International Journal of New Trends in Social Sciences

Volume 4, Issue 1, (2020) 10-24

www.ij-ss.eu

The comparative effects of different gloss types through screencast on vocabulary learning and working memory of Iranian EFL learners

Mohammad Reza Tavasoli, Department of Persian Literature and Foreign Languages, Islamic Azad University, South Tehran Branch, Tehran, Iran
Bahram Mowlaie*, Department of Persian Literature and Foreign Languages, Islamic Azad University, South Tehran Branch, Tehran, Iran
Millad Abdol Majid, Department of Persian Literature and Foreign Languages, Islamic Azad University, South Tehran Branch, Tehran, Iran
Ali Rahimi, School of Social Sciences and Languages, VIT University, Vellore 632014, India

Suggested Citation:
Tavasoli, M. R., Mowlaie, B., Abdolmajid, M. & Rahimi A. (2020). The comparative effects of different gloss types through screencast on vocabulary learning and working memory of Iranian EFL learners. *International Journal of New Trends in Social Sciences*. *4*(1), 10–24. https://doi.org/10.18844/ijntss.v4i1.4809

Received January 29, 2020; revised March 04, 2020; accepted May 28, 2020.
Selection and peer review under responsibility of Prof. Dr. Huseyin Uzunboylu, Higher Education Planning, Supervision, Accreditation and Coordination Board, Cyprus.

Abstract

Screen cast as a viable digital tool to enhance vocabulary learning and retention is quite rare in many language contexts in Iran. It was stipulated that the application of different gloss types as a new pedagogical technique could be of value for this purpose. Therefore, the present study aimed at investigating the effect of different gloss types presented through screen cast on learning vocabulary and working memory (WM). For this purpose, 60 male Iranian EFL learners were assigned to three equal groups (i.e., two experimental and a control group). After pre-tests, the experimental groups were taught vocabulary through different gloss types (i.e., lexical and topic-level) by means of a screen cast presentation. The control group was instructed through traditional techniques. The analysis of the data in post-tests revealed that the experimental groups outperformed the control group. It is thus suggested that gloss types presented via screen cast can boost EFL learners' vocabulary knowledge and WM. This result can have pedagogical implications for EFL teachers and material developers.

Keywords: Gloss types, screen cast, vocabulary learning, working memory.

* ADDRESS FOR CORRESPONDENCE: **Bahram Mowlaie,** Department of Persian Literature and Foreign languages, Islamic Azad University, South Tehran Brach, Tehran, Iran. *E-mail address*: mowlaiebahram@gmail.com / Tel.: +98 09122723179

1. Introduction

Language learning, whether first or second, starts with learning words (Thornbury, 2002). Since the meaning of a sentence is basically derived from the meaning of the words contained in it, vocabulary knowledge is perceived to be fundamental for comprehension (Richards, 2002) and generally the building block of any language (Brown, 2001; Richards & Renandya, 2002). So, the more words learners know and the richer knowledge of vocabulary they have at their disposal, the greater ability they will have to express their thoughts in a comprehensive and clear manner (Nation & Chung, 2009).

Despite its undeniable significance, vocabulary learning has remained the biggest problem language learners face (Thornbury, 2002): a problem that can debilitate their communicative skill (Nation, 2004) and increase their anxiety level. However, it is hoped that due to the ever-increasing awareness on the part of teachers and learners alike, the role of vocabulary in second language teaching (L2) has changed over time (Zimmerman, 2012). In the past, vocabulary teaching and learning were often given little attention in language programmes, thus turning it into a Cinderella skill, but over the last decade there is a renewed surge of interest in the nature and the role that vocabulary plays in learning and teaching a language (Richards & Renandya, 2002). Given the above-mentioned importance, teaching and learning vocabulary have gained extraordinary attention in language teaching and learning where developing efficient techniques and strategies to facilitate these processes are deemed extremely crucial in the second language pedagogy (Nation & Chung, 2009). Therefore, it can be safely be postulated that any technique that can be conducive to vocabulary enhancement must be considered as a worthwhile cause to be taken into account.

In this line, different types of glosses can be considered among the viable techniques for vocabulary learning. Placed either in the side or at the bottom margins of the page, glosses can deal with unfamiliar words in the text by providing short definitions, explanations or translation of words or phrases which seem unfamiliar to the readers (Lomicka, 1998). Different types of glosses, or annotations, provide definitions of words or additional information about the topic through hyperlinks during web-based or electronic reading, which according to Nation (2001) can be advantageous for L2 learners in many ways such as accelerating immediate access to the meanings of unknown words and therefore fostering their interest, or improving learners' overall comprehension of the text. Besides the immediate help, a particular kind of glossing, i.e., topic-level glossing provides topic level information and provides beneficial explanation about unfamiliar concepts which might support the reading process (Varol & Ercetin, 2016) by providing learners with the necessary background information.

It is generally accepted that one way to enhance learners' incidental vocabulary knowledge is by using marginal glosses (Hulstijn, Hollander & Greidanus, 1996), which has proved quite effective in printed materials. Several empirical studies have revealed that incidental vocabulary learning can be improved through marginal glosses. At the same time, marginal glosses and still images as multimodal annotations seem to be even more effective for incidental learning (Dabaghi Varnosfadrani & Rafiee, 2012). Such results advocate the positive use of multimodal strategies, such as multiple types of glosses and even video captioning in CALL settings for incidental vocabulary learning (Makoto, 2006). Roy (1999) has taxonomy of glosses based on six features: (1) gloss authorship that is divided into glosses which are generated by learners or professionals. Professionals may be instructors or material developers;(2)gloss presentation involves priming glosses or prompting glosses;(3) gloss functions include procedural function (metacognitive, highlighting and clarifying) and declarative function (encyclopaedic and linguistic). The linguistic subset of declarative functions is divided into lexical function (signification and value) and syntactical function; (4) gloss focus which has to do with textual or extra textual materials;(5)gloss language includes L1, L2 and L3; and finally, (6). The gloss form involves verbal, visual (image, icon, video with or without sound) and audio forms.

Ko (2012) states that learners should notice a form in the input in order to process the input further and convert it into intake. He refers to glossing as an influential way to make words salient. This

assertion is in line with studies that confirm the positive role of glossing in vocabulary learning and reading comprehension (e.g., Farvardin & Biria, 2012; Makoto, 2006). According to Ko, glossing, as a type of input modification, facilitates vocabulary learning and reading comprehension. Glosses act as mediators between the text and the learner by providing additional information about difficult words and facilitate both reading comprehension and vocabulary learning (Ko, 2005). Nagata (1999) points out four advantages of glosses: (1) using glosses is easier than using dictionary, (2) they motivate learners to notice and attend to target words based on the notion of consciousness-raising and input enhancement, (3) they contribute to the meaning-form connection by connecting words to meanings, and finally (4) they trigger learners to do lexical processing by frequent referring to the target word and glosses, and this in turn helps the retention of words. One of the ways to present glosses can be screen casting. Coined by Udell (2005, p. 22), screen casting is a way to present 'digitally recorded playback of computer screen output which often contains audio narration' and visually demonstrates information to students. In a screen cast, the instructor can record all necessary information accompanied with audio visual material to create a multimedia presentation that clearly illustrates the action. Screen casts are an effective instructional format that can be used for tutorials, demonstrations, digital storytelling and narrated PowerPoint presentations (Peterson, 2007).

Related to learning in general and vocabulary learning in particular, working memory (WM) is the sine qua non and the primary threshold through which information is transmitted. According to Acheson and MacDonald (2009), WM is identified as a significant differentiating variable mostly associated with several issues regarding language acquisition, including self-monitoring, comprehension and production. Within cognitive psychology, the term has been adopted to 'cover the system or systems involved in the temporary maintenance and manipulation of information' (Baddeley, 2002, p. 85). It can be hypothesised that different types of glosses might influence learners' WM (Brown, 2001). This might be due to the reason that in glass screen casting information is processed in more than one way, in visual as well as auditory format, hence activating more than one module of the WM.

Another equally important issue is that although the significance of vocabulary knowledge is endorsed in overall communicative competence, it is still the victim of discrimination (Chao, Hu & Nation, 2000). Vocabulary is generally given scant attention in the university curriculum in Asian countries (Fan, 2003), including Iran. Generally, the emphasis on English teaching in universities in most Asian countries is on reading and grammar (Catalan, 2003). Vocabulary teaching in many classrooms is largely intentional (Catalan, 2003). This means that when a particular word or phrase appears to be difficult for the students, they are told the definitions. Occasionally, this may be supplemented with the collocations of the target words or information about how the words are used in a particular context. Therefore, inadequacy in lexical knowledge may hinder students' proficiency development and affect their performances in public exams. It is, therefore, extremely vital for language teachers to look into ways to enhance vocabulary knowledge of language learners, especially in vocabulary.

The previous studies (i.e., Chao et al., 2000; Nagy, Anderson & Herman, 1987) mostly explored the effect of general reading on learners' vocabulary learning. The present study, however, being on the line of the previous theories (Krashen, 2004), focuses on the effect of different types of glossing through screen cast on the learners' vocabulary learning. It is believed that through different types of glosses, vocabulary learning can be more meaningful and students can be the centre of learning, i.e., learning will be student-centred which is potentially motivating and engaging.

The significance of this study is threefold. First, the importance of vocabulary development as one of the most vital skills language learners need to master makes this study significant. On the other hand, it is the importance of new pedagogical tools like screen cast that adds to the significance of this study. Finally, with regard to WM as a significant factor in language achievement, the effect of multimedia glosses on EFL learners' WM might add a unique dimension to the importance of this study.

Besides what is mentioned, a point must be mentioned on the contextual relevance of the present study. Despite the usefulness and applicability of glossing via screen casting, and in sharp contrast to what goes on in many language learning centres around the world, the majority of educational institutes as well as universities and schools in Iran seem to have turned a blind eye on learning opportunities provided by the recent advancements in computer technology. Therefore, to the best of researchers' knowledge, it is not surprising to note that the application of multimedia glosses, as a digital tool, is quite rare in many contexts in Iran. Moreover, despite the fact that the role of glosses has been examined in previous studies (e.g., Zarei & Mahmoodzadeh, 2014), the findings of these studies are deemed inconclusive and the need to conduct further studies is felt.

The results of the current study might prove beneficial for EFL teachers in general and Iranian English teachers in particular, making them aware of alternative vocabulary teaching approach through different types of glossing which can consolidate efficient, long-term retention and production of lexical items. In today's society, due to advances in technology, there is a tendency to use computer-based programmes to learn a language. It is assumed that using computer-based multimedia learning tools which assimilate pictures and sounds would provide an enriched environment to improve EFL learners' comprehension and interest. Incorporating computer-based multimedia learning tools might influence EFL learners' motivation and is deemed as a unique pedagogical tool to boost the learners' vocabulary development. Furthermore, it is believed that using multimedia glosses may enhance the transmission of information and improve learners' concentration. Therefore, the present study might open a new perspective for teaching vocabulary through a totally new, engaging approach. Based on the aforementioned points, the present study will try to answer the following research questions:

- Do different types of glossing presented through the screen cast have any significant impact on intermediate EFL learners' vocabulary learning?
- Do different types of glossing presented through the screen cast have any significant impact on intermediate EFL learners' WM?

2. Methodology

2.1. Participants

In order to conduct this study, 60 male EFL learners within the age range of 14–25 years, studying at a language school in Tehran, Iran, were selected out of 88 participants via double sampling; first, they were selected conveniently and then they were homogenised based on their scores on a Nelson test. They were all from Tehran province and Persian was their native language. By using the demographic information provided by the institute, only those participants who had been studying English for at least 2years were selected. They were studying at the intermediate level at the institute, although their language proficiency level was also confirmed via the proficiency exam too. Furthermore, they had never lived in a foreign country and it could be postulated that they had fairly the same socio-economic status.

To ensure homogeneity, 60 participants from among the 88 test takers whose scores on the homogeneity test fell one standard deviation above (i.e., SD = 8.834) and one standard deviation below the mean (i.e., mean = 31.62) were selected as the participants of the study. Accordingly, 28 test takers who had extremely high or extremely low scores on the test were considered as the outliers and were not included in the present study. Next, the selected participants were randomly assigned to two experimental groups (i.e., lexical *vs*. topic-level glosses) and a control group.

2.2. Materials

In order to conduct the present study, the researchers used *New Headway* (Fourth Edition, intermediate) by Soars and Soars (2013) published by Oxford University Press. *New Headway* series are argued to be an English course specifically designed to boost language learners' communicative skills. Each course book contains a variety of interactive, rich reading passages, specifically developed for the targeted proficiency level to enhance learners' reading comprehension and vocabulary skills.

2.3. Instruments

In order to test the effectiveness of different types of glosses on the vocabulary development and WM of Iranian EFL learners, the following instruments were utilised in this study: Nelson test, WM test and a vocabulary comprehension pre-test/post-test.

2.3.1. Nelson test (Series 205B) as proficiency test

The Nelson English language proficiency test (Fowler & Norman Coe, 1976) consisted of 50 multiple-choice items organised in four parts: grammar (two sections), vocabulary, reading and comprehension. The time allotted was 40 minutes. The reliability of the Nelson proficiency test was estimated and was found to be 0.90 using Cronbach's alpha. In fact, a pilot study was carried out with 30 EFL intermediate learners who had similar characteristics with the main sample of this study.

2.3.2. Vocabulary pre-test

Before the treatment, a researcher-made vocabulary pre-test was administered to the participants to elicit the probable initial differences among the learners. The pre-test consisted of 30 multiple-choice vocabulary items selected from *Active Skills for Reading 2* (Anderson, 2008) and *New Headway* (intermediate; Soars & Soars, 2013) and met the unfamiliarity criterion to avoid pollution effect. It is worth mentioning that the selected materials, as Soars and Soars indicated, were perfectly balanced with extensive resource specifically designed for intermediate students.

The reliability of the pre-test was ascertained through piloting prior to the main administration. In doing so, 10 EFL learners who were different from the main sample learners, but whose proficiency level was the same as the main sample (through evaluations made by institute at the end of the term), were asked to take the test. The internal reliability through Cronbach's alpha of this test turned out to be 0.752.

2.3.3. Vocabulary post-test

After the treatment, a researcher-made post-test, piloted in advance on 10 EFL intermediate students ($\alpha = 0.752$), was given to all participants. To develop the post-test, the items were selected from the materials or content (i.e., passages and their follow-up questions) covered during the instructional programme. The post-test consisted of 30 multiple-choice vocabulary items. To develop the post-test, an attempt was made to include essential words and materials covered in the course which met the candidate's unfamiliarity criterion, i.e., as Farhadi, Jafarpour and Birjandi (1994) propose, words that are essential in speaking and oral communication were included. Furthermore, as Thornbury (2002) recommends, the criteria of frequency of use, scope and usability were taken into account. Finally, to prepare the test, a table of specifications was constructed. It helped to identify what is to be tested and the number of items necessary to be tested. Finally, the items were reviewed by two experienced language raters who checked the appropriateness of the items.

2.3.4. Digits Backward WM capacity test

Digits Backward measure (Appendix A) was used to determine the participants' WM capacity, i.e., it measures verbal short-term memory, defined as a system that allows for temporary storage of information and is crucial in everyday task such as remembering a telephone number or

understanding long sentences (Steinberg & Sciarini, 2013). According to Southwick et al. (2011), Digits Backward is among the most commonly used scales to measure general intellectual ability in adults.

2.3.5. Screen cast application

The last instrument used in the present study was the screen cast application downloaded from the Internet and used for the presentation of the reading passages.

2.4. Procedures

At the beginning and before the instruction began, 88 eligible male EFL students were selected. Next, the Nelson test was given to them in order to make sure that there was no significant difference in language proficiency among the participants. Based on the result of the homogeneity test, 60 learners whose scores fell one standard deviation above and one standard deviation below the mean score were selected as the participants of the study. Next, the participants were randomly assigned to two experimental and one control groups: the two experimental groups focused on two different types of glosses of interest (i.e., lexical *vs*. topic-level glosses), whereas the third group served as the control group who received the placebo treatment which was the mainstream treatment of the institute where the study was conducted. The participants were assured that their forthright answers were necessary and the results of their performance on the tests would be kept confidential.

Next, the vocabulary pre-test was administered to measure the vocabulary knowledge of the participants before receiving the instruction. Having administered the vocabulary pre-test, the WM capacity test (i.e., Digits Backward) was given to the participants to measure their WM capacity.

Following the pre-test, the participants in both experimental groups received the intended instructional material. They were given an identical passage every session which were glossed differently, i.e., the participants in the lexical group were given a passage which provided them with lexical glosses (i.e., lexical information such as synonyms, antonyms or the definitions for the unknown words), whereas the participants in the topic-level group were given a passage which included topic-level annotations (i.e., general information about unfamiliar themes and concepts). The passages were displayed by using the screen cast speculated to offer an engaging, multimedia learning environment. The experimental groups each received 10 consecutive sessions of instruction. Each session lasted for 90 minutes and took place during the regular class periods based on the institute's curriculum. To ensure the usefulness of the gloss type, the procedure was illustrated by the teacher, followed by the participants doing it and asking any ambiguous points prior to the main parts.

The participants in the control group were also exposed to 10 one-and-a-half-hour consecutive sessions of practice with traditional mainstream reading activities. The texts for experimental and the control group were the same to nullify the potential effect due to text type. All three groups were instructed by the same teacher. In order to avoid any history effect, the researchers also made sure (within the possibility and practicality) that the participants did not take part in other general language proficiency instructional programmes, a point which could not be ascertained completely. To avoid any practice effect, a 2-week interval was planned to intervene between the different stages of the study.

3. Results and discussion

The purpose of this study was to investigate the effect of different gloss types presented through screen cast on vocabulary learning and WM of Iranian EFL learners. For this purpose, the ANCOVA statistical procedure was used, but using ANCOVA requires checking the normality assumptions which are explained in the following sections.

3.1. Homogeneity results through the Nelson proficiency test

The results of the homogeneity test gained through the Nelson test are presented in Table 1. As shown, the mean, median and mode of the Nelson test scores before homogenising were 29.58, 29.50 and 27, respectively. These central parameters are close to one another, denoting that the Nelson test scores are normally distributed around the mean. Moreover, the ratios of skewness and kurtosis over their respective standard errors are not beyond the range of ±1.96, which shows that the Nelson test scores are normally distributed.

Table 1. Descriptive Statistics for the Nelson Test Homogenisation

n	Mean	Median	Mode	*SD*	Skewness Ratio	Kurtosis Ratio
88	29.58	29.50	27	7.42	0.393	−1.391

3.2. Descriptive statistics

Descriptive statistics of the participants' pre-test and post-test scores in the experimental (topic level vs. lexical gloss) and the control groups are presented in Table 2.

Table 2. Descriptive statistics for pre-tests and post-tests of the experimental and the control groups

		n	Minimum	Maximum	Mean	Std. Deviation	Skewedness	Kurtosis
Topic gloss	Vocabulary pre-test	20	13	17	14.65	1.18	0.557	−0.165
	Vocabulary post-test	20	15	20	17.20	1.32	0.201	−0.235
Lexical gloss	Vocabulary pre-test	20	13	15	13.90	0.781	0.152	−0.880
	Vocabulary post-test	20	15	19	17	1.12	−0.247	−0.823
Control group	Vocabulary pre-test	20	12	15	13.75	0.966	−0.219	−0.817
	Vocabulary post-test	20	13	16	13.95	0.887	0.607	−0.246

Descriptive statistics of the participants' WM pre-test and post-test scores in the experimental (topic gloss and lexical gloss) and the control groups are presented in Table 3.

Table 3. Descriptive statistics for the pre-test and post-test WM of the experimental and the control groups

		n	Minimum	Maximum	Mean	Std. Deviation	Skewedness	Kurtosis
Topic gloss	WM pre-test	20	11	17	14.40	1.90	−0.389	−0.791
	WM post-test	20	13	18	16.05	1.57	−0.723	−0.464
Lexical gloss	WM pre-test	20	12	18	14.90	1.77	0.041	−1.01
	WM post-test	20	12	19	16.75	1.48	−0.061	−0.848
Control group	WM pre-test	20	11	18	14.45	1.87	−0.046	0.011
	WM post-test	20	11	18	14.90	1.94	−0.179	−0.389

3.3. Normality of distribution of test scores

The distribution of scores for dependent variables should be normal for each value of the independent variable. To check this assumption, the Kolmogorov–Smirnov and Shapiro–Wilk tests were run. Table 4 shows the results of the Kolmogorov–Smirnov and Shapiro–Wilk tests.

Table 4. The Kolmogorov–Smirnov and Shapiro–Wilk tests for normality of the distribution of the data.

	Kolmogorov–Smirnov[a]			Shapiro–Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Vocabulary pre-test	0.213	60	0.088	0.815	60	0.099
Vocabulary post-test	0.134	60	0.079	0.918	60	0.081
WM pre-test	0.119	60	0.085	0.950	60	0.066
WM post-test	0.143	60	0.074	0.938	60	0.054

Given that the statistics of the Kolmogorov–Smirnov and Shapiro–Wilk tests are not meaningful, the results presented in Table 4 indicate that the assumption of normality of the test scores has been observed ($p > 0.05$).

3.4. Homogeneity of error variances

To check the homogeneity of variances, Levene's statistic was used. Levene's statistic tests the assumption that the error variance of the dependent variable is equal across groups.

Table 5. Levene's test of equality of error variances

Test	*f*	df 1	df 2	Sig.
Vocabulary pre-test	2.817	2	57	0.068
Vocabulary post-test	1.607	2	57	0.209
WMpre-test	0.126	2	57	0.882
WM post-test	0.389	2	57	0.680

As displayed in Table 5, the results of Levene's test were not significant for the vocabulary pre-test ($f = 2.817$, Sig = 0.068, $p > 0.05$), the vocabulary post-test ($f = 1.607$, Sig = 0.209, $p > 0.05$), the WM pre-test ($f = 0.126$, Sig = 0.882, $p > 0.05$) and the WM post-test ($f = 0.389$, Sig = 0.680, $p > 0.05$). Based on these results, it can be concluded that there were no significant differences between the variances of the groups. The main result of the ANOVA of the pre-test of the between groups is presented in Table 6:

Table 6. Tests of between-subjects effects

Source	Dependent variable	Type III sum of squares	df	Mean square	*F*	Sig.
Corrected model	Post-vocabulary	137.081[a]	5	27.416	21.846	0.000
	Post-WM	143.746[b]	5	28.749	30.329	0.000
Intercept	Post-vocabulary	222.760	1	222.760	177.501	0.000
	Post-WM	22.523	1	22.523	23.761	0.000
Group	Past-vocabulary	5.900	2	2.950	2.351	0.035
	Post-WM	0.013	2	0.006	.007	0.043
Group * pre-vocabulary *	Post-vocabulary	4.381	3	1.460	1.164	0.332
pre-WM	Post-WM	130.113	3	43.371	45.754	0.993
Error	Post-vocabulary	67.769	54	1.255		
	Post-WM	51.187	54	0.948		
Total	Post-vocabulary	15,661.000	60			
	Post-WM	14,672.000	60			
Corrected total	Post-vocabulary	204.850	59			
	Post-WM	194.933	59			

As the data in Table 6 show, the values were not found to be significant (Sig = 0.332, $p > 0.05$, and Sig = 0.993, $p > 0.05$). This means that there was no significant difference in the mean scores among the three groups of interest, indicating that any statistically meaningful difference in the post-test can be attributed to the effect of the treatment, exposure to the independent variable (providing gloss with two levels: word meaning *vs*. topic meaning) a linear relationship between the pre-test and the post-test scores.

3.5. Linearity of slope of regression lines

This assumption is checked by drawing a scatter plots. As Figure 1 shows, there was a linear relationship between the pre-test and the post-test scores which is an indication of the fact that the assumption of linearity of regression lines was also held.

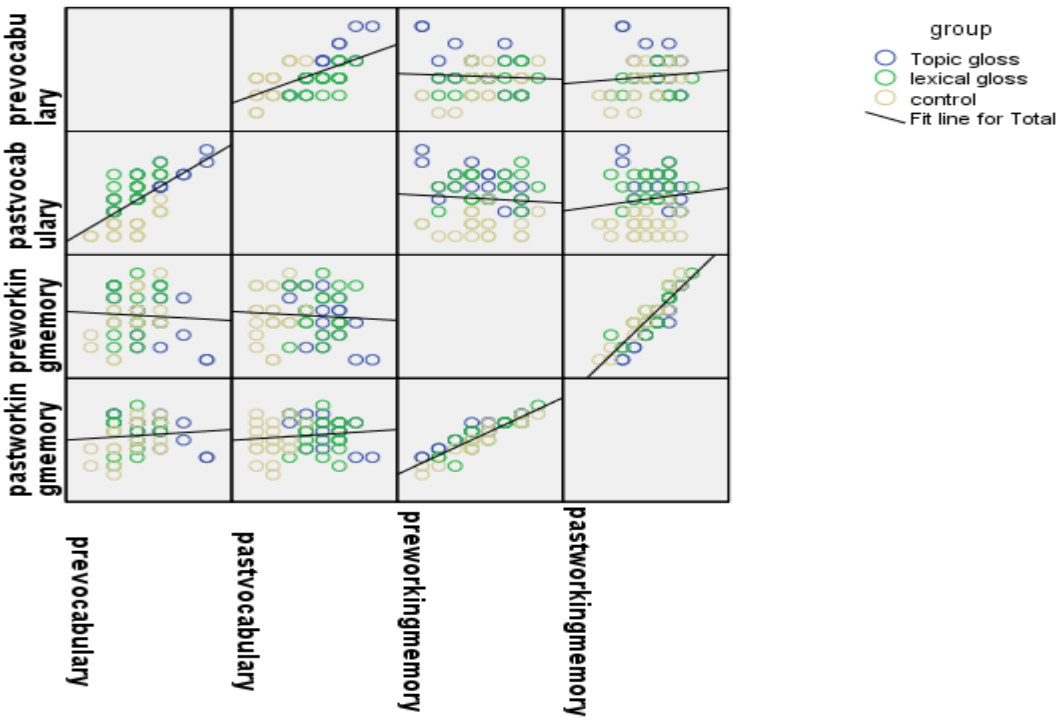


Figure 1. Linear relationship among regression lines

3.6. Testing the first research hypothesis

With regard to the first research hypothesis (i.e., different types of glosses do not have any significant impact on Iranian intermediate EFL learners' vocabulary learning), the descriptive statistics showed that there was a difference between the control group, topic gloss and lexical gloss with regard to vocabulary learning. In order to assess whether this difference was meaningful or not, the ANCOVA analysis was utilised. The results of this analysis are presented in Table 7.

Table 7. Tests of between-subjects effects

Source	Type III sum of squares	df	Mean square	*f*	Sig.
Corrected model	172.068[a]	3	57.356	97.980	0.000
Intercept	4.382	1	4.382	7.486	0.008
Group	95.442	2	47.721	81.520	0.000
Pre-vocabulary	39.368	1	39.368	17.252	0.081
Error	32.782	56	0.585		
Total	15,661.000	60			
Corrected total	204.850	59			

On the basis of observed results, it can be concluded that there was a meaningful difference between the three groups (f = 81.520, p < 0.05). In other words, it can be stated that the treatment had a significant impact on the experimental groups. The value power of the test (1-β = 0.99) showed

that the ANCOVA was able to reject the null hypothesis. To locate the place where the treatment was more effective, *post-hoc* Bonferroni was run, the results of which are shown in Table 8:

Table 8. Pair wise comparisons (Bonferroni) for the groups' performance in vocabulary learning

(I) group	(J) group	Mean difference (I-J)	Std. error	Sig.[a]	95% confidence interval for difference[a]	
					Lower bound	Upper bound
Topic gloss	Lexical gloss	−0.440	0.254	0.267	−1.067	0.188
	Control	2.482*	0.259	0.000	1.842	3.123
Lexical gloss	Topic gloss	0.440	0.254	0.267	−0.188	1.067
	Control	2.922*	0.242	0.000	2.324	3.520
Control	Topic gloss	−2.482*	0.259	0.000	−3.123	−1.842
	Lexical gloss	−2.922*	0.242	0.000	−3.520	−2.324

With reference to Table 8, it can be observed that there was a meaningful difference between the control and the topic gloss group ($p < 0.05$). Moreover, there was a meaningful difference between the control and the lexical gloss groups ($p < 0.05$). However, there was no meaningful difference between the topic gloss and the lexical gloss group ($p > 0.05$). Nevertheless, the topic gloss technique was found to be slightly more effective than the lexical gloss group.

3.7. Testing the second research hypothesis

With regard to the second research hypothesis (i.e., different types of glosses do not have any significant impact on Iranian intermediate EFL learners' WM), the descriptive statistics showed that there was a difference between the control, topic gloss and lexical gloss groups with regard to WM. In order to assess whether this difference was meaningful or not, the ANCOVA was utilised. The results of this analysis are presented in Table 9.

Table 9. Tests of between-subjects effects

Source	Type III sum of squares	df	Mean square	*f*	Sig.
Corrected model	171.678[a]	3	57.226	137.803	0.000
Intercept	5.316	1	5.316	12.802	0.001
Group	158.102	2	79.051	87.183	0.000
Pre-WM	18.045	1	18.045	8.580	0.062
Error	23.255	56	0.415		
Total	14,672.000	60			
Corrected total	194.933	59			

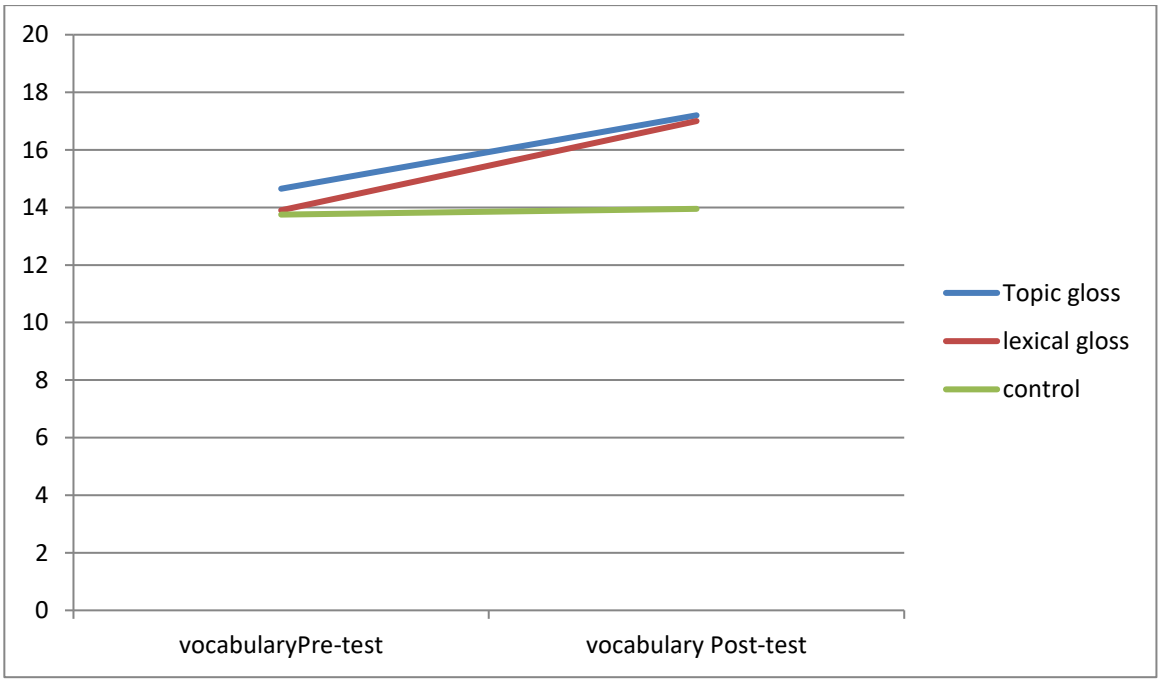
On the basis of observed results, it can be concluded that there was a meaningful difference between the three groups ($f = 87.183$, $p < 0.05$). In other words, it can be stated that the treatment had a significant impact on the experimental groups. The value power of the test ($1\text{-}\beta = 0.99$) showed that the ANCOVA was able to reject the second null hypothesis. To locate the place where the treatment was more effective, *post-hoc* Bonferroni was run, the results of which are shown in Table 10:

Table 10. Pairwise comparisons (Bonferroni) for the groups' performance in WM

(I) group	(J) group	Mean difference (I-J)	Std. Error	Sig.[a]	95% confidence interval for difference[a]	
					Lower bound	Upper bound
Topic gloss	Lexical gloss	−0.278	0.196	0.485	−0.762	0.206
	Control	1.192*	0.195	0.000	0.711	1.673

Lexical gloss	Topic gloss	0.278	0.196	0.485	−0.206	0.762
	Control	1.470*	0.196	0.000	0.987	1.954
Control	Topic gloss	−1.192*	0.195	0.000	−1.673	−0.711
	Lexical gloss	−1.470*	0.196	0.000	−1.954	−0.987

With reference to Table 10, it can be observed that there was a meaningful difference between the control and the topic gloss groups ($p < 0.05$). Moreover, there was a meaningful difference between the control and the lexical gloss groups ($p < 0.05$). There was no meaningful difference between the topic gloss and the lexical gloss groups ($p > 0.05$). However, the topic gloss technique was found to be slightly more effective than the lexical gloss strategy.



4. Discussion

Regarding the first research question, which explored whether implementation of gloss types through screen cast affect Iranian EFL learners' vocabulary learning, the findings of this study revealed that topic and lexical glosses had a significant impact on Iranian EFL vocabulary instruction. The results of the ANCOVA revealed that the experimental groups' score on the vocabulary post-test was higher than that of the control group, i.e., the experimental groups which were provided with different gloss types through screen cast performed better on vocabulary post-test in comparison to the control group. Therefore, the null hypothesis of the present study was rejected.

This finding is in line with what other scholars observed (e.g., Fathi & Sarkhosh, 2019; Prince, 1996; Schuten van Parreren, 1989). This can be explained in light of the fact that the application of different gloss types might assist learners to deal with the complex cognitive task of reading. Part of the reason for this might be explained by considering Schmidt's (2010) noticing hypothesis on the grounds that glossing through screen casting might increase readers' noting by providing them with the needed information they lack to decipher the text successfully.

Another plausible answer might be the fact that the learning vocabulary items through different gloss types enabled participants to develop either semantic networks by means of word-related

glosses or the required schemata or background information in subject-related glosses (Yazdanpanah, 2007).

The finding of this study, however, runs on the contrary to what Nation (2002, cited in Richards & Renandya, 2002) observed. Nation believes that vocabulary learning through meaning-focused activity is fragile and it depends heavily on the quantity of learners' control of reading skill. This might mean that intensive reading, as Nation (2009) posits, cannot be enough and the skill must be solidified through extensive reading as well; a point that seems reasonable not only for reading skill but also for any other skill.

The findings on the efficiency of screen cast of gloss can be considered from another perspective. According to Nation (2008), one of the reasons why exposure to reading does not lead to improving vocabulary is that certain input is not rich and clear enough, and at the same time Koren (1999) states that glossary provision can be one of the easiest ways of learning the meaning of the word by enriching the context, a condition that can be hypothesised to have been met in the current study. Therefore, it can be posited that screen casting of glosses might obviate some of the inherent problems faced by many learners to be able to cause statistically meaningful difference. This is supported by Mayer (1997) stating that multimedia learning occurs and optimises learning by utilising information in more than one mode, such as pictures and words. This might justify the prevalence of such programmes and software which is becoming the norm in reading activities.

A practical reason for the efficiency of screen casting of glosses is that multimedia glosses can be integrated into the process of learning a new language. Najjar (1996) enumerates the following advantages of learning by computer-based multimedia instruction: Computer-based multimedia instruction is more interactive in comparison with traditional classroom lectures. The control of learning pace is another advantage of this kind of instruction because the learner can move to new material whenever he is ready. In addition, information provided by multimedia instruction is more novel than information provided by traditional classroom lecture. Hong and Keiko (2010) points out to other advantages of multimedia learning. Firstly, using computer promotes learners' interest and they are motivated to read more in an enjoyable and comfortable situation and secondly, multimedia encourage learners to become more autonomous. Shahrokni (2009) also states that using multimedia gloss is a learner-oriented technique that helps learners and facilitates reading comprehension. In addition, it is useful for learners without dictionary and library search skill. Furthermore, in this environment, information is conveyed quickly and effectively to all students and as the result learners' concentration (or noting) and interest is boosted. Finally, the effectiveness of screen casting gains support from Al-Seghayer (2001, p. 207), who notes that computerised gloss is attractive and does not interrupt the reading process because the glossed item is hidden until the reader clicks on the target word. He states that the effect of computerised glosses is because of 'the availability of different types of information, the absence of interruptions during reading, the generation of casual-inferences, and the construction of a situation model'.

With regard to the second research question which explored whether implementation of gloss types through screen cast affect Iranian EFL learners' WM, the findings of this study revealed that topic and lexical gloss had a significant impact on Iranian EFL WM. The results of the ANCOVA revealed that the experimental groups' score on the WM post-test was higher than that of the control group. Therefore, the second research hypothesis was also rejected. This can be explained by the fact that gloss types through screen cast might have helped language learners to cognitively engage with the presented material more due to its novelty effect, hence improving their WM, a point which might be explained by Schmidt's (2010) noticing hypothesis or Krashen's I+ one hypothesis on that ground that screen casting of glosses might reduce the gap between learners' proficiency level or schemata and the readability of the text by providing them either semantic clues or topic clues, hence leading to improvement in their WM as the threshold to long or permanent memory.

The improved WM due to multimedia can also be explained by the cognitive theory, specifically dual coding theory and generative theory. Dual coding theory (Clark & Paivio, 1991) states that cognition involves two subsystems: a verbal system and a nonverbal system. The verbal system deals directly with language and nonverbal system deal with non-linguistic events. In this theory, cognitive processing takes place within two verbal and visual systems, i.e., learners have a better process of learning when they use both verbal and visual systems simultaneously than when the words are coded in a single manner. Therefore, it can be inferred that students will make better referential connections when both verbal and visual materials are presented continually than when they are presented separately, a condition that is meet in screen casting of glosses in reading activities.

References

Anderson, A. (2008). *Active skills for reading* (vol. 1–4). Oakhurst, CA: Thompson.

Acheson, D. J. & MacDonald, M. C. (2009). Verbal working memory and language production: common approaches to the serial ordering of verbal information. *Psychology Bulletin, 135*(1), 50–68. doi: 10.1037/a0014411.

Al-Seghayer, K. (2001). The effect of multimedia annotation modes on L2 vocabulary acquisition: a comparative study. *Language Learning and Technology, 5*(1), 202–232.

Baddeley, A. D. (2002). Is working memory still working? *European Psychologist, 7*(2), 85–97. https://doi.org/10.1027//1016-9040.7.2.85

Brown, D. (2001). *Teaching by principles: an interactive approach to language pedagogy.* London, UK: Longman Pearson Education Company.

Catalan, R. (2003). Sex differences in L2 vocabulary learning strategies. *International Journal of Applied Linguistics, 13*(1), 54–77.

Chao, H., Hu, M. & Nation, P. (2000). Unknown vocabulary density and reading comprehension. *Reading in a Foreign Language, 13*(1), 403–30.

Clark, J. M. & Paivio, A. (1991). Dual coding theory and education. *Educational Psychology Review, 3*, 149–210.

Dabaghi Varnosfadrani, A. & Rafiee, M. (2012). Incidental vocabulary learning and the development of receptive and productive vocabulary: how gloss types work. *Suvremena Lingvistika, 38*(74), 175–187.

Fan, Y. M. (2003). Frequency of use, perceived usefulness, and actual usefulness of second language vocabulary strategies: a study of Hong Kong learners. *The Modern Language Journal, 87*(2), 222–241.

Farvardin, M. T. & Biria, B. (2012). The impact of gloss types on Iranian students' reading comprehension and lexical retention. *International Journal of Instruction, 5*(1).

Farhadi, H., Jafarpour, A. & Birjandi, P. (1994). *Testing language skills*. Tehran, Iran: SAMT Publication.

Fathi Fathi, M. & Sarkhosh, M. (2019). A study of the impact of input modification by using glosses on vocabulary acquisition and retention. *Int J Engl Lang Transl Stud, 7*(1), 55–67.

Fowler, W. S. & Norman Coe, N. (1976). *Nelson English language tests*. Walton-on-Thames, UK: Surrey.

Hong, K. H. & Keiko, K. S. (2010). The influence of L2 teachers' use of CALL modes on language learners' reactions to blended learning. *CALICO Journal, 27*(2), 328–348.

Hulstijn, J., 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. *Modern Language Journal, 80*, 327–339.

Kordjazi, Z. (2014). The effect of visual mnemonic support practice on the reading comprehension of psychology texts. *European Online Journal of Natural and Social Science, 3*(4), 840–848.

Ko, M. (2005). Glosses, comprehension, and strategy use. *Reading in a Foreign Language, 17*(2), 125–143.

Ko, M. H. (2012). Glossing and second language vocabulary learning. *TESOL Quarterly, 46*(1), 56–79.

Koren, S. (1999). Vocabulary instruction through hypertext: are there advantages over conventional methods of teaching? *TESL-EJ,* 4(1), 1–18.

Krashen, S. D. (2014). The power of reading: *insights from the research* (2nded.).Westport, CT: Libraries Unlimited.

Lomicka, L. L. (1998). To gloss or not to gloss: an investigation of reading comprehension online. *Language Learning and Technology, 1*(2), 41–50.

Makoto, Y. (2006). L1 and L2 glosses: their effects on incidental vocabulary learning. *Language, Learning and Technology, 10*(3).

Mayer, R. E. (1997). Multimedia learning: are we asking the right questions? *Educational Psychologist, 32*(1), 1–19.https://doi.org/10.1207/s15326985ep3201_1

Nagata, N. (1999). The effectiveness of computer-assisted interactive glosses. *Foreign Language Annals, 32*(4), 469–479.

Nagy, W. E., Anderson, R. C. & Herman, P. A. (1987). Learning word meanings from context during normal reading. *Am Educ ResJ, 24*(2), 237–270.

Najjar, L. J. (1996). Multimedia Information and Learning. *J Educ Multimed Hypermedia, 5*(2), 129–150.

Nation, I. S. P. (2004). A study of the most frequent word families in the British National Corpus. In P. Bogaards & B. Laufer (Eds.), *Vocabulary in a Second Language: Selection*, Acquisition, and Testing (pp. 3-13). Amsterdam: John Benjamins

Nation, I. S. P. (2001). *Teaching vocabulary.* Boston, MA: Heinle.

Nation, I. S. P. (2008).*Teaching vocabulary: Strategies and techniques*. Boston, MA: Heinle.

Nation, I. S. P. (2009). *Teaching ESL/EFL reading and writing*. Abingdon, UK: Routledge.

Nation, I. S. P. & Chung, T. (2009). Teaching and learning vocabulary. In M. H. Long & Doughty C. J. (Ed.), *The handbook of language teaching.* (2nd Eds London, UK: Wiley-Blackwell.

Peterson, E. (2007). Incorporating screencasts in online teaching. *Int Rev Res Open Distance Learn,* 8(3). Retrieved from http://www.irrodl.org/index.php/irrodl/article/viewArticle/495/935.

Prince, P. (1996). Second language vocabulary learning: the role of context versus translations as a function of proficiency. *Modern Language Journal, 80*, 478–493.

Richards, J. C. (2002). 30 Years of TEFL/TESL: a personal reflection. *RELC Journal, 33*(2), 1–36*.*

Richards, J. C. & Renandya, W. A. (2002). *Methodology in language teaching*. Cambridge, UK: Cambridge University Press.

Roy, W. (1999). What's in a gloss? *Language Learning and Technology, 2*(2), 94–101.

Soars, J. & Soars, D. (2013). *New headway*. Oxford, UK: Oxford University Press.

Southwick, J. S., Bigler, E. D., Froehlich, A., DuBray, M. B., Alexander, A. L., Lange, N. & Lainhart, J. E. (2011). Memory functioning in children and adolescents with autism. *Neuropsychology*, *25*(6), 702–710. https://doi.org/10.1037/a0024935

Schuten van Parreren, C. (1989). Reading foreign languages in the first phase of secondary education. Why, what and how? *European Journal of Teacher Education, 12*(2), 131–140.

Shahrokni, S. A. (2009). Second language incidental vocabulary learning: the effect of online textual, pictorial, and textual pictorial glosses. *The Electronic Journal for English as a Second Language, 13*(3), 1–17.

Steinberg. D. D. & Sciarini, N. (2013). *An introduction to psycholinguistics* (2nd ed.). Abingdon, UK: Routledge.

Thornbury, S. (2002). *How to teach vocabulary*. Harlow, UK: Longman.

Udell, J. (2005). *What is screencasting*. Retrieved from http://www.oreilly.com/pub/au/32

Varol, B. & Ercetin, G. (2016). Effects of working memory and gloss type on L2 text comprehension and incidental vocabulary learning in computer-based reading. *Elsevier. Procedia - Social and Behavioral Sciences,* 232, 759–768.

Yazdanpanah, K. (2007). The effect of background knowledge and rading comprehension test items on male and female performance. *Reading Matrix, 7*(2), 64–80.

Zarei, A. A. & Mahmoodzadeh, P. (2014). The effect of multimedia glosses on L2 reading comprehension and vocabulary production. *Journal of English Language and Literature, 1*(1), 1–7, 1, 1.

Zimmerman, C. B. (2012). Do reading and interactive vocabulary instruction make a difference? An empirical study. *TESOL Quarterly, 31*(1), 121–140.

Appendix A

Digit Backward Working Memory Test

Recall and recite a string of digits presented by the examiner:

2, 3, 9, 1

4, 10, 17, 5, 7

5, 16, 8, 11

21, 44, 13, 2, 26

Recall and recite a string of digits backwards:

24, 3, 7, 12

21, 15, 2, 13

7, 11, 17, 23

Listen to and remember a series of numbers and letters and recall first the numbers in numerical order and second the letters in alphabetical order:

A-7-X-2-M-4

C-6-D-22-K-3

E-17-J-1).”