EFFECTS OF MULTIMEDIA GLOSSES ON L2 VOCABULARY LEARNING

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ABSTRACT

The present study investigates the effects that different types of multimedia glosses have on second language vocabulary learning. Sixty elementary level learners of English were randomly assigned to three types of annotations:

➢ with only textual annotations available,
➢ with only pictorial annotations available, and
➢ with both textual and pictorial annotations available.

Subjects were asked to read four annotated texts with the intention of comprehension. Acquisition was measured by means of two types of tests: word recognition test and picture recognition test. Results showed that the groups that had access to both textual and pictorial annotations significantly outperformed the other two groups in both tests. The results also indicated that the pictorial group obtained significantly higher mean score in comparison to textual group.

Keywords: Multimedia glosses, vocabulary, second language learning.

INTRODUCTION

One aspect of second language teaching via multimedia to have received attention over the past few years is the impact of glossing individual vocabulary words through different modalities. Since in a multimedia environment it is possible to provide a variety of annotations in the form of text, audio, picture, video, and sound, it has become crucial to investigate whether multimodal glosses or annotations are effective in facilitating vocabulary learning. Thus, the present study explores the effects of multimedia annotations, particularly textual, pictorial, and textual pictorial glosses on vocabulary learning while reading a L2 passage.

Multimedia and Learning

It is suggested that multimedia can have a positive impact on L2 learning and teaching due to its integration of different media (Kramsch & Andersen 1999; Shea 1996). The theoretical foundations for learning in multimedia environments have been developed within Dual Coding Theory (Paivio, 1986) and Cognitive Load Theory (Chandler & Sweller, 1991; Sweller, 1994; Sweller et.al., 1998). Mayer (1997) integrates these two theories and proposes the Generative Theory of Multimedia Learning. Paivio's Dual-Coding Theory (1986) states that learning improves when the information is received through two channels (verbal and visual) to construct meaning.

On the other hand, Cognitive Load Theory suggests that the processing capacities of visual and verbal working memories are severely limited unlike the long-term memory. Presenting too many elements to be processed in visual or verbal working memory can lead to cognitive overload. Thus, several messages of instruction should be coded as a single element in ways that will minimize the chances of overloading learners' cognitive system (Chandler& Sweller 1991). Mayer (1997) builds up his Generative Theory of multimedia learning integrating these theories and provides a framework for instructional presentations. He argues that meaningful learning requires the selection of relevant words and images from the presented input to be stored either in

auditory/verbal or the visual/pictorial channel depending on the type of the input. Learners, then, organize this information into a coherent piece of verbal representation and visual representation separately. Finally, they integrate verbal and visual representations into an already existing mental representation (i.e., schemata).

IMPACT OF MULTIMEDIA GLOSSES ON L2 VOCABULARY LEARNING

There are a considerable number of studies that investigated the effectiveness of multimedia glosses on L2 vocabulary acquisition. Chun & Plass (1996), for instance, investigated the effect of multimedia glosses on vocabulary acquisition. The participants, 160 university students who were learning German as a second language, read a 762-word text on the computer and took a vocabulary test and a recall test. The research employed a within-subjects design and all the participants read the text using the same reading program with some words glossed with text-only, some with text and pictorial cues, and some with text and video clips. The study indicated that the combination of text and picture glosses was more effective than text-only or text-plus-video glosses.

Al-Seghayer (2001) investigated what type of multimedia gloss, dynamic video or still picture, was more effective in aiding vocabulary acquisition. Results of the analyses carried out indicated that learners presented with text -plus- video had scores that were significantly higher than the text -plus- picture condition. In addition, results also showed that the text only condition was significantly more effective than the text -plus-video condition. Yoshii and Flaitz (2002) investigated vocabulary learning using text and picture glosses with 151 beginning and intermediate ESL adult learners. Students read a story with 14 glossed words presented in three conditions: condition 1 (text definition only); condition 2 (picture only); condition 3 (text definition-plus-picture). Results showed that students in condition 3 (text-plus-picture) understood more vocabulary than students in the text or picture only conditions.

Yeh and Wang (2003) investigated the effect of three gloss types on vocabulary learning with 82 ESL learners at a Taiwanese university. Students were in one of three conditions: condition 1 (text translation-plus-definition) Chinese translation and English explanations; condition 2 (translation-plus-definition-plus-pictures); condition (translation-plus-definition -plus-picture-plus-audio). Results found that gloss condition 2 (text translation-plus-definition -plus- picture) was most effective for vocabulary acquisition.

Yoshii (2006) compared the effectiveness of L1 and L2 glosses on the incidental vocabulary learning of 195 Japanese university students. There were four groups in the study, L1 text only, L2-text-only, L1-text-plus-picture, and L2-text-plus-picture. The research instruments were immediate and delayed definition-supply and word recognition tests. However, the results indicated that there were no significant differences between the two language gloss types. Significant differences were found between picture (text-plus-picture) and no-picture (text-only) glosses for definition-supply test. Delayed tests, on the other hand, showed that the L1 text-only group outperformed the L2 text-only and L2 text plus picture groups in recalling the target words. A more recent study in the field has been carried out by Yanguas (2009) following the theoretical framework of attention (Robinson, 1995). Applying four treatments, namely textual, pictorial, textual plus pictorial, and a control condition for comparison, with 94 students of fourth semester college-level Spanish, he used think-aloud technique, reading comprehension, recognition, and production measures to investigate the effects of different types of multimedia glosses when the goal was comprehension of a computerized text. The results indicated that first of all, all the multimedia groups outperformed the control group on noticing and recognition measures. Secondly, there was no significant difference in the performance of the groups on the production measures. Finally, the combination group outperformed all other groups on the comprehension measures. The results of this study suggest that a combination condition is ideal for text comprehension.

Overall, the previously discussed studies have shown that multimedia glosses are effective in promoting vocabulary acquisition in language learning. Consequently, this study, in line with the theoretical framework of

Generative Theory of Multimedia Learning (Mayer, 1997, 2001), attempts to shed light on the effectiveness of textual, pictorial, and textual pictorial glosses in the vocabulary learning of elementary learners of English. The present study, hence, attempts to address the question:

What are the effects of different types of multimedia glosses, namely textual, pictorial, and textual-pictorial, on L2 vocabulary learning?

EXPERIMENTAL DESIGN

Participants
The study was conducted in a foreign language education department at an Iran university. Sixty freshman students (60 females) participated in the study. These learners can be considered as elementary learners of English according to scores on an Oxford placement test. They ranged in age from 18 to 20. They all possessed basic computer skills such as conducting web searches, using e-mail, Microsoft Word, Microsoft Excel, and Microsoft PowerPoint.

Computerized Reading Text
The reading passages used in this study were selected from the book Communicative Reading Skills (CRS) that has been gathered for students of elementary learners (Root & Blanchard, 2004). Macromedia Flash MX 2004 was used to design the texts, which was then uploaded online so that participants could access it.

Piloting of the Experimental Text
Twenty randomly selected participants underlined all the unknown words in the text. Only words underlined by more than half of the participants were selected to be glossed.

Glossing
As a result of the pilot test 20 words were glossed. In the experimental conditions, the words were hyperlinked. When the participants clicked on them a box appeared above the word with a definition. The textual definitions were extracted from Oxford Learner's Dictionary (1991) and the pictorial definitions were extracted from the Internet in English (textual gloss group), a picture (pictorial gloss group), or a combination (textual-pictorial gloss group).

TESTING INSTRUMENTS

English Language Placement Test
In order to guarantee the close homogeneity of the groups, the Oxford Placement Test was administered to the participants. The test, which is a commercially developed package, is claimed to grade and place students reliably into appropriate levels. The results are interpreted by referring to the test manual. By reference to a 12-column table of level specifications, students can be assigned to levels within the OPT Band, OPT Score, OPT Language Level, Common European Framework Level, ALTE & QPT, UK NQF level, IELTS, Cambridge ESOL Main Suite, Cambridge BEC, Cambridge CELS, TOEFL, and TOEIC

Self- report Vocabulary Pre-test
The participants took a pre-test prior to the treatment. The test was designed in the form of student self-report, i.e. students were asked to indicate whether they knew the word they would read in the treatment texts. The participants were instructed to put a check mark by any words they knew and provide a short written explanation or synonym in English or Farsi.

Post-tests

The participants received two types of tests after the treatment: word recognition test and picture recognition test.

Word Recognition Test

The word recognition test included 20 target words with four multiple-choice answers for each item. The participants were asked to select the most appropriate definition of a given word from four choices. The definitions were phrased differently from those used in reading passages, although they conveyed the same meaning. The participants received one point for each correct answer, which amounted to 20 maximum points in total for the test.

Picture Recognition Test

The picture recognition test consisted of 15 items. The participants were asked to choose a related picture for each target word.

The pictures were also different from the ones used in the study even though they conveyed the same meaning. Such a safeguard was taken to avoid the participants' memorizing the definitions as well as pictures encountered in the course of reading. The participants received one point for each correct answer and a zero for incorrect answer.

Procedure

One week before the study, an Oxford Placement Test was administered to the volunteers. Once the researcher made certain that the participants formed a homogenous sample, a pre-test examining the knowledge of the target words was administered. The participants were presented with a list of 24 words and were instructed to put a check mark by each word they knew and write down a short definition or synonym in English.

Subsequently, the words, which were defined correctly by the participants, were discarded from the initial pool of target words, resulting in the elimination of four words. When the final participants as well as the target words were identified, the participants were randomly divided into three groups using three different gloss types: the first group read a text with text-only glosses; the second group read it with pictorial cues in the glosses; and the third group used both text and pictorial cues in the glosses.

Each group consisted of 20 subjects. Before the reading session, the researchers gave a brief oral introduction to the class about the reading activity and the availability of glosses. The participants worked on this reading activity individually on their own computer.

When the reading task finished, the participants were redirected to the test page where they were presented with the two main testing instruments, word and picture recognition tests, and, as a safety measure, two reading comprehension items to avoid the participants' guessing the main concern of the research.

Although the test items were displayed on the screen, the participants were to answer the questions on the answer sheets which were distributed towards the end of the reading task. The students were not allowed to look at the text while they worked on the vocabulary tests.

RESULTS

The data were analyzed using the one-way ANOVA statistical analysis as performed in the environment of the software SPSS 15.0 for Windows. For all the analyses, the alpha level was set at .05.

Word Recognition Test (WRT)

Group means and standard deviations for the three participating groups on WPT appear in Table 1.

Table 1
Results of Descriptive Statistics for WRT

	Mean	Std. Deviation	Std. Error
Experimental group 1 (textual)	15.40	2.01	.44
Experimental group 2 (pictorial)	16.70	2.07	.46
Experimental group 3 (textual-pictorial)	18.00	1.86	.41

As the above table shows, the combination group obtained higher mean score ($\overline{X}$=18) in comparison with both the textual group ($\overline{X}$=15.40) and the pictorial group ($\overline{X}$=16.40). Also, the results indicated the pictorial group's mean ($\overline{X}$=16.70) was higher than that of textual group ($\overline{X}$=15.40). Figure 1 displays means for three participating groups on WRT.
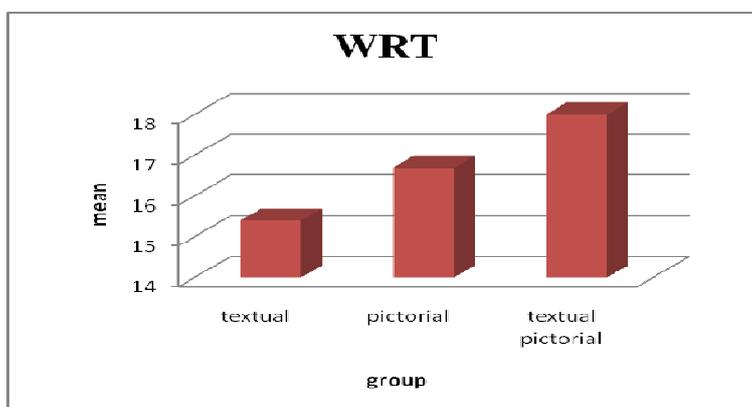
Figure 1
Group means for the WRT

In order to further investigate whether the differences among the means were statistically significant, a one-way ANOVA analysis was performed on the data. The results indicated that significant differences existed in the performance of the groups, $F(2, 57)=8.563$, $p=.001$. A post-hoc comparison results indicated that the combination group differed significantly from the pictorial and the textual groups, and the pictorial group significantly differed from textual group.

Word Recognition Test (PRT)
The descriptive statistics of PRT, including group means and standard deviations, for each group appear in Table 2.

Table 2
Results of Descriptive Statistics for PRT

	Mean	Std. Deviation	Std. Error
Experimental group 1 (textual)	10.00	1.65	.36
Experimental group 2 (pictorial)	12.60	1.35	.30
Experimental group 3 (textual-pictorial)	13.70	.97	.21

As the above table shows, three groups' performance on PRT is different. The results indicated that the combination group who received both text and pictorial cues in the glosses obtained higher mean score ($\overline{X}$=13.70) in comparison to pictorial and textual groups ($\overline{X}$=12.60 and $\overline{X}$=10, respectively). Also, pictorial group's mean ($\overline{X}$=12.60) was higher than that of textual group ($\overline{X}$=10). Figure 2 displays means for three participating groups on WPT.
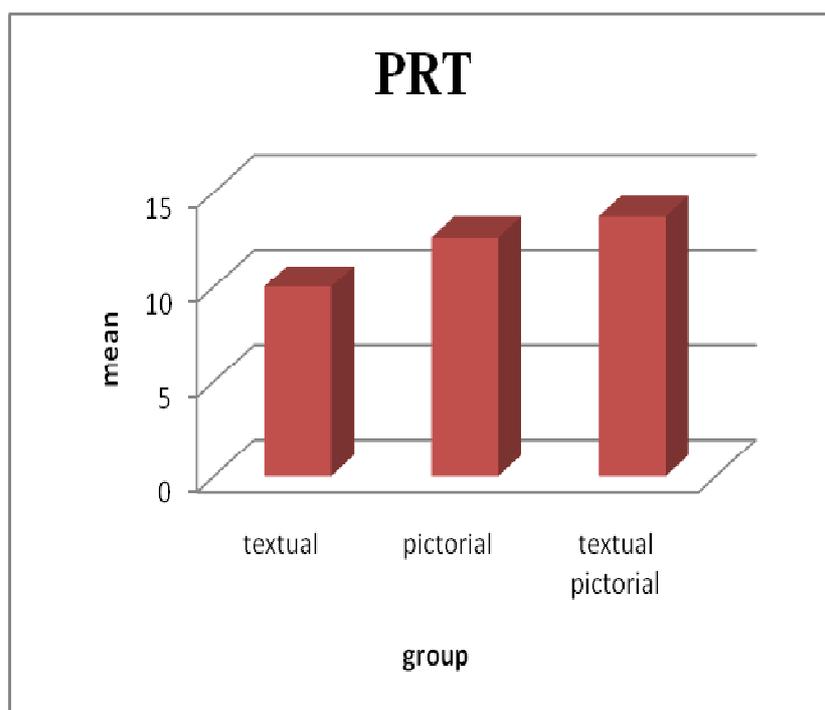
Figure 2
Group means for the PRT

The result of one way ANOVA revealed that the difference between groups was significant in WRT. Technically speaking F (2,57)=39.194, *p*=.000 proved to be significant at the .05 level. A post-hoc comparison results showed that the combination group differed significantly from the pictorial and the textual groups, and the pictorial group significantly differed from textual group.

DISCUSSION

Findings of the study confirmed the findings of the other studies that have found a combination of textual and pictorial glosses was more beneficial in facilitating the learning of second language vocabulary than providing only textual or pictorial glosses for learners (Al-Seghayer, 2001; Chun & Plass, 1996; Yeh & Wang, 2003; Yoshii & Flaitz, 2002; Yanguas, 2009). These findings are in line with the Generative Theory of Multimedia Learning, particularly with the dual channels assumption, which suggests that it is better to present an explanation in words and visuals than solely in words.

According to this theory, the students who selected from words annotated in both pictorial and written modes were able to build more referential connections between the verbal (written) and visual (pictorial) mental

representations of the vocabulary words and were therefore able to recall more of the vocabulary in a follow-up vocabulary post-test than the students in the other two groups.

The findings of the study also indicated the pictorial group obtained significantly higher mean scores in comparison to textual group in both vocabulary tests, namely picture recognition test and word recognition test.

The findings seems logical in picture recognition test because the pictorial group was exposed to pictorial glosses, even though the pictures in the test were different from those the students observed in the glosses attached to the target words. Though it was expected that the textual group would, in turn, outperform the pictorial group on the word recognition test, the reverse turned out to be the case and the pictorial group still outperformed the textual group. It is worth mentioning that L2 vocabulary learning is, by comparison, more effective with the use of pictures.

Regarding the variability of scores, it was determined that the combination group had an advantage over the other two groups on both word and picture recognition tests. This is further evidence to support the idea that pictures help foster vocabulary learning.

On the whole, the two instruments indicated that the combination of the two glossing techniques, namely textual and pictorial, was most influential in helping the participants with learning L2 vocabulary.

LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

This study poses several limitations; thus, the findings should be considered with caution. First, the target population of the study consisted of elementary level language learners of English. This study should be replicated in other learning contexts with students from different proficiency levels to generalize findings to a larger target population and to different learning environments. Second, the use of a pre-test further affected the generalizability of the results. In other words, the results cannot be generalized to people who are not pretested.

Third, this study was conducted with a small sample size and short duration of the experiment. Future studies are needed to replicate this study with larger sample size sand longer periods of time. Fourth, this study also controlled for gender. A similar study could investigate the effect of the three annotation types on vocabulary learning of male students. Finally, this study investigated the immediate vocabulary gains of participants. There is a need to further assess the delayed retention of target words after a one/two-week period.

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