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Is Technology an Asset? Enhancing EFL Learners' Vocabulary Knowledge and Listening Comprehension through CALL

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Abstract

Technology-enhanced language instruction has attracted researchers' attention in language teaching and learning in recent decades. Accordingly, the present mixed-methods study attempts to investigate the effect of Computer-Assisted Language Learning (CALL) on EFL learners' vocabulary development and listening comprehension. In doing so, 60 intermediate EFL learners were conveniently chosen for the quantitative phase of the study and were divided into one experimental group (n=30) and one control group (n=30). The teacher-researchers taught vocabulary tasks and listening skills to both groups, using computer software for the experimental group and the traditional method for the control group for 10 sessions for 5 weeks straight. To look into the effect of CALL instruction, quantitative methodology was employed. By analyzing the mean scores of the learners' pre-test and post-test, it was revealed that the incorporation of computer software in English Language Teaching (ELT) classes resulted in learners' significant improvement in vocabulary learning and listening comprehension. Then, the qualitative phase of the study began and 24 learners from the same experimental group were invited to semi-structured interviews to share their experiences of CALL classes with the researchers. The qualitative analysis of learners' data manifested two thematic categories: 1) technology is an asset to EFL learners, and 2) technology makes the input more comprehensible. The findings of the study contributed to the conscious use of technology-enhanced instruction through computer and mobile tools to provide an interactive learning atmosphere for EFL learners, and to help them develop language skills and sub-skills, which seems beneficial for both EFL learners and teachers as ubiquitous technology is becoming an inevitable member of teaching and learning community.

Keywords: CALL, computer software, EFL learners, technology

1. Introduction

The eye-catching technological advancement in recent years has bestowed educators with opportunities to utilize technology for pedagogical purposes. As a result, the English language teaching (ELT) context has not been an exception and technology has nearly been ubiquitous in English as a Foreign Language (EFL) classes for quite a while (Novawan et al., 2024). In recent years, significant investments in incorporating technology into foreign language learning and teaching to empower learners in novel ways have been made by instructors (Tahmasbi & Rabani EbrahimiPour, 2023). As the literature suggests, ELT scholars are trying to direct teachers' and learners' attention to consciously use technology in ELT classrooms, and it seems that traditional pedagogy is being replaced by technology-enhanced language instruction (Corbeil, 2007).

Furthermore, employing technologies in the ELT context has been found no less effective than the traditional classroom and the emergence of computer-assisted language learning (CALL) has paved the way for English language learners to experience meaningful interaction with their peers and teachers as well. Besides, Ardoiz Garcıa (2017) considers it important to equip students with educational tools that help them achieve their goals since today's learners are digital natives and are bored of the traditional classrooms/methods without any motivating collaboration (Babakhani & Tabatabaee-Yazdi, 2022).

Nowadays, using CALL tools for EFL learners is widely applicable through computer software, and computer systems can be freely used in language institutes. Learners can individually benefit from such software to study the tasks in a rather different learning setting compared to conventional classrooms. Numerous multimedia experts believe that using multimedia technologies in an ELT setting brings about great advantages (Timucin, 2006). That is why practitioners across the language curricula resort to CALL instruction for innovative language teaching particularly with the advent of modern technologies over the last decade. Some of the apparent advantages of CALL include comprehensible input, assessment of students' responses, feedback, motivation, and interaction (Chen et al., 2024; Dina & Ciornei, 2013; Jung, 2005; Monterde et al., 2022; Shadiev & Yang, 2020).

Notably, CALL was not introduced to ignore the effective role of the classroom interaction taking place in authentic and real-life language settings, yet they suggest facilitative ways to enable EFL and ESL learners to be actively engaged in language learning rather differently (Latt et al., 2007; Yang & Chen, 2007). Students might use CALL programs to study specific tasks of language skills and sub-skills regardless of time and space, which are limited to the classroom setting. They can get involved in active participation in learning a target language through interactive activities and receive spontaneous feedback. Despite the growing interest among scholars in CALL, it can be said that there is a gap between the available literature on the use of computers and technology for L2 teaching purposes and the experience of the actual implementation process in EFL contexts (Timucin, 2006).

1.1 Statement of the Problem

The integration of computer-based instruction does not simply provide the same instruction through a different medium, but rather promotes a transformation of traditional instruction (which was a teacher-centered learning setting), to one that is more student-centered and based on classroom interaction. This requires the introduction of a technology-mediated learning context which is supported by the knowledgeable peer (who is the teacher), and it is the supporter who monitors the classroom interaction, which lies in the role of computer-assisted language learning, and particularly listening comprehension, which might have been taken for granted in CALL instruction. Listening is a crucial and intricate skill, according to Oxford (1993), which encompasses comprehending significant words, phrases, clauses, sentences, and coherent speech. Even in one's native language, developing listening skills can be difficult, let alone in a foreign language (Golchi, 2012).

Additionally, listening anxiety is a common issue that arises when students are faced with an unfamiliar or challenging task, according to Scarcella and Oxford (1992). Young (1992) also emphasized that listening comprehension can be quite nerve-wracking when the discourse is hard to understand. Learners may feel anxious while listening to foreign languages due to the various difficulties associated with foreign language (FL) listening (Astrid et al., 2024). However, previous studies have shown that technology encourages both instructors and students to take an active role in the language-learning process (Zainuddin, 2023), which helps L2 learners overcome overall anxiety in general and listening anxiety in particular.

Moreover, according to Olsen and Kagan (1992), "willingness to cooperate in learning" means that learning tasks and activities are designed to depend on the socially structured exchange of information between learners within a group. Each learner is held accountable for their learning and also motivated to help others increase their learning. Based on the considerations of politicians and educators, twenty-first-century skills require collaborative work abilities and improvement in useful relational communication skills (Babakhani & Tabatabaee-Yazdi, 2022).

Regarding the inadequacy of research on applying CALL in teaching listening comprehension, reducing listening anxiety, and helping learners develop their knowledge of vocabulary from the listening classroom, which seems to have not yet been considered in the literature, the present study aims to shed light on the innovative aspects of CALL by looking into the effect of computer software on the EFL learners' improvement in vocabulary knowledge and listening comprehension; hence, the following research questions could be addressed.

1.2 Research Questions

Considering technology-enhanced language learning, the following questions are addressed in this study:

RQ1. To what extent does using CALL through computer software have any statistically significant effect on the vocabulary learning of intermediate EFL learners?

RQ2. To what extent does using CALL through computer software have any statistically significant effect on the listening comprehension of intermediate EFL learners?

RQ3. How do intermediate EFL learners who have experienced CALL instruction perceive technology-enhanced language learning?

2. Literature Review

2.1 The Evolution of Computer-Assisted Language Learning

Technology and its application in pedagogical environments have always been encouraging for its users, in effect, ELT teachers have been concerned with incorporating technology into language learning and teaching since the 1960s (Warschauer & Healey, 1998). The application of multimedia and technology devices in language instruction resulted in the emergence of computer-assisted language learning or CALL. Warschauer and Healey (1998) presented comprehensive background information regarding the evolution of CALL by highlighting three stages of development including behaviouristic, communicative, and integrative (Barjesteh et al., 2022; Iberahim et al., 2023; Zainuddin, 2023).

As to the behaviouristic perspective, the computer was considered a useful mechanical tutor, which can be used in the language classroom for doing language drills by the learners themselves at an individualized pace. The emergence of microcomputers in the early 1980s led to the appearance of the second philosophy (i.e., communicative CALL) which concentrated on contextual learning. The purpose was to provide an opportunity for language learners to be interactively involved in the process of language learning to be independent of their teachers and rely on their mental power and abilities as emphasized by cognitive theories (Warschauer & Healey, 1998). In other words, by adopting CALL, grammar could be taught implicitly by fostering more communication among EFL learners.

By the early 1990s, teachers were transferred from the communicative view of technology-mediated instruction to a more socio-cognitive view in which language is dynamically applied in authentic social contexts (Warschauer & Healey, 1998). The focus was to use technology tools to help learners improve their language skills by engaging in more collaboration with their peers as well as the teacher. It can be argued that technology has been utilized for pedagogical purposes for over half a century now. Chapelle (2001) maintains that existing technologies and upcoming communication devices have provided a more sophisticated view of Computer-Assisted Language Learning (Barjesteh et al., 2022).

2.2 Computer-Assisted Language Learning Matters

The emergence of CALL has resulted in teachers' adherence to social networking in paving the way for EFL learners to experience meaningful interaction with their peers and the teacher. They further imply that traditional pedagogy is being replaced by technology-enhanced language instruction. In fact, language learning has increasingly benefited from Computer-Assisted Language Learning (CALL) technologies (Chen et al., 2024). As a general rule, technologically enhanced learning environments encourage students to communicate with one another more consistently and provide them with access to teachers and peers located all over the world. There are many different kinds of technology, and each one is employed to accomplish a certain goal. The term "technology" as used here refers to the use of technological procedures, methods, or expertise to accomplish a learning or instructional goal (Iberahim et al., 2023).

According to Radhakrishnan (2017), Technology Enhanced Language Learning (TELL) refers to the use of a computer as a technical innovation to show multimedia as a means of supplementing a teaching and learning method. Meanwhile, TELL is the use of digital technology, including software, hardware, and the internet to enhance language learning by enabling learners to access online dictionaries, online communication, and view global events (Iberahim et al., 2023). Therefore, positive aspects of TELL which students get access to all of the technology that is available

for improving language learning. It is crucial to note that TELL is not a teaching method in and of itself, but rather a strategy that can be utilized in conjunction with a teaching method to enhance in learning process. Utilizing technology as a part of L2 teaching and learning has proven to be an appropriate method for learners. Instructors can model the use of instructional processes to enhance learners' utilization of technology to acquire L2 language skills (Costley, 2014; Zainuddin, 2023). Technology can improve learners' collaboration, which is a vital tool for language learning. By engaging in collaborative activities and practicing the tasks of their peers, learners can work together to improve their language skills (Barjesteh et al., 2022).

In the same vein, Wilson and Stacey (2004) aim to guide the audience to be distant from face-to-face or traditional instruction and transform to the new instructional method in which technology mediates teachers' and learners' interaction. Moreover, compared to traditional classrooms, technology-enhanced language instruction adopts a different discipline through which learners are motivated enough to initiate participation in the classroom since they are the main beneficiaries in this regard.

In an encouraging study to motivate teachers to adopt innovative methods of technological tools, Wilson and Stacey (2004), descriptively measured the effectiveness of applying online interaction in language classrooms. They attempted to direct the readers' attention to the use of online teaching programs which enables the teacher to take advantage of making the class more interactive while giving various types of feedback and providing both teacher's scaffolding and peer support which creates a warm atmosphere in favor of meaningful interaction that is under the umbrella of communicative approaches to language teaching. The researchers argue that faculty staff should be given enough information in terms of applying innovative methods of L2 teaching to attract the learners' attention and motivate them to eagerly go for language learning.

In the same fashion, to investigate the effectiveness of utilizing technology in improving language learning, Ghanizadeh et al. (2015) reviewed various articles on technology-enhanced language learning published between 2004 and 2014. They found out that technology was used in nearly all areas of ELT context and was discovered to be useful in enhancing the quality of input, providing timely and relevant feedback, and making communication authentic. Ghanizadeh et al. (2015) further maintained that technology could support the development of all language skills and sub-skills (i.e., listening, writing, reading, speaking, grammar, vocabulary, and pronunciation). It was also found that the learning environments created by technology utilization were pleasant for EFL learners.

Wu and Li (2024) conducted a comprehensive and theoretically-driven meta-analysis on the effects of technology on L2 acquisition. In doing so, the study reported a meta-analysis from 47 independent studies out of 29 literature samples involving 1791 EFL learners on Robot-Assisted Language Learning (RALL) for language skill development published during 2004–2023. The results indicated that the overall effect size was g = .69, 95% CI [.49, .90], suggesting that RALL outperforms non-RALL conditions. Therefore, technology-based intervention was found to be a significant medium for L2 learners.

Nonetheless, some research (Zhao, 2003; Zhonggen, 2018; Zhou & Wei, 2018) has suggested the negative effects on the well-being of learners from the incessant use of technology (e.g., negative feelings, physical distress, and cognitive effort). Zhonggen (2018) cautioned that if learners keep on using technology for too long, they can feel nervous, which may pose a risk to learning usefulness (Barjesteh et al., 2022).

2.3 Computer-Assisted Vocabulary Instruction

Vocabulary is the foundation of mastering a language, as it consists of the fundamental building blocks of meaning (Yu & Trainin, 2022). Extensive vocabulary can make speaking, listening, reading, and writing smoother and situationally precise which is the key to communicating successfully. Literature has recognized the role of technology in vocabulary instruction (e.g., Barjesteh et al., 2022; Wang, 2016; Zhu et al., 2023), revealing the positive application of computers in paving the way for learners to improve their knowledge of target vocabulary when they were exposed to CALL environment.

According to the dual coding theory by Paivio and Clark (2006), information is encoded through two routes: visual and verbal. While the verbal route encodes linguistic information in all its forms, the visual route encodes images. Overlapping inputs in two routes can improve encoding and retrieval. This is because the referential connections between the two codes allow for operations such as imagining words to reinforce input and accurate retrieval of information (Clark & Paivio, 1991). Moeller et al. (2009) noted that the use of multimedia in teaching addresses individual learning needs. It provides students with opportunities to be exposed to language in multiple modalities, which can increase the speed of L2 learning and enhance vocabulary retention. Dual coding theory supports the use of technology to enhance retrieval by incorporating images, sounds, and print, thereby facilitating L2 vocabulary learning (Yu & Trainin, 2022).

CALL has also been found by Wang's (2016) study to be facilitative in the development of the learners' vocabulary knowledge in which quantitative research was carried out to look into the effect of automatic word recurrence on contextual English as a foreign language vocabulary learning. Seventy Taiwanese college students who were native speakers of Mandarin Chinese studying International Business in their first year included the participants in the study. The desirable data collection instruments were a proficiency test, an online immediate vocabulary test, an online delayed vocabulary test, and a paper-and-pencil system evaluation questionnaire as well as word-meaning recall tasks. The findings of the study revealed that the adaptive computer-assisted EFL reading system resulted in significant improvement in the learners' vocabulary achievements, and learner satisfaction attached importance to personalized learning and word recycling. Results also suggested that language teachers and material developers who are in favor of applying computer technology need to develop effective vocabulary learning programs while considering learners' differences and learning needs. Hence, vocabulary gains took place and learners showed positive attitudes since using computer software could enhance their knowledge of L2 structure. Moreover, it was found that the learners were satisfied with the CALL instruction since it has been a new experience of multimedia learning for them.

2.4 Computer-Assisted Listening Instruction

Language learners may face various challenges during the listening process which can lead to uneasiness and tension, resulting in poor listening (Pebrianto, 2023). According to Young (1992), several factors contribute to poor listening skills such as insufficient emphasis on listening, outdated teaching methodologies, ineffective listening strategies, and students' limited vocabulary. Anxiety has emerged as an increasingly significant factor that plays a crucial role in poor listening, as the anticipation of using a foreign language to receive information can provoke anxiety. Listening anxiety is a common issue that arises when students are faced with an unfamiliar or challenging task, according to Scarcella and Oxford (1992). Young (1992) also emphasized that listening comprehension can be quite nerve-wracking when the discourse is hard to understand. Learners may feel anxious while listening to foreign languages due to the various difficulties associated with foreign language (FL) listening. Listening is a complex and important skill, as defined by Oxford (1993). It involves understanding meaning-bearing words, phrases, clauses, sentences, and connected discourse. Even in one's language, mastering listening can be challenging, let alone in a foreign language (Golchi, 2012; Li, 2023).

Listening is used far more than any other language skill in normal daily life (Celce-Murcia, 1991) and the importance of listening skills cannot be underestimated. She argues that on average, we can expect to listen twice as much as we speak, four times more than we read, and five times more than we write. According to Hedge (2001, p. 228) "of the time an individual is engaged in communication, approximately 9 percent is devoted to writing, 16 percent to reading, 30 percent to speaking, and 45 percent to listening". Moreover, according to Richards and Renandya (2002), some applied linguists argue that listening comprehension is at the core of second language acquisition and therefore demands a much greater prominence in language teaching. Unfortunately, in the traditional listening class, boring activities would certainly make students lose their interests and motives. The teacher would explain some difficult or new words, and then he would give students the correct answer after playing the recording materials several times. Students listen to the materials mechanically. In this sense, the teacher is like a tape-recorder player who needs to push the play and rewind buttons. With such a monotonous teaching method, students' interests would soon fade away. Due to a lack of motivation, interest, and variation in teaching and learning, students easily get bored and take a passive attitude which is a great obstacle for both teaching and students' progress (Dinh, 2022).

Since the success of language learning mainly depends on the learner's attitude, teachers would rather take the listening lesson attractive enough to grip student's attention (Krashen, 1981). While traditional approaches to language teaching tended to underemphasize the importance of teaching listening comprehension, more recent approaches emphasize the role of listening in building up language competence (Richards & Rodgers, 2014), and suggest that more attention should be paid to teaching listening, especially, in the initial stages of second or foreign language learning. Teaching such a crucial skill through CALL has significantly been highlighted in the literature (e.g., Li, 2023; Mahmudah & Nuraida, 2022; Pebrianto, 2023; Pirasteh 2014; Wang, 2016), demonstrating the positive effect of computer software to assist learners in improving their listening skill and build up language competence.

It seems that CALL learning tools can pave the way for the learners to experience online language learning in which they receive the feedback online, which creates a rather different learning environment and on the other more conveniently engages in classroom interaction through these tools. CALL language teaching appears to be a supplementary tool, applied by the teacher, to promote the learners' interaction and motivate the learners to enthusiastically interact with their peers since today's students can be easily in touch with the technology and they may find it more interesting in teaching and learning. With technological improvement, the globalization of

communication, and the increase of the Internet to embrace social networks, traditional instructional practice is replaced by technology.

In sum, technology-enhanced instruction has facilitated language instruction through the introduction of CALL as an effective tool to mediate the language learning process, reach improvement in the quality of instruction, and help learners engage in active and interactive learning environments. Therefore, the present study aims to consider to what extent incorporating CALL into teaching vocabulary and listening comprehension could pave the way for language learners to face possible improvement in vocabulary learning and listening comprehension ability.

3. Methodology

3.1 Participants

For the quantitative phase of the study, regarding the efficiency of computer software on vocabulary development and listening comprehension ability of L2 learners, 60 intermediate EFL learners (i.e., 24 male and 36 female) were randomly chosen from a private English language institute situated in Amol city, Mazandaran province of Iran. The random selection of the participants prevented the uneven distribution of potential confounding variables between the groups, which would affect the internal validity of the study. Randomized selection and assignment have major implications for probabilistic generalization from a study's results (Balance, 2024). Initially, the participants' homogeneity was checked through their scores gained from the records of the institute where they were studying. Besides, all the participants were between the age range of 18 to 25 to see how young EFL learners would respond to technology-enhanced instruction. It should also be noted that the participants were divided into one experimental group (n=30) and one control group (n=30) to compare their scores in the case of the effectiveness of instruction through technology on their vocabulary learning and listening comprehension ability.

For the qualitative phase of the study, 30 intermediate EFL learners from the same experimental group were kindly invited to join the study for semi-structured interviews. Hopefully, 24 of them (i.e., 14 female & and 10 male) agreed to participate in the study entirely voluntarily to explain and share their experiences of technology-enhanced language instruction and its effects on their vocabulary knowledge and listening comprehension with the researchers of the study. Their ages ranged from 19 to 24 (M=22.31, SD=1.42). All the attendees were reassured that the data obtained from them would be merely used for the sake of research and academic purposes, and their personal information would be kept entirely confidential.

3.2 Design

The present study is based on concurrent design (i.e., mixed-methods) whereby the quantitative data and qualitative data are collected and analyzed separately but at approximately the same time. Initially, to prevent the uneven distribution of potential confounding variables between the groups which can affect the internal validity of the study, the participants were randomly selected and the homogeneity of the selected learners was checked through the records of the institute where they were doing their General English Course. Then, the quantitative phase of the study commenced, and the vocabulary pre-test, as well as the listening comprehension pre-test, were given to the participants to check their initial ability in vocabulary knowledge and listening comprehension. Then, those participants assigned as the experimental group were given vocabulary and listening instruction through computer software, trying to provide opportunities for the learners to be interactively involved in the listening instruction and simultaneously master the vocabulary that emerged within the listening tasks. Finally, the experimental group and the control group (receiving no CALL instruction) took the vocabulary and listening post-test to investigate the effect of technology-enhanced instruction through computer software on the so-called language sub-skill and skill. Later, the qualitative phase commenced and the EFL learners of the experimental group were invited to semi-structured interviews to explain and share their experiences of technology-enhanced language learning with the researchers of the study.

3.3 Instruments

The following instruments were used for the quantitative phase of the study to conduct a data collection procedure concerning the purpose of the study. For the qualitative phase, interviews were run.

3.3.1 Listening Comprehension Pre-Test and Post-Test

To check the learners' initial listening comprehension ability, they took the listening pre-test, which was adopted from the Cambridge Key English Test (KET). It contained 25 listening comprehension items with various formats, including multiple-choice, fill-in-the-blanks, and matching questions. Before the administration of the test, the reliability coefficient of the listening test was found to be 0.74 using the KR-21 formula. In this regard, a pilot study was conducted with the participation of 5 intermediate students from a private institute with similar characteristics to the participants of the present study to check test score consistency (Table 1). The teacher-researchers provided

sufficient explanations regarding the test and how they were expected to answer the items. The participants were given 30 minutes to do the pre-test, which was played for the testees twice. Similarly, another version of KET was used as the post-test to check the effect of treatment sessions of technology-enhanced instruction through computer software on the learners' listening comprehension ability. The number of items as well as the formats were the same as the pre-test.

3.3.2 Vocabulary Pre-Test and Post-Test

The researcher-made vocabulary pre-test was taken by the participants before the treatment. The pre-test was based on the course syllable content. It was in the form of 1multiple-choice questions to check their initial knowledge of the target vocabulary. Similar to the pre-test, the researcher-made vocabulary post-test was used to look into the effectiveness of the treatment sessions of CALL instruction. The post-test served as a measurement of the student's progress after the treatment. Notably, the post-test items were the same as the pre-test with some small changes in the order of the questions and replacing the responses. As to the reliability coefficient of the vocabulary test, a pilot study was conducted with the participation of 5 intermediate students (from a private institute with similar characteristics to the participants of the present study) to check test score consistency. The Reliability coefficient was found to be 0.78 for the pretest and 0.76 for the post-test (using the KR-21 formula), which appeared to be reasonable values in terms of consistency of scores as highlighted in Farhady, Jafarpour, and Birjandi (1994). The reliability of the pre-tests and post-tests are shown in Table 1.

Table 1. The reliability of listening comprehension and vocabulary test

Test		N	Mean	SD	Variance	Reliability
Listening	pretest	5	7.2	2.86	8.2	0.74
	posttest	5	8.3	2.88	8.3	0.79
Vocabulary	pretest	5	7.9	2.69	7.9	0.78
	posttest	5	7.8	2.79	8.1	0.76

3.3.3 Language-learning Software

Rosetta Stone is a language-learning software produced by Rosetta Stone, Ltd. The *Rosetta Stone Software* utilizes a combination of images, texts, and sounds to teach various vocabulary terms, listening skills, and grammatical functions intuitively without drills or translation, and the difficulty levels increase as the language learner progresses. Instruction takes the form of a unit of lessons consisting of ten groups of four images each, with an associated word or sentence both written and spoken aloud by a native speaker of the language. Lesson topics range from grammatical concepts such as verb tense to specific topics. Within each lesson, there are sets of exercises testing vocabulary and listening comprehension (for which the computer must have a speaker and a microphone). The user is offered either text, sound, or image and later, video, to match the four possibilities. With a mark chosen by the reader from the preferences menu, the program indicates whether the right or wrong choice has been selected.

3.3.4 Interview

To deeply look into the efficiency of computer software on vocabulary development and listening comprehension ability of L2 learners, semi-structured interviews were arranged and utilized. According to Klassen et al. (2012), open-ended questions and the responses received could produce qualitative data that are rich in detail and would provide in-depth data that goes beyond ordinary quantitative data. The interview questions of this study were prepared and arranged in a top-down manner beginning with general ideas and experiences, and then continuing to more specific and detailed notions, regarding how participants felt, what they practiced, and what they experienced in technology-based classes. One obvious advantage of this method is that the researcher formulates questions before the interview meetings so that the conversation can be smooth and have direction to avoid loss of focus. To equally obtain answers from the participants, the researcher asked the same questions from all of the participants.

As Lindlof (1995, p. 172) maintains, "By asking the same questions of all participants in the same order, the researcher minimizes interviewer effects and achieves greater efficiency of information gathering" (Gilbert & Stoneman, 2015). In addition, the content validity of the interview questions was verified by three experts who are seasoned enough to conduct research studies in Teaching English as a Foreign Language (TEFL). As Klassen et al. (2012) declare, experts in the field can serve to establish content validity for questionnaires. Each question had an acceptable universal

agreement of .81 or above (Polit & Beck, 2006). The interview sessions were run in a face-to-face manner at a language institute center located in Amol, Iran. The researchers met each of the individuals in a separate meeting in which general prompt questions were asked allowing participants to verbalize their perceptions, attitudes, beliefs, emotions, and experiences. Besides, the interview sessions were held in the interviewees' native language (i.e., Persian) to make verbalization more relaxed and more comfortable in a less stressed atmosphere.

3.4 Procedures

The present study benefited from mixed methodology to look into the learners' possible improvement in vocabulary learning and listening comprehension as a result of being exposed to the CALL environment (i.e., The Rosetta Stone Software). The participants of the study, who were doing their General English Course, received vocabulary input and listening instruction through computer software to help them master these language skills and sub-skill. Before initiating the treatment sessions, participants took the vocabulary and listening comprehension pre-tests to check their initial ability in the knowledge of vocabulary and listening comprehension. It is noteworthy that the reliability of the vocabulary tests was checked by a pilot study with the participation of similar students. After the pre-tests, the participants received CALL instruction through computer software to experience a fairly varied educational environment. Learners were provided with computer software slides full of vocabulary and listening tasks to raise their knowledge interactively.

Before being exposed to listening instruction, target vocabularies related to the listening tasks were also taught by the teacher-researcher to help the learners develop their understanding of target words. Vocabulary instruction was done before the learners' comprehension of listening tasks by asking various questions and making related examples. In this way, learners were exposed to a conscious understanding of the vocabularies as they were asked to apply them in their sentences. After exposure to 10 two-hour sessions of CALL instruction for 5 weeks, the participants took the required post-tests to examine the effectiveness of treatment sessions on their vocabulary learning and listening comprehension. It should be also mentioned that the participants in the control group underwent normal conventional classroom sessions in which the learners experienced no technology-enhanced learning environment and the same teacher offered the same treatment conventionally.

Secondly, the qualitative phase commenced and was based on the interpretations of the data obtained through 24-fifteen-minute interviews with the EFL learners of the same experimental group, which took 32 days to fulfill. In this regard, all the participants were separately invited to attend an interview session, at their best convenience, in the same language institute in which they had undergone CALL instruction (located in Amol city in Mazandaran Province, Iran). Those invited participants who missed the meetings were offered a second chance to be interviewed online via Skype– an easy and user-friendly application specifically used for video calling. Each interview session, whether in person or virtual, lasted for nearly 15 minutes on average. Following greetings, each interview began with a short announcement of the objectives of the current study to assist interviewees in discerning what was going on and feeling more comfortable (Isaee & Barjesteh, 2023). Then, general questions were asked which would naturally lead to more specific ones. All the interview sessions were entirely audio-recorded for further analysis.

Great care was taken by the researchers to offer as much time as needed to the respondents to freely express or reiterate their ideas, opinions, and feelings without unnecessary interruptions. To make verbalization more relaxed and in a less stressful atmosphere, the interview sessions were held in the interviewees' native language (i.e., Persian). Later, the recorded interviews were transcribed and translated into English by one of the researchers (i.e., Associate Professor Hamed Barjesteh). As some errors might probably occur during the translation process, this phase was considered a challenging issue since the meanings of the original messages could be distorted; however, every line was double-checked to ensure that there were no inconsistencies between the recorded message and the translated message. Then, the transcripts were carefully read several times by the researchers to aid them in becoming sufficiently familiar with the content of the data. Finally, through principles of conformability, dependability, credibility, and transferability, essential precautions were taken to ensure the trustworthiness of the data.

3.5 Data Analysis

To analyze the data, quantitative methodology as well as qualitative methodology were adopted. Unlike secondary data in which the data are collected from other sources (e.g., articles, publications, websites, and books), the data collected for this study is known as primary data (Ary et al., 2019), which were gathered by the researchers themselves. In the current study, the first-hand primary data were obtained through pre-test, post-test, and interviews.

Initially, the data obtained through pre-test and post-test were subjected to statistical analysis (i.e., descriptive and inferential statistics) through SPSS version 22, to find the effectiveness of CALL instruction on the EFL learners'

vocabulary and listening comprehension improvement. Besides, a series of paired sample t-tests were employed to compare the experimental group's performance to the control group, on the pre-test and post-test.

Secondly, the qualitative data obtained from the interview sessions were thematically analyzed via the Nvivo Application to make sure that all the important aspects of the data were captured. The creation of themes is a crucial process where important and recurring points are derived from the transcribed texts concerning the research objectives (Terry et al., 2017). The interview transcripts of this study underwent five steps: 1) getting sufficiently familiar with the information, 2) open coding, axial coding, and selective coding, 3) identifying themes, 4) naming and defining themes, and 5) getting the paper reports. It is worth mentioning that during open coding, meaning-carrying and significant parts of the transcripts were coded and when plausible, groups of codes were assigned as a category. During axial coding, meaningful connections between the categories were established. And at last, during selective coding, a unified category of the EFL learners' perceptions of technology-based classes was achieved. Each research question of the study has been investigated separately, and the results have been tabulated in 10 Tables. To facilitate a grasp of the data, two figures are also depicted as follows.

4. Results

4.1 Quantitative Data Analysis

Initially, the normal distribution of the quantitative data was checked to determine the p-values, regarding the pre-test and post-test of both the experimental and control groups, which is shown in Table 2 below.

Table 2. Normal distribution of learners' vocabulary learning and listening comprehension

Test	Groups		Shapiro-Wilk		
			Statistic	df	Sig.
Pretest	Experimental	Vocabulary	.945	30	.152
		Listening	.830	30	.188
	Control	Vocabulary	.882	30	.077
		Listening	.907	30	.057
Posttest	Experimental	Vocabulary	.788	30	.072
		Listening	.912	30	.091
	Control	Vocabulary	.932	30	.249
		Listening	.963	30	.358

As shown in the table above, the p-values of the experimental group's vocabulary learning are .152 and .072 regarding the pre-test and post-test, respectively. Moreover, the same values for the listening comprehension pre-test and post-test of the experimental group are .188 and .091. Additionally, the p-values for the pre-test and post-test of the control group's vocabulary are .077 and .249, and for listening comprehension are .057 and .358, respectively. It can be inferred that the p-values for the experimental and control groups are more than .05 (i.e., $p>.05$), indicating the normal distribution of the data.

4.1.1 Investigation of the First Research Question

4.1.1.1 Descriptive Statistics

The first research question took into account the effect of applying CALL on the learners' vocabulary learning. To investigate the effect of treatment on the experimental group's vocabulary learning (i.e., the first research question of the study), descriptive statistics were employed which are depicted in Table 3 below.

Table 3. Descriptive statistics for the experimental group's vocabulary learning

Test	Mean	N	Std. Deviation	Std. Error Mean
Pretest	28.5632	30	4.54621	1.01204
Posttest	34.1524	30	7.01354	1.99574

As shown in Table 3, the learners' vocabulary knowledge increased from the pre-test (*M*=28.56) to the post-test (*M*=34.15), which reveals that teaching English through computer software resulted in the learners' vocabulary improvement (i.e., mean difference= -5.58). To gain a better understanding of the effect of CALL in L2 vocabulary learning, the mean scores of the pretest and post-test of the control group's vocabulary learning, who underwent conventional classes, are also shown in the following table.

Table 4. Descriptive statistics for the control group's vocabulary learning

Test	Mean	N	Std. Deviation	Std. Error Mean
Pretest	27.5923	30	4.59874	1.01652
Posttest	28.0000	30	4.89234	1.90245

As shown in Table 4, the learners' vocabulary knowledge increased from the pre-test (*M*=27.59) to the post-test (*M*=28.00), and the nuisance amount of the mean difference (i.e., *MD*=-0.407) reveals that the conventional method of teaching vocabulary did not have any great effect on learners' vocabulary improvement compared to the experimental group. To facilitate a grasp of the data, they are visually represented in Figure 1.

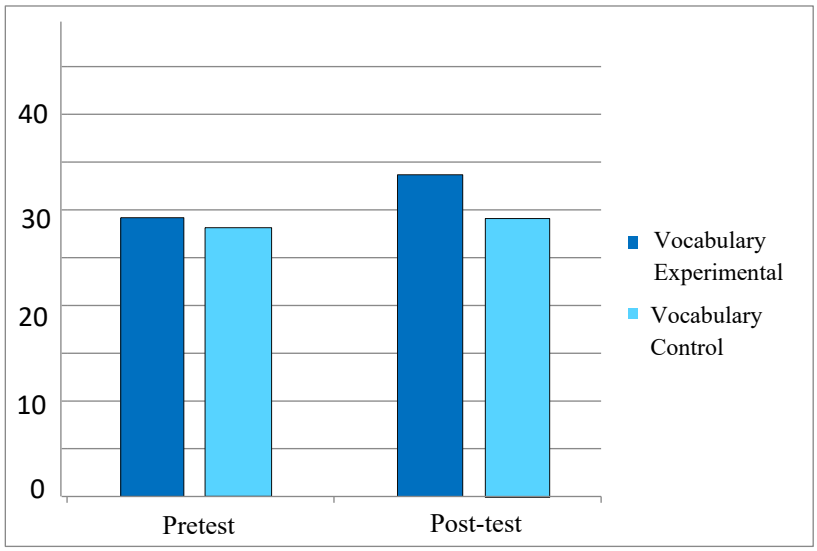

Figure 1. Mean scores of the pretest and post-test of both groups

4.1.1.2 Inferential Statistics

To inferentially take into account the experimental group's performance on the pre-test and post-test of vocabulary learning, a paired sample t-test was conducted the results of which are shown in Table 5 below.

Table 5. Paired-Sample T-test for the experimental group's vocabulary learning

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pretest - Posttest	-5.5892	3.19624	.83215	-7.99776	-3.24461	-6.211	29	.000

The result of the paired sample t-test in Table 5 indicates that the significance level is less than .05 (p= .000<.05, df= 29, t= -6.21), which denotes a significant difference between the learners' vocabulary learning on the pre-test and post-test (mean difference= -5.58). Therefore, it can be concluded that CALL through computer software could pave the way for the learners to improve their vocabulary knowledge. In addition, the same inferential statistics for the control group were run and the result of the paired sample t-test are shown in Table 6.

Table 6. Paired-Samples T-test for the control group's vocabulary learning

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pretest - Posttest	-0.4077	4.7455	1.459	-6.82733	2.34321	-5.324	29	.509

The result of the paired sample t-test in Table 6 reveals that the significance level is more than .05 (p= .509>.05, df= 29, t= -5.32), which denotes there is no statistically significant discrepancy between the control group's vocabulary learning on the pre-test and post-test (*MD*=-.407). Therefore, it could be concluded that the conventional method of teaching vocabulary did not have any significantly different effect on the vocabulary improvement of the control group, compared to the experimental group.

4.1.2 Investigation of the Second Research Question

4.1.2.1 Descriptive Statistics

The second research question of the study looked into the effect of using computer software on the learners' listening comprehension ability. To do so, quantitative measures of the pre-test and post-test scores were calculated through SPSS statistical software which are shown in Table 7 below.

Table 7. Descriptive statistics for the experimental group's listening comprehension

Test	Mean	N	Std. Deviation	Std. Error Mean
Pretest	29.0000	30	4.84162	1.0234
Posttest	36.1221	30	3.34579	.79324

Table 7 reveals that the experimental group's listening comprehension scores increased from the pre-test (*M*=29.00) to the post-test (*M*=36.12), which demonstrates that technology-enhanced instruction through computer software can pave the way for L2 learners to improve their listening comprehension ability (i.e., MD=-7.12), and to compare the obtained results of the experimental group with the mean scores of the control group's listening comprehension improvement, another table is provided and explained as follows.

Table 8. Descriptive statistics for the control group's listening comprehension

Test	Mean	N	Std. Deviation	Std. Error Mean
Pretest	28.2000	30	5.50980	1.23203
Posttest	28.3000	30	4.92470	1.10120

Table 8 reveals that the control group's listening comprehension scores increased from the pre-test (*M*=28.20) to the post-test (*M*=28.30), which demonstrates partial improvement of the learners who underwent conventional classes (*MD*=-0.10) compared to the experimental group (*MD*=-7.12). To facilitate a grasp of the data, they are visually represented in Figure 2.

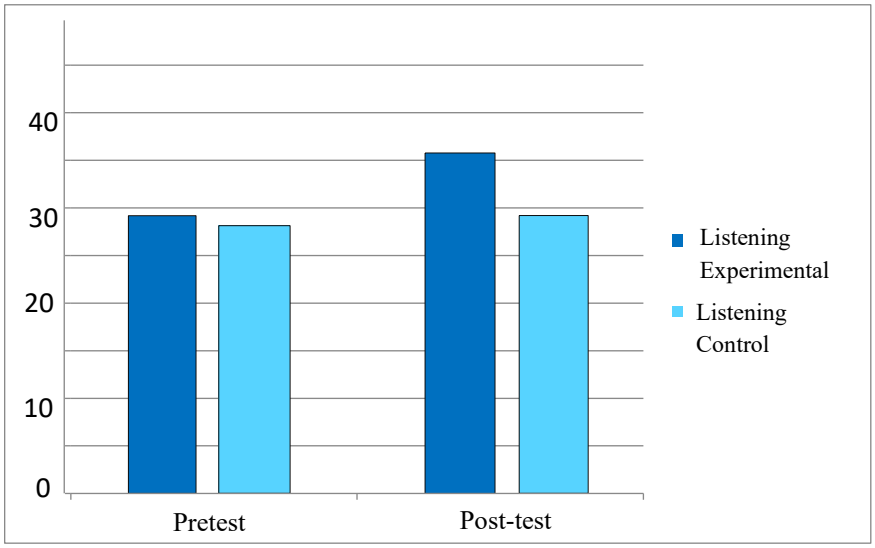

Figure 2. Mean scores of listening comprehensions of both groups

4.1.2.2 Inferential Statistics

Following the descriptive analysis of the data regarding listening comprehension pre-test and post-test of the experimental group, inferential analysis of data is provided in the next Tables.

Table 9. Paired-Samples T-test for the listening comprehension of the experimental group

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pretest - Posttest	-7.1221	1.79823	.53647	-6.10352	-4.24933	-5.261	29	.000

As observed in Table 9, the paired sample t-test shows that the level of significance is less than .05 (p= .000<.05, df= 29, t= -5.26), highlighting the significant differences in the learners' mean scores of listening comprehensions for the experimental group (*MD*=-7.12). Therefore, it can be concluded that using technology-enhanced instruction through computer software improved the learners' listening comprehension ability. In addition, for a better grasp of data, the same inferential statistics for the control group were run and the results of the paired sample t-test are shown in Table 10 below.

Table 10. Paired-Samples T-test for the listening comprehension of the control group

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pretest - Posttest	-.1000	5.21822	1.1655	-6.63111	-5.31822	-8.862	29	.066

The result of paired sample t-test in Table 10 reveals that the significance level is more than .05 (p= .066>.05, df= 29, t= -8.86), which denotes there is no statistically significant difference between the control group's listening comprehension improvement on the pre-test and post-test (mean difference= -.1000). Therefore, it can be concluded that the conventional method of teaching listening comprehension did not have any statistically significant effect on listening improvement of the control group, compared to the experimental group.

In sum, the findings of the study revealed that the experimental group's knowledge of vocabulary and listening comprehension had significantly been affected by CALL through computer software. In this regard, the experimental group's EFL learners were invited to semi-structured interviews to share their experiences of technology-based classes with the researchers, and the obtained qualitative data were analyzed and discussed as follows.

5.2 Qualitative Data Analysis

5.2.1 Investigation of the Third Research Question

The third research question of the study screened the perceptions of 24 members of the experimental group of the study (i.e., the same EFL learners who received the treatment in the first phase of the study) to find out how young EFL learners perceived and experienced technology-enhanced language instruction through computer software. In effect, the translated-into-English transcripts of the interview sessions underwent three stages: 1) open coding, 2) axial coding, and 3) selective coding. During open coding, meaning-carrying and significant parts of the transcripts were coded and when plausible, groups of codes were assigned as a category. During axial coding, meaningful connections between the categories were established. And at last, during selective coding, two unified categories of the EFL learners' perceptions of technology-enhanced language instruction were achieved: 1) technology is an asset to EFL learners, and 2) technology makes the input more comprehensible. The emerged thematic categories are explained below and a few extracts have been provided for clarification as follows:

5.2.1.1 Technology is an Asset to EFL Learners

The improvement of technology is constantly changing all the different aspects of human life as well as English language teaching contexts all over the world. Technology has brought changes in both pedagogical applications and student's learning styles in recent decades (Mazman & Usluel, 2010). Technology, availability of numerous applications and software, and internet access, are used as supplements to conventional classroom teaching and this has encouraged educators to explore its use in a variety of ways. As a result, several new approaches to the teaching and learning process have resulted from the blending of pedagogy and technology with many different combinations of computer software, media, learning design, and teaching strategies (Stacey & Gerbic, 2007).

There is no doubt that utilizing technology and CALL instruction in the ELT context is beneficial since the majority of the participants (n=22) believed that it was the most effective strategy for improving their vocabulary knowledge and enhancing their listening comprehension ability. The participatory EFL learners also believed that the environment which was equipped with technology supplied the possibility of getting more familiar with various applications, software, and platforms for the first time. Overall, the learners' data analysis manifested that utilizing technology in EFL classes is a crucial asset to learners. The following extracts reveal the EFL learners' perceptions accordingly:

Extract 1.

To be frank, it was my first experience of computer-assisted language learning. It was noble, encouraging, and motivating. For the first time, sorry to say that, I got rid of my textbooks. I know that the new generation doesn't prefer traditional approaches. Hopefully, I had the chance to experience a new method. It was great. After some sessions, the software helped me learn a lot of new terms and my vocabulary knowledge amazingly increased. I have also improved a lot in my listening comprehension skills. I could listen to the audio files as many times as I wished. I also had the chance to read the audio scripts simultaneously. I wish I had managed to combine technology with my language learning much earlier. Technology is amazing, it is an asset to us all.

Extract 2.

I am always the first volunteer when it comes to technology. I cannot imagine a world without computers, laptops, or mobile phones. I am really happy that I am living in the era of technology. The language classes I attended during the last 5 weeks were amazing. The computer software was easy to use. It was kind of user-friendly and simple. My listening comprehension ability and vocabulary knowledge improved a lot, and I was satisfied when I saw my final scores (i.e., posttest). From my point of view, technology and technological devices must be employed in our language classes to help us become more competent in all language main skills and sub-skills. We had better say goodbye to traditional methods. Technology, in my idea, is a useful, permanent, and helpful partner.

Extract 3.

Well, technology-enhanced language instruction. I like the name. It is unfair if I don't confess how much I have improved! To me, listening skills sounded the most difficult part of language learning. I used to evade my listening tasks. It was a nightmare! I was too weak in learning new words as well because I have a poor memory. Thanks to this study and being a part of it, I changed my attitude completely. Now, I do believe that I can overcome each burden in my L2 career with the help of technology. Frankly, I feel ashamed to say I even didn't know there was such supportive software. I will use and benefit from technology-enhanced instruction from now on. Who doesn't like a new method of L2 education replete with collaboration, motivation, and engagement?!

5.2.1.2 Technology Makes the Input More Comprehensible

The new generation of students does not know the world without new technologies, and lives, works, and studies in technology-rich cultures and prefers new ways of quick and efficient learning. They even demand information in new and often challenging ways like requiring information access, immediate feedback, engaging in multi-tasking, and being connected to others (Black, 2010).

Nearly, all of the interviewed EFL learners (n=20) believed that CALL through computer software paved the way for them to improve their vocabulary knowledge and listening skills more simply compared to traditional classes, as the input seemed more comprehensible to them than ever before. The reason is that the computer software made listening skills digestible for learners in two ways: 1) at the word level the EFL learners need practice in hearing and saying the sounds of isolated words as a native speaker ideally pronounces them without the distortions or blurs which commonly occur within the context of natural speech, and 2) at sentence level in which the length of the utterance is either the phrase or sentence, and every day and spontaneous speech becomes easier for learners. Moreover, a reduction made by the software in the syntactic complexity of the input played a significant role in its comprehension for the learners. The following extracts reveal the EFL learners' perceptions accordingly:

Extract 4.

From my point of view, listening skill is the most difficult aspect of language learning for us EFL learners. The computer software that was used in my recent classes helped me a great deal. At first, the new words were pronounced several times and some related pictures were shown on the screen, so I could understand and learn the words much better. Then, some related questions were played and I had to guess the correct answer among some given alternatives, and I received instant feedback, which was great. Later, the listening file was played and I could, again and again, hear the new words while listening. I think the software controlled everything. I am sure that it began from easy words and sentences, and then, little by little, moved to hard ones.

Extract 5.

It has been four years since I started attending English classes as I am interested in picking up languages, both methods, either new or traditional ds interesting to me. But there is one thing that I can't ignore. This time, during the last 5 weeks, our class was different. I could see that my classmates felt more relaxed than ever before. It was obvious that they were enjoying the new method or, as you said, technology-enhanced language instruction. The input, I mean the new words and the listening tasks, were somewhat easier than before, and more comprehensible if I am right. I believe that technology must be permanently used in our classes. We, I mean my classmates and I, have decided to discuss the issue with the head-principle of the institute.

Extract 6.

I would say that computer software, mobile phone applications, and online platforms can be positively applied in the language classroom to direct the EFL learner's attention to the tasks provided by the teacher. In this study, as you know, I was a member of the experimental group and I completely understood how and to what extent technology can pave the way for us, L2 learners, to master language skills and sub-skills. I believe that technology-enhanced instruction could serve English language teaching and learning contexts, and this is beneficial to both learners and teachers. The computer software that was used in our classes (Rosetta Stone) is designed and programmed perfectly, and it uses specific techniques and strategies that make English language learning easier, simpler, and more enjoyable. Additionally, participating EFL learners also declared that during technology-enhanced language instruction, the teachers monitored their activities and they benefited a lot from peer communication. They also testified that the utilization of listening and speaking tasks made learners feel more motivated to take an active role in the classroom collaboratively and communicatively.

5. Discussion

The present mixed-method study was an attempt to investigate the effectiveness of CALL instruction through computer software on EFL learners' vocabulary learning and listening comprehension ability. As to the quantitative

findings of the study aiming to measure the pre-test and post-test scores of the learners in the experimental and control groups, it was found that the experimental group significantly outperformed the control group after the treatment sessions, testifying that technology-enhanced instruction was quite successful in helping the learners to improve their vocabulary knowledge and listening comprehension ability. In other words, the experimental group, who was taught through technology instruction, benefited a lot from Rosetta Stone language-learning software in comparison with the control group who underwent the conventional method of teaching listening comprehension and vocabulary learning without the mediation of technology. Hence, the findings of the study to a large extent revealed that technology-enhanced instruction could serve to teach language skills within a communicative context. The present study found empirical support to those of Alves et al. (2017), Babakhani and Tabatabaee-Yazdi (2022), Diaz and Ngoc (2014), Maggio et al. (2018), Safdari (2022), Tahmasbi and Rabani EbrahimiPour (2023), Yang and Chen (2007), Zhou and Wei (2018) who attempted to attract the scholars' attention in benefiting from technology-enhanced instruction to pave the way for L2 learners to engage in an interactive learning environment.

Qualitative analysis of the EFL learners' (i.e., the experimental group) semi-structured interviews through grounded theory and the categorization of the data manifested two components: 1) technology is an asset to EFL learners, and 2) technology makes the input more comprehensible. The interview results revealed a relatively strong alignment between the EFL learners' perceptions of technology-based classes since all the interviewed participants of the experimental group were satisfied with CALL instruction through computer software. They also acknowledged that during technology-enhanced language instruction, the teachers monitored their activities and they benefited a lot from peer communication. They also testified that the utilization of listening and speaking tasks made learners feel more motivated to take an active role in the classroom collaboratively and communicatively; therefore, congruity between the quantitative and qualitative data is salient. The two aforementioned manifested categories are discussed as follows.

Technology is constantly changing all the different aspects of human life and the English language teaching context is not an exception. Over the last few decades, there have been significant changes in teaching methods and the way students learn (Mazman & Usluel, 2010). The present generation of students has grown up with technology and is used to its incorporation in all aspects of their lives, including education. Consequently, they prefer fast, easy, and efficient ways of gaining knowledge. They even demand information in new and often challenging ways like requiring information access, immediate feedback, engaging in multi-tasking, and being connected to others (Black, 2010). Numerous applications and software are used as supplements to conventional classroom teaching which help EFL learners digest the arduous aspects of L2. in a variety of ways. As a result, several new approaches have emerged from the blending of pedagogy and technology with many different combinations of computer software, media, learning design, and teaching strategies (Stacey & Gerbic, 2007).

To add more value concerning the effectiveness of CALL instruction, Nutta (2013) and Wang (2016) urged language teachers to take advantage of the practical and effective application of computer software in providing an interactive learning atmosphere for the teachers and learners to have more meaningful cooperation (Warschauer & Healey, 1998), which ultimately leads to success in the language learning process. As studied by Zurita and Nussbaum (2004), computers can be positively applied in the language classroom to direct the learners' attention to the tasks provided by the teacher, assisting the teacher to smoothly follow the plans through computer software.

The findings of the study were also in alignment with some studies done by other ELT scholars (e.g., Babakhani & Tabatabaee-Yazdi, 2022: Barjesteh et al., 2022; Corbeil, 2007; Ghanizadeh et al., 2015; Isaee & Barjesteh, 2023, Safdari, 2022; Shadiev & Yang, 2020; Wilson & Stacey, 2004; Zhou & Wei, 2018) who concentrated on the positive effect of employing technology to improvement learners' language skills. Moreover, Chapelle (2001) argues that CALL seems to provide a more facilitative learning setting through which learners can easily access the teachers' tasks and do them on their own, which positively insists on distant education through which learners are involved in learning in a stress-free environment and at the same time receiving teacher and peer support. The findings of the study manifested high satisfaction of EFL learners regarding technology-based language learning as nearly all of them testified that CALL through computer software facilitated their involvement in an interactive learning context where they benefited from both teachers and peers.

6. Conclusion

The present study was conducted to investigate the effect of CALL instruction through computer software on language learners' vocabulary learning and listening comprehension ability. It was found that the language learners in the experimental group significantly outperformed the control group, denoting that computer software tasks assisted learners, to a great deal, in improving their vocabulary knowledge and listening comprehension ability which helped them experience positive emotions in the FL classroom.

6.1 Implications of the Study

The findings of the study contributed to the fact that English language teaching through computers should be productively applied as an appropriate methodology which seems to be beneficial for both learners and teachers. Furthermore, by being taught by technological devices, learners can overcome their listening difficulties since they are exposed to an interactive learning environment in which they seem to be more interested in enhancing their comprehension. In addition, such techniques can enhance learners' motivation as technology-enhanced instruction seems to pave the way for them to have more interaction with their peers as well as the teacher (Safdari, 2021); however, learners' proficiency levels also need to be considered during learning processes supported by technology. Moreover, EFL teachers and learners in particular, and all teaching and learning communities in general should be trained in technology to build up digital competency (Isaee & Barjesteh, 2023). The educational community, including curriculum designers, researchers, and instructors, can utilize these findings to improve the planning, design, and presentation of materials, creating more efficient and meaningful learning environments. As a result, learners can experience a supportive, friendly, and positively competitive learning context.

All in all, technology plays a significant role in our daily lives, especially in the field of second language teaching and learning. It has created new learning environments for both teachers and students, which can result in better and more efficient learning outcomes. This study has identified both the advantages and challenges of technology-enhanced language learning. This indicates that as technology continues to evolve and users become more proficient, more effective technology-based second language learning systems will emerge as a valuable strategic tool in the future. However, certain challenges come with implementing technology-based instruction. Students may become too reliant on the system's assistance and misuse it for language learning. Therefore, it's crucial to supervise technology-based instruction throughout the learning process. This approach promotes conversational interaction between teachers and students, makes the teaching and learning process more student-centered, enhances learners' willingness to learn a second language efficiently, and makes them more comfortable in the language-learning process. According to this study, technology in classrooms enables teachers to use a diverse range of teaching strategies and methods, and it motivates students to develop an interest in learning a language. As a result, this paper's implications apply to all teachers and students who intend to incorporate technology into their classrooms and provide an interactive teaching/learning approach.

6.2 Limitations of the Study

The conducted study is not exhaustive and has some limitations. One limit is related to the relatively small number of subjects which prevents full generalization of the findings; hence, caution must be taken in interpreting the observed results. In addition, the study only investigated the effect of CALL instruction on vocabulary learning and listening comprehension ability of EFL learners and other skills and sub-skills have due to the design of the study been ignored which in turn demands further investigations; therefore, conducting similar studies or replicating this project in other contexts with other dependent variables and individuals (especially the middle-aged and elderly EFL learners) may generate different results. Undoubtedly, by accumulating and meta-analyzing the findings of such studies, it might be possible to make more confident decisions regarding the way technology can be applied to L2 education. Finally, some external factors that might influence participants' performance (e.g., their exposure to English outside of the classroom, motivation levels, or prior experience with language learning software), have not been taken care of in this study. Addressing such factors and their potential influence on the results would strengthen the study's credibility and generalizability.

Overall, EFL and ESL teachers are always seeking noble and productive ways to foster communicative learning settings in teaching language skills and sub-skills, and technology-enhanced language instruction sounds have the potential and potency to assist them in fulfilling their goals by involving learners in the communicative context of learning. A single experimental study aims to decide if an intervention has a measurable effect on learners. A single study is not enough evidence for changing practice, but, once a field accumulates enough studies, a meta-analysis can provide adequate evidence for the efficacy of an approach.

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References

Alves, P., Miranda, L., & Morais, C. (2017). The influence of virtual learning environments on students' performance. *Universal Journal of Educational Research, 5*(3), 517-527. https://doi.org/10.13189/ujer.2017.050325

Ary, D. et al. (2019). *Introduction to research in education* (10th ed.). Wadsworth: Cengage Learning.

Astrid, A., Khodijah, N., Zuhdiyah, Z., & Yuliyanti, A. Y. (2024). Students listening anxiety factors and solutions: Multiple case studies. *Studies in English Language and Education, 11*(1). https://jurnal.usk.ac.id/SiELE/article/view/30976

Babakhani, A., & Tabatabaee-Yazdi, M. (2022). Digital game-based activities as a predictive power of Iranian EFL learners' willingness to communicate and cooperate. *IJREE, 7*(4), 95-104. http://ijreeonline.com/article-1-743-en.html

Ballance, O. J. (2024). Sampling and randomization in experimental and quasi-experimental CALL studies: Issues and recommendations for design, reporting, review, and interpretation. *ReCALL, 36*(1), 58-71. doi: https://doi.org/10.1017/S0958344023000162

Barjesteh, H., Movafaghardestani, E., & Modaberi, A. (2022). COVID-19's impact on digitalization of education: Incorporating visual vocabulary learning application to foster vocabulary knowledge. *Asian Education and Development Studies, 11*(1), 172-187. https://doi.org/10.1108/AEDS-05-2020-0111

Black, A. (2010). Gen Y: Who they are and how they learn. *Educational Horizons, 88*(2), 92-101. https://www.jstor.org/stable/42923795

Celce-Murcia, M. (1991). Grammar pedagogy in second and foreign language teaching. *TESOL Quarterly, 25*(3), 459-480. https://doi.org/10.2307/3586980

Chapelle, C. (2001). *Computer applications for second language acquisition: Foundations for teaching, testing, and research*. Cambridge University Press.

Chen, B., Bao, L., Zhang, R., Zhang, J., Liu, F., Wang, S., & Li, M. (2024). A multi-strategy computer-assisted EFL writing learning system with deep learning incorporated and its effects on learning: A writing feedback perspective. *Journal of Educational Computing Research, 61*(8), 60-102. https://doi.org/10.1177/07356331231189294

Clark, J. M., & Paivio, A. (1991). Dual coding theory and education. *Educational Psychology Review, 3*(3), 149–210. https://doi.org/10.1007/BF01320076

Corbeil, G. (2007). Can PowerPoint presentations effectively replace textbooks and blackboards for teaching grammar? Do students find them an effective learning tool? *CALICO Journal, 24*(3), 631-656. https://www.jstor.org/stable/24147981

Costley, K. C. (2014). *The positive effects of technology on teaching and student learning*. Arkansas Tech University.

Diaz, M. K., & Ngoc, T. H. (2014). Corrective feedback in the context of online English teaching. *IEEE Conference on e-Learning, e-Management, and e-Services (IC3e),* 36-39. doi: 10.1109/IC3e.2014.7081238

Dina, A. T., & Ciornei, S. I. (2013). The advantages and disadvantages of computer-assisted language learning and teaching for foreign languages. *Procedia-Social and Behavioral Sciences, 76*, 248-252. https://doi.org/10.1016/j.sbspro.2013.04.107

Dinh, D. T. (2022). The effects of technology-assisted listening practice on MOODLE on English-majored freshmen's listening proficiency. *European Journal of English Language Teaching, 7*(5), 57-77. https://oapub.org/edu/index.php/ejel/article/view/4453

Farhady, H., Jafarpour, A., & Birjandi, P. (1994). *Testing language skills.* SAMT Publications.

Ghanizadeh, A., Razavi, A., & Jahedizadeh, S. (2015). Technology-enhanced language learning (TELL): A review of resources and upshots. *Int. Lett. Chem. Phys. Astron. 54*, 73. https://web.archive.org/web/20221215234449id_/https://www.academicoa.com/ILCPA.54.73.pdf

Gilbert, N., & Stoneman, P. (Eds.). (2015). *Researching social life*. Sage.

Golchi, M. M. (2012). Listening anxiety and its relationship with listening strategy use and listening comprehension among Iranian IELTS learners. *International Journal of English Linguistics, 2*(4), 115. http://dx.doi.org/10.5539/ijel.v2n4p115

Hedge, T. (2001). *Teaching and learning in the language classroom* (Vol. 106). Oxford University Press.

Iberahim, A., Yunus, M. M., & Sulaiman, N. A. (2023). A review on technology-enhanced language learning (TELL). *International Journal of Academic Research in Business and Social Sciences, 13*(2), 1509-1519. doi:10.6007/IJARBSS/v13-i2/16496

Isaee, H., & Barjesteh, H. (2023a). EFL teachers' professional development needs: A comparative phenomenological analysis for face-to-face and online instruction. *Journal of Studies in Learning and Teaching English, 12*(2), 45-56. https://sanad.iau.ir/Journal/jslte/Article/911473

Isaee, H., & Barjesteh, H. (2023b). Screening EFL teachers' and learners' perceptions of emergency remote teaching during COVID-19 pandemic: A comparative analysis. *Human Areanas* https://link.springer.com/article/10.1007/s42087-023-00353-7

Jung, H. J. (2005). Advantages and disadvantages of opportunities in call classroom environments. *The Reading Matrix, 5*(1), 57-72. https://readingmatrix.com/articles/jung/article.pdf

Klassen, A. C., Creswell, J., Plano Clark, V. L., Smith, K. C., & Meissner, H. I. (2012). Best practices in mixed methods for quality-of-life research. *Quality of Life Research, 21*, 377-380. https://link.springer.com/article/10.1007/s11136-012-0122-x

Krashen, S. (1981). Second language acquisition. *Second Language Learning, 3*(7), 19-39.

Latt, M. D., Lally, V., Lipponen, L., & Simons, R. J. (2007). Online teaching in networked learning communities: A multi-method approach to studying the le of teacher. *Instructional Science, 35*, 257-286. https://link.springer.com/article/10.1007/s11251-006-9007-0

Li, R. (2023). Effects of mobile-assisted language learning on EFL learners' listening skill development. *Educational Technology & Society, 26*(2), 36-49. https://www.jstor.org/stable/48720994

Lindlof, T. R. (1995). *Qualitative communication research methods*. Thousand Oaks, CA: Sage.

Maggio, L. A., Daley, B. J., Pratt, D. D., & Torre, D. M. (2018). Honoring thyself in the transition to online teaching. *Academic Medicine, 93*(8), 1129-1134. https://doi.org/10.1097/ACM.0000000000002285

Mahmudah, F., & Nuraida, R. (2022). The influence of computer-assisted language learning on students listening skills. *JR-ELT (Journal of Research in English Language Teaching), 6*(2), 85-90. doi: https://doi.org/10.30631/jr-elt.v6i2.33

Mazman, S. G., & Usluel, Y. K. (2010). Modeling educational usage of Facebook. *Computers & Education, 55*(2), 444-453. doi: 10.1016/j.compedu.2010.02.008

Moeller, A. K., Ketsman, O., & Masmaliyeva, L. (2009). The essentials of vocabulary teaching: From theory to practice. *Diverse by Design*, 1. https://digitalcommons.unl.edu/teachlearnfacpub/171/

Monterde, R. B., E., Ramos, D. B., A Francisco, K. J., & Lim, R. (2022). The viability of video conferencing applications in an online classroom through the lens of the technology acceptance model. *International Journal of Research in English Education, 7*(3), 1-15. http://ijreeonline.com/article-1-660-en.html

Novawan, A., Walker, S. A., & Ikeda, O. (2024). The new face of technology-enhanced language learning (TELL) with artificial intelligence (AI): Teacher perspectives, practices, and challenges. *Journal of English in Academic and Professional Communication, 10*(1), 1-18. https://publikasi.polije.ac.id/index.php/jeapco/article/download/4565/2458

Nutta, J. (2013). Is computer-based grammar instruction as effective as teacher-directed grammar instruction for teaching L2 structures? *CALICO Journal*, *16*(1), 49-62. https://www.jstor.org/stable/24147822

Olsen, R. E. W. B., & Kagan, S. (1992). About cooperative learning. In C. Kessler (Ed.). *Cooperative language learning: A teacher's resource book* (pp. 1-30). Englewood Cliffs, NJ: Prentice Hall.

Oxford, L. R. (1993). Research update on teaching L2 listening. *System, 21*(2), 205-211. http://dx.doi.org/10.1016/0346-251X(93)90042-F

Paivio, A., & Clark, J. M. (2006). Dual coding theory and education. *Pathways to literacy achievement for high poverty children*, 1-20.

Pebrianto, S. Y. (2023). *The implementation of computer-assisted language learning in teaching listening for students with visual impairment at SLB A'Aisyiyah Ponorogo* (Doctoral dissertation, IAIN Ponorogo). http://etheses.iainponorogo.ac.id/id/eprint/25047

Pirasteh, P. (2014). The Effectiveness of computer-assisted language learning (CALL) on learning grammar by Iranian EFL learners. *Procedia-Social and Behavioral Sciences, 98*, 1422-1427. https://doi.org/10.1016/j.sbspro.2014.03.561

Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure you know what's being reported? Critique and recommendations. *Research in Nursing & Health, 29*(5), 489-497. https://doi.org/10.1002/nur.20147

Radhakrishnan, J. (2017). Strategies for technology-enhanced language learning in language classes. *International Journal of Interdisciplinary Research in Arts and Humanities, 2*(1), 162–165. https://doi.org/10.5281/zenodo.545982

Richards, J. C., & Renandya, W. A. (Eds.). (2002). *Methodology in language teaching: An anthology of current practice.* Cambridge University Press.

Richards, J. C., & Rodgers, T. S. (2014). *Approaches and methods in language teaching*. Cambridge University Press.

Safdari, S. (2021). Operationalizing L2 motivational self-system: Improving EFL learners' motivation through a vision enhancement program. *Language Teaching Research, 25*(2), 282-305. https://doi.org/10.1177/1362168819846597

Safdari, S. (2022). Experiencing virtual online classes during the pandemic: Foregrounding Iranian EFL teachers' and learners' voices. *International Journal of Research in English Education, 7*(3), 46-57. http://ijreeonline.com/article-1-674-en.html

Scarcella, R. C., & Oxford, R. L. (1992). *The tapestry of language learning: The individual in the communicative classroom*. Heinle & Heinle.

Shadiev, R., & Yang, M. (2020). Review of studies on technology-enhanced language learning and teaching. *Sustainability, 12*(2), 524. https://doi.org/10.3390/su12020524

Stacey, E., & Gerbie, P. (2007). Teaching for blended learning :Research perspectives from on-campus and distance students. *Education Information Technology, 12*, 165–174. https://link.springer.com/article/10.1007/s10639-007-9037-5

Tahmasbi S., & Rabani EbrahimiPour, K. (2023). The effect of mobile-assisted flipped learning on Iranian EFL learners' cohesive devices improvement in writing. *IJREE, 8*(2), 82-95. http://ijreeonline.com/article-1-779-en.html

Terry, G., Hayfield, N., Clarke, V., Braun, V. (2017). Thematic analysis. In: Willig C, Stainton Rogers W, editors. *The sage handbook of qualitative research in psychology*. 2nd ed. London: Sage, p. 17–37.

Timucin, M. (2006). Implementing CALL in an EFL context. *ELT Journal, 60*(3), 262-271. https://doi.org/10.1093/elt/ccl006

Wang, Y. H. (2016). Promoting contextual vocabulary learning through an adaptive computer-assisted EFL reading system. *Journal of Computer Assisted Learning, 32*(4), 291-303. https://doi.org/10.1111/jcal.12132

Warschauer, M., & Healey, D. (1998). Computers and language learning: An overview. *Language Teaching, 31*, 57-71.

Wilson, G., & Stacey, E. (2004). Online interaction impacts on learning: Teaching the teachers to teach online. *Australian Journal of Educational Technology, 20*(1), 33-48. https://doi.org/10.14742/ajet.1366

Wu, X., & Li, R. (2024). Effects of robot-assisted language learning on English-as-a-foreign-language skill development. *Journal of Educational Computing Research*. https://doi.org/10.1177/07356331231226171

Yang, S. C., & Chen, Y. J. (2007). Technology-enhanced language learning: A case study. *Computers in Human Behavior, 23*(1), 860-879. https://doi.org/10.1016/j.chb.2006.02.015

Young, D. J. (1992). Language anxiety from the foreign language specialist's perspective: Interactive with Krashen, Omaggio Hadley, Terrell, and Rubin. *Foreign Language Annuals, 25*(2), 157-172. http://dx.doi.org/10.1111/j.1944-9720.1992.tb00524.x

Yu, A., & Trainin, G. (2022). A meta-analysis examining technology-assisted L2 vocabulary learning. *ReCALL, 34*(2), 235-252. doi:10.1017/S0958344021000239

Zainuddin, N. (2023). Technology-enhanced language learning research trends and practices: A systematic review (2020-2022). *Electronic Journal of e-Learning, 21*(2), 69-79. https://doi.org/10.34190/ejel.21.2.2835

Zhao, Y. (2003). A comprehensive review of research on technology uses in language education. *The CALICO Journal, 21*(1), 7–27. https://www.jstor.org/stable/24149478

Zhonggen, Y. (2018). Differences in serious game-aided and traditional English vocabulary acquisition. *Computer Education, 127*, 214–232. https://doi.org/10.1016/j.compedu.2018.07.014

Zhou, K., Jin, F., Li, W., Song, Z., Huang, X., & Lin, C. H. (2024). The design of technology-enhanced vocabulary learning: A systematic review. *Education and Information Technologies, 1-23.* https://doi.org/10.1007/s10639-023-12423-y

Zhou, Y., & Wei, M. (2018). Strategies in technology-enhanced language learning. *Studies in Second Language Learning and Teaching, 8*(2), 471-495. https://files.eric.ed.gov/fulltext/EJ1183997.pdf

Zhu, T., Zhang, Y., & Irwin, D. (2023). Second and foreign language vocabulary learning through digital reading: A meta-analysis. *Education and Information Technologies,* 1-33. https://doi.org/10.1007/s10639-023-11969-1

Zurita, G., & Nussbaum, M. (2004). A constructivist mobile learning environment supported by a wireless handheld network. *Journal of Computer-assisted Learning, 20*(4), 235-243. https://doi.org/10.1111/j.1365-2729.2004.00089.x