participant read the story individually. Subjects in all groups read a text that contains words that the researchers have targeted for learning. Subjects viewed 5 passages over five sessions where each session lasted for about 45 minutes. After reading the passage in each session, participants were asked to take a comprehension test (five items) and a vocabulary test (eight items). In the seventh session and two weeks later after the end of the course and again without warning, the delayed vocabulary post- test was administered.

### Results and Discussion

In this section, both descriptive and inferential results pertaining to pre-and post-tests are presented and discussed. Table 1 shows the pretest results comparing the three groups in both reading comprehension and vocabulary knowledge.

#### Pre-Test Results

**Table 1:** The Descriptive Results of the Pretest

Test	Group		
	Control	WR	BR
Mean	8.9048	8.9048	8.6667
Std. Deviation	2.89663	2.21144	2.61406
Minimum	4.00	5.00	4.00
Maximum	15.00	14.00	14.00

As table 1 shows, the means of the pretest in all three groups are almost the same and show that all groups are similar in reading comprehension and vocabulary knowledge before the treatment. However, to determine if the differences between the mean scores of the three groups are significant, one-way ANOVA was used as displayed in table 2.

**Table 2:** One-way ANOVA for Performance on the Pretest

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.794	2	.397	.059	.943
Within Groups	402.286	60	6.705		
Total	403.079	62			

As the results of the one-way ANOVA show,  $P < 0/05$ , there is no significant difference between the control and two experimental groups and as a result, the three groups were homogeneous before the experiment.

### Post-test Results

The descriptive and inferential posttest results comparing the three groups in immediate reading comprehension and vocabulary knowledge as well as delayed vocabulary performance are presented in this section. Table 3 shows the descriptive results for the immediate vocabulary post-test.

**Table 3:** The Descriptive Results of the Vocabulary Posttest

Test	group		
	Control	WR	BR
Mean	27.0000	33.5238	31.3333
Std. Deviation	4.72229	2.85690	3.69233
Minimum	14.00	29.00	22.00
Maximum	34.00	40.00	37.00

As table 3 shows, the mean score of WR group in the vocabulary posttest is more than BR group, and the mean score of BR is more than the mean score of control group. However, to show if these differences are significant, an inferential analysis is done through one-way ANOVA, as shown in table 4.

**Table 4:** One-way ANOVA for Performance on the Vocabulary Posttest

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	462.952	2	231.476	15.748	.000
Within Groups	881.905	60	14.698		
Total	1344.857	62			

As the results of the one-way ANOVA in table 4 show, there is a significant difference between the three groups. Therefore, it can be concluded that multimedia presentation through image, audio, L1 translation, and a sentence context of whole new words are in general more effective than the traditional modes of presentation. More specifically, it was found that while reading multimodal presentation is more effective than such a presentation before reading. The results pertaining to the effect of three modes of presentation on reading comprehension are displayed in table 5.

**Table 5:** The Descriptive Results of the Reading Comprehension Posttest

	Group		
	Control	WR	BR
Mean	16.0952	20.1429	17.8571
Std. Deviation	3.08066	2.53546	2.08052
Minimum	8.00	15.00	14.00
Maximum	22.00	25.00	23.00

As displayed in table 5, similar to vocabulary results, the mean of WR group is more than the that of BR group and the mean of BR group is more than that of control group in reading

comprehension test. Again, a one-way ANOVA analysis is used to see if there is any significant difference between all the groups in this regard.

**Table 6:** One-way ANOVA for Performance on the Reading Comprehension Test

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	172.984	2	86.492	12.815	.000
Within Groups	404.952	60	6.749		
Total	577.937	62			

As the results of one-way ANOVA in table 6 show there is a significance difference between the three groups and it can be said that multimodal presentation is useful for improving in both vocabulary and reading comprehension with a better effect when presented during reading. In addition to the immediate results of multimodal presentation on vocabulary and reading comprehension, the descriptive and inferential statistics related to the delayed vocabulary test results are also displayed in tables 7 and 8.

**Table 7.** The Descriptive Results of the Delayed Vocabulary Posttest

test	group		
	Control	WR	BR
Mean	20.1429	25.6667	23.4762
Std. Deviation	4.29285	4.12715	4.06963
Minimum	10.00	20.00	15.00
Maximum	32.00	37.00	33.00

As it can be seen in table 7, the delayed vocabulary test results are also similar to the previous means for immediate vocabulary and reading comprehension tests. The mean score of WR group in the delayed vocabulary posttest is more than BR group, and the mean score of BR is more than the mean score of the control group. The inferential results are displayed in table 8.



**Table 8.** One-way ANOVA for Performance on the Delayed Vocabulary Posttest

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	324.952	2	162.476	9.369	.000
Within Groups	1040.476	60	17.341		
Total	1365.429	62			

The results of the one-way ANOVA in table 8 reflect that there is a significant difference between the three groups confirming the similar positive results for multimodal presentation specially for presentation during reading.

The results of this study concur with findings by Davis (1989), Jacobs (1984), Chun and Plass (1996), and Lyman-Hager et al. (1993) on the positive effect of multimedia on vocabulary acquisition and retention. Moreover, the present study findings confirm the results found by Rott et al. (2002) and Jacobs et al. (1994) that multi modal presentation is useful in reading comprehension. What makes the results in this study is the fact that multimodal presentation while reading is more effective than such a presentation before reading even in long term vocabulary retention.

### Conclusion

Therefore, based on the study findings, it can be concluded that multimedia vocabulary presentations before and while reading the text have positive effects on Iranian high school EFL students' immediate reading comprehension and vocabulary retention as well as on their vocabulary retention. Moreover, it can be claimed that multimedia vocabulary presentation while reading the text is better than multimedia vocabulary presentation before reading the text. In other words, participants can learn and recall more words, and comprehend the texts better when the new words are presented while students were reading the text, via multimedia.

It is recommended that teachers in all levels of junior high schools and high schools in Iran use such a technology enhanced facility of multimedia presentation for teaching vocabulary and reading comprehension. It is also recommended that this study be replicated with a larger number of participants from the same background. It would be interesting to compare results

across levels of proficiency. The same experiment with female students within the same age range would be necessary to confirm the findings of this study. The setting which was chosen for this study was schools. The same techniques could be used in other settings, for example, language institutes and universities. Other nationalities can be examined in a new research. Finally, similar studies can be conducted on investigating the effect of multimedia on other skills and language areas such as speaking, listening, writing, grammar, and pronunciation.

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