

THE IMPACT OF COMPUTER ASSISTED LANGUAGE LEARNING (CALL) ON IMPROVING INTERMEDIATE EFL LEARNERS' VOCABULARY LEARNING

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Abstract

Regarding the large amount of vocabulary that learners should learn and the limited amount of time available in the EFL classes, Computer Assisted Language Learning (CALL) is considered as an attractive option for learning. One specific benefit of using CALL vocabulary instruction is to provide systematic repetition of words, ensuring that learned words are not forgotten. The objective of current investigation is to examine the effect of CALL on Iranian intermediate learners' vocabulary learning. The researchers used Tell Me More (TEM) software for this objective. This investigation used Preliminary English Test (PET) as a standardized measurement to seek the level of the subjects in terms of language proficiency. Then, the researchers assigned the participants into two groups: experimental group and control group. Experimental group included 31 EFL students and control group involved 30 EFL students. 80 items were administered as pre-test to evaluate the participants' previous knowledge of English in respect to the vocabularies. The researchers taught the students of both groups for 12 sessions. The TEM software was used as treatment in experimental group and the control group received no treatment. The taught words were the same in both groups. After 12 sessions, the 65 items were administered as post-test in order to compare the results of the scores of two groups and decide about the effectiveness of the treatment. The data were analyzed through running the Independent sample t-test. The results of post-test showed that the participants of experimental group outperformed the control group and had positive attitudes towards CALL. The results of this study may be useful for EFL teachers, EFL learners, and syllabus designers.

Keywords: CALL, TEM, EFL learners, Vocabulary Learning

INTRODUCTION

The first step in the process of learning a foreign language is to learn its vocabulary. Vocabulary refers to the words of one language that can be in the form of single item or phrase that convey a particular meaning. We cannot ignore the power of vocabulary in English as a foreign language (EFL) learners' communication because without sufficient vocabulary, students cannot understand others or express their own ideas. Without words, a speaker cannot express intended meanings (Kitajima, 2001). Limited word knowledge can limit learners' understanding and

communication. Inappropriate lexical use can have important consequences for communication since a lexical item carries a speaker's or writer's intended message (Ko & Goranson, 2014; Thornbury, 2002).

There are many constraints or challenges faced by teachers and learners in using vocabulary (Nation, 2008; Thornbury, 2002). Many problematic constraints are pertinent to the lack of time and opportunity to both teach and learn vocabulary. EFL teachers do not have sufficient time to teach all the vocabulary that learners need, given the amount of class time devoted to English instruction. Learning

vocabulary is one of the most tedious learning tasks confronting the language learners. Vocabulary is difficult because of two important reasons: one reason is that there are a large number of words to be mastered, and the other is that little attention has been given to the problems of students in this regard (Ko & Goranson, 2014).

A conventional teaching vocabulary method which is still applied at schools and universities of Iran is having the students memorize the word lists or explicitly providing them with paired translation equivalents of the words. The problem is that not only does this traditional method lack theoretical support since vocabulary learning is more than sheer memorization of the target language word lists, but the whole learning experience could also leave a sour taste in language learners' mouth since learners would view vocabulary learning as a tedious experience of memorizing endless lists of words (Krashen, 1982). Therefore, the sheer memorization of the paired translation of the target words, which is widely applied at schools and universities of Iran, is not considered an effective method (Tabatabaei, 2012). These ineffective methods led to frozen vocabulary learning courses which are remembered with distaste by Iranian school and university students. Many studies have been done in this area, but yet there are a few studies about the effective techniques for promoting EFL vocabulary learning.

Learners sometimes forget the meaning of the words owing to the fact that they have not used an effective technique to learn them, or they were not effectively taught by instructors. Traditional chalk and board method is no longer considered as the sole means of teaching; and it is no longer welcomed by language learners as a productive method. In other words, dependence on a single vocabulary instruction method will not result in optimal learning (Nagy, 2005). Using an appropriate method for teaching and learning vocabulary is extremely crucial. Technology

application has recently encouraged some researchers to examine the influence of using computer technologies on EFL learners' vocabulary acquisition (Tabatabaei, 2012).

One way to overcome constraints in vocabulary learning is to use a technology-assisted vocabulary learning program (Kim & Kwon, 2012; Miles & Kwon, 2008). Technology-assisted language learning promotes individualized learning, as a single instrument is matched with a single user at one time. It provides a lot of opportunity for the learners to learn English vocabulary by various interactive exercises. This program can assist learners in learning both receptive and productive vocabulary knowledge (Miles & Kwon, 2008).

Mousavi and Nemati. (2017) believes that CALL provides a new outlook for language teaching and learning and vocabulary acquisition. CALL programs provide different activities for learners. Incorporating technology into the learning process accompanies learners on their ways of improving English. This study examines the impact of CALL on Iranian intermediate learners' vocabulary learning. Iranian EFL learners should be motivated to be independent learners outside their classes. Therefore, it is important to investigate whether CALL program is effective at the university level as well as whether learners perceive CALL to be useful for learning English vocabulary.

Regarding to the aims of this investigation, the following research questions are addressed:
Q1: Does teaching vocabulary through CALL have any significant effect on intermediate EFL learners' vocabulary learning?
Q2: Is there any significant difference between teaching vocabulary through CALL and conventional method on intermediate EFL learners' vocabulary learning?

The following null hypotheses are presented for the above research questions:

H0₁: Teaching vocabulary through CALL has no significant effect on intermediate EFL learners' vocabulary learning.

H0₂: There is no significant difference between teaching vocabulary through CALL and conventional method on intermediate EFL learners' vocabulary learning.

REVIEW OF THE LITERATURE

Background

Tell Me More (TMM), an asynchronous online learning system, is one of the advanced self-learning tools that has a comprehensive solution for language learning skills. It involves lessons that make second language learning skills possible. It consists of elements of different topics that enable learners to practice their listening, speaking, reading, and writing skills. It has five different levels of proficiency from beginner to advanced, which correspond to the levels A1 to C1. TMM seeks to tutor learners by exposing them to over 850 hours of learning content, 4,500 exercises and 37 types of activities in six categories: Lesson Workshop, Cultural Workshop, Vocabulary Workshop, Grammar Workshop, Oral Workshop, and Written Workshop. Learners select the level of their preference to define the learning skills they want to improve either linguistic and communication skills. TMM adopts the role of tutor or teacher and possesses the role of giving meaning, controlling the process of learning, giving feedback, and evaluating learning. The content of TMM has been structured around authentic events like at the airport, weather forecast, a linguistic function, and listening to a dialogue on scenarios of communication. This is followed by an activity of interaction and other pronunciation, standard activities of vocabulary and grammar (Gyamfi & Sukseemuang, 2017).

Previous Studies on Using Computer Assisted Language Learning (CALL)

The advent of digital age has changed the way people communicate in the last decades.

Technology has been integrated with communication to challenge the way individuals associate with one another (Scarborough, 2009). Web 2.0 applications have influenced our life in many ways. E-learning is a by-product of these technologies that had a great impact on education and consequently language learning. Using computer technologies in educational and instructional contexts can be considered as a powerful idea because students spend a lot of time on these online networking activities (Mazman, 2010). In recent years, many researchers have examined the effect of multimedia materials on second language learning. For instance, Getkham (2005) examined the vocabulary development of two groups of students; one using computer program and the other using traditional printed texts. The findings showed that both groups enhanced their vocabulary knowledge after applying vocabulary practices but the students in both groups forgot some words after one month. Nevertheless, the amount of forgetting of vocabulary in the group using printed texts was more than that of the group using multimedia.

Shahrokni (2009) investigated the effects of online textual, pictorial, and textual pictorial glosses on the incidental vocabulary learning of 90 Iranian EFL learners. They were randomly allocated to three groups of 30 and exposed to the treatment. During three sessions of treatment, five computerized reading passages involving 25 target words were studied. The learners read the passages for comprehension and checked the glosses attached to the target words. Then the participants were tested on their incidental vocabulary learning through two research instruments, word and picture recognition tests. The findings of a one-way ANOVA analysis indicated that a combination of passages and images resulted in significantly better vocabulary learning. Kilickaya and Krajka (2010) explored the possible

differences existing between online vocabulary teaching methods and conventional methods. The results revealed that the participants who experienced online vocabulary learning process showed a better performance compared to those who were taught the same lexical items through traditional classroom-based instructions.

The other study conducted by Yunus, Hasim, Embi, and Lubis (2010) about using Tell Me More software. 85 university learners and four lecturers in Malaysian University participated in this study. Learners found the software useful for learning English because it helped them improve their proficiency in English. Learners also valued the adequacy of the software to improve communication, grammatical, and lexical skills. The lecturers indicated that the software was a useful tool and their positive attitudes were affirmed through its suitability, ease of use, and usefulness. Nielson (2011) performed a study about using Rosetta Stone and Tell Me More to improve their proficiency in Spanish, Arabic, and Chinese languages. The results demonstrated that learners didn't like to use the resources owing to the technological problems and insufficient support for their autonomous learning. This led to the learners' gradual loss of interest in the mentioned systems.

In their study, Tamjid and Moghadam (2012) conducted an experimental study to investigate the effects of Narsis software on Iranian intermediate EFL learners' vocabulary acquisition. To this end, 46 homogeneous learners were invited to participate in this study. They were randomly assigned to experimental and control groups. The experimental group received the treatment by Narsis software which was based on "504 Absolutely Essential Words" book over a one-month period of time. The control group was taught the same vocabulary by traditional method. The results showed that the experimental group outperformed the other group and the participants in the experimental

group had positive attitudes towards Narsis software.

Bagheri, Roohani, and Nejad Ansari (2012) carried out a study on using CALL-based and non-CALL-based approaches in teaching and learning vocabulary. 61 Iranian EFL learners took part in this study. The instruments of the study were a proficiency placement test, a vocabulary software program called Phonics, and pre- and post-tests. Participants were randomly assigned to two groups: CALL and non-CALL. CALL group was taught by Phonics software in a language laboratory equipped with sufficient computers. The non-CALL group practiced the same vocabulary but they did it in the classroom. The researchers utilized paper, pictures, cassette player, and flash cards to teach vocabulary to the control group. Then the vocabulary test was given to both groups after twenty sessions of instructions to evaluate their vocabulary learning. 20 days later the same vocabulary test was administered to both groups, as delayed post-test, to see the effect of instructions on both groups. The results revealed that the effects of CALL and non-CALL on vocabulary test were not significantly different in the immediate and delayed post-tests. The findings also showed that both CALL-based and non-CALL based approaches significantly increased learners' lexical knowledge in short and long period of time.

Barrios (2013) carried out a research in Spain on the attitudes of 75 teachers about Tell Me More software. The results indicated a degree of satisfaction with the software in terms of their interest, usefulness, and effectiveness. The findings revealed that participants saw a moderate improvement in language skills like oral and written comprehension, vocabulary, grammar, or pronunciation. In the same vein, Noeparast and Khatami (2014) investigated the effect of employing Net Support School program as Local Area Network (LAN) software on Iranian intermediate EFL learners' vocabulary

retention. 60 female learners were selected as the participants of this study. They were divided into two groups of experimental and control. The study was carried out for 20 sessions. The students in the control group were taught new words from the printed pages, while the experimental group was taught new words by Net Support School. In the last session, both group had the post-test. The findings indicated that the software improved learners' vocabulary retention and reading comprehension. In other words, the students who were taught by the mentioned software significantly performed better than students who were taught by the conventional printed text.

Likewise, Akhlaghi and Zareian (2015) performed a study to investigate the impact of PowerPoint presentations on grammar and vocabulary learning of Iranian EFL learners. Both quantitative and qualitative methods were used. The instruments used for this objective were PowerPoint software, pre- and post-tests, and an interview. 54 female learners were randomly selected. They were randomly divided into two groups of 27 participants. For collecting quantitative data, an experimental design was used in which the experimental group was taught by using PowerPoint presentations while the control group was taught using a traditional method of instruction. For qualitative data collection, a survey design through interviews was used. The results represented that PowerPoint presentations improved learners' grammar and vocabulary knowledge.

In their study, Jafari and Chalak (2016) investigated the role of Whats App in Iranian EFL learners' vocabulary knowledge. Using a mixed method design, a group of 60 students including 30 male and 30 female students studying at two male and female junior high schools in Isfahan, Iran participated in the study. A pre-test and post-test were used. The experimental group received vocabulary instructions electronically four days a week for

four weeks using the Whats App while the control group was taught vocabularies of their textbook inside the classroom by traditional method. The results showed that using Whats App had a significant role in students' vocabulary learning. The results also showed that there was not a substantial difference between male and female students regarding their vocabulary knowledge after using Whats App.

In addition, Mousavi and Nemati. (2017) conducted a study to investigate the impact of using vocabulary software on Iranian EFL learners' vocabulary learning. 54 learners (23 males and 31 females) participated in the study. They were randomly divided into two groups. Both groups participated in the teacher-made test of vocabulary as pre-test. The control group was taught vocabulary in the conventional way through the printed textbook while the experimental group was instructed by the software version of the same book. One independent samples t-test and two paired sample tests were run to examine the objectives of this study. The results indicated that although both methods had positive impacts on learners' vocabulary learning, using vocabulary learning software was more effective than using printed book.

Finally, Hajebi, Taheri, Fahandezh, and Salari (2018) carried out a research about the effect of web-based language (WBL) learning on learners' vocabulary improvement. 66 students took part in this study and they were divided into one experimental group (n1=33) who learned vocabularies using free vocabulary learning sites of IELTS English language learning site every day for 8 weeks and one control group (n2=33) who received ordinary classroom instructions each session. The findings revealed a significant difference between experimental and control group concerning their vocabulary knowledge. WBL instruction enhanced EFL learners' vocabulary knowledge.

METHOD

Research Design

The quantitative study was conducted using a quasi-experimental design as there is no true randomization. A quasi-experiment is an empirical study used to estimate the causal impact of an intervention on its target population without random assignment. In this study, there were two groups; experimental and control groups. This experimental control group design allowed the study to predict

whether using “TMM” software has any effect on Iranian intermediate EFL learners’ vocabulary learning. The purpose of pre-test and post-test comparisons allows straightforward assessment of a pedagogical or technological intervention by detecting differences in learning outcomes between two points in time-before and after it. Table 1 illustrates the experimental-control group design as employed in this study.

Table 1. Research Design

Experimental Group	T1	X	T2
Control Group	T1		T2
(X = intervention, T1= Pre-test, T2= Post-test)			

Participants

This study was conducted in Saye English Institute in Tehran, Iran. The participants consisted of 90 Iranian intermediate EFL learners who had to undergo Preliminary English Test (PET) to establish homogenization. Accordingly, students whose scores fell between one standard deviation above and below the means were accepted to be the participants for this study. Consequently, only 29 students were excluded and removed from the study and the rest were assigned into two groups of experimental with 31 Iranian EFL students and control group with 30 Iranian EFL students. All participants were female aged between 13 to 17 who had studied English for 3 to 4 years; and currently studying the book “Four Corners” in accordance with the principles set by the aforementioned English Institute.

Instruments

Three instruments were used to get the objectives of this study. PET and Teacher Made Vocabulary Test as pre-test and post-test were the instruments of this study. The following sections discuss about each of these instruments in detail.

Preliminary English Test

In order to get homogenized groups of participants, a PET which included reading, writing, listening, and speaking parts was used. PET was used as a standardized measurement to seek the level of the subjects in terms of language proficiency. The result of this standard proficiency test was used to specify the homogeneity of the sample before assigning them into two equal groups prior to the commencement of the intervention program. Then, the participants were assigned into two groups: experimental group and control group. Experimental group involved 31 EFL students and control group included 30 EFL students.

Teacher Made Vocabulary Test as Pre-test

In order to leave out any assumptions, a pre-test was administered to evaluate the participants’ possible tacit knowledge of knowing the meaning of the vocabularies before the actual intervention. The Teacher-Made Vocabulary Test, used as a pre-test, was designed according to “Four corners 3” book. This test included 80 multiple choices questions. Therefore, efforts were made to create a text containing the vocabularies intended to be taught during the instruction period.

Teacher Made Vocabulary Test as Post-test

Prior to the intervention, participants had to undergo pre-test. Then, after the instruction, Teacher-Made Vocabulary Test as post-test (hereafter Post-test-TMVT) was administered. The items of this test contain similar materials to pre-test items. Pre-test and post-test were the same and the only difference was that 15 high frequency items in pre-test were removed. Therefore, to measure the participants' vocabulary learning, a 65 multiple-choice items was used and the reliability of the test was estimated through KR-21 method ($R=.84$). The validity of the test was detected against the Oxford Vocabulary Test as a valid test to establish content validity.

The content, face, and construct validity of the test was approved by three experienced EFL instructors. The first draft of Vocabulary Learning Pre-test contained 85 items and 5 items that lacked appropriate item facility, item discrimination, or reliability index were deleted and the final draft composed 80 items was used for the pre-test. The results of pilot study showed that the reliability value for the Vocabulary Pre-test reached .85 using KR-21. The results of pilot study showed that the reliability value for the Vocabulary Post-test turned out to be .84 using KR-21. As the vocabulary test was basically teacher-made, it was piloted to 30 learners who were randomly selected to participate in the pilot study. These learners were similar to the main participants of the study regarding their age, gender, and English background.

Following the pilot study, the researchers had to make changes on the teacher-made vocabulary tests to be more applicable for the actual participants. For instance, the researchers decided to omit and add some related vocabularies to make the tests more reliable to apply for the main participants. This original test consisted of 80 multiple-choice question items which later 15 items were removed due to high frequency of the

vocabulary. The reliability of the pilot test result was estimated .84.

Procedure

The researchers used PET to identify the homogeneity and equality of the sample before assigning them into two equal groups. Then, they assigned the participants into two groups: experimental group and control group. Experimental group included 31 EFL students and control group included 30 EFL students. 80 words were selected from "Four Corners 3" book as teaching materials. The Teacher Made Vocabulary Test was administered as a pre-test to evaluate the participants' possible tacit knowledge of knowing the meaning of the vocabularies before the actual intervention. This test consisted of 80 multiple choices items. Then, 15 high frequency items were removed from teaching course and post-test.

Then, the intervention program was started. The researchers taught the students of both groups for 12 sessions. Each session lasted 90 minutes, three times a week. However, only 15 to 20 minutes of each class session were dedicated to teach vocabulary to respect language institute policy and principle. The TMM software was used as treatment in experimental group and the control group received no treatment. The taught words were the same in both groups. After 12 sessions, the 65 items post-test was administered in order to compare the results of the scores of two groups and decide about effectiveness of the treatment. In the following sections, the actual procedures for each group are described.

Experimental Group

Experimental group consisted of 31 EFL learners. TMM software was used as an intervention program for this group. The researchers explained TMM application to the students. Although some students were familiar with this software, the researchers provided time for the rest of the students to install TMM application in their mobile or

Tablet. Then, during the introduction session, the researchers held training session for twenty minutes on how to use this software for learning. The researchers taught the students of this group 12 sessions. Each session lasted 90 minutes, three times a week. However, only 15 to 20 minutes of each class session were dedicated to teach vocabulary. In each session, the researchers taught 5 words by the use of this software. Since the participants were in the same school, they could use this software to communicate with each other as well.

However, there was no evidence to be sure that the members of control group were ignorant about the named software. Nevertheless, the impact for the learning was very trivial to consider since it had a minor effect on the post-test result. Finally, at the end of the 12th session, when the intended numbers of vocabularies (n=50) were taught, the Teacher Made Vocabulary Test was administered as a post-test to collect the data. And the game continued until students learned 5 words. The software provided some questions about the taught words. These questions were in the form of pictures and matching. The students must answer to each question correctly and the software went on the next item. Then, the software started its play. It showed one picture and students supposed to write the name of that picture. One word appeared and the students matched it with its related word. Because it gave scores to students, it was quiet interesting for students and they were eager to gain more scores.

Control Group

Control group involved 30 EFL learners. This group received similar training as experimental group. For example, number of sessions, the number of vocabularies, and the objective of vocabulary training received equal attention as experimental group. However, the main variable was kept away from this group and no TMM application was used in this class. The strategies of teaching vocabulary to this

group were through giving synonym and antonym and matching. The members of the control group also enjoyed learning five vocabularies through giving synonyms and antonyms. Then, the students were provided time to make a sentence with each vocabulary to evaluate their learning ability. The learners' sentence productions were controlled by the teachers. In case of making mistakes, the teaching procedures were repeated to ensure the learning process.

The participants shared their sentences with their classmates in the group. The intended vocabularies were covered in 12 sessions. Afterward, the participants were required to take TMVT as a post-test in order to gather required data. Teachers asked the students the meaning of the taught words. Then, they wrote the meaning on other corner of the board. They provided the definitions and asked students to spot the respective vocabulary for each definition. The matching was the other activity in this class. The teachers wrote these exercises on the board. The students wrote it in their notebook and solved it individually and the teachers checked them.

Data Analysis

To examine the effect of CALL on intermediate EFL learners' vocabulary learning, the scores obtained from the proficiency, pre-test, and post-test were analyzed using SPSS Version 21.0. Independent sample t-test was performed to compare the vocabulary measures of the two groups on the pre-test so as to ensure that the participants of the two groups had the same vocabulary knowledge before experiencing the treatments of this study. And finally, in order to test the hypotheses of the study, the students' vocabulary scores of the two groups on the post-test were compared using independent samples t-test.

FINDINGS

The goal of this study was to explore the effect of CALL on improving intermediate EFL learners' vocabulary learning. The data collection procedure was carefully performed and the raw data were submitted to SPSS (version 21.0) to address the research questions and hypotheses of the study. All steps taken to analyze the obtained data are presented through descriptions accompanied by tables and figures.

In order to select homogeneous participants, the researchers gave PET to 95 EFL learners. The results gained on PET are set forth in Table 2. According to Table 2, the mean, median, and mode of the PET scores are 56.51, 57.50, and 61, respectively. These central parameters are close to one another denoting that the PET scores are normally distributed around the mean.

Table 2. Descriptive Statistics for PET

Mean	Median	Mode	SD	Skewness Ratio	Kurtosis Ratio
56.51	57.50	61	14.84	-.417	-1.129

Based on the results of PET, 61 learners whose scores were one standard deviation plus and minus the mean (56.51) were chosen as the participants for the main study. Besides, according to Table 2, the ratios of skewness and kurtosis over their respective standard

errors are not beyond the ranges of +/- 1.96 showing that the PET scores are normally distributed. Figure 1 below is a histogram that demonstrates the normal distributions of the PET scores

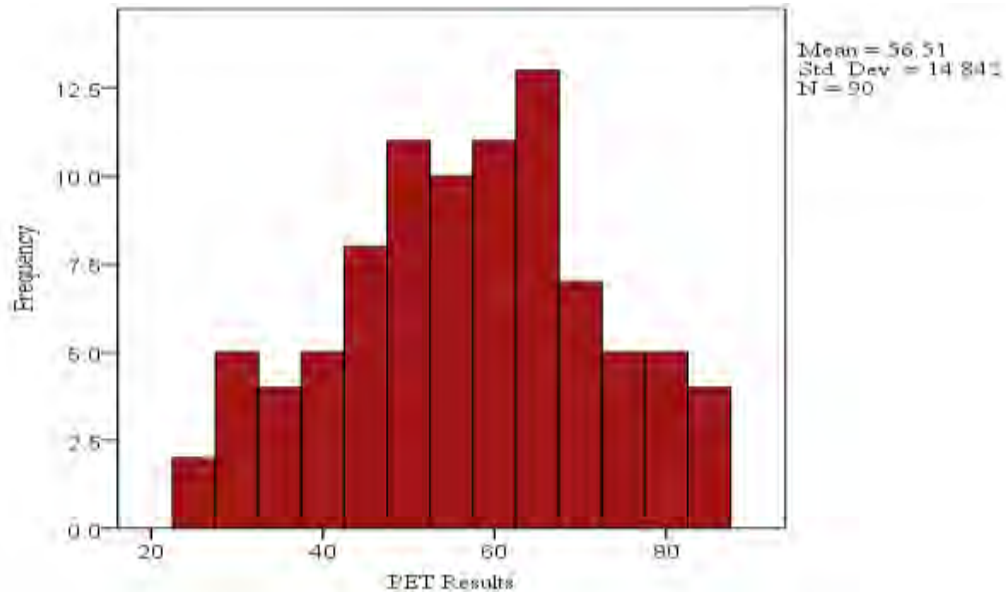


Figure 1. Histogram of Normal Distribution of PET Scores

To answer the research questions, two independent sample t-tests were performed comparing the mean scores of vocabulary learning for the experimental and control

groups on both pre-test and post-test. In fact, there were two groups (i.e. experimental and control) in this study and the researchers wanted to compare the mean scores of

vocabulary learning in the two groups. As it can be seen in Table 3, all sets of vocabulary learning scores on the pre-test have normal distribution since the ratios of skewness and kurtosis over their respective standard errors

are not beyond the ranges of +/- 1.96. Therefore, the researchers of the present study were justified to use parametric independent samples t-test instead of the nonparametric Mann Whitney U Test.

Table 3: Skewness and Kurtosis Test of Normality for Vocabulary Learning Scores in the Two Groups (Pre-test)

Group	N	Skewness	Std. Error	Skewness Ratio	Kurtosis	Std. Error	Kurtosis Ratio
Experimental	31	.235	.421	.558	-.564	.821	-.687
Control	30	.051	.427	.120	-.317	.833	-.380

The related descriptive statistics are set forth in Table 4 below before explaining the results of independent samples t-test. Table 4 displays the mean, standard deviation, and number of the students in the experimental

group ($\bar{x} = 19.97$, $SD = 3.65$, $n = 31$) and control group ($\bar{x} = 20.53$, $SD = 4.19$, $n = 30$) on the pre-test of vocabulary learning.

Table 4: Descriptive Statistics of Experimental and Control Groups' Vocabulary Learning Scores on the Pre-test

Group	N	Mean	SD	Std. Error Mean
Experimental	31	19.97	3.647	.655
Control	30	20.53	4.191	.765

The results of independent samples t-test comparing the experimental and control groups' vocabulary learning scores on the pre-test are laid out in Table 5 below. As evident from Table 5, the assumption of equal of

variances is not violated as the significance level of .57 associated with Levene's value is higher than the selected significance level of this study (.05).

Table 5. Independent Samples T-test for Comparing Two Groups' Scores of Vocabulary Learning (Pre-test)

Levene's Test for Variances	T-test for Means					
	t	Df	Sig. (2-tailed)		Mean Diff.	
Factor	F	Sig.				
Equal variances assumed	.329	.568	-.563	59	.575	-.566
Equal variances not assumed			-.562	57.318	.576	-.566

A look at Table 5 above reveals that *t*-value and significance level ($t(59) = .56, p = .57, p > .05$) are signs of no statistically significant difference in vocabulary learning scores for the experimental group ($\bar{x} = 19.97$) and control group ($\bar{x} = 20.53$) in which the *t*-value (.56) is lower than the *t*-critical of 2.00. This shows that the students in the two groups have almost the same vocabulary knowledge

at the beginning of the study. Before explaining the results of independent samples *t*-test on the post-test, the related descriptive statistics are shown (Table 6). Table 6 manifests the mean, standard deviation, and number of students for the experimental group ($\bar{x} = 42.16, SD = 7.45, n = 31$) and the control group ($\bar{x} = 37.47, SD = 6.64, n = 30$) on the pre-test of vocabulary learning.

Table 6. Descriptive Statistics of Experimental and Control Groups' Vocabulary Learning Scores on the Post-test

Group	<i>N</i>	Mean	<i>SD</i>	Std. Error Mean
Experimental	31	42.16	7.448	1.338
Control	30	37.47	6.642	1.213

Table 7 below shows that the two sets of vocabulary learning's scores gained on the post-test meet normality assumption as the ratios of skewness and kurtosis over their

respective standard errors do not exceed the ranges of +/- 1.96. So, parametric independent samples *t*-test was applied in this study.

Table 7: Skewness and Kurtosis Test of Normality for Vocabulary Learning Scores in the Two Groups (Post-test)

Group	<i>N</i>	Skewness	Std. Error	Skewness Ratio	Kurtosis	Std. Error	Kurtosis Ratio
Experimental	31	.681	.421	1.620	.130	.821	0.159
Control	30	.232	.427	.543	-.513	.833	-0.616

Table 8 below summarizes the results of independent samples *t*-test that was conducted

to compare the vocabulary learning scores for the experimental and the control groups

Table 8. Independent Samples Test for Comparing Two Groups' Scores of Vocabulary Learning (Post-test)

Levene's Test for Variances					T-test for Means		
Factor	F	Sig.	T	df	Sig. (2-tailed)	Mean Diff.	
Equal variances assumed	.125	.725	2.595	59	.012	4.695	
Equal variances not assumed			2.600	58.617	.012	4.695	

Table 8 indicates that the significance level (.72) related to Levene's value is greater than the selected significance level (.05). Furthermore, the independent samples t-test reveals that there is a statistically significant difference ($t(59) = 2.59, p = .01, p < .05$) in vocabulary learning measures for the experimental group ($\bar{x} = 42.16$), who experienced vocabulary instruction through TMM, and control group ($\bar{x} = 37.47$), who received vocabulary instruction in the conventional way. Moreover, the t -observed (2.59) is bigger than the t -critical (2.00). As a result, the first null hypothesis of the current study is rejected and it can be claimed that teaching vocabulary through TMM improves intermediate EFL learners' vocabulary learning. A line chart was made in order to

demonstrate the results of both pre-test and post-test of vocabulary learning for both groups graphically. As can be seen clearly from Figure 2, the means of two groups show an upward trend from pre-test to post-test of vocabulary learning. Actually, Figure 2 shows that the mean score of vocabulary learning for the two groups are almost the same on the pre-test, though the mean for the experimental group is significantly higher than the control group on the post-test of vocabulary learning. Therefore, the second null hypothesis of the this study is also rejected and it can be claimed that there is a significant difference between teaching vocabulary in the experimental group who used CALL and control group who used conventional method on learners' vocabulary learning.

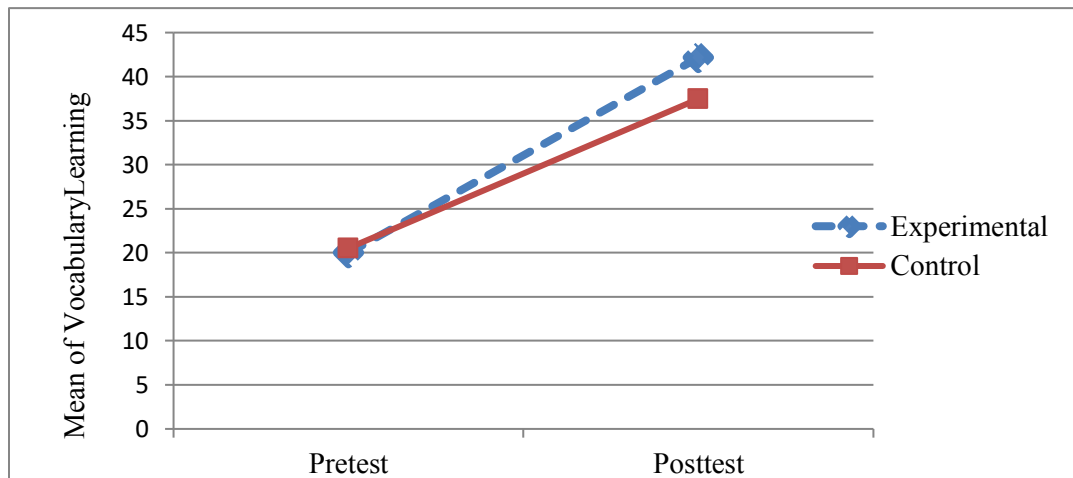


Figure 2. Two groups' means of vocabulary learning (pre-test & post-test)

DISCUSSION

The present study investigated the impact of CALL on Iranian EFL learners' vocabulary learning. The results obtained from this study correlate with previous studies (Barrios, 2013; Getkham, 2005; Hajebi, Taheri, Fahandezh, & Salari, 2018; Jafari & Chalak, 2016; Kilickaya & Krajka, 2010; Mousavi & Nemati, 2017; Shahrokni, 2009) on the importance of vocabulary instruction through CALL in improving EFL learners' vocabulary learning. The literature review showed that in most cases, the achievement gap between EFL students of differing language proficiency levels is one of the most persistent and frustrating problems which is due to their limited knowledge of vocabulary (Ostovar-Namaghi & Malekpur, 2015).

To rectify such problems, a consistent and persistent investment in vocabulary development can be a good solution, which can be implemented through a variety of ways (Ebbers & Denton, 2008). Thus, it is believed that without intervention, literacy deficits in language learners' early years of education will follow a downward spiral as they progress from one level of language proficiency into another. A high correlation on the use of technology in improving EFL learners' vocabulary learning (Horst, Cobb, & Nicolae, 2005) was seen indicating the effect of online tools on vocabulary learning. Thus, one aim of this study was to introduce an intervention program related to vocabulary development and to seek its effectiveness on vocabulary retention.

The findings of present study are in line with the results of some previous studies (Jafari & Chalak, 2016; Girgin, 2011; Horst, Cobb, and Nicolae, 2005; Kabilan et al., 2010) on the importance of vocabulary instruction through digital games on improving EFL learners' vocabulary learning and retention. The results of independent sample t-test indicated that there was a significant difference between learners' performances in the experimental and control groups. In other words, CALL had a

positive impact on learners' vocabulary learning. The results of this study are in line with the findings of Lauc, Matić, and Mikelić (2007) who stated that the use of multimedia educational software had a great effect on learning new vocabulary.

The findings of this study are also in line with the findings of Naraghizadeh and Barimani (2013). The results of pre-test and post-test of both groups showed that there was a significant difference between experimental and control group concerning their vocabulary knowledge. They concluded that the experimental group had a higher mean score than the control group. The results of the current study are supported by Wang, Teng, and Chen (2015) who investigated the impact of iPad on learners' vocabulary knowledge. They found that those who used this software had better improvement in their vocabulary knowledge over those who did not use it. The above finding is also supported by the finding of Ahmadian, Amerian, and Goodarzi (2015), indicating that the software-used group had a better performance than the other group in vocabulary learning.

The above finding is also in agreement with findings of study of Mousavi and Nemati. (2017) who examined the effect of vocabulary software on Iranian EFL learners' vocabulary learning of 54 learners were randomly assigned into two groups: control and experimental. Learners in the control group were instructed vocabulary through the printed textbook while learners in the experimental group were taught through the software version of the same book. The findings of this research revealed that learning vocabulary through software was more effective than learning it through printed book.

The results of the current research are not compatible with the findings of Bagheri, Roohani, and Nejad Ansari's study (2012), which expressed that there is no significant difference between CALL-based and non-CALL based methods of vocabulary

instruction. The results of the present study partly differed from the study which was performed by Aryadoust and Lashkary (2009). They examined the impact of teaching aids on Iranian learners' vocabulary achievement. They did not find any significant difference between the post-test scores of the participants in two groups. The results of this study are also in contrast with some other studies (Ostovar-Namaghi & Malekpur, 2015) that they proved ineffectiveness of digital games in vocabulary learning. They proved using CALL can be considered as a distractive factor.

CONCLUSION

This research dealt with the use of CALL in vocabulary learning to see whether it has any effect on Iranian EFL learners' vocabulary learning. This study tried to help access better ways of learning and retaining words. One way was reinforcing vocabulary through TMM which helped learners develop and use words in different contexts. By using TMM, learners could get rid of boring classrooms and have a fun time during the research course. The findings revealed that TMM software had a significant effect on Iranian EFL learners' vocabulary learning. Based on the results of the

current study, it was found that learners who learned the words through CALL had higher mean values in the post-test compared with those who learned the words by traditional vocabulary methods. To assure and determine any significant change in vocabulary learning and retention of our groups of subjects, the results of performance of each group at the pre-test were compared with the results of its performance at the post-test stage through applying t-test. The findings of this study showed that the experimental group improved their vocabulary significantly through CALL instruction. Due to the fact that learners who used CALL had better performance in the post-test, we came to the conclusion that CALL produced better results in vocabulary learning than traditional vocabulary teaching method. The results led to conclude that teachers can have more student-centered classes and more interactive teaching environments. It should also be stated that just the presence of computer technologies cannot facilitate language learning in general and vocabulary learning in particular. Enough training periods should be provided for teachers to know how, when, and where to use these technologies in teaching language skills.

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