The Effectiveness of App-Based Language Instruction: A Blend of Productive Linguistic Knowledge Improvement and Users' Perceptions and Experiences

Maryam Khavaninzadeh[1], Mohammad Golshan[2]

[1]PhD student, Department of English, Maybod Branch, Islamic Azad University, Maybod, Iran. mim.khavanin@gmail.com
[2]Assistant Professor, Department of English, Maybod Branch, Islamic Azad University, Maybod, Iran (**Corresponding author**). mohammadgolshann@gmail.com

Abstract

The growing popularity of language-learning apps among language learners has highlighted the need for rigorous evaluation of their efficacy in second language acquisition (SLA). This study combined quantitative measures to comprehensively understand the effectiveness of the Busuu app in improving the productive vocabulary of Iranian intermediate EFL learners with qualitative data from in-depth interviews to explore their perceptions and experiences while using the app. Forty-three learners (17 males and 26 females with a mean age of 27.53) were selected to assess the effectiveness of the Busuu app on learners' productive vocabulary knowledge. Among them,15 participants (all female with a mean age of 29.40) agreed to be interviewed after the Busuu study to gain insights into learners' perceptions and experiences with app-based learning. A pretest-posttest design using the LEX30 task, a standardized productive vocabulary assessment tool, was conducted before and after the Busuu study to evaluate participants' productive vocabulary knowledge. Paired samples t-tests revealed no significant improvement in participants' productive vocabulary knowledge. Nonetheless, the number of responses produced in the posttest was higher than in the pretest. According to the interview data, users rated vocabulary as the most favored feature of the app, while restricted access to premium content was noted as the least favored. Most participants acknowledged that the app exceeded their initial expectations before installing it. Additionally, improving vocabulary knowledge was the users' primary expectation from utilizing the app. Furthermore, approximately all participants found the app beneficial for language learning. However, most of them reported low levels of enjoyment during app usage. The results can contribute to understanding what needs to be done to upgrade the quality and potential of the Bussu app, how the app can better support EFL learners in effectively activating their lexical knowledge, and what the users' experiences and expectations from a language-learning app are.

Keywords: attitude, Busuu, computer-assisted language learning, EFL, language-learning application, mobile-assisted language learning, productive vocabulary knowledge

1. Introduction

Vocabulary mastery plays a vital role in language acquisition. It has been classified into diverse dimensions. Receptive/productive linguistic competence is a well-known and pervasive framework. Receptive vocabulary knowledge pertains to processing words instead of creating them, while productive knowledge addresses creation and production (Harmer, 2007). In other words, the lexical items that learners can recognize and comprehend when they listen or read are passive, while the words that learners can use in their speech and writing are active lexical items. Therefore, having sufficient active lexical competence is essential for L2 learners to recall and use words effectively in their language.

With its effortless, instant, and roughly limitless access to various software, applications (or apps), and a host of additional resources, technology has revolutionized second-language learning (L2). In addition, the COVID-19 outbreak has further accelerated this shift towards online resources, making digital instruction a substantial issue in recent years. As such, digital instruction plays a crucial role in shaping the future of language learning and teaching, offering a promising outlook for the potential for app-based language instruction.

Prior research on technology has primarily focused on whether and how technology promotes SLA (El Hariry, 2015). However, comparatively less attention has been given to utilizing technology to instruct SLA outside the classroom (Rosell-Aguilar, 2016), possibly due to the rapid evolution of technology in language learning apps. The widespread growth and popularity of mobile apps among language learners have underscored the need for rigorous evaluations of their design and quality. These evaluations not only help developers understand the impact of their apps on users' real-life learning performance but also contribute to the ongoing discourse on the effectiveness of language learning outside classroom contexts.

Given the widespread usage of apps beyond formal learning settings, it is becoming increasingly crucial that autonomous users evaluate the fitness of apps for their learning needs (Rosell-Aguilar, 2017). However, the scarcity of research on the effectiveness of exclusive app-based language learning underscores the urgent need for further exploration. Our study, therefore, attempted to bridge this gap and contribute to the ongoing discourse on the effectiveness of apps in language learning outside classroom contexts, thereby underlining its importance.

While previous research has attested to the potential of apps in facilitating vocabulary acquisition, the issue of learners' ability to use the

gained vocabulary productively in their language use has been overlooked. The present study, therefore, examined the potential effectiveness of Busuu, a popular language-learning app designed for self-study, in developing productive lexical knowledge among Iranian learners. By focusing on Busuu's capacity to enhance productive vocabulary knowledge, this study contributes to the future of language learning and pedagogy.

Therefore, this study aimed to comprehensively evaluate Busuu's effectiveness in enhancing learners' vocabulary acquisition and sought to gain deeper insights into users' attitudes and overall learners' experiences while using the app. The research questions that guided this study are as follows:

RQ1. To what extent does the Busuu app improve the productive vocabulary knowledge of intermediate EFL learners?

RQ2. How do L2 English learners perceive the effectiveness of the Busuu app in supporting their language learning journey?

2. Literature Review

2.1. Lexical Knowledge

Vocabulary has always been considered the most vital component of all languages, underscoring its pivotal role in language learning and teaching. Given the importance of vocabulary learning for SLA, applied linguistics has been concerned with developing and enhancing learners' vocabulary knowledge, an indispensable component of language learning and teaching and the foundation of communication. This emphasis on vocabulary learning highlights the significance of our work within this domain.

Vocabulary knowledge is a complex construct involving several aspects. It is multidimensional, encompassing many classes and subclasses (Laufer & Goldstein, 2004; Nation, 2001). Nation (2001) classified this knowledge into three main categories: knowing the form, the meaning of the word, and how to use it, highlighting its intricate nature.

One area of lexical knowledge that has been extensively studied is the difference between receptive and productive vocabulary knowledge. An agreed-upon definition of these constructs remains elusive (Pignot-Shahov, 2012), and the interrelationship between these two types of knowledge and the process of learning them is still unclear and ambiguous (Fan, 2000; Read, 2000; Webb, 2005). Receptive vocabulary, or passive vocabulary knowledge, is used while listening to or reading something. Productive vocabulary knowledge, or active knowledge, is the correct use of words in productive skills (Nation, 2001). In other words, receptive vocabulary pertains to

processing the word instead of producing it; however, productive knowledge requires creation and production, as in speech or writing (Harmer, 2007).

The general belief is that words are initially stored receptively, necessitating intentional or incidental learning for productive use. Hence, linguistic knowledge can be conceptualized as a continuum; one end is receptive word knowledge, and the other is productive. However, this dichotomy is not absolute. In contrast to the general view that receptive knowledge grows first and faster than productive knowledge, Zhong and Hirsh (2009) reported that productive vocabulary grew faster among their participants than receptive vocabulary. Likewise, Hagtvet (1982) posited that productive lexical knowledge grows before receptive knowledge for some lexical items.

A widely observed finding is that learners' receptive vocabulary tends to expand faster than productive vocabulary knowledge. Laufer (1998) concluded that there was a significant improvement in learners' receptive vocabulary knowledge, whereas little to no progress was shown in their productive vocabulary knowledge. Similarly, a study by Fan (2000) showed a slower rate of advancement for productive vocabulary knowledge. Correspondingly, Webb (2005) noted that learners with greater receptive vocabulary knowledge tended to show more productive vocabulary knowledge. Given the distinction between receptive and productive vocabulary knowledge, effectively transferring receptive lexical knowledge to productive mode is a crucial objective in language teaching.

Laufer and Paribakht (1998) emphasized that word frequency is essential in facilitating the transition from receptive to active vocabulary knowledge. Although the issue of transferring vocabulary knowledge from receptive to productive mastery is substantial in SLA, it is relatively under-researched (Heidari, 2019). Furthermore, using what has been learned receptively within authentic situations stimulates learners' notice of the vocabulary items and their pragmatic applications (Lee & Muncie, 2006). Lehmann (2007) also stated that the gap between learners' passive and productive knowledge is more noticeable in EFL contexts compared to ESL environments, and this could be attributed to more opportunities available to ESL learners to apply the vocabulary they acquired receptively and turn them to the productive mode. Due to the limited opportunities for EFL learners to use the language, productive vocabulary knowledge activation rarely occurs. Thus, from all the points mentioned, it is apparent that vocabulary learning is not just memorizing the meaning of words without using them (Swain, 1985). Uchihara and Saito (2016) used the LEX30 task to efficiently asses productive vocabulary knowledge. They also investigated the predictive power of L2

learners' productive vocabulary knowledge in predicting multiple dimensions of spontaneous speech production. Findings revealed a significant correlation between productive vocabulary scores and L2 fluency but not comprehensibility or accentedness, suggesting a pivotal role of productive lexical knowledge in developing L2 learners' oral proficiency.

2.2. Evaluating Language Learning with Mobile Applications

In recent years, the remarkable growth of digital technologies has been exponential, providing more opportunities and affordance for language learners. Gorjian (2012) stated that technology use in language teaching had increased over the past decade and had outstanding upshots on language learning. The widespread use of mobile technologies, such as smartphones, provides instant access to enormous educational resources, such as language-learning apps.

Many learners use one or more apps as their primary form of instruction to learn languages (Rosell-Aguilar, 2018). The value and potential of these apps as language-learning resources differ enormously. Based on a large number of research findings, apps have been shown to improve several language skills, such as vocabulary acquisition (Steel, 2012; Xodabande & Atai, 2020; Rezaei et al., 2014), reading and writing (Steel, 2012), speaking (Hwang et al., 2014b; Shadiev et al., 2015), listening comprehension skills (Kim, 2013; Sorayyaei Azar & Nasiri, 2014), and grammar (Castañeda & Cho, 2016). On the one hand, some researchers have stressed the downsides of some language learning apps, noting a mismatch between pedagogical and technical qualities and contending that these apps only offer fragmented language practice (Pareja-Lora et al., 2013). Others argue that apps provide only basic learning activities without adding anything extra to what has been done earlier with other technologies (Burston, 2014). On the other hand, some believe apps can boost learners' autonomy and interest in language learning (Godwin-Jones, 2011). Language learners can use them as a valuable supplementary tool for traditional classes (e.g., Lord, 2016), particularly when in-class language practice is inadequate. Furthermore, regular practices provided by apps can support language learners who are no longer formally studying a language but still want to keep practicing it (Rosell-Aguilar, 2017). New users, stakeholders, analysts, and researchers are willing to know the benefits of using language-learning apps, identify which app offers the best experience, and explore ways to improve the quality and potential of language-learning apps.

Zhang (2011) believed that learners' perceptions of computer-assisted language learning (CALL) significantly predict the successful use of computers in language learning. Several studies have reported learners' positive attitudes toward learning with apps (Castañeda & Cho, 2016; Ebadi &

Bashiri, 2018; Khodarahmi & Heidari-Shahreza, 2018; Kim, 2013; Steel, 2012). For instance, Kim (2013) researched a group of Korean students and found positive effects of the apps' authentic listening materials on the listening comprehension of the experimental group. In addition, positive attitudes were reported toward using apps for this purpose. Relatedly, Sorayyaei Azar and Nasiri (2014) compared the effects of audiobooks on cell phones with traditional CD-ROM/ audiocassettes. The study showed that mobile learning effectively improves listening comprehension and presents an exciting and innovative approach to learning a new language.

In a similar vein, the findings of Khodarahmi and Heidari-Shahreza (2018) within the Iranian context confirmed the substantial influence of mobile apps on vocabulary acquisition. Moreover, EFL learners showed a positive attitude toward using Telegram, a mobile app, for the purpose of mastering word stress patterns. Correspondingly, Ebadi and Bashiri (2018) investigated EFL learners' perceptions of vocabulary learning via smartphone apps. Their results indicated that the participants harbored positive attitudes toward the app (Vocabulary Flashcards, 2016) due to its beneficial impact on their learning and its provision of both form and meaning-focused instruction. Steel (2012) emphasized the value of using language learning apps outside the classroom. According to his study, many students used more than one app and valued the opportunity to engage in language learning outside the classroom. The features reported by participants that they preferred most were portability, convenience, flexibility, and the potential to personalize their learning experience. The language areas perceived as highly beneficial were vocabulary, reading and writing, grammar, and translation activities. Basal et al. (2016) investigated the Effectiveness of WhatsApp, a mobile app, in facilitating learning idioms. The control group was instructed to learn material and tasks in printed form (paper-based), while the experimental group was engaged with the learning content through WhatsApp. In within-group comparisons, both groups showed significant progress; however, in between-group comparisons, the experimental group outperformed the control group.

2.3. Busuu Application

Busuu is a popular language-learning program that operates across Android and iOS operating systems, and it is also accessible via the web (available at https://www.busuu.com/en/logout). It is easy to access the Busuu app; one only needs an email address or a phone number to create an account. This app offers a diverse selection of 12 languages, permitting users to choose the language of their interest to begin learning. This app offers language courses from beginner level A1 to upper intermediate level B2 (using CEFR). Users can follow the courses in a linear fashion or navigate freely through them

to find the topics of interest. While Busuu is not entirely free, it offers substantial content at no cost for learners who sign up for a basic account. They can access additional features and sections if they upgrade to a premium membership. This program offers a comprehensive range of exercise types, topics, and situations that facilitate practicing essential language skills. The activities are designed to enhance reading, writing, speaking, listening, vocabulary, translation, and grammar, providing learners with a well-rounded language learning experience.

Moreover, users can access smart vocabulary reviews and quizzes. Learners can visually monitor their progress to see how much of the lesson they have completed, and they can also create a report showing their achievements over seven days, promoting self-monitoring. Additionally, the Busuu community allows learners to provide feedback on each other's writing exercises, fostering a motivational environment for learning. Although Busuu is one of the most widely popular apps and claims to have over 60 million registered users (Busuu, 2016), there is a paucity of research studies on Busuu as a language-learning platform, indicating a need for further investigation. Some examples of such studies are provided in the following paragraphs.

Rezaei et al. (2014) investigated the effectiveness of mobile apps (Interactive English and Busuu) in enhancing English vocabulary learning. They found that using these apps significantly improved vocabulary acquisition, increased learners' confidence, enhanced class participation, and fostered a positive inclination toward implementing multimedia in education. In a large-scale survey involving 4,095 participants, Rosell-Aguilar (2018) used an online questionnaire to assess user experiences with the Busuu application. The study revealed that 83% of the participants found the app beneficial for improving their language skills, with vocabulary acquisition being the main area of improvement. The study concluded that users considered the app a reliable resource for language learning, as evidenced by their high expectations. Notably, one-third of the respondents (36%) reported using it as their sole resource for language acquisition. Additionally, 40% of them relied solely on apps and digital resources for language learning, while 24% used formal language learning programs. The survey highlighted several important app features, such as interactive exercises, personalized learning paths, and the inclusion of native speaker feedback, all of which contributed to its usefulness. This research suggests that a significant number of adults worldwide rely exclusively on apps for their language learning, emphasizing the need for further studies into app-based learning. Moreover, in a non-peered-reviewed study conducted by Vesselinov and Grego (2016b) about the effectiveness of the Busuu app, it was reported that after two months (on average, 22.5 hours of study), 84 percent of the participants demonstrated

improvement in their writing skills, and over 75 percent of them improved their oral proficiency.

2.4. Autonomous Language Learning via Apps

One of the potentials of using apps recognized by earlier studies is their ability to trigger learners' autonomy and interest in language learning (Godwin-Jones, 2011; Leis et al., 2015). Using mobile apps inside the classroom context with teacher guidance differs significantly from using them autonomously. While many studies have been conducted on mobile device activity within a classroom setting, less is known about how learners engage in mobile learning independently outside the classroom.

Leis et al. (2015) examined the benefits of implementing smartphones in an EFL setting in Japan, focusing on learners' motivation and autonomy. The outcomes suggested that learners encouraged to use their smartphones in the classroom demonstrated motivation to study more during their leisure time. Furthermore, these learners showed high autonomy, took responsibility for their learning, and actively sought ways to enhance their study habits and language proficiency. Similarly, Mason and Zhang (2017) investigated how learners of Chinese as a foreign language with different proficiency levels used mobile apps to promote their learning of Chinese characters. A survey and semi-structured interviews found that 94 percent of the participants used apps independently; however, learners used only a small part of the available functionalities.

The previous sections have highlighted the importance of evaluating the effectiveness of apps in aiding language learning. While current literature suggests that these apps help develop language skills and vocabulary acquisition and that learners generally have positive attitudes toward them, some research gaps still require further investigation. Firstly, researchers employed applications not specially designed for language learning in many studies, such as Telegram or WhatsApp (e.g., Basal et al., 2016; Khodarahmi & Heidari-Shahreza, 2018). Therefore, the assessment of these apps differs from that of dedicated language-learning apps. Moreover, some studies concentrated on apps designed for a single language skill, such as flashcards (e.g., Xodabande & Atai, 2020), while others utilized apps that offer a combination of skills (e.g., Busuu) (e.g., Rosell-Aguilar, 2018; Rezaei et al., 2014). Since language skills are inherently interconnected and complement each other in the context of language learning and use, this study used a language-learning app (Busuu), which includes all skills for learning a new language.

Another gap identified in most studies mentioned in the extant literature is that educators frequently integrated app features into their instruction, interfering with learners using the app independently (e.g., Khodarahmi & Shahreza, 2018). As a result, it is challenging to associate users learning improvements with the app directly. Building upon these findings, this study aimed to evaluate a language-learning app when learners use it independently without the influence of teacher intervention. In addition, previous research has consistently demonstrated the usefulness of app learning in improving vocabulary knowledge. It is worth noting that vocabulary knowledge is multi-dimensional, and the ultimate goal of vocabulary learning is to use it actively. Accordingly, this study seeks to determine the extent to which apps contribute to expanding learners' active vocabulary repertoire. Lastly, although numerous studies have reported a generally positive attitude among users, variation exists in their assessment criteria, participants' age groups, language proficiency levels, and expectations.

3. Method

3.1. Design

An explanatory sequential mixed-method research design was used, combining quantitative data from pretests and posttests with qualitative data from semi-structured interviews. The quantitative component facilitated a robust comparison of learners' productive vocabulary knowledge before and after using the Busuu app, providing numerical evidence of the app's effectiveness. However, the interviews evaluated its effectiveness, providing deeper insights into the users' perceptions and experiences.

Participants were chosen using convenience sampling, following Dörnyei 's (2007) approach. This method was selected due to the ease of access and availability of participants who met specific criteria and were willing to take part. These criteria included: (a) being native Persian speakers, (b) not currently enrolled in any formal English study, (c) having an intermediate level of English proficiency, and (d) being willing to commit to studying English on Bussu for at least 250 minutes (over 4 hours) for fewer than three months.

3.2. Participants

Sixty-five participants met these benchmarks and agreed to participate in the study. Participants were asked to report their average usage time on Busuu every two weeks to ensure they received enough treatment. Of the 65 participants, 47 diligently studied English on Busuu for at least 250 minutes and reported their work to the researcher. Finally, 43 of these participants (17 male and 26 females, M_{age} 27.53, SD=13.82) completed the posttests. Of

those,15 participants (all female, M_{age}= 29.40, SD=9.48) volunteered and were seated for the interview after their experience with the Busuu study.

3.3. Materials and Instruments

3.3.1. Productive Vocabulary Test (Lex30)

Lex30 task, a significant tool in our research, elicited participants' productive mental lexicon through word associations. The Lex30 task is a widely recognized and validated tool for measuring productive vocabulary knowledge. It was built on the relatively familiar construct of vocabulary frequency and yields rapid, quantitative score data (Fitzpatrick& Clenton, 2010). Moreover, Lex30 produces a lexically rich text economically, involving minimal employment of receptive knowledge (Fitzpatrick& Clenton, 2010).

In this task, respondents were required to write up to four other words that they considered semantically related to each cue. We used the computerized version of the Lex30 task (available at https://www.lognostics.co.uk) and replicated the same stimulus, spaces, and instructions to create a digital format of the Lex30 task. The digital format was designed using Google Forms. The participants were provided with the link, a brief explanation, a picture of the LEX30 task, and an example, which improved the transparency of the process.

Lex30 was first developed and validated by Meara and Fitzpatrick (2000). Clenton (2010) concluded that Lex30 offers a valuable means of understanding the construct of productive lexical knowledge. Also, it was reported to be effective in "broadly measuring productive vocabulary knowledge" (Fitzpatrick & Clenton, 2010, p. 545). According to Fitzpatrick and Meara (2004), "Lex30 is a robust enough measuring tool to fill an important gap in the battery of tests currently available" (p. 72). Figure 1 displays some instances of the completed tasks.

Figure 1
Instances of Completed Lex30 Tasks
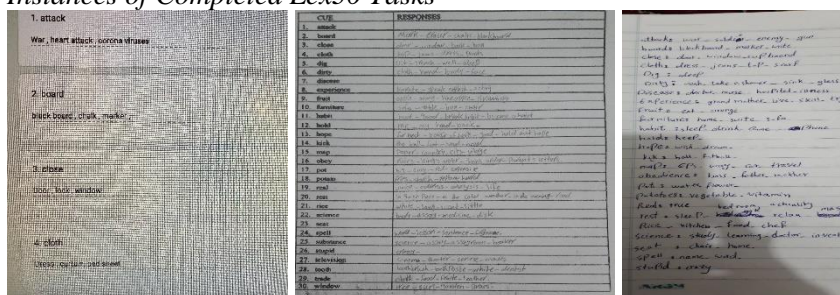
Earlier research studies have shown high validity for this task, with significant correlations reported with the Productive Vocabulary Levels Test (PVLT; Laufer & Nation, 1999) (Fitzpatrick & Clenton, 2010; Walters, 2012). Three experts in the field meticulously proofread the questionnaire to establish its validity. The questionnaire was then piloted with five EFL learners similar to the main participants. The test/retest reliability coefficient of the questionnaire was estimated, yielding an index of .937

3.3.2. New Inside Out Quick Placement Test

International organization Macmillan Publishers (2015) developed the New Inside Out Quick Placement Test. The test scores are equivalent to CEFR levels and indicate students' English level of proficiency after they reply to multiple-choice questions on vocabulary and grammar. Only 15 minutes are required to answer the test's questions. The test can be downloaded or used online (available at http://www.insideout.net/new/wp-content/uploads/2010/09/quick-placement-test.doc). According to the test conversion Table, the range required for the intermediate level (B1) is 30-39 points.

3.3.3. Interviews

Students' attitudes and willingness toward technology affect the effective application of computers in education (Pektaş & Erkip, 2006). Therefore, to evaluate the app and explore users' attitudes, perceptions, and experiences about using it after using it, semi-structured interviews were conducted with 15 participants in Persian. Six interviews took place via Skype, and the remaining were via WhatsApp. Each interview lasted roughly 15 minutes on average. The sessions were also audiotaped and transcribed for further analysis.

A content analysis was conducted on all meeting data to identify common themes regarding learners' attitudes toward the learning materials and their experience using the app. Although many comments were elicited for analysis, we focused on the most frequent themes. The data extracted from the interviews offered valuable insights into the nature of linguistic gains and learners' experience with the app.

3.4. Procedures

The current investigation comprised three parts: first, pretesting; second, Busuu study; and finally, post-testing and interviewing. After selecting participants based on the research criteria, a link to the online Lex30 task was designed using Google Forms. Essential explanations and an example were shared with the participants. The participants completed the Lex30 task for

about 15 minutes. Then, participants announced their agreement to participate in the Busuu study. A brief explanation of how to use the app was provided to ensure that users could use the app properly. An invitation link was sent to the participants, enabling them to access a 30-day free trial. Participants used Busuu for less than three months for at least 250 minutes between pretesting and posttesting. They were required to complete Busuu lessons several days a week and to report their progress to the researchers verbally or by text weekly. However, they were also encouraged to study every day if they wished.

After about three months, the researcher conducted posttesting using Lex30. For scoring, each participant's responses were assembled and any misspellings were corrected. Subsequently, the responses underwent lemmatization following strict principles similar to the approach used by Meara and Fitzpatrick (2000). According to the lemmatization criteria in their study, if a word has an affix included in designated lists, it has to be simplified to its base form, called "lemmas". If a word does not have an affix from the designated lists, it has to remain unchanged. The data was converted into a text file using Gboard and Google Keyboard and sorted alphabetically for each individual. The JACET list in Vocabprofile (Cobb, n.d.) was used to analyze the responses (available at https://lextutor.ca/freq/lists_download/jacet/jacet1000.txt). One point was scored for every low-frequency word produced (not being in the 1000 most frequent English content words). In this study, we used raw scores for the scoring method. Volunteered participants were then seated for semi-structured interviews. Each interview lasted 10–15 minutes and was recorded with participants' consent for further exploration.

3.5. Data Analyses

The Statistical Program for Social Sciences (SPSS) version 22 was used for the quantitative part of the study (descriptive statistics and inferential statistics). A paired samples t-test, a statistical tool, was used to analyze the learners' pre- and post-test scores. The interview data was analyzed using the two-cycle coding procedure outlined by Miles et al. (2014). In the first cycle, open coding was performed. researchers examined the interview transcripts to identify recurring concepts and themes independently. In the second cycle, axial coding was used to further refine and organize the initial codes into broader categories. Codes were compared and discussed until a consensus was reached. The coding process revealed major themes: user features, expectation alignments, perceived learning outcomes, motivation and engagement factors, and overall user satisfaction. Each theme falls under three dimensions: user experience, effectiveness of learning, and engagement and motivation.

4. Results

The results of the quantitative and qualitative data analyses are presented in separate sections as follows.

4.1. Quantitative Findings

Table 1 presents the descriptive statistics of the paired samples t-test. A Kolmogrov-Smirnov test was conducted through SPSS 22 to check the normality assumption. Table 2 depicts the results of the normality assumption.

Table 1

The Descriptive Statistics of Paired Samples T-test for Pretest and post-test scores

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pretest_score	23.7907	43	16.46144	2.51035
	posttest_score	24.3721	43	15.37627	2.34486

The data presented in Table 1 show that the observed mean of the scores the participants gained in the pretest was 23.8, while the average of the posttest scores was 24.4.

Table 2

One-Sample Kolmogrov-Smirnov Test of Pretest and Posttest Scores

		pretest_score	posttest_score
N		43	43
Normal Parameters[a,b]	Mean	23.7907	24.3721
	Std. Deviation	16.46144	15.37627
Most Extreme Differences	Absolute	.154	.124
	Positive	.154	.124
	Negative	-.112	-.124
Test Statistic		.154	.124
Asymp. Sig. (2-tailed)		.052	.093

As the analysis results in Table 2 show, the assumption of normality of pretest and posttest scores is met (pretest, $p=. 052$; posttest, $p=. 093$). To plot the subjects' progress after the Busuu study, a paired samples t-test was conducted to compare the Lex30 scores before and after the Busuu study.

Table 3

The Paired Samples T-test for Pretest and Posttest Scores

		Paired Differences							
					95% Confidence Interval of the Difference				Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	df	
Pair 1	pretest_score - posttest_score	-.58	1.95	.29	-1.18	.02	-1.95	42	.058

As indicated in Table 3, the difference between participants' scores in the pre and posttest shows no significant difference between the two sets of scores. In other words, the participants' performance in the pretest (*M*=23.8, *SD*=16.5) was statistically the same as their performance in the posttest (*M*=24.4, *SD*=15.4), *t* (42) =-1.950, *p*=. 058. The eta squared statistic (.08) shows an insignificant effect size.

Table 4

A Kolmogorov-Smirnov test of the Number of the Words Produced in the Pretest and Posttest

		pretest_replied	posttest_replied
N		43	43
Normal Parameters[a,b]	Mean	58.5116	73.8837
	Std. Deviation	35.59519	29.83064
Most Extreme Differences	Absolute	.192	.136
	Positive	.178	.067
	Negative	-.192	-.136
Test Statistic		.192	.136
Asymp. Sig. (2-tailed)		.000	.045

As the p values of the pretest (*p*<. 001) and posttest (*p*=. 045) show, the normality of the number of words the participants produced in each test is not assumed. A Wilcoxon signed rank test will be appropriate for comparing the number of words produced in each test.

Table 5

The Descriptive Statistics of the Number of Words Produced in Pre- and Posttest

		N	Mean Rank	Sum of Ranks
posttest_replied - pretest_replied	Negative Ranks	17[a]	17.65	300.00
	Positive Ranks	26[b]	24.85	646.00
	Ties	0[c]		
	Total	43		

The descriptive statistics in Table 5 show that the mean of the number of words increased from the pre-test (*M*=17.65) to the post-test (*M*=24.85).

Table 6

A Wilcoxon Signed Rank Test for the Number of Words Produced in Pre- and Posttest

	posttest_replied - pretest_replied
Z	-2.089[b]
Asymp. Sig. (2-tailed)	.037

From the test statistics in Table 6, it is evident that there is a significant difference between the number of responses in the pretest and posttest (Z=-2.089, p=. 037). The eta squared index is .31, which indicates a medium effect size. Identifying the test in which more responses were produced is possible by referring to the bar graph.

Figure 2

The Bar Graph of the Number of Words Produced in Pre- and post-tests by Age Groups
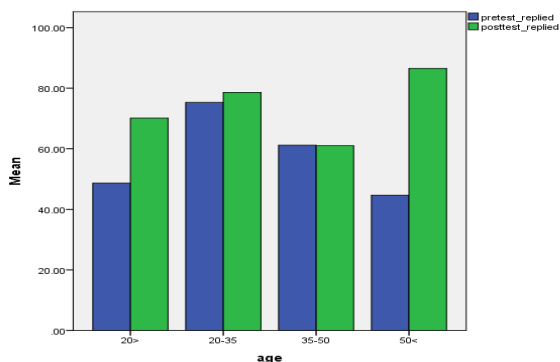

Figure 2 depicts that the number of words in the posttest is more than the number of words the participants produced in the pretest, almost for all age groups categorized in the study.

4.2. Qualitative Findings

Semi-structured interviews were implemented to address the second research question on users' perceptions and experiences. Although loads of comments were elicited for analysis, here we tried to focus on the most frequent themes concerning

1) More/less favored app features: user feedback on app features they enjoyed or found frustrating
2) Expectations alignment: if the app met their initial expectations from a language learning app
3) Perceived learning outcomes: learners' assessment of their language gains after using the app
4) Motivation and engagement factors: app influence on learners' motivation and enjoyment during the learning process
5) Overall user satisfaction: general satisfaction and quality of the app

according to users' experiences.

4.2.1. What specific app features do they like more/less than other features?

Tables 7 and 8 present the users' responses about the app's features that they liked more and less than others. The features reported by learners that they liked more than other features of the app were as follows: 66.66 percent of the learners reported that they liked Vocabulary activities, 53.33 percent mentioned that they liked listening activities, and 33.33 percent believed recap and quizzes sections were the parts the liked more than other ones. Moreover, 20 percent of learners reported that they liked that they could skip through the lessons and choose the lessons they wished to learn, and 60 percent acknowledged that the app was easy to use. Other comments were referring to the visual stuff.

Less-liked features were reported as 40 percent grammar practice and 60 percent speaking exercises. Twenty percent of comments were related to a dearth of decent writing activities, and 66.66 percent were about the necessity of full premium access to the app's contents. Other comments referred to the users' issue with the app's speech-to-text glitch and difficulty using it.

Table 7

Learners' More-liked Features of the Busuu App

More-liked	Examples
Vocabulary practice % 66.66	Using the mobile app helped me learn my English vocabulary better, and it was more fun.
Listening practice %53.33	The apps' listening activities improved my listening skills and gave me confidence, as I could listen to the activities repeatedly and do them anyway.
Recap& Quizzes section % 33.33	The tests provided by the app regularly helped me feel confident knowing how much I have learned.
Choose the topic of their interest % 20%	Picking up my preferred topics was excellent. I did not have to stand the boring topics.
Easy to use 60%	I could easily and quickly go through the app materials, and the app saved my progress, which was easier than browsing the web.
Other 6.66%	I like using the app more than reading a book as it presents the material in multiple ways (photo, sound, examples, test, etc.)

Table 8

*Learners' Less-Liked Features of the Busuu App*

Less-liked	Examples
Speaking exercises 60%	Speaking exercises were only saying what we heard.
Grammar practice 40%	I am afraid I have to disagree that this app can help me to develop my grammar.
Writing activities 20%	Writing activities were only dragging some words into their place or ordering the words in a sentence.
Accessing to full premium content 66.66%	I did not like that some sections of some lessons were not free, and I could not complete some lessons.
Other 13.33%	The voice recognition did not work correctly. Sometimes, even when I know I am not pronouncing accurately, Busuu just accepts what I say.

As illustrated in Tables 7 and 8, vocabulary practice is the most liked feature of the Busuu app, and not accessing full premium content was the least liked feature.

4.2.2. Did the app meet users' expectations?

A total of 28 comments were extracted. The most popular expectation from the app was improving vocabulary knowledge (36%), speaking skills (29%), reading (14%), and writing (11%), followed by improving their grammar knowledge (7%). Ultimately, four percent reported that they had zero expectations. The visual representation of the results appears in Figure 3.

Figure 3

Learners' Expectations from the Busuu App
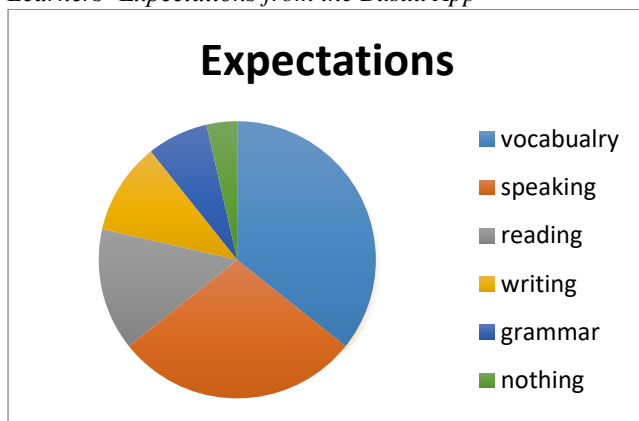
To gain learners' insights about their overall view about the usefulness of the app, they were asked to choose one of the statements: "The app was better than what they expected before," "The app was worse than what they expected," or "the app was as they expected." Regarding fulfilling users' expectations, 66.66 percent acknowledged that the app was better than they had expected before installing it, 26.66 percent admitted that the app was as expected, and 6.66 percent alleged it was worse than expected. As Figure 3 depicts, most participants' expectations from the app were improving their vocabulary knowledge and speaking skills. They did not believe the app could help them at all or help promote their grammar skills.

4.2.3. Do they think using the app has improved their language learning?

The app was generally found to be effective for language learning by the learners. However, some respondents suggested that the app could provide more free content or that the app's language of instruction should be their L1 (Persian). The interviewer asked learners to choose one of the following statements: "Using the app has helped me improve my knowledge of language" or "Using the app did not help me improve my knowledge of language" to understand learners' views better. Fourteen out of 15 respondents selected the first statement, meaning that 93.33 percent of participants confirmed that the app has helped them improve their language knowledge.

4.2.4. Do they enjoy using the Busuu app?

Eleven out of fifteen (73/33 percent) participants stated that they did not experience enjoyment while using the app. Some instances are: "Only gaming apps keep me motivated and encouraged to continue," "There is no fun in Busuu; it is only language learning," or "I wish I could do something enjoyable like collecting coins and shopping." Conversely, one participant said that the app's progress report was a source of inspiration and motivation to continue using the app. She further explained that she felt satisfied upon seeing her improvements.

4.2.5. How satisfied are they with their Busuu experience?

Many comments were about learners' experiences using the app. A broad theme extracted from their experience was persistence. Notably, a positive attitude toward learning with an app does not necessarily guarantee that the app will be used (Dashtestani, 2016).

While app use can provide invaluable opportunities for engagement in learning, the learning experience with mobile devices can often be highly fragmented and full of distractions (Kenning, 2007). Some users reported difficulty using the app, either finding the appropriate time and place (66.66%) or focusing and avoiding distraction during the Busuu study (20%). These findings indicate two properties of this fragmentation.

Regarding persistence over time and place constraints, several participants reported that they postponed using the app when busy and occasionally forgot or did not feel like using it. However, some participants were successful in integrating the app into their routines. One learner mentioned that using the app had become a regular habit for her, describing, "Going through the app lessons has become my routine before going to bed." Also, some participants (13.33%) reported difficulties in pronunciation and speaking practice. They could not take advantage of this app feature from place to place or from time to time, feeling awkward and discouraged from practicing in crowded or public places or in situations where others were resting.

Concerning constraints that distract learners during language learning via Busuu, responses were about unexpected notifications about other programs and other apps' magnetism, which distract the users during Busuu study. The following statements demonstrate this theme: "When I decide to practice English through the app, it is hard to ignore notifications from social media apps and stay focused during language learning."

Despite the discussed constraints, some learners found motivational factors that kept them persisting with using the app. The positive experiences with the app serve as a testament to its potential. For instance, one learner found the option to skip some lessons and move through the lesson list made the app interesting. Another participant stated, "The progress report provided by the app is actually encouraging. I keep checking my progress after completing each lesson."

5. Discussion

5.1. Vocabulary knowledge

The results from the first research question revealed no statistically significant difference in the participants' productive vocabulary knowledge when comparing the pretests with the posttests. In other words, after 250 minutes of using the Busuu app study, there was no evidence to suggest that the app effectively promotes users' active vocabulary repertoire. Nonetheless,

concerning the number of words produced by learners in the LEX30 task, participants generally produced more words as their responses in the posttests than in the pretests. This result is consistent with Laufer's (1998) findings. Laufer concluded that the study subjects' productive vocabulary knowledge did not progress after one year of regular school instruction. This result may be due to inadequate transfer of receptive vocabulary knowledge to active use. Poor exercise design or lack of enough exposure may fail to provide the ideal learning environment for using vocabulary knowledge actively. Research suggests that abundant exposure and ample practice are fundamental to successfully transferring words from receptive to productive status (Laufer & Paribakht, 1998). Laufer (1998) argued that pushing to use the newly learned vocabulary is required to activate vocabulary knowledge. This can be accomplished by designing appropriate speaking or writing activities that provide a context for learners to apply the newly learned lexis. Another reason for this lack of progress may be due to insufficient time allocated for the successful transition of receptive vocabulary knowledge to productive knowledge. These results support Laufer (1998) and Fan (2000), who found that learners' receptive vocabulary knowledge usually develops faster than their active vocabulary knowledge. Thus, while learners may experience an increase in passive vocabulary knowledge, this period might be insufficient for substantial growth in their productive vocabulary knowledge.

The increased number of responses in the posttest suggests that, generally, learners tend to learn frequent words earlier than infrequent ones. One possible explanation for this finding lies in Rezaei et al. (2014) asserting that enhancing confidence is one of the potentials of using apps. Therefore, app-based learning might bolster learners' confidence in their language learning, allowing them to think better and retrieve more words.

Language skills and cognitive processes (recognition, recall, and comprehension) are at the forefront of many language-learning apps. However, they often suffer from inadequate socio-cognitive activities or collaborative learning opportunities (Kim & Kwon, 2012). The disconnection between the pedagogical and technical qualities of language learning apps also results in fragmented language practice (Pareja-Lora et al., 2013). These outcomes support the perspectives of researchers who stressed the downsides of using apps due to their fragmented language practice and failure to adequately integrate communicatively based foreign language curricula (Burston, 2014; Pareja-Lora et al., 2013). As suggested by Fan (2000) games can effectively bridge the gap between receptive and productive vocabulary knowledge

facilitating implicit learning. Thus, employing gamification strategies might help to improve learners' productive vocabulary knowledge.

5.2. Users' Perceptions and Experiences

The findings related to the second research question revealed that vocabulary practice was the best-liked feature, and not accessing full premium content was the least-liked feature of the Busuu app. Regarding the app's best-like feature, this result agrees with Rosell-Aguilar (2018) and Khodarahmi and Heidari-Shahreza (2018), as vocabulary knowledge was perceived as the language skill that apps could help learners develop.

Regarding participants' expectations, the majority of them confirmed that the app is better than what they had expected before using it, and improving vocabulary knowledge is the participants' number one expectation from the app. These findings are not consistent with what Rosell-Aguilar (2018) found. He found that speaking skills (15.6%) were the most popular expectation from the app. Regarding learners' satisfied expectations in his study, 61.9 percent (more than half of the participants) stated the app was not as expected. However, in this study, 66.66 percent said the app was better than expected.

Moreover, the outcomes suggested that learners predominantly had positive opinions about using the Busuu app for language learning. This finding conforms with previous research about learners' positive impressions of using apps for language learning in general (Castañeda & Cho, 2016; Kim, 2013; Rezaei et al., 2014; Sorayyaei Azar & Nasiri, 2014; Steel, 2012) and the Busuu app in particular (Rezaei et al., 2014; Rosell-Aguilar, 2018).

In addition, virtually all participants believe that the app is not interesting enough to use. This might be because learning apps should battle other apps on users' devices to capture their attention, perhaps by incorporating games, pop-up notifications, and other engaging elements. One possible result of the absence of participants' enjoyment is not using gamification strategies in the app to induce learners' interest and make learning more appealing. As Tang, Hanneghan, and El Rhalibi (2009) suggested, using games for educational purposes could make learning more enjoyable and motivating; games can offer an engaging learning environment for language learners and extend situational experiential learning. To promote vocabulary learning, which was found to be the number one expectation of the users in this study, Fan (2000) suggested subconscious learning of words by playing games as a

strategy to narrow down the gap between receptive and productive vocabulary knowledge.

Furthermore, according to self-determination theory (SDT) (Deci & Ryan, 1985), activities that are carried out because an individual does them for inherent enjoyment in the process facilitate sustained engagement (like games). These outcomes seem to contradict the views of researchers who contended that using apps for language learning encourages learners' interest and motivation toward language learning (e.g., Castañeda & Cho, 2016; Ebadi & Bashiri, 2018; Godwin-Jones, 2011; Khodarahmi & Heidari-Shahreza, 2018; Kim, 2013; Steel, 2012). Another reason might be Iranians' restrictions in accessing international payment services or even credit cards as a result of sanctions which handicap users from activating some of the features of the app, which can nullify the inherent motivation that technologies (Busuu in this study) generate for learning as claimed by Stockwell (2013).

A broad theme extracted from learners' experience was persistence. Some learners have difficulty persisting in using the app, finding an appropriate time or place (66.66%), or focusing and not being distracted during the Busuu study (20%). In evaluating language-learning apps, issues about learners' persistence, which guarantees further learning due to more input, are essential. Persistence issues with app use among users were reported in previous studies (e.g., Nielson, 2011; Rosell-Aguilar, 2018). Rosell-Aguilar (2018) contended that persistent individuals who used Busuu longer were more likely to report positive language improvement than short-term users who were more likely to perceive no improvements in their language abilities. Issues with user sustainability are a common observed finding in MALL-oriented studies. Usually, these studies have a high rate of attrition that evidences a dearth of user persistence. However, the underlying reason in this study can be learners' lack of knowledge to independently use language-learning apps effectively, as they were not proficient language learners (intermediate). Thus, Petersen and Sachs' (2016) claim appears accurate, as they alleged that "technology is not a substitute for instructional expertise [yet]" (p. 5). This study supports their claim by showing that the Busuu app designed for self-study has limitations, particularly for low-proficient learners.

Another reason Busuu was not used persistently in this study is that EFL learners often receive support and encouragement from their teachers and peers in classroom settings. Typically, EFL learners rely on language classes to promote their language proficiency. However, motivation is critical for

learners' engagement and persistence in autonomous use of applications. These apps should incorporate more appealing activities or approaches to address users' persistence issues. One possible solution is using language-learning apps as part of learners' assignment with teacher guidance to gradually foster independent learning.

This study has a few limitations that future researchers should address. First, a larger sample size is necessary to generalize the findings across diverse populations. Second, the gender imbalance within the sample of the qualitative phase of the study may skew the results, primarily reflecting the female experiences and perceptions. Furthermore, since the participants were intermediate language learners, examining different proficiency levels is needed to shed more light on the effectiveness of app-based instruction with Busuu. Also, examining Busuu's effectiveness in improving users' productive vocabulary knowledge with an extended learning treatment and using delayed posttests would provide a more accurate assessment. Another area for future research to investigate the effectiveness of app-based language learning is to examine popular language learning apps from various perspectives, including user engagement, and compare them with other language learning apps.

6. Conclusions and Implications

Based on the study results, it can be concluded that although this is a small-scale study, there was no evidence of the participants' productive vocabulary knowledge improvement. These findings suggest that Busuu's study did not help them promote their active vocabulary knowledge. Users cannot depend only on the Busuu app to improve their active vocabulary knowledge. Among all aspects of the app, vocabulary practice emerged as the most-favored feature, while not accessing full premium content was the least favorable aspect. Regarding participants' expectations, the majority acknowledged that the app exceeded their initial expectations. Moreover, improving vocabulary knowledge was the most important expectation from the app. Furthermore, nearly all participants acknowledged that the app helped them improve their language knowledge. However, it is worth noting that a significant number stated they did not enjoy when using the Busuu app.

The present study offers valuable insights into what the Busuu app needs to help activate learners' lexical knowledge in EFL contexts, where learners' opportunities to use the words that they have receptively learned are limited. These findings can also contribute to a broader understanding of how this mobile app can effectively support vocabulary learning. It highlights the

experiences and expectations of EFL users from a language-learning app to better fit into their lives. By identifying users' real needs, the study provides recommendations on what could be done to maximize the quality and potential of language-learning apps.

References

Azar, A. S., & Nasiri, H. (2014). Learners' attitudes toward the effectiveness of mobile assisted language learning (MALL) in L2 listening comprehension. *Procedia-Social and Behavioral Sciences*, *98*, 1836-1843. doi:10.1016/j.sbspro.2014.03.613

Basal, A., Yilmaz, S., Tanriverdi, A., & Sari, L. (2016). Effectiveness of mobile applications in vocabulary teaching. *Contemporary Educational Technology*, *7*(1), 47-59. doi:10.30935/cedtech/6162

Burston, J. (2014). The reality of MALL: Still on the fringes. *Calico Journal*, *31*(1), 103-125. doi:10.11139/cj.31.1.103-125

Busuu. (2023, November 10). *Our 8th Anniversary - Busuu in numbers*. Bolg Busuu. https://blog.busuu.com/8-years-busuu-numbers/

Castañeda, D. A., & Cho, M. H. (2016). Use of a game-like application on a mobile device to improve accuracy in conjugating Spanish verbs. *Computer Assisted Language Learning*, *29*(7), 1195-1204. doi:10.1080/09588221.2016.1197950

Clenton, J. (2010). *Investigating the construct of productive vocabulary knowledge with Lex30* (Doctoral dissertation, Swansea University).

Cobb, T. (n.d.). Web Vocabprofile, an adaptation of Heatley & Nation's (1994) Range. https://www.lextutor.ca/vp/

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. doi:10.1080/09588221.2015.1069360

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behaviour*. Plenum Press. http://dx.doi.org/10.1007/978-1-4899-2271-7

Dörnyei, Z. (2007). *Research methods in applied linguistics*. Oxford University Press.

Ebadi, S., & Bashiri, S. (2018). Investigating EFL learners 'perspectives on vocabulary learning experiences through smartphone applications. *Teaching English with Technology*, *18*(3), 126-151.

El Hariry, N. A. (2015). Mobile phones as useful language learning tools. *European Scientific Journal*, *11*(16), 298-317.

Fan, M. (2000). How big is the gap and how to narrow it? An investigation into the active and passive vocabulary knowledge of L2 learners. *RELC Journal*, *31*(2), 105-119. doi:10.1177/003368820003100205

Fitzpatrick, T., & Clenton, J. (2010). The challenge of validation: Assessing the performance of a test of productive vocabulary. *Language Testing*, *27*(4), 537-554. doi:10.1177/0265532209354771

Fitzpatrick, T., & Meara, P. (2004). Exploring the validity of a test of productive vocabulary. *Vigo international journal of applied linguistics*, *1*(1), 55-74.

Godwin-Jones, R. (2011). Emerging technologies: Mobile apps for language learning. *Language Learning & Technology*, *15*(2), 2-11.

Gorjian, B. (2012). Teaching vocabulary through web-based language learning (WBLL) approach. *Procedia Technology*, *1*, 334-339. doi:10.1016/j.protcy.2012.02.070

Hagtvet, B. E. (1982). On the relation between language comprehension and language production in a social psychological perspective. In Lowenthal, F., Vandamme, F., Cordier, J. (eds) *Language and Language Acquisition* (pp. 157-166). Springer, Boston, MA. doi:10.1007/978-1-4684-9099-2_22

Harmer, J. (2007). *The practice of English language teaching*. Essex. Pearson Education Limited.

Heidari, K. (2019). Willingness to communicate: A predictor of pushing vocabulary knowledge from receptive to productive. *Journal of psycholinguistic research*, *48*(4), 903-920. doi:10.1007/s10936-019-09639-w

Hwang, W. Y., Huang, Y. M., Shadiev, R., Wu, S. Y., & Chen, S. L. (2014b). Effects of using mobile devices on English listening diversity and speaking for EFL elementary students. *Australasian Journal of Educational Technology*, *30*(5), 503–516. doi:10.14742/ajet.237

Kenning, M. M. (2007). ICT and language learning. In *ICT and Language Learning* (pp. 135-170). Palgrave Macmillan. doi:10.1057/9780230591325_5

Khodarahmi, Z., & Heidari-Shahreza, M. A. (2018). Effect of MALL on the acquisition of word stress patterns of English by Iranian EFL learners: The case of Telegram. *Journal of Applied Linguistics and Language Research*, *5*(1), 40-55.

Kim, H. S. (2013). Emerging mobile apps to improve English listening skills. *Multimedia-Assisted Language Learning*, *16*(2), 11-30.

Kim, H., & Kwon, Y. (2012). Exploring smartphone applications for effective mobile-assisted language learning. *Multimedia-Assisted Language Learning*, *15*(1), 31-57. doi:10.15702/mall.2012.15.1.31

Laufer, B. (1998). The development of passive and active vocabulary in a second language: Same or different? *Applied linguistics*, *19*(2), 255-271. doi:10.1093/applin/19.2.255

Laufer, B., & Goldstein, Z. (2004). Testing vocabulary knowledge: Size, strength, and computer adaptiveness. *Language learning*, *54*(3), 399-436. doi:10.1111/j.0023-8333.2004.00260.x

Laufer, B., & Nation, P. (1999). A vocabulary-size test of controlled productive ability. *Language Testing*, *16*(1), 33-51. http://dx.doi.org/10.1177/026553229901600103

Laufer, B., & Paribakht, T. S. (1998). The relationship between passive and active vocabularies: Effects of language learning context. *Language learning*, *48*(3), 365-391. doi:10.1111/0023-8333.00046

Lee, S. H., & Muncie, J. (2006). From receptive to productive: Improving ESL learners' use of vocabulary in a postreading composition task. *TESOL Quarterly, 40* (2), 295–320. doi:10.2307/40264524

Lehmann, M. (2007). The lexical diversity of short texts: Exploring the productive-receptive continuum of lexical knowledge. In J. Horváth & M. Nikolov (Eds.), *UPRT 2007: Empirical studies in English applied linguistics* (pp. 293–305). Pécs: Lingua Franca Csoport.

Leis, A., Tohei, A., & Cooke, S. D. (2015). Smartphone assisted language learning and autonomy. *International Journal of Computer-Assisted Language Learning and Teaching (IJCALLT)*, *5*(3), 75-88. http://doi.org/10.4018/IJCALLT.2015070105

Lord, G. (2016). Rosetta stone for language learning. *IALLT Journal of Language Learning Technologies*, *46*(1), 1-35. doi:10.17161/iallt.v46i1.8552

Mason, A. & Zhang, W. (2017). An exploration of the use of mobile applications to support the learning of Chinese characters employed by students of Chinese as a foreign language. In Q. Kan & S. Bax (Eds.*) Beyond the language classroom: researching MOOCs and other innovations* (99- 112). Research-publishing.net. doi:10.14705/rpnet.2017.mooc2016.674

Meara, P., & Fitzpatrick, T. (2000). Lex30: An improved method of assessing productive vocabulary in an L2. *System*, *28*(1), 19-30. doi:10.1016/S0346-251X(99)00058-5

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook (3rd ed.)*. Sage.

Nation, I. S. P. (2001). *Learning vocabulary in another language*. Cambridge University Press. doi:10.1017/CBO9781139524759

Nielson, K. B. (2011) Self-study with language learning software in the workplace: What happens? *Language Learning & Technology*, *15*(3), 110–129.

Pareja-Lora, A., Arús Hita, J., Martín Monje, E., Read, T., Pomposo Yanes, L., Rodríguez Arancón, P., Calle-Martinez, C., Pomposo, L., . . .Bárcena, E. (2013, September). Toward Mobile Assisted Language Learning Apps for Professionals that Integrate Learning into the Daily Routine. In *Proceedings of EUROCALL* (Vol. 20, pp. 206-210).

Pektaş, Ş. T., & Erkip, F. (2006). Attitudes of design students toward computer usage in design. *International Journal of Technology and Design Education*, *16*(1), 79-95. doi:10.1007/s10798-005-3175-0

Petersen, K. & Sachs, R. (2016). The language classroom in the age of networked learning. In Leow, R. P., Cerezo, L. and Baralt, M. (eds.), *A psycholinguistic approach to technology and language learning*. De Gruyter, 3–22.

Pignot-Shahov, V. (2012). Measuring L2 receptive and productive vocabulary knowledge. *Language Studies Working Papers*, *4*(1), 37-45.

Read, J. (2000). *Assessing vocabulary*. Cambridge University Press.

Rezaei, A., Mai, N., & Pesaranghader, A. (2014). The effect of mobile applications on English vocabulary acquisition. *Jurnal Teknologi*, *68*(2), 73-83. doi:10.11113/jt.v68.2912

Rosell-Aguilar, F. (2017). State of the app: A taxonomy and framework for evaluating language learning mobile applications. *CALICO Journal*, *34*(2), 243–258. doi:10.1558/cj.27623

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. doi:10.1080/09588221.2018.1456465

Shadiev, R., Hwang, W. Y., Huang, Y. M., & Liu, T. Y. (2015). The impact of supported and annotated mobile learning on achievement and cognitive load. *Educational Technology & Society*, *18*(4), 53–69.

Steel, C. (2012). Fitting learning into life: Language students' perspectives on benefits of using mobile apps. In: M. Brown, M. Hartnett and T. Stewart, *ascilite2012 Conference proceedings*. Wellington, New Zealand, (875-880).

Stockwell, G. (2013). Technology and motivation in English language teaching and learning. In Ushioda, E. (Eds), *International perspectives in motivation: Language learning and professional challenges* (pp. 156- 175). Palgrave Macmillan. doi:10.1057/9781137000873_9

Swain, M. (1985). Communicative competence: Some roles of comprehensible input and comprehensible output in its development. In S. Gass & C. Madden (Eds.), *Input in second language acquisition* (pp. 235–253). Newbury House.

Tang, S., Hanneghan, M., & El Rhalibi, A. (2009). Introduction to games-based learning. In *Games-based learning advancements for multi-sensory human computer interfaces: Techniques and effective practices* (pp. 1-17). IGI Global.

Uchihara, T., & Saito, K. (2016). Exploring the relationship between productive vocabulary knowledge and second language oral ability. *The language learning Journal*, *47*(1), 64-75. doi:10.1080/09571736.2016.1191527

Walters, J. (2012). Aspects of validity of a test of productive vocabulary: Lex30. *Language Assessment Quarterly*, *9*(2), 172-185. doi:10.1080/15434303.2011.625579

Webb, S. (2005). Receptive and productive vocabulary learning: The effects of reading and writing on word knowledge. *Studies in second language acquisition*, *27*(1), 33-52. doi:10.1017/S0272263105050023

Xodabande, I., & Atai, M. R. (2020). Using mobile applications for self-directed learning of academic vocabulary among university students. *Open Learning: The Journal of Open, Distance and e-Learning*, *37*(4), 330-347. doi:10.1080/02680513.2020.1847061

Zhang, S. (2011). *Attitudes of ESL students toward the use of computer-assisted language learning (CALL) in a university in China* (pp. 1-133). Texas A&M University-Commerce.

Zhong, H., & Hirsh, D. (2009). Vocabulary growth in an English as a foreign language context. *University of Sydney Papers in TESOL, 4*, 85–113.