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An Account of EFL learners' Vocabulary Learning in a Mobile-Assisted Language Environment: The Case of Rosetta Stone Application

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Abstract

The present study investigates the potential of using the CALL-based platform of Rosetta Stone application and Mall-based platform of Rosetta Stone application for teaching English vocabularies to EFL learners. The current study was carried out on a sample of 60 male Iranian language learners within the age range of 15 to 25 in a private English language institute. Then, they were divided into three groups including technological-based groups (CALL-based group and MALL-based group) and a Classroom-based group (no technology integration). Technological-based groups learned vocabularies through Rosetta stone applications by their mobile and personal computer. On the other hand, the Classroom-based group learned vocabulary via the teacher-fronted platform. One-way analysis of covariance was utilized to compare the mean scores of the three groups. Also paired samples t-test was used to compare the pretest and posttest scores of each group. The results of the present study demonstrated that technological-based groups significantly outperformed the classroom-based group. Also, the findings of this study showed that statistically it could be concluded that the PC-based learning group's development in terms of vocabulary knowledge was indeed better than those of the mobile-based learning group and classroom-based learning group. Overall, the findings of the study supported the effects of technology on learning vocabulary among foreign language learners.

Keywords: CALL, MALL, Rosetta Stone Application, Technology, Vocabulary

Introduction

Nowadays, technology is seen in every aspect of people's lives, and language learning is no exception to the ever-growing pace of technological integration into mainstream education (Nickerson, 2020). In effect, the vast use of technology-mediated instruction has recently paved the way for language learners to use the diverse potentials of different affordances of technology to learn different languages (Şad, Yakar, & Öztürk, 2020; Wang, & Chen, 2020). There are different methods of using technology to teach language components, among these different ways and platforms two platforms have gained more attention over the others, namely; Computer-based platform and Mobile-based platform (Ko, 2019; Li, Cummins, & Deng, 2017; Rosell-Aguilar, 2018).

The first platform which received the scholars' attention long before the emergent of Mobile-Assisted language learning is a Computer-based platform also known as Computer-Assisted Language Learning (CALL) which mainly focuses on the use of computers, specifically desktop application for the learning of different language components. However, this study was intended to use the desktop version of the Rosetta Stone application for teaching English vocabulary items. On the other hand, we have another popular type of technology-mediated instruction called mobile-assisted language learning also known as MALL which mainly deals with the use of mobile-based instruction for teaching different components of the English language. Therefore, we also compared the impact of the mobile-based platform of Rosetta Stone application on the learning of English vocabulary items with that of a computer-based approach.

In the last decade, the trend of mobile-based technologies, specifically mobile phones, in teaching-learning contexts based on technological developments in information and communication technologies (ICT) has provided a special prospect to plan the learning process differently and to strengthen students' learning experience. (Jiang, Li, Han, & Yang, 2019).

This, in turn, has led to a rich propagation of research in the mobile learning (hereafter termed m-learning) domain to understand the prerequisites to the integration of mobile technologies in the field of education, particularly foreign language teaching and learning (Chen, Chen, & Yang, 2019; Ko, 2019; Pegrum, 2019; Wrigglesworth, 2020).

Regarding the Iranian EFL context, the teaching of English vocabulary items may not have witnessed unique methods for teaching English vocabulary. To be more specific, the teaching methods intended to improve the Iranian EFL learner's vocabulary knowledge is not very much concerned with the use of technology-mediated instruction, especially EFL teachers in the context of Iran still follow the traditional ways of teaching vocabularies (Mansouri, & Mashhadi Heidar, 2019; Namaziandost, Rezvani & Polemikou, 2020; Shokrpour, Mirshekari, Moslehi, & Popescu, 2019).

Consequently, that is why the researchers put forth the idea of investigating the impact of technology-mediated instruction on the learning of English vocabulary items for Iranian EFL learners.

Consequently, seeing the need to fill the research gap felt to exist concerning the role of technology-mediated instruction in improving L2 learners' vocabulary knowledge in the context of Iran, this study aimed to explore whether the use of desktop and mobile-based platforms of Rosetta Stone application had any significant effects on improving Iranian EFL students' vocabulary knowledge. This study also aimed at investigating whether there was a significant difference between using Mobile-based and Computer-based platforms of Rosetta Stone application regarding the improvement of Iranian EFL students' vocabulary knowledge.

Given this short introduction, this study aimed at comparing two platforms of technology-mediated instruction namely Mobile-based and Computer-based platforms of Rosetta Stone application in improving the Iranian EFL student's vocabulary knowledge.

Nowadays, the importance of technology-mediated instruction on learning different language components cannot be neglected. According to the literature, technology-mediated instruction is comprised of many components, including Computer Assisted Language Learning (CALL), Mobile Assisted Language Learning (MALL), and Web-based language learning and alike. The focus of the current study was on investigating the potential of using the CALL-based platform of Rosetta Stone application and Mall-based platform of Rosetta Stone application for teaching English vocabularies to EFL learners. In other words, the researchers intended to make a comparison between the two different versions of the Rosetta Stone application provided by a Computer-based platform and a Mobile-based platform in teaching English vocabularies.

The importance of this research lies in the fact that regarding utilizing technology for teaching English vocabularies there have been a few if any, studies conducted in the Iranian EFL context. To add to that, after reviewing the literature the researchers came up with the understanding that few studies compared different technology-mediated instruction platforms let alone the comparison of Mobile-based and Desktop-based technology-enhanced instruction. Therefore, the researchers intended to conduct the study and draw further attention to the importance of integrating technology with conventional teaching methods. Moreover, having the literature reviewed, it turned out that having technology-mediated instruction integrated with conventional teaching-learning context for teaching foreign languages can be efficacious. Therefore, to shed some light on the efficiency of utilizing CALL and Mall in the EFL context of Iran, the researchers believe that this study may be an attempt to pave the way for further related investigations to have a better view of using everyday technologies in language learning contexts.

Research Questions

The following research questions were formulated to address the objectives of the study:

1. Do different technology platforms of Rosetta Stone have a significant impact on improving the Iranian EFL learners' vocabulary knowledge?
2. Is there any difference between MALL-based and CALL-based platforms of Rosetta Stone application in promoting Iranian EFL learners' vocabulary knowledge?

Research Null-Hypotheses

Based on our research questions, the following null research hypotheses were suggested:

H01: The application of different technology platforms of Rosetta Stone has a significant impact on improving the Iranian EFL learners' vocabulary knowledge and has no differential impact on promoting Iranian EFL learners' vocabulary knowledge**.**
H02: There is no difference between Mall-based and Call-based platforms of Rosetta Stone application in promoting Iranian EFL learners' vocabulary knowledge.

Review of Literature

For many learners studying English as a foreign language, vocabulary retention is considered a time-consuming process. Learners find it hard to memorize the intended vocabulary items for a long-term period. To eradicate the problem, Computer-Assisted Language Learning (CALL) systems often use computers to engage learners more in the learning process. CALL as a multidimensional computer tool has been practiced by language teachers to facilitate learning and teaching processes (Cummins, 2008).

In recent years, the rapid evolution of Information and Communication Technology (ICT) has made great changes in societies and education. The internet, particularly, has become a useful tool for communication, a venue for experiencing different cultures, and a mediator in diverse political, social, and economic situations. Along with the impact of the Internet worldwide, the extensive use of computers at schools has had a great influence on educational environments (Pöntinen, & Räty-Záborszky, 2020).

MALL (Mobile Assisted Language Learning)

M-learning or as it referred to mostly, Mobile learning is a sub-branch of E-learning and it is more concerned with the use of mobile phones to learn nevertheless, in the domain of mobile learning there is no consensus on the exact kind of devices which can be regarded as a mobile device. A wide range of devices has been introduced from laptop and tablet PCs to PDAs and cell phones (Liu, 2020). However, for this study, we mainly focused on the use of mobile phones. After reviewing the literature related to the domain of mobile learning, we did find some interesting works maintaining the efficiency of MALL in language learning.

MALL and Vocabulary Learning

One attempt was made by Thornton and Houser (2004, 2005). In their study which was an attempt to teach English to 44 EFL Japanese learners in a university setting, they applied mobile phone's e-mail affordance. To meet this end, one hundred-word English email vocabulary lessons along with their Japanese equivalents were sent three times a day to the students' mobile phones at scheduled intervals (i.e., 9:00 a.m., 12:00 p.m., and 5:00 p.m.). They offered the vocabulary items in different settings. The students' performance was later accessed through a post-study quiz to scrutinize their development as a result of the investigation. The results of the first stage of the project revealed the effectiveness of L2 vocabulary lessons through mobile phone e-mail. Furthermore, in the second stage of the study, the learning outcomes of those who participated in the mobile phone's e-mail vocabulary study were compared with other students' who were using identical materials on paper or the Web. The outcomes indicated that the students

receiving mobile e-mail vocabulary lessons had learned more than their counterparts on paper or the Web (Thornton & Houser, 2005).

Studies like the one conducted by Stockwell (2008) on the prominence of the intention to use mobile platforms, as a language learning tool in completing vocabulary learning activities, have paved the way for many other studies. Stockwell (2008) conducted his work with 75 first-year Japanese students of English at Waseda University to determine their intentions to use mobile platform, as a language learning tool in completing their vocabulary learning activities, while the other platform (i.e., desktop computer) was available. System databases were identical for both the mobile and PC platforms unless the PC version of the materials could be accessed, given that the Internet access was at hand on stationary locations where the PC was placed. In contrast, the mobile version of the database was downloadable everywhere through the Web function of the Internet-capable cell-phone. The survey results specified that, despite the low use of mobile phones compared to PC, over two-thirds of the learners who participated in this survey rated the system positively and were eager to use a mobile phone in their language learning practices in short or long periods. The feasibility of using MALL-based learning for teaching vocabulary to EFL students has also been investigated by Taki and Khazaei (2011). They concluded that mobile learning could be regarded as an efficacious way to teach vocabulary.

Alavinia and Qoitassi (2013) investigated the essential impact of applying MALL-operated vocabulary instruction techniques on the process of vocabulary acquisition. To this end, they selected 40 elementary learners (all females) studying at the Iran Language Institute (Mohabad branch, Iran). And to tap their data, they used a variety of instruments including questionnaires, interviews, and a multiple-choice vocabulary test. The result of this study indicated that treatment through the application of mobile-assisted vocabulary learning had been quite effective in improving learners' vocabulary acquisition. In the same vein, Hayati, Jalilifar, and Mashhadi (2013) reported positive outcomes in favor of SMS-affordance of MALL in terms of delivering English idioms to EFL learners.

In another study conducted by Wu (2014) the effectiveness of smartphones on helping ESL college students to learn English vocabulary was investigated. The focus of this study was on a JAVA application (Word Learning) software program containing 852 English words. This researcher-developed application presented each word in a graphic diagram with seven features which are spelling, pronunciation, meaning in the Chinese language, synonym, antonym, part of speech, and using it in example sentences. The researcher conducted the study with the help of 50 participants who were equally divided into an experimental group and a control group. A pre-test and post-test were given to learners to measure the impacts. The findings of the investigation revealed that the learners receiving treatment in the experimental group outperformed those in the control group significantly.

Similarly, Suwantarathip and Orawiwatnakul (2015) conducted a study to scrutinize the application of mobile-assisted exercises to support students' vocabulary skill development. The researchers did examine the effects of mobile-assisted vocabulary exercises on the vocabulary acquisition of 80 students. They were from two sections enrolled in a fundamental English course participated in the study. The participants then were divided into two groups with 40 students for each group attended the sessions. All learners were exposed to the same amount of new words and dictation in class. Then only the members of the experimental group did vocabulary exercises on mobile phones via

SMS. Those in the control group received paper-based exercises to be done in class. The results of the statistical analysis indicated that the vocabulary knowledge of students in the experimental group outperformed the control group. They used and learned target vocabulary better than those in the control group. Moreover, mobile-assisted vocabulary exercises had a significant effect on the vocabulary ability of the students.

In the same vein, the use of the mobile learning approach in the Iranian EFL context has been investigated by Dashtestani (2016). The findings of his study indicated that Iranian EFL students are generally positive about mobile learning and the use of mobile devices for learning EFL. He outlined the benefits of implementing MALL in the Iranian context as (1) opportunities for ubiquitous learning, (2) access to the internet, (3) use of multimedia in the classroom, and (4) portability.

Some scholars attempted to scrutinize the application of mobile-assisted exercises to support students' vocabulary skill development (Chen et al., 2019). This study focused on an English vocabulary learning app with a self-regulated learning mechanism (EVLAPP-SRLM) to provide learners with an opportunity to help improve their SRL abilities, to improve their learning performance and motivation in a mobile learning context. A total of 46 Grade 5 students were selected from two classes in an elementary school in Taoyuan City, Taiwan, to participate in the study. The two classes were randomly divided into experimental or control groups, which used, separately, the EVLAPP-SRLM and the English vocabulary learning app without a self-regulated learning mechanism (EVLAPP-NSRLM) to develop their English vocabulary learning throughout two weeks. The findings of this study revealed that the learners in the experimental group exhibited significantly greater learning performance and motivation than those in the control group. Additionally, the learners who utilized EVLAPP-SRLM showed significantly better learning performance and motivation than those who applied EVLAPP-NSRLM.

Wrigglesworth (2020) carried out a study to examine the process whereby university English language learners engage in student-oriented communicative tasks on a Multimedia Messaging Systems (MMS) platform accessed through their smartphones. Applying a sociocultural theory, the researcher found that learners successfully engaged in these tasks and that they perceived them useful as language learning activities.

CALL (Computer Assisted Language Learning)

One of the ways which could help the learner to encounter few problems in the future is to find a way by which the learner takes responsibility for his/her learning. Since the 1980s, CALL software applications have tended to shift the focus of control from the computer to the learner. Later generations of CALL viewed the computer as a tool controlled by the learner rather than an expert controlled environment for the learner (Warschauer, & Kern, 2000).

The impact of those changes in education is increasingly evident and teachers are becoming more familiar with terms such as education technology, science and technology, Internet, hypermedia, multimedia, satellites, simulation, educational games, electronic networks, new methods of generation and transmission of visual and graphic information, virtual library, CALL and computer sciences applied to education (Hubbard & Levy, 2006). The use of these terms shows the changing nature of the educational environment which is a vital part of the new world order that has started to trigger the modernization

of the teaching-learning process and has consequently started to modify the way the educational system works (Son, 2008).

CALL is a language learning and teaching approach in which the computer is used as a tool for presentation, assisting students, and evaluating material, and has an interactional element. CALL as a multidimensional computer tool has been practiced by language teachers to facilitate learning and teaching processes (Cummins, 2008). From the beginning until today, the effectiveness of various CALL materials has been dependent on pedagogical designs and the way teachers use these materials. When computers are appropriately used, they will improve the learning process in different ways (Warschauer & Healey, 1998). In parallel to advances in technology, computer and instructional technologies are becoming an indispensable part of the learning and teaching processes.

Similarly, Golonka and Frank (2014) reviewed over 350 studies (including classroom-based technologies, individual study tools, network-based social computing, and mobile and portable devices) to examine the effectiveness of technology use in a foreign language (FL) learning and teaching. The results of their study indicated that technology made a measurable impact on foreign language learning.

CALL and Vocabulary Learning

There is been a much wide interest in scrutinizing the effect of Computer Assisted Language Learning on developing EFL student's vocabulary knowledge. The way to develop vocabulary has witnessed tremendous CALL-mediated innovative contributions.

In one study conducted by Gorjian, Moosavinia, Ebrahimi, Asgari & Hydarei (2011), the impact of asynchronous computer-assisted language learning approaches on English as a foreign language high and low achievers' vocabulary retention and recall were scrutinized. Following their research design, the researchers carried out their study with the help of 40 female and 10 male students ranging from 18 to 47 years old. They bifurcated the participants into two high and low achievers based upon the median score that divided the proficiency test scores into two parts. In line with their study, they provided both groups with eight expository passages, which included Select readings: Pre-intermediate and intermediate course books developed by Bernard and Lee (Bernard, & Lee, 2004). Select readings: Pre-intermediate. Oxford: Oxford University Press). Later on, a delayed post-test was administered as an indicator of the long-term effect of the experience. The results obtained throughout this study revealed that the difference between the two groups was significant in terms of retaining vocabulary in the immediate post-test (retention) and delayed one (recall). Nonetheless, high achievers benefited from the CALL approach to learn vocabulary in both retention and recall processes, while the low achievers gained the chance of learning vocabulary just in the retention period. However, their ability to recall vocabulary faded away after the time-delayed since low achievers could not keep the recall abilities during the time lapses for more than two weeks.

In the same vein Talarposhti and Pourgharib (2014), investigated the effect of CALL on vocabulary acquisition and instruction thoroughly. In this study, the use of computers for lexical skill development has been investigated in terms of linking CALL with vocabulary acquisitions and searching for effective ways to use CALL in vocabulary instruction. In their study, they worked on 60 male students who were selected from among 128 early intermediate EFL learners who themselves were selected through the

cluster sampling of the students at Khazraee air force training center. During this study, i.e. 38 sessions the experimental group utilized a tutorial computer-assisted courseware and the control group was taught vocabulary traditionally. Two tests were applied to compare the two groups: A pre-test before the treatment and a post-test after the treatment. The results indicated that the experimental group performed significantly better than the other group in a retention test. This suggests that the presentation of vocabulary with visual, aural, and sentence contexts in computer-assisted learning environments would enhance vocabulary learning and teaching.

Mouri and Rahimi (2016) also put forth the matter of exploring the impact of computer-assisted language learning on Iranian EFL students' vocabulary learning. In doing so they invited 76 Iranian EFL students – 29 males and 47 females to participate in their study. These participants were randomly divided into two groups namely experimental and control groups. Both groups took part in the teacher-made test of vocabulary, Vocabulary Levels Test (VLT), and Word-Associates Test (WAT) as a pre-test. Throughout class sessions the control group was taught the vocabulary, using a teacher-fronted way, through the printed textbook while the experimental group taught by the software version of the same book. The results of this study showed that applying vocabulary learning software was more effective than using a printed book on vocabulary learning, vocabulary breadth, and vocabulary depth of the participants.

Another study carried out by Shoaei and Alavi (2016) scrutinized the impact of computer-assisted language learning applications on incidental vocabulary recall and retention. In their work, they gained help from 62 pre-intermediate teenage learners of English studying in a language institute in Iran. The students were randomly assigned to Computer-Assisted Vocabulary Learning and traditional teacher-led groups. To elicit the effect of CAVL on the students' recall and retention of vocabulary items, the researchers developed a multimedia application integrating contextual cues, frequency of occurrence, dictionary definitions, and textual and audio annotations. Utilizing a pretest-posttest research design, it was revealed that the students in the CAVL group significantly outperformed those of the non-CAVL group, confirming superior recall of the new words.

Shokrpour et al., (2019) investigated the effectiveness of CALL on Iranian EFL learners' vocabulary learning. Additionally, they attempted to discover if there is any difference between the impact of CALL-mediated instruction on Iranian male and female EFL learners' vocabulary performance. The results of their study revealed that using the CALL-mediated approach can be regarded as an effective way to teach English vocabulary to EFL students. It was also found that gender does not play an important role in terms of vocabulary learning using CALL instruction.

CALL versus MALL

Using mobile phones to enhance the learners' vocabulary knowledge was also investigated by Stockwell (2010) in which he examined 175 pre-intermediate learners of English who could choose to complete vocabulary activities on either a mobile phone or a desktop computer to identify the effect of the mobile platform. Data were gathered from three cohorts of learners over three years, and learner activity was analyzed for the amount of time required to complete activities on both platforms and the scores they achieved for the activities. The results of the study are discussed in terms of how the platform affects learners' ability to complete tasks, whether continued usage contributes to improved

performance or sustained usage of the mobile platform over time. The findings of this study indicated that there was no significant difference between Mobile-based and PC-based groups in terms of scores achieved in activities. Moreover, in gauging the differences in time required to complete the activity on mobile and PC platforms the results revealed that, with the activities used in the current study at least, there was a clear difference in the amount of time required to do activities on the mobile phone compared with the computer. Since smaller screens and keypads were less convenient for entering text, learning through the mobile phone just took much longer.

Hassan Taj, Ali, Sipra, and Ahmad (2017) compared the PC-based vocabulary learning approach and Mobile-based learning platform in terms of vocabulary development of EFL university students. 122 students (61=Female, and 61=Male) in their first year at a public university participated in this study. During six weeks of vocabulary learning students were presented with activities through PCs in the language laboratory and multi-glossed vocabulary cards on mobile phones via a social networking mobile phone application WhatsApp. Findings suggested that the performance of the mobile-based group was significantly better than that of the PC-based group on achievement posttest. The impact of treatment was found gender-neutral as male and female participants benefitted from it alike.

In another study conducted by Katemba (2019) the differences between CALL and MALL were investigated in terms of developing the EFL students' vocabulary knowledge. In doing so, the researcher examined the level of lexical knowledge between students who were taught through CALL and those taught through MALL among grade 10 EFL (English as a foreign language) students in Bandung, Indonesia. The focus of this study was on an application named 'Tell Me More' for the CALL software. This software evaluates vocabulary learning through many features, such as picture, voice, and correct pronunciation of words. Consequently, for the MALL part, the researcher selected SMS. Specifically, SMS is one of the cell phone's features that could enable communicative language practice. 68 EFL grade 10 students were equally divided into two groups. The two groups were grade 10-H (33 students) taught with the CALL method, and grade 10-E (35 students) taught through the MALL method. A pre-test and post-test were given to learners to measure the impacts. The findings of the investigation revealed that there was no significant difference in vocabulary enhancement between students using CALL and those using MALL.

All in all, reviewing the literature so far, we concluded that few studies compared Mobile-based and Desktop-based technology-enhanced instruction. To put it in other words, there were rare studies conducted in the Iranian context to examine the feasibility of different affordances of the Rosetta stone application and compare their features and capabilities in terms of delivering English vocabularies. Thus, the researchers aimed at drawing further attention to the importance of integrating technology with conventional teaching methods.

Method

Participants

The current study was conducted with 60 Iranian male adult EFL Intermediate students ranging in age from 15 to 25 at Parsian language institute in Ahvaz, Iran who were selected from a pool of 120 intermediate through random sampling. After informing the learners about the project, those who find themselves interested in the project were given a homogeneity test of the Quick Placement Test of Oxford University Press (2001) and University of Cambridge Local Examinations Syndicate (2002).

By utilizing the above-mentioned homogeneity test the researchers tried to assure the homogeneity of their participants. were randomly divided into three groups, i.e. experimental groups (who were taught with technology integration using computers and mobile phones as learning platforms) and the control group (taught conventionally via teacher-fronted instruction and out of technology integration). In addition, the experimental groups, in turn, were classified as CALL-based groups and MALL-based groups which were labeled according to the different platforms used to teach English vocabularies to Iranian EFL students. To shed more light on this differentiation, the experimental groups also called technological-based groups received their vocabulary instruction via different technological media, namely, the mobile-based version of the Rosetta Stone application vs. the computer-based version of the Rosetta Stone application.

Instruments

Cell Phones

All the participants of the MALL-based group were required to have a cell phone to receive the instruction provided by the mobile version of the Rosetta application on their mobile phones.

Computers

In turn, all the learners in the CALL-based group were required to have their desktop version of the Rosetta Stone application installed on computers. It is noteworthy of mentioning that the researchers were obliged to provide the participants in the CALL-based group with computers having an installed version of the Rosetta Stone application.

Homogeneity Test

The Quick Placement Test of Oxford University Press and the University of Cambridge Local Examinations Syndicate, version 1, (2001) was used to homogenize the intended participants. It is a 60-item multiple-choice test and places learners based on their proficiency level and in line with the Common European Framework from A1 to C2.

Pre-test and Post-test

Both before and after the treatment the participants of all the three groups namely CALL-based, MALL-based, and conventional groups were given a test consisting of 60 multiple-choice questions related to common English vocabularies.

In other words, to assess the students' vocabulary knowledge, the researchers made a test including 20 items as pre-test and post-test consisting of 10 multiple-choice items and 10 true/false items adapted from the word list provided by Rosetta Stone application. Moreover, to assess vocabulary size (VS), Vocabulary Levels Test (Qian, 2002) was utilized. The vocabulary size test was composed of five different levels, namely, the 2000 word-family level, the 3000-word family level, the 5000-word family level, the university word list level, and the 10000 word-family lists. All in all, the pre-test and post-test were comprised of 60 items, i.e., 40 items from the Vocabulary Levels Test (Qian, 2002) and 20 items adapted from the vocabulary list offered by the Rosetta Stone application.

Data Collection Procedure

Pretesting

After identifying the participants of the study, the researchers proceeded to measure their vocabulary knowledge by pretesting. From among a pool of 120 Iranian EFL Intermediate male students who are studying at Kian language institute, 60 students ranging in age from 15 to 25 participated in this study.

Afterward, the participants were sorted out into three groups with the number of 20 male individuals for each group, i.e., two experimental groups i.e., CALL-based group and MALL-based group, and one control group (to be taught without technology integration) i.e., Classroom-based group (i.e., conventional group).

Before the instruction started, and to estimate the participants' knowledge of English vocabularies, a pretest consisting of 60 multiple-choice questions related to common English vocabularies was utilized. The test was similar for all three groups of learners and was conducted on a paper-and-pencil basis. The instructions for the test were on the first page and there was a 60-minute time limitation assigned to complete the test. Students were orally assured that the test would not count for their class scores but will be used to determine their vocabulary knowledge to better plan their materials.

Vocabulary selection

The vocabularies which were taught throughout the process of investigation would be adapted from the word list provided by the Rosetta Stone application. According to the coverage of English vocabularies in the specified time (i.e., 49 days), a total number of 100 English vocabularies were selected to conduct the present investigation.

Instructional procedures

Following the pretest, the researchers gave the treatment to the experimental groups following the mentioned below strategy:

Among the mentioned groups of this study i.e., technological-based groups (CALL-based group and MALL-based group) and a Classroom-based group (no technology integration), only one group attended the teacher-led classroom that was taught the selected English vocabularies without the presence of technology integration

or to say technological media and the other two groups(CALL-based group and MALL-based group) received their instructional content regarding the learning of English vocabularies via two technological media i.e., Computer-based platform and Mobile-based platform of Rosetta Stone application.

It is noteworthy of mentioning that the participant in the control group, i.e., contextualized were taught English vocabularies for 21 sessions (i.e., 3 sessions per week which lasted 7 weeks) via conventional methods of teaching, however, the difference lies in the point that the two experimental groups i.e., CALL-based and MALL-based groups received their intended English vocabularies via to different platforms of Rosetta Stone application that were computer-based platform and mobile-based platform throughout the process of the study. To meet this end, the researchers sorted out the members of technological-based groups into two groups namely the CALL-based group and the MALL-based group with the number of 20 participants for each group. To add more, these groups were labeled according to the instructional platform they were going to receive their instructional content from. Consequently, the rest of the participants were assigned to the classroom-based group with the number of 20 members to be taught English vocabularies without the presence of technology integration and via teacher-led classroom.

To sum up, the number of sessions devoted to this investigation comprised 21 sessions from which 2 sessions were devoted to the administration of pre-test and post-test and the other 20 sessions were devoted to the treatment.

Post-testing

To measure the students' development as a result of the instruction and also to determine the efficiency of each technological medium i.e., CALL-based platform and MALL-based platform of Rosetta Stone application in the retention of English vocabularies, a posttest similar to the pretest, i.e., a 92-item multiple-choice test, with some modification was administered at the end of the study in which the meanings of the English vocabularies which were used in the experiment were solicited.

An Overview of the Rosetta Stone Application

Founded in 1992, Rosetta Stone's language company applies all kinds of solutions to help all types of learners with their reading, writing, and speaking more than 30 languages. This application gains help from a specific learning approach namely, Lexia Learning. The Rosetta Stone application is considered one of the leading software in the literacy education space. Nowadays, Lexia helps students form fundamental reading skills through its rigorously researched, independently evaluated, and widely respected instruction and assessment programs. The focus of the current study was on the two platforms of the Rosetta Stone application, i.e., Mobile-based and PC-based for teaching American English.

A mobile-based platform of Rosetta Stone application

The mobile version of Rosetta Stone's application is featured with characteristics like multi-device capability, phrasebook, audio companion, stories, and live tutoring. The application was released in both IOS and Android mobile operating systems. The focus of the current investigation however will be entirely on the android-based version of the application. As is shown in Figure 1 the application offers courses in different languages. The focus of the study was on an English course in particular.

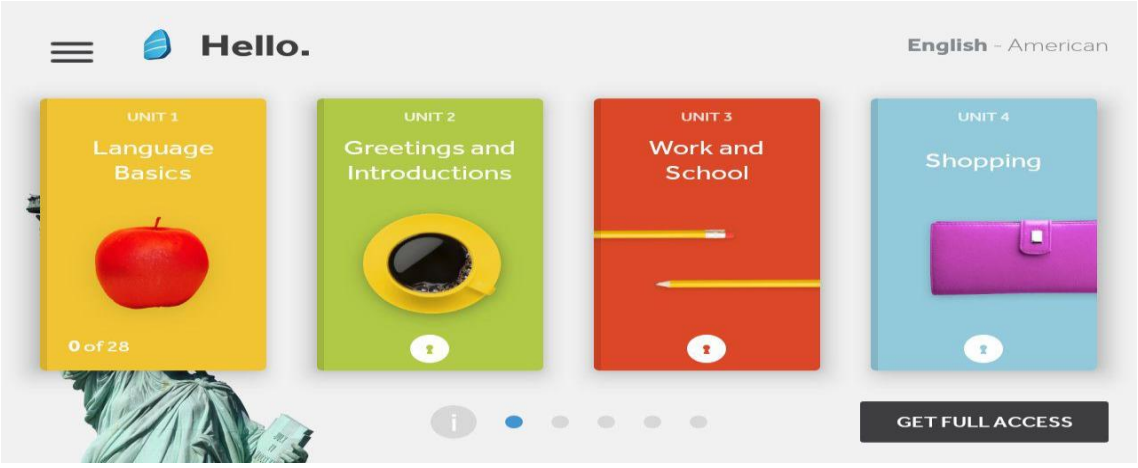
Figure 1

An overview of the languages provided by Rosetta Stone's mobile-based platform

As is shown in Figure 2 the mobile version of the Rosetta stone application encompasses 20 different units and each unit includes topic-based learning content related to the everyday life of English speakers. The topics are namely, language basics, greetings and introductions, work and school, shopping, travel, past and future, friends and social life, dining and vacation, home and health, life and world, everyday things, places and events, tourism, and recreation, professions, and hobbies, at home and around town, style and personal wellness, business and industry, arts and academics, emergencies, family and community (Figure 2). The focus of the current study however was on unit 14 of the Android application which was named professions and hobbies.

Figure 2

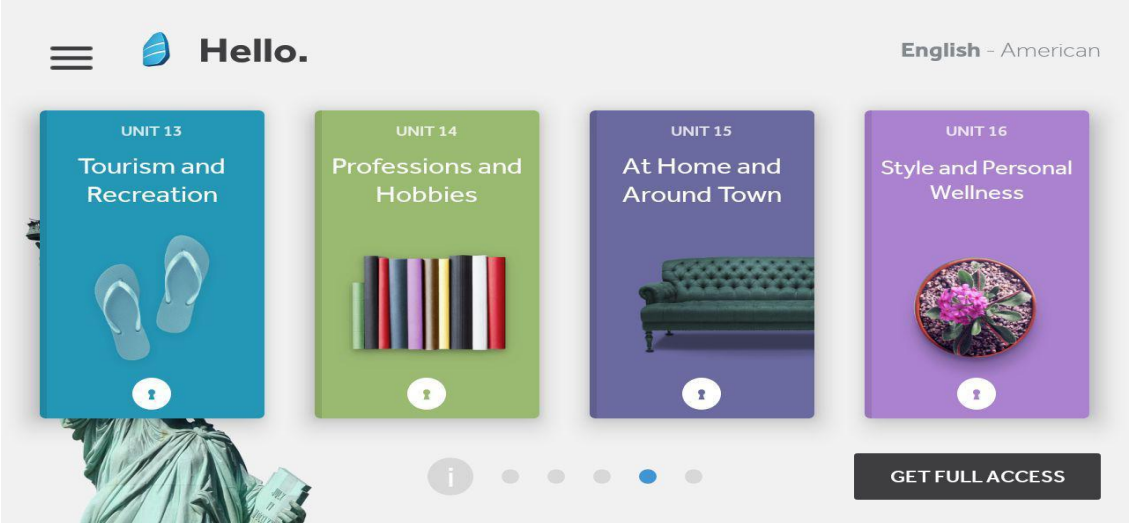
The environment of Rosetta Stone's mobile-based platform



In this application, each unit includes four different lessons and each lesson encompasses one core lesson and four other parts related to pronunciation, vocabulary, grammar, and listening (Figure 3).

Figure 3

The snapshot of Rosetta Stone's mobile-based platform

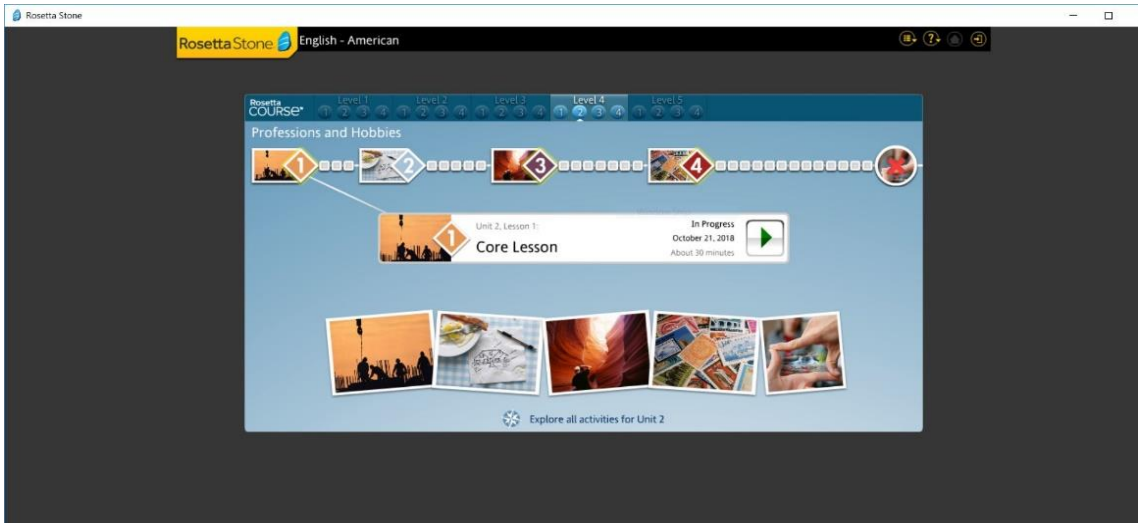


The PC-based platform of the Rosetta Stone application

The PC-based platform of the Rosetta Stone application includes five different levels related to learning English with 250 hours of instructional content. Level one, which is named "language basics", is concerned with language fundamentals. During level one that lasts 50 hours to accomplish the learner will gain confidence by mastering basic conversational skills. This includes greetings, introductions, simple questions and answers, and much more. Level two that starts from hour 51 and carries on until hour 100 includes the learning to navigate in the environment and handle basic interactions. This level is named "Travel" and covers topics like giving and getting directions, using transportation, telling time, eating out, and more. Level three of the Rosetta Stone application is named "Home & Health" and lasts 49 hours. In this navigating the workplace, caring for the health, arranging repairs, moving abroad, driving, planning adventures, health, and emotional states for themselves and others, expressing personal taste in terms of material and sensory preferences.

Figure 4

The environment of Rosetta Stone's computer-based platform



Level four of the computer-based platform of Rosetta Stone application which was the main focus of the current study named "Professions and Hobbies" and took 49 hours of working with the software. At this level, the students are to master ways of sharing their ideas and opinions, express their feelings, and talk in everyday life. This includes your interests, profession, current events, and more. Level five of the application named "business and industry" last 49 hours. This level covers ways of discussing entertainment, culture, government, and the marketplace (Figure 4).

Homogeneity Test Results

To homogenize all the participants, a language homogeneity test (the Quick Placement Test of Oxford University Press (2001) and University of Cambridge Local Examinations Syndicate, 2002) was administered to all the participants who were keen on taking part in the study (from a pool of 120 students). The 60 homogeneous participants were randomly assigned to 3 equal groups with the number of 20 students for each group and this selection and sorting was based on the students' test scores obtained from the administered placement test and convenience sampling. All those whose proficiency test scores score fell between 30 and 47 were considered to have the prerequisites to participate in this study as B1 and B2 learners. The scores of the participants in all three groups (i.e., Mobile-based, computer-based & Classroom-based) ranged from 30 to 43 and the mean score of the mobile-based group in the homogeneity test was 41.70. Plus, the obtained mean scores of the computer-based group was 41.25. Furthermore, the mean scores of the participants in the Classroom-based group regarding the homogeneity test were 38.00. The descriptive statistics for language proficiency scores are as follows (Table 1):

Table 1
Descriptive Statistics for the Homogeneity Test Scores

Group	N	Minimum	Maximum	Mean	Std.
Mobile-based	20	30	43	41.60	4.375
PC-based	20	30	43	41.25	4.429
Classroom-based	20	30	43	40.00	5.753

Moreover, an analysis was performed on the scores obtained by the 60 participants to further determine whether there were any significant differences in the language proficiency level of the technological-based groups (i.e., Mobile-based & computer-based) and Classroom-based groups. The results as shown in Table 2 indicated that there was no significant difference between the mean scores of these so-called groups, ($P > 0.05$).

Table 2
Results of The Test of Homogeneity of Variances from The Homogeneity Test Scores of The All Three Groups

Level	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	88.033	2	44.017	1.819	0.171
Within Groups	1378.950	57	24.192		
Total	1466.983	59			

The Success Rate of Students' learning vocabulary

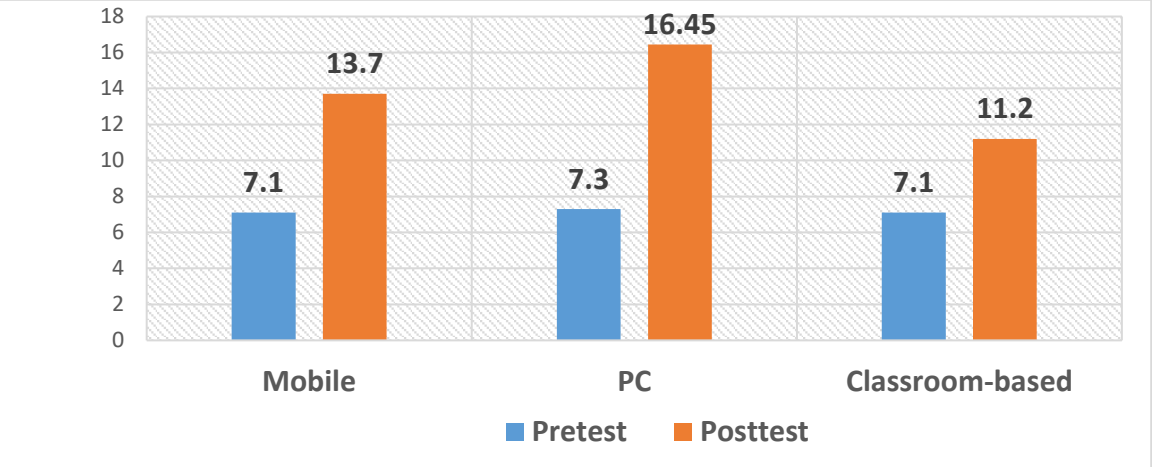
After giving the treatment to the three groups, namely, mobile-based group, computer-based group, and Classroom-based group, the participants' performance was examined both before and after the treatment. Table 3 illustrates the descriptive statistics, the mean score, and the standard deviation of pretest and posttest in all three groups. (As it is shown in Table 3).

Table 3
Descriptive statistics of pretest and posttest in all three group

Groups	Pretest		Posttest	
	M	SD	M	SD
Mobile-based	7.10	1.94	13.70	2.05
PC-based	7.30	1.45	16.45	1.82
Classroom-base	6.90	1.48	11.20	2.50

The mean scores obtained from the administered pretest differ from those of the conducted posttest in each group of learners, which reveals the possibility of the effect of one mode of instruction on the improvement of the students' vocabulary performance. Figure 5 depicts the three groups' vocabulary performance from pretest to posttest concerning means scores.

Figure 5
The Three Groups' Idiomatic Performance from Pretest to Posttest



To be more specific and in comparing the mean scores of all three methods of instruction obtained from the administered pretest and posttest both before and after the treatment and as is shown in Table 3., the following statistical results were found:

Mobile-based group

As can be inferred from Table 3 the mean scores of the participants in the mobile-based group concerning their administered pretest were 7.10± 1.94. Furthermore, in terms of this group's vocabulary knowledge performance in the given posttest, the result was 13.70±2.05 which indicates that the participants' vocabulary performance in the mobile-based group was improved.

Computer-based group

It can be seen from data illustrated in Table 3 that the mean scores of the participants in the PC-based group with regards to their given pretest were 7.30±1.050 and in comparison with their performance after the treatment in the administered posttest (15.15±1.45), it can be inferred that the participants' vocabulary performance in the PC-based group was enhanced.

Classroom-based group

In interpreting the data obtained from the given pretest which can be seen from the statistical results reported in Table 3, the mean scores of the participants in the classroom-based group were reported as 6.90 ± 1.48. The classroom-based group vocabulary performance in the administered posttest, on the other hand, was reported as 11.20±2.50, which in turn reveals that the participants' vocabulary performance in the classroom-based group was improved after giving the intended treatment. As can be seen from the data presented in Table 3, the pretest vocabulary performance was improved using all three different methods of instruction.

Table 4

Results of One-Sample Kolmogorov-Smirnov Test for Normal Distribution

Group	**Test**	One-Sample Kolmogorov-Smirnov Test	
		z	Sig
Mobile	Pre-test	0.79	0.58
	Post-test	0.85	0.45
PC	Pre-test	0.73	0.65
	Post-test	1.06	0.21
Classroom-based	Pre-test	**0.67**	0.76
	Post-test	**0.81**	0.52

As Table 4 demonstrates, the One-Sample Kolmogorov-Smirnov Test was used to take into account the normal distribution of data in three groups in terms of pretest and posttest scores. Concerning the obtained mobile-based group results, the obtained z score in pretest and posttest equal 0.79 and 0.85, respectively. The z scores are not statistically significant at the 0/05 level (p> 0.05). Also, the obtained PC-based group results show the obtained z score in pretest and posttest equal 0.73 and 1.06, respectively. The z scores are not statistically significant at the 0/05 level (p> 0.05). Moreover, the obtained classroom-based group results demonstrated the obtained z score in pretest and posttest

were 0.67 and 0.81(p> 0.05), respectively. Therefore, it is concluded that the terms for the normal distribution of data in all groups are satisfactory. -

Results of the First Research Question

RQ1: Do different technology platforms of Rosetta Stone have a significant impact on improving the Iranian EFL learners' vocabulary knowledge?

To find out the answer to the first research question and also to scrutinize the possible significant differences in the results obtained from the pretest to posttest in each group of instruction (i.e., Mobile-based learning approach, PC-based learning approach & Classroom-based learning approach), a paired-samples t-test was administered for each group of learners.

In other words, this analysis was conducted to measure the degree of changes regarding the treatment. The result of this analysis which can be inferred from the data presented in Table 5 indicated that significant differences were found between the mean scores of the participants in three groups of learners which benefited from 3 different types of instruction from pretest to posttest (P < 0.05). These findings revealed the effectiveness of the three modes of instruction in delivering instructional content (i.e., English vocabularies) as participants' mean scores enhanced from pretest to posttest. Table 5 demonstrates all three groups of vocabulary learning from pretest to posttest.

Table 5

The Three Groups' Learning Gains from Pretest to Posttest

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
Group		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Mobile	pre1 - post1	-6.60000	2.62378	.58669	-7.82797	-5.37203	-11.249	19	.000
PC	pre2 - post2	-9.15000	2.43386	.54423	-10.28908	-8.01092	-16.813	19	.000
Class-r	pre3 - post3	-4.30000	2.57723	.57629	-5.50618	-3.09382	-7.462	19	.000

Mobile-based group's Performance from Pretest to Posttest

As indicated in Table 5, three paired-samples t-tests were conducted to evaluate the impact of the intervention on students' scores on learning vocabulary knowledge. There was a statistically significant increase in vocabulary learning in the mobile-based group from pretest (M=7.10, SD=1.94) to posttest (M=13.70, SD=2.05), t (19)= -11.24, p < 00.1 (Two-tailed). The mean increase in vocabulary learning in the mobile-based group was 6.6 with a 95% confidence interval ranging from -7.82 to -5.37. The eta squared statistic (0.8) indicated a large effect size (Cohen, 1988, pp.284-7).

PC-based group's Performance from Pretest to Posttest

Also, there was a statistically significant increase in vocabulary learning in the CALL-based group from pretest (M=7.30, SD=1.45) to posttest (M=16.45, SD=1.82), t (19)= -16.81, p < 00.1 (Two-tailed). The mean increase in vocabulary learning in the computer-based group was 9.15 with a 95% confidence interval ranging from -10.28 to -8.01. The eta squared statistic (0.9) indicated a large effect size.

Classroom-based group's Performance from Pretest to Posttest

Moreover, There was a statistically significant increase in vocabulary learning in classroom-based group from pretest (M=6.90, SD=1.48) to posttest (M=11.20, SD=2.50), t (19)= -7.46, p < 00.1(Two-tailed).The mean increase in vocabulary learning in the classroom-based group was 4.1 with a 95% confidence interval ranging from -5.50 to -3.09. The eta squared statistic (0.7) indicated a large effect size. In sum, all the groups obtained a higher significant posttest concerning their pretest scores.

Results of the Second Research Question

RQ2: Is there any difference between MALL-based and CALL-based platforms of Rosetta Stone application in promoting Iranian EFL learners' vocabulary knowledge?

Table 6

The Pretest Analysis of Variance

Pretest	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.600	2	.800	.296	.745
Within Groups	153.800	57	2.698		
Total	155.400	59			

A one-way between-group analysis of variance was conducted to explore the participants' background knowledge of vocabulary learning among all three groups concerning pretest scores. Participants were divided into three groups according to their language proficiency. There was no statistical difference at p <0.05 in pretest scores for three groups (2, 57) =0.296, p =0.74. The effect size, calculated using eta squared, was 0.01 which indicates a small effect in Cohen's (1988, pp.284-7) terms.

Table 7

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	285.191[a]	5	57.038	12.175	.000
Intercept	441.882	1	441.882	94.317	.000
Group	31.433	2	15.716	3.355	.042
Pretest	3.185	1	3.185	.680	.413
group * Pretest	5.828	2	2.914	.622	.541
Error	252.993	54	4.685		
Total	11937.000	60			

Corrected Total	538.183	59

Table 7 reveals the interaction between groups and pretest scores. As shown, the probability value is 0.54, safely above the cut-off (F= 0.62, p >0.5). Therefore, the assumption of homogeneity of regression slope was not violated. This supports the earlier conclusion gained from an inspection of the scatterplots for each group.

Table 8

Levene's Test of Equality of Error Variances

F	df1	df2	Sig.
.416	2	57	.662

Table 8 reveals Levene's test of equality of variance to see the violation of the assumption of the equality of variance. As shown, the probability value is 0.66, safely larger than cut-off (F= 0.41, p >0.5). Therefore, the assumption of homogeneity of the equality of variance was not violated. This supports the run of performing the univariate analysis of variance. Table 4.9 reports on the univariate analysis of variance.

Table 9

The Univariate Analysis of Variance

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	279.363[a]	3	93.121	20.148	.000	.519	60.445	1.000
Intercept	468.850	1	468.850	101.443	.000	.644	101.443	1.000
Pretest	3.530	1	3.530	.764	.386	.013	.764	.138
Group	266.735	2	133.367	28.856	.000	.508	57.712	1.000
Error	258.820	56	4.622					
Total	11937.000	60						
Corrected Total	538.183	59						

a. R Squared = .519 (Adjusted R Squared = .493)

b. Computed using alpha = .05

A one-way between-group analysis of covariance was conducted to compare the effectiveness of three different interventions designed to enhance the potential degree of vocabulary learning. The dependent variable was the type of intervention (Mobile-based approach, computer-based approach, and traditional-based approach), and the dependent variable consisted of the vocabulary learning administered after the intervention was completed. Participants' scores on the pre-intervention administration of the vocabulary learning of the pre-test were used as the covariate in this analysis.

Preliminary checks were conducted to ensure that there was no violation of the assumptions of normality, linearity, homogeneity of variances, homogeny of regression slopes, and reliable measurement of the covariate. After adjusting for pre-intervention scores on the pretest, there was a significant difference among the intervention groups on post-intervention scores. F (2, 56) =28.85, p=0.000, partial eta squared=0.50. There was

an insignificant relationship between the pre-intervention and post-intervention scores, as indicated by a partial eta squared value of 0.01. To post-hoc test was run to observe the difference among the groups concerning posttests scores.

Table 10

Post- Hoc Test

(I) group	(J) group	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
Mobile	PC	-2.720*	.681	.001	-4.400	-1.040
	Control	2.470*	.681	.002	.790	4.150
PC	Mobile	2.720*	.681	.001	1.040	4.400
	Control	5.189*	.683	.000	3.503	6.876
Control	Mobile	-2.470*	.681	.002	-4.150	-.790
	PC	-5.189*	.683	.000	-6.876	-3.503

Post-hoc comparisons using Bonferroni Test indicated that the posttest mean scores of both experimental groups (i.e., Mobile-based group =13.70, SD =2.05 & computer-based group: M=16.45, SD=1.82) were significantly higher than that of the control group (i.e., classroom-based group: M=11.20, SD= 2.50) ($p < 0.05$). Also, there was a statistically significant mean difference between experimental groups in favor of the computer-based group.

Discussion

In this part, the research questions are brought up and dealt with, concerning both the findings of the research and comparing them to the previously found ones. Then, discussions considering the interpretation of the findings regarding the central purpose of the study, i.e., investigating the potential of using the Rosetta Stone application in the computer-based platform and mobile-based platform for teaching English vocabularies to Iranian intermediate EFL students are presented.

RQ1. Do different technology platforms of the Rosetta Stone have a significant impact on improving the Iranian EFL learners' vocabulary knowledge?

According to the obtained results of the above-mentioned statistics, it can be concluded that technology in general and the use of technology-mediated instruction in specific plays important roles in developing the learners' vocabulary knowledge as the learners of this study who were exposed to learning materials via two technological platforms i.e., computer-based learning approach and mobile-based learning approach, outperformed those who had their instructional materials i.e., English vocabulary knowledge, under the classroom-based approach. This superiority of technological media over conventional classroom settings could be well understood by the statistical analysis.

One explanation regarding the improvement in the vocabulary knowledge of the technological-based groups (i.e., computer-based learning group & Mobile-based

learning group) is the capabilities that these two technological media could equip the learners with. In the case of the participants in the mobile-based learning platform, it can be concluded that the improvement in the vocabulary development was because these participants who were exposed to instructional materials via Rosetta Stone on their cell-phones benefited from the push aspect (Stockwell, 2016) of mobile technology (i.e., they were exposed to instructional content without needing to search or fetch them).

Also, the members of the mobile-based learning group who were exposed to instructional content (i.e., English vocabularies) via the Rosetta Stone application installed on their mobile phones as the mobile-based group's members benefited from the advantage of learning on the move, where these learners were able to learn at any place and can access learning materials from a variety of outdoor places as compared with the traditional and conventional classroom settings. On the other hand, participants of the Classroom-based learning approach, who only attended their usual class and did not use their mobile phones for receiving English vocabularies acquired the lowest degrees of improvement in vocabulary learning concerning the results obtained from the administration of pretest to posttest.

In explaining the superiority of technological-based groups over the classroom-based learning approach in terms of the development in the vocabulary performance, it could be concluded that the participants in the classroom-based learning platform, only had exposure to learning materials while they were entailed to the classroom context with conventional teacher-led settings during which the learners received their English vocabularies through the teacher-mediated instruction only with no pictures or videos at play, the participants of the technological-based groups, on the other hand, received their instructional materials with no restriction or bounding to conventional classroom settings in a variety of language inputs (textual, visual, audio-visual) and in different outdoor places for the mobile-based group with specific time-intervals. Thus, it seems logical to vote in favor of the technological-based groups, as the statistical data also showed, when compared with the classroom-based learning approach.

To rationalize the differences, it is necessary to consider the fact that the participants, being exposed to English vocabularies via two different technological media. This, in turn, would facilitate the learning process which consequently could empower the fact that being able to learn on the move at any place, outside the walls of the conventional classroom settings regardless of any restrictions from the part of the educational setting and under few or no boundaries could result in the better improvement of the vocabulary performance as compared with the classroom-based learning approach. These findings strongly strengthened, justified, and supported by the findings of Thornton and Houser (2005) who mentioned that when students were frequently receiving messages on spaced time intervals were “prodded” to study the material more often than their counterparts in other methods of instruction.

The findings of this study were consistent with those of Golonka et al (2014) and Frank’s (2014) who stressed the importance of technology integration in the realm of foreign language learning and teaching. As was mentioned earlier, they found that technology has the potential to enhance the teaching-learning process which conclusively supports the findings of the current study. In effect, what was mainly considered as a contentious issue in the case of the present study is the importance of technology integration mainly supported by the findings of several researchers. For example, Taki and Khazaei (2011) who surveyed to find out more about the use and efficiency of

technological approaches in the different sides of teaching and learning a foreign language, further maintained the importance of technology-integrated instruction. They found out that the use of technology (e.g., mobile) could be regarded as an important and effective factor in the context of vocabulary learning.

The importance and effectiveness of technology-mediated instruction which was the focus of the first research question were further supported by the findings of Suwantarathip and Orawiwatnakul (2015) who applied the same design to explore the importance of integrating technology in the context of language learning. The following procedures were done: the treatment group participated in technology-enhanced language learning activities, while the control group attended a regular class i.e., conventional teacher-led class. Using a variety of technological materials, including, cellphone multimedia grammar and vocabulary drills, instructional video, and online spell checkers, the researchers aimed at exploring and documenting the importance of integrating technology in the context of language learning. The outcome of both studies revealed that technology-mediated language learning is as effective and well operative as classroom instruction, if not more. Accordingly, these findings highly support the findings of the present study which implied the effectiveness of technology-mediated instruction in the realm of EFL language learning.

The findings of this study were also in line with those of Alavinia and Qoitassi (2013). They scrutinized the impact of using MALL-operated vocabulary instruction techniques on the process of vocabulary acquisition. Their findings which conclusively supported the findings of the present study indicated that treatment through the application of mobile-assisted vocabulary learning had been quite effective in improving learners' vocabulary acquisition.

The results of this study were also in conformity with those of Thornton and Houser (2004, 2005) who voiced their concern regarding the feasibility of Mail affordance of MALL for teaching English vocabularies to Japanese EFL students. It is noteworthy of mentioning that the so-called experiment was an attempt to compare different affordances of MALL for the aim of teaching instructional content, to this end it followed the same purpose that the present study aimed to gauge. These researchers made attempts to compare mail affordance and web affordance of MALL in teaching English vocabularies. The results of the mentioned experiment demonstrated that the students receiving mobile e-mail vocabulary lessons had learned more than their counterparts on paper or the Web.

The results of this study were also in line with those of by Hayati, Jalilifar, and Mashhadi (2013) who specifically examined the push aspect of SMS-affordance for teaching English idioms to Iranian EFL student, in a comparison between SMS-based platform and two other methods of instruction (i.e., self-study-based and contextualized learning). The results of this experiment highly supported the finding of the present study revealed that using technology is an efficient way to improve language development.

As far as the other medium of this study (computer-based platform) was concerned, several studies supported the use of this protocol which computer-based platform is using for delivering instructional content which was strengthened and justified by several studies. For example, the findings of Hubbard and Levy (2006) conformed with those of the current study. As it was mentioned in the 2nd chapter, they concluded that the use of computers for delivering language learning materials has a positive impact on the students' language learning and would enhance their language learning.

The findings of this study were consistent with those of Dashtestani (2016) who stressed the importance of technology integration in the realm of foreign language learning and teaching. As was mentioned earlier, the researchers found that technology has the potential to enhance the teaching-learning process which conclusively supports the findings of the current study. In effect, what was mainly considered as a contentious issue in the case of the present study is the importance of technology integration mainly supported by the findings of several researchers. For example, Wrigglesworth (2020) who investigated the efficiency of technological approaches in the different sides of teaching and learning a foreign language, further maintained the importance of technology-integrated instruction. The researcher found out that the use of technology (e.g., mobile) could be regarded as an important and effective factor in the context of vocabulary learning.

The findings of this study were also in line with those of Shokrpour et al., (2019). As it was mentioned in the review of the literature part, they scrutinized the impact of using MALL-operated vocabulary instruction techniques on the process of vocabulary acquisition. Their findings which conclusively supported the findings of the present study indicated that treatment through the application of mobile-assisted vocabulary learning had been quite effective in improving learners' vocabulary acquisition.

The results of this study were also in conformity with those of Chen et al., (2019) who voiced their concern regarding the feasibility of the android application affordance of MALL for teaching English vocabularies to Taiwanese EFL students. The researchers attempted to implement the English vocabulary learning app with a self-regulated learning mechanism (EVLAPP-SRLM) in their EFL context. The results of the mentioned experiment demonstrated that students who received mobile-based delivery of English vocabularies significantly performed better than their counterparts.

As far as the other medium of this study (computer-based platform) was concerned, several studies supported the use of this protocol which computer-based platform is using for delivering instructional content which was strengthened and justified by several studies. For example, the findings of Mouri and Rahimi (2016) conformed with those of the current study. As it was mentioned earlier, they concluded that the use of computers for delivering language learning materials has a positive impact on the students' language learning and would enhance their language learning.

According to what was mentioned so far, it could be concluded that the null hypothesis of the first research question was rejected. In other words, the application of technology does have an impact on prompting Iranian EFL learners' vocabulary knowledge.

RQ2. Is there any difference between MALL-based and CALL-based platforms of Rosetta Stone application in promoting Iranian EFL learners' vocabulary knowledge?

Based on the results of the statistical analysis mentioned earlier and in multiple comparisons of the three methods of instruction namely, mobile-based learning approach, PC-based learning approach, and classroom-based learning approach, it could be concluded that the PC-based learning group's development in vocabulary knowledge was indeed better than those of the mobile-based learning group and classroom-based learning group.

One explanation, regarding the superiority of the computer-based learning group over other methods of instruction, is the capability that computer-based application could offer with which other methods of instruction lack. In a nutshell, computer-based instruction could provide learners with learning materials in a variety of language channels from textual to visual and audio-visual. Moreover, in explaining the computer-based group's outperformance over the mobile-based group, it can be concluded that the computer-based learning platform is different from the mobile-based learning platform in several aspects. First of all, the participants of the computer-based learning approach were exposed to English vocabularies using Rosetta Stone in a variety of language channels including textual, visual, audiovisual while the participants of the computer-based learning group were fixed on the same place. The participants' stability in the computer-based group makes them more concentered through learning the instructional contents (Stockwell, 2010). Consequently, the participants took more privilege through using time intervals in using their PC in language learning. Since a smaller phone's screen and keypad were less convenient for entering text compared with a PC, learning through the mobile phone just took much longer (Stockwell, 2010). On the other hand, the participants in mobile-based learning used a portable tool in different places including train, bus, market, and so forth. Therefore, the mobile could distract the participants' ability to learn efficiently. Therefore, it seems reasonable that the participants in the computer-based learning group outperformed their counterparts in the mobile-based learning group.

The results of another study carried out by Gorjian et al. (2011) supported the findings of this study which stated the learners especially the low achievers gained more chance of learning vocabulary just in the retention period. It could be concluded that using computers fosters the development of students in vocabulary learning.

The results of the study conducted by Shokrpour et al., (2019) supported the findings of this study which stated the using CALL-mediated approach can be regarded as an effective way to teach English vocabulary to EFL students. It could be concluded that using computers fosters the development of students in vocabulary learning. However, the findings of the current study differ from some published studies (Stockwell, 2010; Katemba, 2019) as they found no significant difference between CALL-mediated and MALL-mediated instruction in terms of teaching English vocabularies to EFL students. The results of the study were also in contradiction with the work of Hassan Taj, et al., (2017) as they reported positive results in favor of MALL-based learning instruction in comparison to CALL-based content.

Based on what was discussed earlier in this part regarding this null hypothesis, it could be concluded that the above-mentioned null hypothesis was rejected according to the obtained statistical results. Therefore, it could be said that using a PC has a differential impact on promoting Iranian EFL learners' vocabulary knowledge rather than using mobile.

Based on what was discussed earlier in this part regarding this null hypothesis, it could be concluded that the above-mentioned null hypothesis is rejected according to the obtained statistical results. Therefore, it could be claimed that using a PC has a differential impact on promoting Iranian EFL learners' vocabulary knowledge rather than using mobile.

Conclusion

This study aimed at understanding the extent to which using technology-mediated instruction provided by mobile-based technological media affects the development in vocabulary learning for Iranian EFL intermediate learners. Furthermore, this study showed the efficiency of using computer-mediated vocabulary instruction in vocabulary learning for Iranian EFL intermediate pupils. This study also was an attempt to compare technological media (i.e., Mobile-based platform & computer-based platform) in terms of delivering English vocabularies to Iranian EFL intermediate learners. The research began with the assumption that the use of technology-mediated instruction provided by technological media (i.e., Mobile-based platform & computer-based platform) could enhance the intermediate EFL learners' development of vocabulary performance. The instruction of the study lasted about 7 weeks. In the course of this study, the participants of the technological-based groups (i.e., Mobile-based learning group and computer-based learning group) used their mobile phones and PC as technological tools to receive their intended English vocabularies while the classroom-based learning group received the same instructional materials, without the presence of technology-mediated instruction.
Overall, the findings of this study are consistent with a series of findings mentioned earlier in the literature review (Chen et al., 2019; Mouri and Rahimi, 2016; Shoaei & Alavi, 2016; Stockwell, 2010; Suwantarathip & Orawiwatnakul, 2015; Taki & Khazaei, 2011; Talarposhti & Pourgharib, 2014; Thornton & Houser,2004; Wu, 2014). As the findings of this study revealed, multimedia-based learning materials have the potential to enhance EFL learners' vocabulary performance much better than other ways of delivering instructional content. In other words, exposing the learners to materials in a variety of language channels (textual, visual, and audio-visual) results in better learning of language learning content as compared with presenting the instructional content with one channel of learning.

As it was mentioned earlier, one of the aims of this experiment was to compare mobile-based technological media in terms of delivering English vocabularies to Iranian EFL learners at the intermediate level of proficiency and to scrutinize the effectiveness of mobile-based technological media in terms of delivering English vocabularies to Iranian EFL learners at the intermediate level of proficiency. The results of the current study revealed that the computer-based learning platform won over the Mobile-based learning platform in terms of teaching English vocabulary to Iranian EFL learners at the intermediate level of proficiency. This, in turn, would justify and strengthen the assumption that the type of language channel has a differential impact on prompting the learners' vocabulary learning. In explaining this superiority, it could be concluded that computer-based learning platforms which make the pupils more concentrated over learning the contents (using textual, visual, and audio-visual techniques) won over the Mobile-based learning platform. In a nutshell, it could be concluded that providing the learners with materials presented in a variety of language channels (visual, audio-visual) would enhance the students' development in vocabulary learning when using a PC. Therefore, the students of the computer-based learning group who used their computers with installed Rosetta applications to learn English vocabulary gained more advantages than those exposed to other methods of learning.

Based on the research findings, this study gives the following pedagogical implications and suggests some ideas to material designers, EFL learners, and teachers. Language studies in the domain of Mobile Assisted Language Learning (MALL) and

Computer Assistant language learning (i.e., CALL) are well-advised to take implications presented in this study into thoughtful account. First, the Ministry of Education in Iran (MOI) is strongly suggested to agree with the expansion of PC-based technological media in the context of language learning in schools. Moreover, the material designers are suggested to provide their materials in a variety of language channels (visual, audio-visual, and pictorial), focusing on the multimedia nature of the language learning program.

References

Alavinia, P., & Qoitassi, K. (2013). On the viability of vocabulary learning enhancement through the implementation of MALL: The case of Iranian EFL learners. *Journal of Language Teaching & Research, 4*(2), 412–426. https://doi.org/0.4304/jltr.4.2.412-426.

Bernard, J., & Lee, L. (2004). *Select readings: Upper-intermediate*. Oxford University. http://thuvienso.bvu.edu.vn/handle/TVDHBRVT/14604.

Cummins, J. (2008). Computer assisted text scaffolding for curriculum access and language learning/acquisition. http://iteachilearn.com/cummins/elective.html

Chen, C.-M., Chen, L.-C., & Yang, S.-M. (2019). An English vocabulary learning app with self-regulated learning mechanism to improve learning performance and motivation. *Computer Assisted Language Learning, 32*(3), 237–260. https://doi.org/10.1080/09588221.2018.1485708

Dashtestani, R. (2016). Moving bravely towards mobile learning: Iranian students' use of mobile devices for learning English as a foreign language. *Computer Assisted Language Learning, 29*(4), 815–832. https://doi.org/10.1080/09588221.2015.1069360

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. https://doi.org/10.1080/09588221.2011.552186

Golonka, E. M., Bowles, A. R., Frank, V. M., Richardson, D. L., & Freynik, S. (2014). Technologies for foreign language learning: A review of technology types and their effectiveness. *Computer Assisted Language Learning, 27*(1), 70–105. https://doi.org/10.1080/09588221.2012.700315

Hubbard, P., & Levy, M. (2006). *The scope of CALL education. In Teacher Education in CALL* (pp. 3–20). John Benjamins Publishing Company. http://shorturl.at/ayM49.

Hassan Taj, I., Ali, F., Sipra, M., & Ahmad, W. (2017). Effect of technology enhanced language learning on vocabulary acquisition of EFL learners. *International Journal of Applied Linguistics & English Literature, 6*(3), 1-19. https://papers.ssrn.com/sol3/Delivery.cfm/SSRN_ID2927643_code2578064.pdf?abstractid=2927643&mirid=1

Hayati, A., Jalilifar, A., & Mashhadi, A. (2013). Using Short Message Service (SMS) to teach English idioms to EFL students. B*ritish Journal of Educational Technology, 44*(1), 66–81. https://doi.org/10.1111/j.1467-8535.2011.01260.x

Jiang, Q., Li, M., Han, W., & Yang, C. (2019). ICT promoting the improvement of education quality: Experience and practice. *Ministerial Forum,* 158.

https://iite.unesco.org/wpcontent/uploads/2019/02/Unesco_003_Proccedings_190212a.pdf#page=160

Katemba, C. (2019). Students' vocabulary enhancement at Grade 10: A comparative study using CALL & MALL in Indonesia, *CALL-EJ 20*(1), 87-114. http://callej.org/journal/20-1/Katemba2019.pdf.

Ko, M.-H. (2019). Students' reactions to using smartphones and social media for vocabulary feedback. *Computer Assisted Language Learning, 32*(8), 920–944. https://doi.org/10.1080/09588221.2018.1541360

Li, J., Cummins, J., & Deng, Q. (2017). The effectiveness of texting to enhance academic vocabulary learning: English language learners' perspective. *Computer Assisted Language Learning, 30*(8), 816–843. https://doi.org/10.1080/09588221.2017.1366923

Liu, K. (2020). The Trend of Mobile-assisted Language Learning from 2014 to 2018. *DEStech Transactions on Social Science, Education and Human Science, ecemi*. https://doi.org/10.12783/dtssehs/ecemi2020/34701

Mansouri, S., & Mashhadi Heidar, D. (2019). Peer/teacher technology-enhanced scaffolding through process approach and Iranian EFL learners' vocabulary knowledge: A probe into self-regulation. *Journal of Teaching Language Skills, 38*(3), 189–223. https://doi.org/10.22099/JTLS.2020.34379.2717

Mouri, S., & Rahimi, A. (2016). The impact of computer-assisted language learning on Iranian EFL students' vocabulary learning. *Global Journal of Foreign Language Teaching (GJFLT), 6*(4), 210–217. https://doi.org/10.18844/gjflt.v6i4.1673

Namaziandost, E., Rezvani, E., & Polemikou, A. (2020). The impacts of visual input enhancement, semantic input enhancement, and input flooding on L2 vocabulary among Iranian intermediate EFL learners. *Cogent Education, 7*(1), 1726606. https://doi.org/10.1080/2331186X.2020.1726606

Nickerson, R.S. (1988). Technology in Education in 2020: Thinking About the Not-Distant Future. In Nickerson, R.S., &Zodhiates, P.P. (Eds.) *Technology in Education: Looking Toward 2020.* Lawrence Erlbaum Associates, Hillsdale, NJ. pp. 331-356.

Pegrum, M. (2019). *Mobile learners. Mobile lenses on learning*, 171–206. https://doi.org/10.1007/978-981-15-1240-7_5.

Pöntinen, S., & Räty-Záborszky, S. (2020). Pedagogical aspects to support students' evolving digital competence at school. *European Early Childhood Education Research Journal, 28*(2), 182–196. https://doi.org/10.1080/1350293X.2020.1735736.

Qian, D. D. (2002). Investigating the relationship between vocabulary knowledge and academic reading performance: An assessment perspective. *Language Learning, 52(*3), 513–536. https://doi.org/10.1111/1467-9922.00193

Rosell-Aguilar, F. (2018). Autonomous language learning through a mobile application: A user evaluation of the busuu app. *Computer Assisted Language Learning, 31*(8), 854–881. http://dx.doi.org/doi:10.1080/09588221.2018.1456465

Şad, S. N., Özer, N., Yakar, Ü., & Öztürk, F. (2020). Mobile or hostile? Using smartphones in learning English as a foreign language. *Computer Assisted Language Learning*, 1–27. https://doi.org/10.1080/09588221.2020.1770292

Shoaei, F., & Alavi, M. (2016). The Impact of computer-assisted language learning applications on incidental vocabulary recall and retention. *Bulletin de La Société*

Royale Des Sciences de Liège, 85, 1674–1686. https://doi.org/10.25518/0037-9565.6394

Shokrpour, N., Mirshekari, Z., Moslehi, S., & Popescu, M. (2019). Learning vocabulary electronically: Does computer assisted language learning (CALL) instruction have any impacts on Iranian EFL learners? *Cogent Education, 6*(1), 1702827. https://doi.org/10.1080/2331186X.2019.1702827

Son, J.-B. (2008). Using web-based language learning activities in the ESL classroom. *International Journal of Pedagogies and Learning, 4*(4), 34–43. https://doi.org/10.5172/ijpl.4.4.34

Stockwell, G. (2008). Investigating learner preparedness for and usage patterns of mobile learning. *ReCALL, 20*(3), 253–270. https://doi.org/10.1017/S0958344008000232

Stockwell, G. (2010). Using mobile phones for vocabulary activities: Examining the effect of platform. *Language Learning & Technology, 14*(2), 95–110. https://scholarspace.manoa.hawaii.edu/bitstream/10125/44216/14_02_stockwell.pdf

Stockwell, G. (2016). Mobile language learning. In the *Routledge handbook of language learning and technology* (pp. 296–307). Routledge. http://shorturl.at/clxDP

Suwantarathip, O., & Orawiwatnakul, W. (2015). Using mobile-assisted exercises to support students' vocabulary skill development. *Turkish Online Journal of Educational Technology-TOJET, 14*(1), 163–171. https://eric.ed.gov/?id=EJ1057347

Syndicate, U. of C. L. E. (2002). *Cambridge BEC preliminary 1: practice tests from the University of Cambridge local examinations syndicate* (Vol. 1). Cambridge University Press. http://shorturl.at/iqKMY

Taki, S., & Khazaei, S. (2011). Learning vocabulary via mobile phone: Persian EFL learners in focus. *Journal of Language Teaching & Research, 2*(6), 1252–1258. https://doi.org/10.4304/jltr.2.6.1252-1258

Talarposhti, A. R., & Pourgharib, B. (2014). The possible effect of CALL on vocabulary acquisition and instruction. *Journal of Language Sciences & Linguistics, 2*(3), 79-84. https://www.jlsljournal.com/wp-content/uploads/paper16.pdf

Thornton, P., & Houser, C. (2005). Using mobile phones in English education in Japan. *Journal of Computer Assisted Learning, 21*(3), 217–228. https://doi.org/10.1111/j.1365-2729.2005.00129.x

Thornton, P., & Houser, C. (2004). Using mobile phones in education. The *2nd IEEE International Workshop on Wireless and Mobile Technologies in Education*, 2004. Proceedings., 3–10. https://doi.org/10.1109/WMTE.2004.1281326

Wang, H., & Chen, C. W. (2020). Learning English from YouTubers: English L2 learners' self-regulated language learning on YouTube. *Innovation in Language Learning and Teaching, 14*(4), 333–346. https://doi.org/10.1080/17501229.2019.1607356

Warschauer, M., & Healey, D. (1998). Computers and language learning: An overview. *Language Teaching, 31*(2), 57–71. https://doi.org/10.1017/S0261444800012970b

Warschauer, M., & Kern, R. (2000). *Theory and practice of network-based language teaching. In Network-based language teaching: Concepts and practice* (pp. 1–19). Cambridge university press. https://shorturl.at/emsuQ

Wrigglesworth, J. (2020). Using smartphones to extend interaction beyond the EFL classroom. *Computer Assisted Language Learning, 33*(4), 413–434. https://doi.org/10.1080/09588221.2019.1569067

Wu, Q. (2014). Learning ESL vocabulary with smartphones. *Procedia-Social and*

Behavioral Sciences, 143, 302–307. https://doi.org/10.1016/j.sbspro.2014.07.409