



## The Impact of Computer-Assisted Language Learning (CALL) on Iranian EFL Learners' Vocabulary Learning: A Comparison of Traditional and CALL-based Instruction

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<http://dx.doi.org/10.18415/ijmmu.v11i2.5556>

### **Abstract**

Technology's impact spans diverse human activities, notably in education. Educators and researchers have increasingly focused on computer-assisted vocabulary learning, recognizing it as a crucial component of computer-assisted language learning (CALL). The present study, conducted with one hundred Iranian intermediate-level English as a Foreign Language (EFL) learners, intended to address the impact of Computer-Assisted Language Learning CALL instruction on vocabulary learning. The study addressed whether there is a significant relationship between CALL instruction and Iranian EFL learners' vocabulary learning and whether there is any difference in the impact of CALL instruction on Iranian male and female EFL learners' vocabulary learning. The statistical analysis involved t-tests and descriptive statistics for comparing pre-test and post-test results, contributing valuable insights into the effectiveness of CALL in the context of Iranian EFL education and its equitable impact across genders. The present study's findings revealed a substantial improvement in vocabulary learning among participants who underwent CALL instruction. The study also found that male and female language learners did not display significant performance differences under CALL instruction. This study contributes valuable insights into the role of CALL in Iranian EFL education, emphasizing its potential as an effective tool for enhancing vocabulary learning while promoting gender-neutral outcomes.

**Keywords:** *Computer-Assisted Language Learning; vocabulary learning; EFL language learners*

### **Introduction**

The influence of technology extends to a wide range of human activities, including education. Like other technological advancements, computers are intricately intertwined with individuals' personal and professional spheres, assuming multifarious functions within contemporary society Shokrpour, Mirshekari, and Moslehi (2019). In recent years, there has been a growing interest among educators and researchers in computer-assisted vocabulary learning, recognizing it as a crucial component of computer-assisted language learning (CALL). This can be regarded as a novel facilitative tool for vocabulary training within educational environments (Shokrpour et al., 2019).

Computer-assisted language learning (CALL), also known as Computer-Aided Instruction (CAI) or Computer-Aided Language Instruction (CALI) in the American context, pertains to the exploration and examination of computer applications in the domain of language education (Shokrpour et al., 2019). Computer-Assisted Language Learning (CALL) encompasses various applications and methodologies in teaching and learning foreign languages (Shokrpour et al., 2019).

These include the conventional drill-and-practice programs that were prevalent during the 1960s and 1970s, as well as contemporary iterations of CALL, such as its utilization in virtual learning environments and mobile-assisted language learning (MALL) in distance education settings (Shokrpour et al., 2019). Furthermore, this concept can be applied to many educational tools, including corpora, concordances, and interactive whiteboards. Numerous scholars believe computer technology is optimal for augmenting pupils' English language learning (Shokrpour et al., 2019). According to Beatty (2013), CALL refers to a learning process in which students use a computer to enhance their language skills.

According to Tabar and Khodareza (2012), the emergence of Computer-Assisted Language Learning (CALL) has offered novel perspectives on learning vocabulary. The salience of the impact of computer-assisted language learning (CALL) on vocabulary achievement has been noted by several language researchers (Chapelle, 2001; Gündüz, 2005; Hubbard, 2009; Timuçin, 2006). The primary concern is not simply the utilization of computer-mediated technology in education. Instead, educators must comprehend the most effective ways Computer-Assisted Language Learning (CALL) can deliver impactful instruction to individuals learning a new language (Chapelle, 2001).

According to Teo (2006), students' attitudes towards computers significantly impact their willingness to utilize computers as educational tools and their subsequent behaviours towards computers, such as employing them for further academic pursuits and vocational goals (Timuçin, 2006). According to Celce-Murcia (2002), vocabulary learning has been a significant challenge for those learning a second language, and it plays a crucial role in language learning, regardless of whether the language is a first, second, or foreign language. According to Hoven (1999), various terminology is associated with Computer-Assisted Language Learning (CALL). The acronym CALL is commonly recognized to represent computer-aided language learning (CALL), computer-assisted language instruction (CALI), and computer-enhanced language learning (CELL).

There is a consensus among scholars that a fundamental goal in learning a foreign language is communicating effectively in that language, commonly referred to as communicative competence. Many experts in second language learning (SLA) contend that lexical competence is integral to communicative competence. In recent years, there has been a significant emphasis on the prominence of vocabulary learning in language teaching (Dilek & Yürük, 2013).

Vocabulary teaching and learning should not be disregarded in language learning. This implies that the learning of a foreign language necessitates the learning of its vocabulary. The ability to express ideas and communicate effectively is improved when individuals need to gain knowledge of words and can use language. Attaining advanced skills in a second language is closely associated with lexical knowledge (Dilek & Yürük, 2013).

According to Gündüz (2005) study, the utilization of computer technology has been observed across various domains in the context of foreign language teaching and learning. According to Afshari, Bakar, Luan, Samah, and Foui (2009), using computers in educational settings boosts instructional efficacy, fosters positive social connections, and augments students' inclination and enthusiasm towards learning. In contemporary times, the advent of technology has brought about a significant transformation in the conventional methods of education and instruction (Kung & Chuo, 2002).

Computer-Assisted Language Learning (CALL) has benefited the English language teaching process (Shokrpour et al., 2019). When implemented effectively within an educational setting, CALL can enhance students' interest and motivation in learning English (Shokrpour et al., 2019). Computer-assisted

language learning (CALL) has gained significant prominence in language learning and educational environments over the last ten years (Shokrpour et al., 2019).

The advent of computer-assisted language learning (CALL) has bestowed upon humanity a remarkable degree of adaptability across several domains, establishing itself as a primary manifestation of technology in contemporary society (Shokrpour et al., 2019). Chapelle (2001) posits that CALL is commonly employed to denote a specific technology domain in second language learning and instruction. The computer plays a significant part in Computer-Assisted Language Learning (CALL), an instructional strategy for language learning and teaching. Its primary functions within this context include serving as a tool for facilitating the presentation of instructional materials and as a means for assessing the content to be acquired (Shokrpour et al., 2019).

### ***CALL and Vocabulary Learning***

In recent decades, there has been a notable shift in perspective about the significance of vocabulary, with an increased emphasis on its role in second language learning and instruction. Numerous scholars (Carter & McCarthy, 2014; Coady & Huckin, 1997; De Bot, Paribakht, & Wesche, 1997; Harley, 1996; Kitajima, 2001; Laufer & Shmueli, 1997; Nation, 1990; Zimmerman, 1997) contend that second language vocabulary learning holds considerable importance in the process of language learning. Besides reading comprehension and the correlation between vocabulary development and reading comprehension, most studies examined the effect of extended use of computers on vocabulary learning. According to Ellis (1995) and Goodfellow (1995), substantial attention has been given to vocabulary learning in CALL regarding research or reading skill development.

Although the role of vocabulary knowledge in second and foreign language learning has long been neglected, vocabulary has recently been increasingly emphasised in the language teaching curriculum. Based on the studies of Nunan and Carter (2001), “this is due to several reasons, such as the influence of comprehension-based approaches to language development, the research efforts of applied linguists, and the exciting possibilities opened up by the development of computer-based language corpora”. Tozcu and Coady (2004) proposed that “learning vocabulary is an important aspect of SL/FL learning and academic achievement and is vital to reading comprehension and proficiency, to which it is closely linked”.

Krashen (1989) states that a significant hindrance to effectively utilising a second language is the need for more vocabulary since he contends that the transmission of meaning is accomplished through words. Carter (1998) asserts that the discipline of second language research has historically placed less emphasis on vocabulary, instead prioritizing the study of syntax and phonology. Furthermore, the issue of vocabulary presentation poses a challenge for syllabus designers due to its boundless character.

According to Laufer (1997), vocabulary is no longer subjected to discriminatory treatment in second language learning research or language instruction. Jordens and Lalleman (2010) assert that vocabulary holds greater significance than grammar. This is mainly because individuals tend to prioritize the use of vocabulary and minimize the usage of grammar, especially when aiming to convey a message quickly and accurately (Jordens & Lalleman, 2010). Hatch and Brown (1995) argue that the linguistic needs of foreign language learners throughout the various stages of language learning often surpass the necessity for grammatical regulations.

Wilkins (1972) states that learning and mastery of vocabulary are pivotal in learning and teaching English. Hulstijn (1993) concludes that vocabulary instruction should encompass more than teaching individual words. According to Nation (1990), vocabulary learning strategies are a component of language learning strategies, a subset of general learning strategies.

Given the importance of vocabulary learning in the language learning process, several researchers (Goodfellow, 1994; Groot, 2000; Hirschel & Fritz, 2013) made efforts to develop computer software with the objective of augmenting vocabulary learning. In recent years, there has been a noticeable increase in the utilization of computers in educational environments, resulting from the convergence of educational requirements and technology resources (Warschauer, 1998). The utilization of computers has significantly impacted the investigation of Computer-Assisted Language Learning (CALL) and its recent correlation with vocabulary learning achievement among language learners. One method of incorporating Computer-Assisted Language Learning (CALL) into language instruction involves using computers to aid students in acquiring vocabulary.

Unfortunately, within the Iranian context, materials producers and syllabus designers have not given sufficient attention to Computer-Assisted Language Learning (CALL) in English language instruction. Consequently, integrating CALL tools and resources to enhance the teaching and learning experience must be addressed. Typically, the instructional approach in these classes is centred upon the teacher. Hence, educators employ conventional approaches in their instructional practices (Abdollahi-Guilani, Yasin, & Hua, 2011). This requires a study to ascertain the limitations and advantages of using these approaches. In this way, the effectiveness of such approaches can be emphasised, resulting in an increase in their implementation by all stakeholders.

### ***Literature Review***

The impact of Computer-Assisted Language Learning (CALL) on vocabulary learning has been a subject of substantial research within second language learning. The existing body of research in this field is extensive and covers various topics, including Computer-Assisted Language Learning (CALL), vocabulary learning, and the impact on learner outcomes. Despite all the studies being conducted so far, the results on the impact of Computer-Assisted Language Learning (CALL) on vocabulary learning are mixed. According to Son (2001), drawing definitive conclusions regarding the impact of electronic glossaries on vocabulary learning and reading comprehension is challenging due to the varying presentation methods employed in each study to provide computer-based assistance in conveying word meanings. This implies that the topic needs to be addressed in a specific context and with specific audiences.

Some studies point to a non-significant difference in the impact on students' outcomes when comparing electronic and conventional teaching methods. According to Kaya (2006), no statistically significant differences were observed in the impact on students' outcomes when comparing electronic, conventional, and mixed teaching methods.

Previous research has also examined the efficacy of computer dictionaries concerning the learning of vocabulary or improvement in reading comprehension skills. Chun and Plass (1996) conducted a study investigating accidental vocabulary learning and assessing the efficacy of multimedia annotations in facilitating vocabulary learning for second-year German students utilizing Cyberbuch. The study's findings revealed that various forms of annotations, which involve visual representations that aid in understanding written text, enhanced reading comprehension. This highlights that using annotations contributed to learning and retaining new foreign words.

Other studies indicate that Computer-Assisted Language Teaching (CALL) in vocabulary instruction significantly improves vocabulary learning. Khoshnoud and Karbalaei (2015) found that Elementary EFL learners performed better on retention tests than conventional methods due to real-life experience and active engagement. Ghorbani Ashin, Gh, and Jahandar (2015) found that CALL significantly improved Iranian EFL learners' word retention. Likely, Emami and Amirghasemi (2022) concluded that CALL could positively influence the vocabulary learning of the participants in the experimental group.

According to Eizadpanah, Abedi, and Ghaedrahmat (2014), Computer Aided Vocabulary Learning (CAVL) had beneficial effects on the vocabulary attainment of intermediate English as a Foreign Language (EFL) learners. The researchers further stated that the utilization of E-learning methods increased long-term memory. It was determined that, during the instructional time, the learners realized that they favoured engaging in e-learning.

Talarposhti and Pourgharib (2014) examined computer-assisted language learning (CALL) concerning vocabulary. The findings indicated that the experimental group exhibited a statistically significant performance improvement compared to the control group on a retention test. This implies that incorporating visual, auditory, and contextual elements into computer-assisted learning settings could improve the learning and instruction of vocabulary (Talarposhti & Pourgharib, 2014).

Furthermore, Barani (2013) demonstrated that computer-assisted language learning (CALL) instruction improved vocabulary learning within the framework of English as a Foreign Language (EFL). In their study, Naraghizadeh and Barimani (2013) conducted research to examine the efficacy of Computer-Assisted Language Learning (CALL) in enhancing the vocabulary learning of Iranian English as a Foreign Language (EFL) learners. The study's findings confirmed that CALL instruction positively impacted the enhancement of English as a Foreign Language (EFL) learners' vocabulary knowledge.

Also, Hirschel and Fritz (2013) conducted a study to examine the efficacy of two commonly used but rarely studied methods for vocabulary learning: 1) the use of vocabulary notebooks and 2) a Computer Assisted Language Learning (CALL) application using spaced repetition. Based on the study's findings, it was seen that both the CALL and vocabulary notebook groups demonstrated statistically significant improvements in vocabulary scores. Concerning long-term benefits, the CALL group has shown a marginal improvement.

Several studies suggest that CALL has a positive effect on vocabulary learning (Çakmak, Namaziandost, & Kumar, 2021; Enayati & Gilakjani, 2020; Hanafiah, Aswad, Sahib, Yassi, & Mousavi, 2022; Teng, 2022), as it provides interactive and engaging activities that can enhance vocabulary learning and retention. However, there is also debate regarding the effectiveness of CALL compared to traditional methods, with some studies reporting no significant difference in vocabulary performance between CALL and non-CALL groups (Bagheri, Roohani, & Ansari, 2012). In English as a Foreign Language (EFL) education in Iran, there is a noticeable lack of empirical research on the effectiveness and consequences of Computer-Assisted Language Learning (CALL) instruction for Iranian EFL learners' vocabulary learning. The global importance of technology-enhanced language learning has not been adequately addressed within the Iranian educational setting, as there is a lack of specialized studies examining its specific consequences. This gap highlights the necessity for thoroughly examining the various effects of computer-assisted language learning (CALL) on Iranian English as a foreign language (EFL) learners. This investigation should encompass the impact of CALL on vocabulary retention and overall competency in language learning. It is crucial to acknowledge and address this deficiency to customize English as a Foreign Language (EFL) teaching methods to suit the changing requirements of Iranian learners. Additionally, doing so would provide valuable insights for policymakers in making informed decisions to improve language education inside the country.

### ***Statement of the Problem***

The issue under consideration is the evaluation of the effectiveness of Computer-Assisted Language Learning (CALL) instruction within the framework of English as a Foreign Language (EFL) education for Iranian learners. Examining the influence of Computer-Assisted Language Learning (CALL) on Iranian English as a Foreign Language (EFL) learners is crucial due to the growing importance of English competence in worldwide communication and its significance for academic and professional achievements. Nonetheless, a conspicuous deficiency persists in our comprehension

regarding how Computer-Assisted Language Learning (CALL) instruction substantially impacts these learners' language learning and overall performance. Educators, policymakers, and stakeholders within the Iranian education system must prioritize resolving this matter. Doing so will enable them to make well-informed decisions on incorporating technology into language learning methodologies, enhancing the language learning process for English as a Foreign Language (EFL) students in Iran.

### **Definition of Key Terms**

#### **Computer-aided language learning (CALL)**

The word CALL encompasses various aspects of computer integration in language classes. Computer-assisted language learning (CALL) involves using various technological tools, such as software and the Internet, for language learning. Beatty (2013) posits that the definition of Computer-Assisted Language Learning (CALL) that effectively encompasses its dynamic characteristics is "any procedure wherein a learner utilizes a computer and, consequently, enhances their language skills" (p. 7). According to research by Afshari et al. (2009), "computer technologies can improve interpersonal and communication skills and facilitate cooperative learning opportunities" (p. 86).

#### **Vocabulary learning**

The instruction and learning of vocabulary is a crucial domain that warrants specific focus. Kitajima (2001) argues that effective communication requires using words that can accurately denote things, actions, and concepts for speakers to convey their intended meanings. According to Celce-Murcia's (2002) research, vocabulary learning plays a dispensable role in language learning, regardless of whether the language is first, second, or foreign. Likely, Wilkins (1972) asserts that the conveyance of information is greatly hindered in the absence of grammar, while the absence of vocabulary renders communication completely impossible (pp. 111-112).

#### **Multimedia**

According to Mayer (2005), multimedia encompasses the presentation of spoken and/or printed words and includes visual elements such as illustrations, photographs, animations, or videos. (Freeman, 1991) posits that multimedia technology resembles traditional textbooks regarding information retention while possessing the capacity and functionality to provide users with a more enjoyable experience than regular textbooks. Wang (2006) points out that multimedia devices can enhance second and foreign-language learning comprehension by including auditory and visual stimuli, aligning with Krashen's input theory.

#### **Traditional instruction**

Boumová (2008) asserts that the conventional approach to language instruction primarily involves breaking down the holistic process of foreign language usage into distinct skills and domains of knowledge. According to the author, the approach primarily emphasizes isolated abilities and areas of knowledge, serving a functional purpose. Regarding this matter, conventional pedagogical approaches for vocabulary learning encompass word lists, utilization of dictionaries, completion of workbooks, utilization of materials created by teachers, and engagement in group discussions. According to Groot (2000), acquiring a substantial vocabulary within a limited timeframe is imperative during the intermediate and advanced stages of language learning. Consequently, creating bilingual word lists appears appealing as it requires less time than contextual presentation and yields favourable short-term outcomes. As a result, these methods are widely employed in traditional instruction for vocabulary teaching and learning.

## **Research Main Questions**

This empirical study, therefore, attempts to pose the two research questions:

- (1) Is there any significant relationship between CALL instruction and Iranian EFL learners' vocabulary learning?
- (2) Is there any difference between the impact of CALL instruction on Iranian male and female EFL learners' vocabulary learning?

Based on the research questions of this study, the following two hypotheses are posed:

- (1) There is not any significant relationship between CALL instruction and Iranian EFL learners' vocabulary learning
- (2) There is no difference between the impact of CALL instruction on Iranian male and female EFL learners' vocabulary learning.

## **Materials and Method**

### **Design of the study**

The research employed an experimental design, including experimental and control groups. It commenced with a pre-test comprising 45 items, 10 cloze items and 35 multiple-choice questions. This initial assessment was administered at two private language institutions in Tabriz, Iran. Following the pre-test, participants were divided into experimental and control groups. The experimental group underwent a dedicated six-week intervention during which they received instruction in vocabulary learning through computer-based lessons, embracing Computer-Assisted Language Learning (CALL).

In contrast, the control group received vocabulary instruction using a conventional teaching method without integrating CALL. The experimental group was exposed to this treatment over six weeks. Following the intervention period, both groups underwent a post-test assessment.

### **Participants**

The study comprised one hundred and twenty Iranian intermediate-level English as a Foreign Language (EFL) learners, including 55 males and 65 females, enrolled in two private language institutes in Tabriz, Iran. To ensure homogeneity among the participants, all 120 students took the Oxford Quick Placement Test (2001), a proficiency assessment tool in this investigation. Subsequently, 100 out of the 120 students exhibited similar proficiency levels and were consequently chosen to constitute the sample for the study. These selected participants ranged in age from 19 to 21 years and shared Persian as their native language. They were all pursuing English as a foreign language. Subsequently, these participants were randomly divided into two groups of equal size: the experimental and the control groups, each comprising 50 participants.

### **Instruments**

To gather the necessary data, three instruments were employed. These instruments consisted of a language proficiency test, further divided into a placement test and a demographic information section. Additionally, a vocabulary levels test was administered. Lastly, a computer laboratory for using an electronic dictionary was used for data collection purposes.

### **Language Proficiency Placement Test**

The Quick Placement Test developed by Oxford University Press and the University of Cambridge Local Examinations Syndicate (2001), version, assessed the participants' English language proficiency levels. The multiple-choice test is comprised of two distinct sections, with a total of eight subsections. In total, there are 60 items that participants are required to answer within a designated time frame of 45 minutes. The reliability index measured by Cronbach's alpha for this study was 0.86.

### **Vocabulary levels Pre-Test and Post-Test**

The vocabulary test was developed for both pre-test and post-test purposes. The researcher developed the test by carefully selecting vocabulary items from established competency assessments, including the Nelson English language test and TOEFL. The vocabulary items encompassed various content terms, including nouns, verbs, phrasal verbs, adjectives, and other linguistic elements. These elements comprised passive and active items crucial for effective oral communication and speaking proficiency. The examination comprised a total of 45 items, which encompassed ten cloze items and 35 multiple-choice questions.

### **Computer Laboratory**

The computer laboratory was utilized to enhance the learning process, allowing for the efficient learning of new vocabulary through an electronic dictionary. This approach saved time and provided opportunities for practising perfect pronunciation by constructing various sentences.

### **Procedures**

Initially, to ensure participant homogeneity, a pre-test was administered. Following this assessment, individuals whose scores deviated from the mean by one standard deviation, either above or below, were chosen to participate in the present study. Subsequently, the participants were randomly assigned to the control or experimental groups.

Subsequently, a pre-test was administered to the control and experimental groups, which comprised a 45-item vocabulary that had been previously validated. Then, the experimental group was subjected to the treatment for six weeks, while the control group did not receive any treatment. The intervention consisted of teaching vocabulary using computer-based methods.

To achieve this goal, in the process of reading, participants specifically identified terms from the text and organized them in a designated section at the top of the screen. After completing the reading material, participants had the option to revisit the contents of the word box and generate exercises based on them using the software available on Tom Cobb's website. The implemented activities included exercises to fill knowledge gaps, such as a concordance quiz, retrieval tasks, and spelling activities. After the course, a post-test was administered to evaluate the impact of technology on vocabulary learning. The pre-test and post-test results were subjected to statistical analysis, employing a t-test and percentage rate calculations for comparison.

Initially, a pre-test was administered to ensure the homogeneity of participants. Individuals with test scores within one standard deviation above or below the mean were randomly assigned to either the control or experimental groups. Subsequently, both control and experimental groups underwent a 45-item pre-validated vocabulary test. Following the pre-test, the experimental group underwent a six-week treatment involving computer-assisted vocabulary instruction. During this treatment, learners could select words from the text while reading and place them in a designated word box at the top of the screen. Post-reading, learners could revisit items in the word box, creating exercises through a program available on Tom Cobb's website. This encompassed gap-filling activities, concordance quizzes, retrieval exercises, and spelling activities. To evaluate the impact of technology on vocabulary learning, a post-test was



administered at the end of the course. The comparison of pre-test and post-test results involved statistical analysis using t-tests and percentage rate calculations.

### Data analysis

The data analysis was conducted using the Statistical Package for Social Sciences (SPSS) software. Descriptive statistics, encompassing means and standard deviations were employed to juxtapose the means of the control and experimental groups in both the pre-test and post-test assessments, as well as to compare the performance of male and female language learners on the CALL post-test. Two independent samples t-tests were deployed to identify any statistically significant differences between the control and experimental groups in the pre-test and post-test. Furthermore, two paired samples t-tests were implemented to unveil potential variations in the performance of the CALL group between the pre-test and post-test, as well as in the performance of the face-to-face (F2F) group in the pre-test and post-test. Ultimately, to determine the correlation between male and female students and the impact of computer-assisted language learning (CALL) on their vocabulary learning, an independent samples t-test was conducted.

## Results

### The Pre-test

A pre-test in the form of a vocabulary test developed based on the IELTS exam was administered to measure the comparability of vocabulary proficiency levels between the control and experimental groups. Subsequently, the data were subjected to analysis. Table 2 and Table 3 present the descriptive statistics and the t-test for the pre-test scores of the control and experimental groups.

As shown in Table 3, the mean difference for the pre-test scores was -1.02667 for the CALL and F2F groups, respectively. In addition, the p-value exceeded the threshold of 0.05, indicating a lack of statistical significance in terms of students' performance in the pre-test between the two groups. In other words, all students had a similar level of English language proficiency at the beginning of the study.

Table 2

Descriptive statistics of the experimental and control group in the pre-test					
	Instruction	N	Mean	Std. Deviation	Std. Error Mean
pertest	CALL	150	32.50	8.53	.69680
	F2F	150	33.53	6.92	.56526

Table 3

Results of independent samples t-test of the experimental and control group in the pre-test										
		Levene's Test for Equality of Variances				t-test for Equality of Means				
		F	Sig.	t	df	ig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Equal variances assumed		7.363	.007	-1.144	298	.253	-1.02667	.89724	-2.79241	.73907
Equal variances not assumed.				-1.144	285.84	.253	-1.02667	.89724	-2.79271	.73938

### Control group

A paired samples test was used to examine the possibility that there was a statistically significant difference between the scores of the control groups in the pre-and post-tests (Table 4). The findings indicate that the F2F group had a higher mean in the post-test. In addition, the findings revealed a statistically significant difference in the performance of the F2F group in the pre-test and post-test ( $t = -2.554$ ,  $p < 0.05$ ). Table 5 presents the results of the paired samples t-test of the control group in the pre-test and post-test.

Table 4

Descriptive statistics of the Control group in the pre-test and post-test					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pertest F2F	33.0267	150	7.02913	.57393
	Post-test F2F	35.0600	150	6.96321	.56854

Table 5

Results of paired samples t-test of the Control group in the pre-test and post-test							
	Paired Differences				t	df	Sig. (2-tailed)
	Mean	Std. Deviation	95% Confidence Interval of the Difference				
			Lower	Upper			
Pertest CALL CALL	-2.03333	9.75156	-3.60666	-.46001	-2.554	149	.012

### Experimental group

A paired samples test was run to identify possible differences between the mean of the pre-test and post-test in the CALL group. The results of this analysis presented in Table 7 indicate that a statistically significant difference was observed in the performance of the experimental group in the pre-test and post-test ( $t = -4.786$ ,  $P < 0.05$ ). Furthermore, the students had a higher mean in the post-test (Table 6).

Table 6

Descriptive statistics of the experimental group in the pre-test and post-test					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pertest CALL	32.1733	150	8.53241	.69667
	Post-test CALL	36.5733	150	7.73326	.63142

Table 7

Results of paired samples t-test of the experimental group in the pre-test and post-test							
	Paired Differences				T	Df	Sig. (2-tailed)
	Mean	Std. Deviation	95% Confidence Interval of the Difference				
			Lower	Upper			
Pertest CALL CALL	-4.40000	11.25900	-6.21654	-2.58346	-4.786	149	.000

### Post-test

An independent samples t-test was used to identify possible mean differences between the experimental and control groups in the post-test. According to the data in Table 6, a statistically significant distinction was observed between the groups at a significance level of  $P < 0.05$ . Therefore, the observed disparity may be attributed to the deliberate instruction of language, given that the experimental group outperformed the control group in the post-test (see Table 8 and 9).

Table 8

Descriptive statistics of the experimental and control group in the post-tests					
	Instruction	N	Mean	Std. Deviation	Std. Error Mean
peritest	CALL	150	36.5733	7.73326	.63142
	F2F	150	35.0600	6.96321	.56854

Table 9

Results of independent samples t-test of the experimental and control group in the post-test									
Levene's Test for Equality of Variances					t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	5.002	.026	1.781	298	.076	1.51333	.84967	-.15877	3.18544
Equal variances not assumed			1.781	294.781	.076	1.51333	.84967	-.15885	3.18551

### Comparison of the male and female learners in the experimental group

To address the second research question and test the null hypothesis, an independent samples t-test was employed to compare the means of male and female learners in the experimental group. The purpose was to determine if there was a statistically significant difference in vocabulary learning between male and female learners when enrolled in a computer-assisted language learning (CALL) context. The findings are presented in Table 10 and Table 11.

Table 10

Descriptive statistics of the male and female learners in the experimental group's post-test					
	Instruction	N	Mean	Std. Deviation	Std. Error Mean
peritest	CALL	150	37.5467	6.13778	.50115
	F2F	150	34.0867	8.10827	.66204

Table 11

Independent samples t-test of the male and female learners in the experimental group's post-test									
	Levene's Test for Equality of Variances				t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	8.745	.003	.167	298	.000	3.46000	.83033	1.82595	5.09405
Equal variances not assumed			4.167	277.550	.000	3.46000	.84967	1.82546	5.09454

In light of the data presented in Table 7, the post-test results reveal no statistically significant difference in mean scores between male and female learners. These results suggest that no statistically significant variance was discernible in vocabulary learning among male and female learners employing computer-assisted language learning (CALL) applications. Consequently, the study's second null hypothesis was substantiated.

## Discussion

The mean differences of the language learners receiving F2F vocabulary instruction in the pre- and post-test were statistically significant. Likely, the difference between mean scores in pre- and post-test for the language learners receiving a seven-week CALL course was statistically significant. This finding underscores the statistical significance of the mean differences observed in the language learners' performance, both for those who received traditional face-to-face (F2F) vocabulary instruction and those who underwent a seven-week Computer-Assisted Language Learning (CALL) course. In the context of F2F instruction, the statistically significant mean differences between pre-test and post-test scores suggest a discernible improvement in vocabulary learning over the instructional period. Similarly, the implication for learners engaged in the seven-week CALL course is that there is a statistically significant alteration in mean scores between the pre- and post-assessments, indicative of a noteworthy impact on vocabulary proficiency. In essence, this interpretation highlights the efficacy of both instructional approaches in fostering measurable gains in language learners' vocabulary competence. This finding further posits that through the adept deployment of judicious pedagogical strategies, educators can ensure that students can accrue a substantial and efficacious educational encounter, irrespective of the mode of delivery (Hosseini, Dabiri, Kashefian-Naeeni, & Mustapha, 2023)

The present study's findings resonate with a body of prior research, providing a consistent narrative on the positive impact of technology, particularly Computer-Assisted Language Learning (CALL), on vocabulary learning. Abbasi and Hashemi (2013), Kashefian-Naeeni, Hosseini, Dabiri, Rezaei, and Kustati (2023), Naraghizadeh and Barimani (2013), P Thornton and Houser (2003), and Patricia Thornton and Houser (2005) all corroborate that the integration of technology, such as CALL applications, enhances learners' vocabulary learning. Abbasi and Hashemi's (2013) examination of mobile phone use demonstrated a positive influence on vocabulary retention, while (Patricia Thornton & Houser, 2005) observed improved scores among students using SMS in their learning process compared to those receiving traditional paper-based lectures.

Similarly, Naraghizadeh and Barimani's (2013) investigation into the efficacy of CALL in an Iranian EFL context revealed significant differences in vocabulary knowledge between experimental and

control groups, emphasizing the enhancement of lexical proficiency through CALL training. Gorjian, Moosavinia, Ebrahimi Kavari, Asgari, and Hydarei (2011) on asynchronous CALL methods and Talarposhti and Pourgharib (2014) exploration of CALL's impact on vocabulary learning further support the positive outcomes associated with technology integration.

Contributing to the discourse on varied CALL methodologies, Horst, Cobb, and Meara (1998), Jones (1999), and Akbulut (2008) present diverse approaches to technology-enhanced vocabulary learning, reinforcing the idea that well-designed CALL interventions can positively impact language learning. Maftoon, Hamidi, and Sarem's (2015) findings, indicating that specific CALL components did not improve vocabulary learning, add a nuanced perspective, suggesting that the effectiveness of CALL may depend on specific implementation strategies.

In alignment with the gender-neutral findings of the present study, the work of Başöz and Çubukçu (2014), Hewer (2007), and the Indonesian study by Rahimi and Yadollahi (2011) consistently report that the impact of CALL on language learning is not contingent on gender. These collective findings build a robust foundation for advocating the continued exploration and integration of technology in language education, emphasizing its potential to benefit learners regardless of gender.

## ***Conclusion***

The present study's findings highlight the positive impact of Computer-Assisted Language Learning (CALL) instruction on vocabulary learning within the context of Iranian English as a Foreign Language (EFL) learners. The findings suggest that Computer-Assisted Language Learning (CALL) serves as a valuable tool for vocabulary enhancement and holds the potential to address and bridge educational disparities related to gender. The absence of significant performance differences between male and female language learners suggests that CALL instruction provides an equitable learning experience, fostering an inclusive environment where both genders can benefit equally.

In a broader context, these results underscore the importance of embracing technology in language education, recognizing its role as a facilitator for personalized and interactive learning experiences. Integrating CALL strategies into language instruction caters to students' diverse learning preferences and aligns with the demands of our increasingly digitalized world. This study encourages educators, curriculum developers, and policymakers to consider the integration of CALL methodologies as a means to enhance language learning outcomes and promote gender-neutral educational practices. As we navigate the evolving landscape of language education, acknowledging technology's efficacy in language learning becomes paramount for fostering a more inclusive, effective, and adaptive approach to language instruction.

## ***Limitations of the Study***

While the study's implications are noteworthy, certain limitations should be acknowledged. The present investigation exclusively focused on vocabulary learning, suggesting that future research endeavours should broaden their scope to encompass writing, speaking, and listening skills for a more comprehensive understanding. Additionally, the study faced constraints in participant numbers due to the limited availability of learners. This scarcity may affect the broader applicability of the findings. Generalizability is further challenged by potential regional variations in learners' perceptions of the impact of Computer-Assisted Language Learning (CALL) on vocabulary acquisition, limiting the study's representation across diverse areas of the country. Moreover, the research was confined to a single city in Iran, prompting the recommendation for future studies to extend their reach across multiple provinces to enhance the study's robustness and applicability.

## References

- Abbasi, M., & Hashemi, M. (2013). The impact/s of using mobile phone on English language vocabulary retention. *International Research Journal of Applied and Basic Sciences*, 4(3), 541-547.
- Abdollahi-Guilani, M., Yasin, M., & Hua, T. K. (2011). Authenticity of Iranian English textbooks for schools. *ELT Journal*, 1(2), 25-30.
- Afshari, M., Bakar, K. A., Luan, W. S., Samah, B. A., & Fooi, F. S. (2009). Factors affecting teachers' use of information and communication technology. *International journal of instruction*, 2(1).
- Akbulut, Y. (2008). Exploration of the attitudes of freshman foreign language students toward using computers at a Turkish State University. *Online Submission*, 7(1).
- Bagheri, E., Roohani, A., & Ansari, D. N. (2012). Effect of CALL-based and non-CALL-based methods of teaching on L2 vocabulary learning. *Journal of Language Teaching and Research*, 3(4), 744.
- Barani, G. (2013). The impact of computer-assisted language learning (CALL) on vocabulary achievement of Iranian university students EFL learners. *International Journal of Basic Sciences & Applied Research*, 2(5), 531-537.
- Başöz, T., & Çubukçu, F. (2014). Pre-service EFL teacher's attitudes towards computer-assisted language learning (CALL). *Procedia-Social and Behavioral Sciences*, 116, 531-535.
- Beatty, K. (2013). *Teaching & researching: Computer-assisted language learning*: Routledge.
- Boumová, V. (2008). *Traditional vs. modern teaching methods: Advantages and disadvantages of each*. Masarykova univerzita, Filozofická fakulta,
- Çakmak, F., Namaziandost, E., & Kumar, T. (2021). CALL-enhanced L2 vocabulary learning: using spaced exposure through CALL to enhance L2 vocabulary retention. *Education Research International*, 2021, 1-8.
- Carter, R. (1998). Orders of reality: CANCODE, communication, and culture.
- Carter, R., & McCarthy, M. (2014). *Vocabulary and language teaching*: Routledge.
- Celce-Murcia, M. (2002). *Teaching English as a second or foreign language (3rd ed)*. U.S.A: Heinle & Heinle Publishers.
- Chapelle, C. A. (2001). *Computer applications in second language acquisition*: Cambridge University Press.
- Chun, D. M., & Plass, J. L. (1996). Effects of multimedia annotations on vocabulary acquisition. *The Modern Language Journal*, 80(2), 183-198.
- Coady, J., & Huckin, T. (1997). *Second language vocabulary acquisition: A rationale for pedagogy*: Cambridge University Press.
- De Bot, K., Paribakht, T. S., & Wesche, M. B. (1997). Toward a lexical processing model for the study of second language vocabulary acquisition: Evidence from ESL reading. *Studies in second language acquisition*, 309-329.

- Dilek, Y., & Yürük, N. (2013). Using semantic mapping technique in vocabulary teaching at pre-intermediate level. *Procedia-Social and Behavioral Sciences*, 70, 1531-1544.
- Eizadpanah, J., Abedi, A., & Ghaedrahmat, M. (2014). Teaching vocabulary electronically: Does it work for Iranian intermediate EFL learners. *Research Journal of English Language and Literature (RJELAL)*, 2(4), 16-28.
- Ellis, N. C. (1995). The psychology of foreign language vocabulary acquisition: Implications for CALL. *Computer Assisted Language Learning*, 8(2-3), 103-128.
- Emami, A., & Amirghasemi, A. (2022). The Effect of CALL on the Vocabulary Learning of Iranian pre-intermediate EFL Learners. *Applied Linguistic Studies*, 1(1), 70-88.
- Enayati, F., & Gilakjani, A. P. (2020). The Impact of Computer Assisted Language Learning (CALL) on Improving Intermediate EFL Learners' Vocabulary Learning. *International Journal of Language Education*, 4(1), 96-112.
- Freeman, J. (1991). The early development and education of highly able young children. *European Journal of High Ability*, 1(2), 165-171.
- Ghorbani Ashin, Y., Gh, T., & Jahandar, B. (2015). The effectiveness of play therapy on reducing the symptoms of hyperactivity disorder and lack of attention in primary school children. *Development of Jundishapur Education*, 7, 58-53.
- Goodfellow, R. (1994). Design principles for computer-aided vocabulary learning. *Computers & Education*, 23(1), 53-62.
- Goodfellow, R. (1995). A review of the types of CALL programs for vocabulary instruction. *Computer Assisted Language Learning*, 8(2-3), 205-226.
- Gorjian, B., Moosavinia, S. R., Ebrahimi Kavari, K., Asgari, P., & Hydarei, A. (2011). The impact of asynchronous computer-assisted language learning approaches on English as a foreign language high and low achievers' vocabulary retention and recall. *Computer Assisted Language Learning*, 24(5), 383-391.
- Groot, P. J. (2000). Computer-assisted second language vocabulary acquisition.
- Gündüz, N. (2005). Computer-assisted language learning. *Journal of language and linguistic studies*, 1(2), 193-214.
- Hanafiah, W., Aswad, M., Sahib, H., Yassi, A. H., & Mousavi, M. S. (2022). The impact of CALL on vocabulary learning, speaking skill, and foreign language speaking anxiety: the case study of Indonesian EFL learners. *Education Research International*, 2022, 1-13.
- Harley, B. (1996). Introduction: Vocabulary learning and teaching in a second language. *Canadian modern language review*, 53(1), 3-12.
- Hatch, E., & Brown, C. (1995). *Vocabulary, semantics, and language education*: ERIC.

- Hewer, S. (2007). CALL methodology: integrating CALL into study programs. Module 2.1. *Information and communications technology for language teachers (ICT4LT)*. Slough, Thames Vally University. Retrieved from the World Wide Web: <http://www.ict4lt.org/en/en-mod2-1.htm>.
- Hirschel, R., & Fritz, E. (2013). Learning vocabulary: CALL program versus vocabulary notebook. *System*, 41(3), 639-653.
- Horst, M., Cobb, T., & Meara, P. (1998). Beyond a clockwork orange: Acquiring second language vocabulary through reading.
- Hosseini, S. A., Dabiri, A., Kashefian-Naeeni, S., & Mustapha, R. (2023). *A comparison of the level of the ESP language learners' performance and engagement in a synchronous online course and the face-to-face course*. Paper presented at the Forum for Linguistic Studies.
- Hoven, D. (1999). CALL-ing the learner into focus: Towards a learner-centred model for CALL. In: Swets & Zeitlinger.
- Hubbard, P. H. (2009). *Computer-assisted language learning*. USA: Taylor & Francis Group.
- Hulstijn, J. H. (1993). When do foreign-language readers look up the meaning of unfamiliar words? The influence of task and learner variables. *The Modern Language Journal*, 77(2), 139-147.
- Jones, C. (1999). Contextualise & personalise: Key strategies for vocabulary acquisition. *RECALL-HULL*, 11(3), 34-40.
- Jordens, P., & Lalleman, J. (2010). *Investigating second language acquisition* (Vol. 12): Walter de Gruyter.
- Kashefian-Naeeni, S., Hosseini, S. A., Dabiri, A., Rezaei, S., & Kustati, M. (2023). *A comparison of the effects of web-based vocabulary instruction vs. the conventional method on EFL learners' level of L2 lexical knowledge*. Paper presented at the Forum for Linguistic Studies.
- Kaya, T. (2006). *The effectiveness of adaptive computer use for learning vocabulary*: Northern Arizona University.
- Khoshnoud, K., & Karbalaeei, A. R. (2015). The effect of computer-assisted language learning (CALL) program on learning vocabulary among EFL left and right hemispheric dominant learners. *European Online Journal of Natural and Social Sciences*, 4(4), 761.
- Kitajima, R. (2001). The effect of instructional conditions on students' vocabulary retention. *Foreign Language Annals*, 34(5), 470-482.
- Kung, S.-C., & Chuo, T.-W. (2002). Students' perceptions of English learning through ESL/EFL websites. *TESL-EJ*, 6(1), 1-14.
- Laufer, B. (1997). The lexical plight in second language reading. *Second language vocabulary acquisition*, 20-34.
- Laufer, B., & Shmueli, K. (1997). Memorizing new words: Does teaching have anything to do with it? *RELC journal*, 28(1), 89-108.



- Maftoon, P., Hamidi, H., & Sarem, S. N. (2015). The effects of CALL on vocabulary learning: A case of Iranian intermediate EFL learners. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, 3(4), 19-30.
- Mayer, R. E. (2005). *The Cambridge handbook of multimedia learning*: Cambridge university press.
- Naraghizadeh, M., & Barimani, S. (2013). The effect of CALL on the vocabulary learning of Iranian EFL learners. *Journal of Academic and Applied Studies*, 3(8), 1-12.
- Nation, I. (1990). 1990: Teaching and learning vocabulary. New York: Newbury House.
- Nunan, D., & Carter, R. (2001). *The Cambridge guide to teaching English to speakers of other languages*: Cambridge University Press.
- Rahimi, M., & Yadollahi, S. (2011). Computer anxiety and ICT integration in English classes among Iranian EFL teachers. *Procedia Computer Science*, 3, 203-209.
- Shokrpour, N., Mirshekari, Z., & Moslehi, S. (2019). Learning vocabulary electronically: does computer assisted language learning (CALL) instruction have any impacts on Iranian EFL learners? *Cogent Education*, 6(1), 1702827.
- Son, J. (2001). CALL and vocabulary learning: A review. *English Linguistic Science*, 7, 27-35.
- Tabar, H., & Khodareza, M. (2012). The effect of using multimedia on vocabulary learning of pre-intermediate and intermediate Iranian EFL learners. *Journal of Basic and Applied Scientific Research*, 2(12), 12879-12891.
- Talarposhti, A., & Pourgharib, B. (2014). The possible effect of CALL on vocabulary acquisition and instruction. *Journal of Language Sciences & Linguistics*, 2(3), 79-84.
- Teng, F. (2022). Vocabulary learning through videos: captions, advance-organizer strategy, and their combination. *Computer Assisted Language Learning*, 35(3), 518-550.
- Teo, T. (2006). Attitudes toward computers: A study of post-secondary students in Singapore. *Interactive Learning Environments*, 14(1), 17-24.
- Thornton, P., & Houser, C. (2003). Using mobile web and video phones in English language teaching: Projects with Japanese college students. *Directions in CALL: Experience, experiments & evaluation*, 207-224.
- Thornton, P., & Houser, C. (2005). Using mobile phones in English education in Japan. *Journal of computer-assisted learning*, 21(3), 217-228.
- Timuçin, M. (2006). Implementing CALL in an EFL context. *ELT Journal*, 60(3), 262-271.
- Tozcu, A., & Coady, J. (2004). Successful learning of frequent vocabulary through CALL also benefits reading comprehension and speed. *Computer Assisted Language Learning*, 17(5), 473-495.
- Wang, X. (2006). Benefits and drawbacks of computer-assisted language teaching. *Renmin University of China*, 4.

Warschauer, M. (1998). *Electronic literacies: Language, culture, and power in online education*: Routledge.

Wilkins, D. A. (1972). *Linguistics in language teaching*. London: Edward Arnold.

Zimmerman, C. B. (1997). Do reading and interactive vocabulary instruction make a difference? An empirical study. *TESOL Quarterly*, 31(1), 121-140.

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