Using Mobile Applications for Teaching English Vocabulary to Young Language Learners (YLLs): Investigating the Short- and Long-term Impacts

Maryam Zakian *[1] iD

Abstract

Technology has become a quintessential component of educational practice over the past years. Research in this area has shown that the integration of various technologies positively contributed to language education and facilitated learning different language skills. Despite the extensive application of computer assisted language learning for adults, little research has examined Young Language Learners' (YLL) language development through technology. In this regard, the current study investigated the impact of using a mobile technology on YLLs' (age range: 6 to 8) vocabulary development. Seventy-one learners participated in the study who were divided into a control (N = 32) and an experimental (N = 39) groups. Data were collected using a vocabulary test in three rounds of pre-test, post-test, and delayed post-test. The collected data in terms of vocabulary test scores were analyzed using mixed between-within subjects analysis of variance. The results revealed that the experimental group who used mobile devices for vocabulary learning outperformed the control group in the posttest and gained significant improvements in the delayed posttest. The study provides implications for various educational stakeholders including teachers, learners, and material developers to exploit the affordances of technology in effectively contributing to YLLs' vocabulary development.

* Corresponding Author: Department of General Courses, University of Science and Technology of Mazandaran, Behshahr; *Email:* m.zakian@mazust.ac.ir, ORCID ID; https://orcid.org/0000000167594032

1. Introduction

Given the increasingly developing significance of technological advancements, educational research and practice have emphasized using such developments for enhancing educational standards (Colpaert, 2020). Among the various technological developments, mobile technologies have gained an immense attention from scholars, researchers, and practitioners, in redefining the way education should be delivered (L. Hsu, 2016; Rahmani et al., 2022; Zakian et al., 2022; Zare & Derakhshan, 2022). Due to their accessibility, ease of use, and portability, mobile applications have been extended to various educational environments and have specifically reshaped Mobile Assisted Language Learning (MALL) as "the use of handheld technologies such as smartphones, tablets or gaming devices in a language learning context" (Hsu, 2016, p. 2). The primary purpose of such developments has been how education can reduce the gap between social and educational dimensions of language learning through using tools that have both personal and educational meaning and are in turn connected to the larger issues of relevance to social performance and life of students (Aghaei et al., 2022; Derakhshan & Shakki, 2016; Kohnke et al., 2019, 2020; Shadiev et al., 2017; Shakki, 2022; Tarighat & Khodabakhsh, 2016; Teo et al., 2022).

The application of mobile technologies to various language learning skills and sub-skills has been studied in many contexts. There is increasingly growing research on the use of MALL in relation to assessment (Kukulska-Hulme & Shield, 2008; Laborda et al., 2015; Loewen et al., 2019; Tarighat & Khodabakhsh, 2016), reading comprehension (K.-C. Hsu & Liu, 2021; C.-C. Lin et al., 2020; C. Lin, 2014; J. Yu et al., 2022), grammar (Ghorbani & Ebadi, 2020; Refat et al., 2020; Wang et al., 2021), and pronunciation (Dai & Wu, 2021; Xodabande, 2017). One of the areas that has also been extensively studied using mobile technologies is vocabulary learning (J.-J. Lin & Lin, 2019; Ma, 2017; Xodabande & Atai, 2020; Yang et al., 2021). These studies generally show that mobiles, as Lin and Lin (2019) have specifically noted about vocabulary learning, benefit students by helping them build on the wide range of lexical items that can be learned across different situations learning encounter by using mobiles (Derakhshan & Kaivanpanah, 2011; Xodabande, Iravi, et al., 2022).

One of the areas that has strived for developing a particular knowledge realm exclusive to itself has been the area of Young Language Learners (YLLs). Characterized by learners who usually fall within the age range of six to 14 years

(Nikolov & Mihaljević Djigunović, 2019), YLLs are psycholinguistically and emotionally rich individuals who can internalize various language competencies due to the plasticity and capacity of their mental processes, especially given their abilities to learn multiple languages and process target language information more swiftly, as compared to the adults (Copland et al., 2014; Enever, 2014). Previous research pointed to the crucial role of vocabulary in second language learning in general (Derakhshan & Janebi Enayat, 2020; Janebi Enayat & Derakhshan, 2021; Sun & Yin, 2020). Additionally, it has been argued that vocabulary knowledge is a strong predictor of developments in YLL's second language reading comprehension (Lervåg & Aukrust, 2010), and grammatical development (Parra et al., 2011). Although recent developments in mobile technologies provided numerous affordances for teaching vocabulary to language learners (J.-J. Lin & Lin, 2019), little research has investigated how YLLs learn vocabulary through mobile applications. This gap is quite noticeable in the literature of vocabulary learning, MALL, and YLL learning. Investigating this gap helps researchers to better understand how YLLs learn vocabulary, particularly through mobiles which are an inseparable part of many children and teens in different contexts, especially in the [country] context. Thus, this study aimed to investigate the short- and long-term impacts of learning vocabulary by YLLs through mobile applications.

2. Review of the literature

2.1 Young Language Learners and Vocabulary Learning

Language learning from early ages has been described by Johnstone (2009) as "possibly the world's biggest policy development in education" (p. 33). Lightbown and Spada (2020) emphasize a similar point and argue that starting language learning from early ages offers various benefits to students including psycholinguistic flexibility in learning multiple languages, psychological readiness of students for conquering first-language interference, and sociocultural competencies for gaining more intra- and intercultural repertoire in communication. Moreover, Nikolov and Mihaljević Djigunović (2019) discuss the significance of young language learning in terms of several criteria including implicit and explicit learning, optimal learning, rate of learning, comprehension and production, error analysis, and interlanguage developments that have implications for YLL's literacy skills. These observations generally hold that YLLs can better master the learning

of target languages because they are in the early stages of language learning, which helps them shape their interlanguage more effectively.

Align with the growth of theory and research on YLLs, research has examined YLL's vocabulary learning. For example, in their review paper on YLL's bilingual vocabulary learning, Sun and Yin (2020) identified 15 studies that have explored vocabulary development among preschool children. Synthesis of the studies indicated several themes among the study including (1) lack of research from non-US contexts, (2) lack of information about instruction principles and amount of instruction, (3) lack of research on children's vocabulary depth, and (4) lack of better understanding on the role of socioeconomic status. The researchers called for further research on YLL's vocabulary learning and that "research should also explicitly discuss the vocabulary instruction used in the program" (p. 20). Relatedly, the study pointed to the gaps in our knowledge with respect to YLLs vocabulary development in developing countries, as these contexts are under-represented in the existing literature.

In another study, Faitaki et al. (2020) discuss English vocabulary and grammar development among YLLs and draw on a range of studies to expound on the size and depth of vocabulary learning among (English as an additional language) EAL learners. The researchers argue that "at the earliest stages of language learning, EAL learners generally know fewer words and acquire grammatical constructions at a slower pace than their English monolingual peers" (p. 1) and run the risk of weakening the learners' multilingual literacy skills as in English-only contexts. Furthermore, they argue that further research should be conducted on EAL learners and that such research should take into consideration the range of personal and sociocultural factors that shape the learners' literacy skills. Moreover, learning second language vocabulary incidentally requires large amounts of input and prolonged exposure to the target language content (Webb & Nation, 2017). Nevertheless, EAL learners have limited contact with target language outside the classroom which makes it necessary to address their vocabulary learning needs through explicit instruction (Nation, 2013, 2019). Explicit approaches to teaching vocabulary to YLL generally result in better learning outcomes and effective learning processes (Spycher, 2009). Consequently, using new technologies such as mobile devices for vocabulary learning among YLL provide numerous affordances for explicit focus on vocabulary teaching and learning.

2.2 MALL and YLLs

As one of the fast-growing areas of technology-based instruction, MALL has received considerable attention in recent years (Zare & Derakhshan, 2022). Since daily interaction with mobile technologies has become an essential part of the new generation's socialization outside the educational contexts, implementation of mobile-based interventions facilitated the possibility of learning at anytime and anyplace with increased learner engagement and enhanced learning outcomes (AbuSa'aleek, 2014; J.-J. Lin & Lin, 2019). Another reason for such growth of MALL is that students engage in various online social networking systems that shape their social and personal needs and interests. Given this firm status of mobile technologies in individuals' social life (Godwin-Jones, 2017), educational stakeholders have called for integrating mobile technologies into educational settings to benefit from the affordances of such technological developments and help learners experience an educational context that resembles their social life from several perspectives (Shadiev et al., 2017; Tarighat & Khodabakhsh, 2016).

Over the past years, a growing number of studies investigated the various affordances of mobile devices for vocabulary learning and instruction (Derakhshan & Shakki, 2019; Li & Hafner, 2022; J.-J. Lin & Lin, 2019; A. Yu & Trainin, 2022). This expanding body of knowledge points to the facilitative role of mobile technologies in addressing vocabulary learning component of language teaching programs (Burston, 2013; Zhang et al., 2011). In this regard, the studies investigated the learning outcomes from a range of mobile technologies, including text messages (Derakhshan & Kaivanpanah, 2011), context aware applications (Chen & Li, 2010), game-based learning environments (Cho & Castañeda, 2019), digital flashcards (Fathi et al., 2018; Xodabande, Pourhassan, et al., 2022), and dedicated applications for vocabulary learning (Wu, 2015). Additionally, the findings from earlier studies also indicate that mobile assisted vocabulary learning has considerable potential in promoting intentional vocabulary that is the primary source of learning words for EFL students (Nation, 2013, 2019; Spycher, 2009; Webb & Nation, 2017).

Despite the growth of MALL in the past decade, little research has examined YLL's experiences of MALL. In one study, Pellerin (2014) investigated the contributions of iPods and tablets for Canadian YLLs in the context of redefining task-based language learning. Data were collected from classroom observations,

students' artifacts, and interviews with students and teachers. The findings of the study indicated that mobile technologies allow "young learners to create their own learning environment and meaningful language tasks, as well as self-regulate their language learning process" (p. 1). Moreover, the study concluded that most of the earlier studies have examined the application MALL "with adult learners" and more research is needed to explore how YLLs experience the use of mobile technologies (p. 17).

In another study, Alhinty (2014) investigated the contributions of tablet technologies (specifically iPad) to examine 20 YLLs relatedness in the institutional context and outside it. Data were collected from classroom observations, focus group discussions, post-intervention one-to-one interviews, and blogging. The analysis of data showed that "iPad's affordances (such as portability, largetouch screen, variety of applications and multi-functionality) did indeed enhance children's collaborative learning in the classroom and supported their social interaction beyond the school context which increased their motivation to learn the target language" (p. 66). Alhinty also argued that there is little research on YLL's perspectives, understandings, and experiences of MALL, and future research should address these gaps.

2.3 The Present Study

Although research has investigated YLL's vocabulary development and these learners' MALL-related experiences, little research has examined YLL's MALL-driven vocabulary learning. This gap merits attention because given the current YLL's exposure to technological advancements and educational stakeholders' emphasis on exploring how YLLs experience the process of development from first language to the target language, further research is needed to shed light on these learners' vocabulary learning is faciliatated by MALL-related technologies. To address this gap, the current study explores how a MALL-driven intervention program influenced YLL's vocabulary development. Moreover, the current study moved a step further and examined the short-term and long-term impacts of the program, which provides novel understandings on YLL's vocabulary development over time. In doing so, the following question was addressed:

Does a MALL-oriented intervention program significantly improve young language learners' vocabulary development in short- and long-terms?

3. Methodology

3.1 Participants

The participants of the current study were 71 young language learners in a private language teaching institute in [city, country]. The mean age of the participants was 7, and they were selected based on convenience sampling producers, which means that the available individuals in the context of the study were used to carry out the study and data collection. With respect to previous language learning experience, none of the students had received any formal English language education in the past. The administration of the Cambridge placement test for young learners (Cambridge Assessment, 2021) revealed that the participants were in pre-A1 level based on the Common European Framework of Reference (CEFR) (Council of Europe, 2001) for languages. The participants were divided into an experimental (N = 39) and a control group (N = 32), which was based on (1) their access to smartphone devices (mobile or tablet), and (2) their parents' preferences for letting their children to use smartphones/tablet devices or traditional print-based materials for vocabulary learning. The study adhered to ethical considerations in educational research by protecting the anonymity of the participants, and informing the participants and their parents regarding the benefits and possible negative impacts of using mobile devices for vocabulary learning by children.

3.2 Materials

As the main materials for learning English vocabulary, a freely available mobile application was used. In this regard, the participants installed 'Learn English Vocabulary – Kids' (Aydın, 2021) which is a vocabulary learning application for 2 to 8 years of age children. The application integrates gaming features in teaching basic vocabulary in English related to numbers, colors, animals, fruits, etc. The activity types for teaching vocabulary also includes (1) listening to sounds and selecting the relevant picture, (2) looking into pictures and selecting text, (3) finding same pictures after listening to sounds, (4) memory games, and (5) writing the English word for a given picture (Figure 1).

Figure 1.
Vocabulary Learning Application
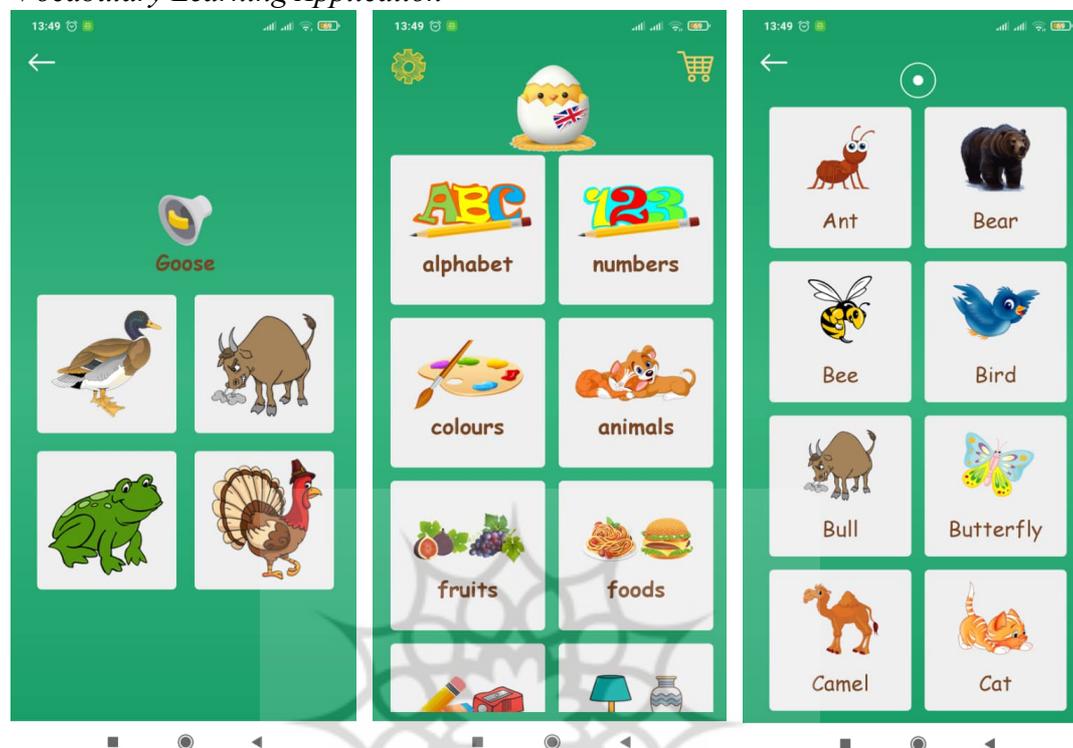
In order to test the participants' vocabulary knowledge prior to and after the treatment, a receptive vocabulary size test which is designed for young non-native speakers of English up to eight years old was used (Figure 2). The Picture Vocabulary Size Test (PVST) (Anthony & Nation, 2021) is a standard and validated test that measures the receptive knowledge of the 6000 most frequent words in English based on British National Corpus and Corpus of Contemporary American English (BNC/COCA) word lists (Nation, 2012). The PVST is currently available in two versions, and measures the test takers' ability to find an appropriate picture (i.e. meaning) for a given word presented in a partly contextualized form. Each version of the test contains 96 items, and all questions are developed based on a similar design procedure. The PVST runs on standard computers using Microsoft Windows, Macintosh OS X, and Linux operating systems. A sample item from the PVST is shown in Figure 2. In order to answer the question, the test taker should first play the sound, and then select a picture which represents the word.

Figure 2
Picture Vocabulary Size Test (PVST)
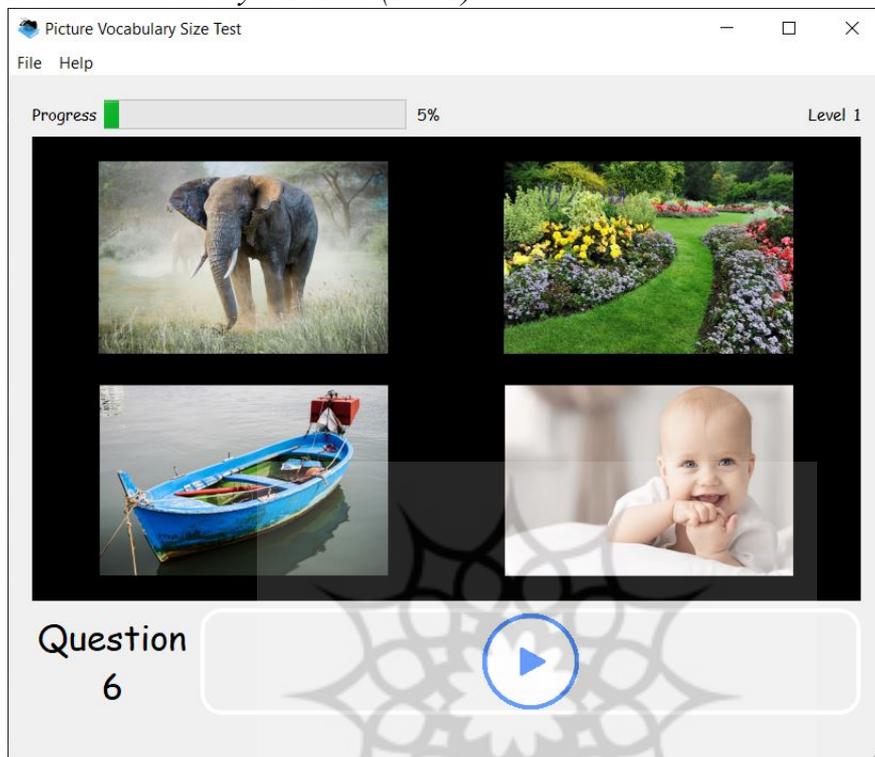
3.3 Procedures

The study was conducted in a private language teaching institute with the administration of the Cambridge placement test for young learners. Following this, the participants' vocabulary knowledge was tested using Picture Vocabulary Size Test (PVST). Two learning conditions for the experimental and control groups were then implemented. In this regard, although all participants received same training in the language teaching institute, the experimental group used Learn English Vocabulary – Kids application at home for learning basic vocabulary in English (for numbers, colors, animals, fruits, etc.), and the control group were given printed materials with associated videos for learning the same content. The participants used the supplementary materials for 20 minutes every day during the five days of the week. The treatment lasted for 5 weeks, and participants' vocabulary knowledge was tested again to document any changes. Finally, a delayed post-test was administered five weeks later to see if the learning gains persisted in the long-term.

3.4 Data Analysis

The collected data for the current study was analyzed for descriptive and inferential statistics using IBM SPSS 25. In this regard, mean values and standard deviations were calculated for the scores obtained on PVST in pre-, post-, and delayed post-test. Moreover, mixed between-within subjects analysis of variance (Pallant, 2016) was used for further analysis of the data and comparing the learning outcomes from different conditions. The between-subjects variable in the study was group with two types (experimental or control), and within-subject variable had three levels including pre-, post-, and delayed post-test. This analysis is appropriate for testing the main effects for independent variables and possible interaction among them.

4. Results

Table 1 summarizes the results for descriptive statistics related to the participants' performances on Picture Vocabulary Size Test (PVST) (Anthony & Nation, 2021) in pre-, post-, and delayed post-test. With respect to the pre-test, the mean values for the PVST were 5.54 ($SD = 3.53$) for the experimental group, and 4.78 ($SD = 2.69$) for the control group. As for the post-test, mean values for PVST were also 9.82 ($SD = 3.11$) and 6.00 ($SD = 2.62$) for the experimental and control group respectively. Regarding the delayed post-test, the participants in the experimental group had a mean score of 12.08 ($SD = 4.06$), and those in the control group scored 6.06 ($SD = 3.38$) on average.

Table 1
Descriptive Statistics

	Group	Mean	Std. Deviation	N
PVST1	Experimental	5.54	3.531	39
	Control	4.78	2.697	32
	Total	5.20	3.183	71
PVST2	Experimental	9.82	3.119	39
	Control	6.00	2.627	32
	Total	8.10	3.465	71
PVST3	Experimental	12.08	4.068	39
	Control	6.06	3.388	32
	Total	9.37	4.811	71

As illustrated in Figure 3, the scores obtained by the participants in the experimental and control groups followed different patters from pre-test to the delayed post-test. In this regard, although the performance of both groups was similar in pre-test (time 1), those in the experimental group attained higher scores compared to the control group in the post-test. Similarly, from post-test to the delayed post-test, the participants in the experimental group improved their vocabulary knowledge even further and scored higher than the post-test, while those in the control group showed very little improvements in their PVST scores at the same period. The results of descriptive statistics generally show that those in the experimental group benefitted from the intervention and improved their vocabulary knowledge considerably.

Figure 3.
Estimated Marginal Means for the Experimental and Control Groups Over Time
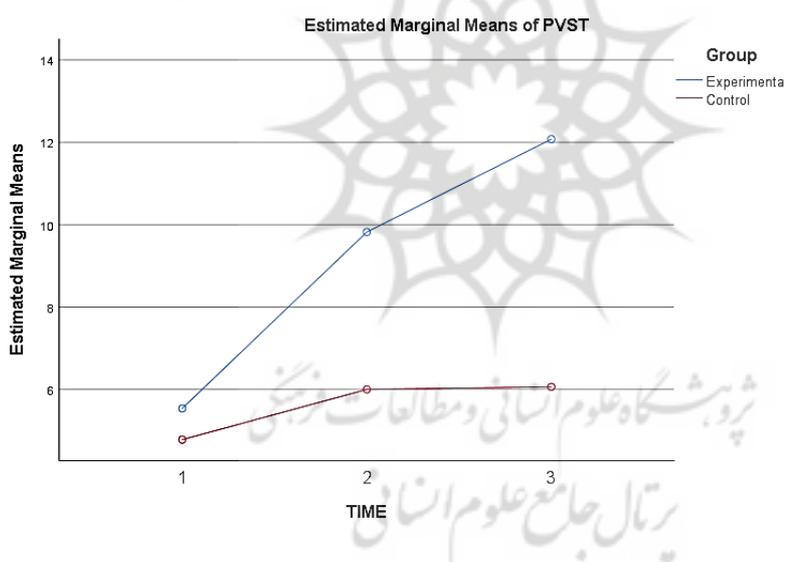
A mixed between-within subjects analysis of variance was conducted to see if the observed differences in PVST scores for the experimental and control groups are statistically significant. In doing so (1) Levene's Test of Equality of Error Variances and (2) Box's Test of Equality of Covariance Matrices as the assumptions of homogeneity of variances were checked and no serious violation was observed. The analysis then proceeded to multivariate tests for within subjects variable (i.e. time) and its possible interaction with the between subjects variable (i.e. group). The results for multivariate tests are shown in Table 2. The findings

pointed to a significant effect for time, Wilks' Lambda = 0.634, F (2, 68) = 19.58, p = 0.00, η_p^2 = 0.366. Moreover, the interaction effect among the between- and within-subjects variables (i.e. time and group) was also statistically significant, Wilks' Lambda = 0.802, F (2, 68) = 8.41, p = 0.001, η_p^2 = 0.198. The results of multivariate tests revealed that there was a significant difference among the PVST scores at different testing times, where the impact of one variable is influenced by the level of the second variable. The values calculated for the partial eta squared suggested a very large effect size for the observed differences among the experimental and control groups (Cohen, 1988).

Table 2
Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
TIME	Pillai's Trace	.366	19.589[b]	2.000	68.000	.000	.366
	Wilks' Lambda	.634	19.589[b]	2.000	68.000	.000	.366
	Hotelling's Trace	.576	19.589[b]	2.000	68.000	.000	.366
	Roy's Largest Root	.576	19.589[b]	2.000	68.000	.000	.366
TIME * Group	Pillai's Trace	.198	8.417[b]	2.000	68.000	.001	.198
	Wilks' Lambda	.802	8.417[b]	2.000	68.000	.001	.198
	Hotelling's Trace	.248	8.417[b]	2.000	68.000	.001	.198
	Roy's Largest Root	.248	8.417[b]	2.000	68.000	.001	.198

a. Design: Intercept + Group
 Within Subjects Design: TIME

b. Exact statistic

   As the interaction effect between the time and group variables was statistically significant, tests of within-subjects effects was conducted for calculating the overall and exact F value for the time factor (Table 3). Since the data did not violate the assumption of sphericity, the results indicated a significant F value for time, F (2, 138) = 24.823, p = 0.000, η_p^2 = 0.265. The value for the partial eta squared suggested a very large effect size for time (Cohen, 1988).

Table 3
Tests of Within-Subjects Effects

Measure: PVST

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
TIME	Sphericity Assumed	567.073	2	283.536	24.823	.000	.265
	Greenhouse-Geisser	567.073	1.876	302.322	24.823	.000	.265
	Huynh-Feldt	567.073	1.954	290.177	24.823	.000	.265
	Lower-bound	567.073	1.000	567.073	24.823	.000	.265
Error(TIME)	Sphericity Assumed	1576.279	138	11.422			
	Greenhouse-Geisser	1576.279	129.425	12.179			
	Huynh-Feldt	1576.279	134.842	11.690			
	Lower-bound	1576.279	69.000	22.845			

The results for the test of between-subjects effects are shown in Table 4. Accordingly, the findings revealed a significant main effect for between-subjects variable (i.e. group) in the study, $F (1, 69) = 65.615$, $p = 0.000$, $\eta_p^2 = 0.487$. The effect size of the observed difference among the groups was also very large.

Table 4
Tests of Between-Subjects Effects
Measure: PVST
Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	11487.970	1	11487.970	1146.687	.000	.943
Group	657.360	1	657.360	65.615	.000	.487
Error	691.269	69	10.018			

Finally, as part mixed between-within subjects analysis of variance, pairwise comparisons were conducted between the groups based on marginal means (Table 5). The results indicated that the mean differences for the control and experimental group was not statistically significant in pre-test (time 1), however, the experimental group outperformed the control group in the post- and delayed post-test (times 2 and 3). The findings in general indicated that those participants in the

experimental group that used mobile applications for learning English vocabulary performed better in vocabulary knowledge tests and attained significantly higher scores.

Table 5
Pairwise Comparisons on PVST

		Sum of Squares	df	Mean Square	F	Sig.
PVST1	Between Groups	10.078	1	10.078	.995	.322
	Within Groups	699.161	69	10.133		
PVST2	Between Groups	256.566	1	256.566	30.327	.000
	Within Groups	583.744	69	8.460		
PVST3	Between Groups	635.835	1	635.835	44.557	.000
	Within Groups	984.644	69	14.270		

5. Discussion

With growing functionality of mobile devices and their increased availability for language learners around the world, there is a growing need for investigating various affordances of such learning environments for education in general and language learning in particular. The expanding body of knowledge in MALL generally points to facilitative role of mobile devices for vocabulary learning among adult language learners. However, our understanding with respect to the impacts of MALL on vocabulary knowledge development among YLLs remained largely limited. In addressing this gap, the present study investigated the effect of using mobile applications in YLL's vocabulary development. To this aim, two control and experimental groups participated in the study. The results of statistical analyses showed that the experimental group performed better than the control group in both post-test and delayed posttest, although the groups performed similarly in the pretest. These results indicate that using technological developments and specifically mobile applications can positively enhance YLL's vocabulary development.

The results of the study are in line with Sun and Yin (2020) who argue that technology can positively enhance YLL's learning. Regarding the four themes they found in their literature review (i.e., (1) lack of research from non-US contexts, (2) lack of information about instruction principles and amount of instruction, (3) lack of research on children's vocabulary depth, and (4) lack of better understanding on the role of socioeconomic status), the current study covered the first two themes in

being conducted in a non-US context and using a mobile application (i.e., Learn English Vocabulary – Kids) that guided the students' use of mobiles in vocabulary learning. Further research should examine the role of the other factors in YLL's vocabulary learning through mobile applications to develop the horizons of research in this area.

The results corroborate Spycher (2009) and Nation (2013, 2019) in adopting explicit approaches to teaching vocabulary, which can result in better performance of students. Since the application used in this study provided both pictorial and auditory affordances, it seems that it has provided a better means for the students to integrate their world knowledge with schema from the mobile application. This observation is in line with the literature on YLLs, which emphasizes that these learners can benefit from better psycholinguistic and psychological processing of information (Copland & Garton, 2014; Johnstone, 2009; Lightbown & Spada, 2020). In these terms, the learners seem to have relied on both affordances in processing the vocabulary knowledge, which has resulted in better understanding of the lexical items and hence better performance. This could be the main reason for the experimental group's better performance in both the posttest and the delayed posttest.

Technologically speaking, the results of the study parallel those reported in Pellerin (2014) and Alhinty (2014). These studies also found that using MALL increases the learners' learning attitudes and outcomes. The present study not just reported a similar result, but it investigated the long-term impacts of using mobile technologies on the learners' vocabulary development. From this perspective, as using mobile phones is common among many [country] students in their social life, it seems that they have benefited from using mobiles at their convenience to internalize the lexical items in greater depth. This result corroborates the other studies conducted in the same context regarding the use of mobile applications and the benefits they offer for learners (Dashtestani, 2016; Fathi et al., 2018). In addition, it seems that the learners' constant use of the mobile application has positively contributed to their development of vocabulary knowledge and retention (Webb & Nation, 2017).

6. **Conclusions**

The present study investigated the impact of a mobile application on vocabulary development of [country] YLLs. The results of the study indicated that the

experimental group that received vocabulary development through the mobile application performed better than the control group. This finding adds to the body of knowledge on MALL, YLLs, and vocabulary development by reporting data on a less-trodden area of inquiry in the intersection among the three foregoing areas. Considering the thin body of knowledge in this area, the findings contribute to enhancing researchers' and educational stakeholders' knowledge of how YLLs learn vocabulary through mobile applications.

The results of the study offer implications and applications for syllabus designers, material developers, teachers, and learners. Regarding syllabus designers, since YLLs are in the early stages of interlanguage development and need to have exposure to a pedagogy that features attention to multimodal affordances (e.g., Copland & Garton, 2014, Enever, 2014), syllabus designers could integrate activities that mark focal attention to such multimodality. One such multimodal affordance could be using MALL-related development and mobile applications that put emphasis on exploiting the benefits of mobiles in designing the syllabus. Modules that focus on such perspective could in turn facilitate practicing activities that bridge the social and educational performance of students and respond to their needs effectively.

Material developers could highly benefit from the results of this study. Current perspectives of education emphasize using technological advancements in designing materials that feature the presence of mobile developments (see Colpaert, 2020). In this sense, textbooks could be practiced hand-in-hand with using the mobile applications to make the learning process multifaceted and in more contact with students' lives outside the class, which happened in this study and produced effects results. Therefore, material developers could pay more attention to using textbooks in conjunction with technological advancements. This implication works more effectively with YLLs as they need to have exposure to textual, auditory, and visual affordances that make the learning process more interesting and conducive to effective outcomes.

Perhaps one of the most important implications of this study is for teachers. The significant role of teachers in effectively using technology has been emphasized in the literature (e.g., Kohnke, 2020; Shadiev et al., 2017; Tarighat & Khodabakhsh, 2016). Moreover, this role has been highly emphasized in relation to YLLs in that teachers "must daily fulfill the tasks of instructing their students, often being required to use a pedagogic approach which is alien to many, and having to

persuade their students of the value of learning English" (Copland et al., 2014, p. 2). Given these understandings, teachers need specific training in effectively using mobile technologies, particularly with regard to YLLs. Such training could involve paying attention to the role of various verbal and non-verbal tools that make instruction more effective and engaging. Additionally, since vocabulary development is a process that relies on various verbal and non-verbal tools (Nation, 2019; Webb & Nation, 2017), teachers need to make their instruction closer to the level of YLLs by using such tools, which could be effectively done in teacher training courses.

As the learners of this study practiced using the mobile application (Learn English Vocabulary – Kids) at home, it appears that offering this affordance for the learners can help them extend the learning process to their outside-the-class learning experiences, a suggestion that parallels the understandings of using mobile technologies (see Hsu, 2016). In this regard, school managers and teachers could guide the students in how to use mobile applications so that learning English and specifically vocabulary become a regular part of the students' experiences. This recommendation could also be applied to other skills and sub-skills in using MALL-driven affordances that integrate technology into the many parts of students' learning process. This way, students and especially YLLs can use mobile applications anywhere and anytime to hone their language skills.

The current study had some limitations that could be addressed in future research. First, there were only two participating groups in this study. Future research should examine how different mobile applications contribute to YLLs' vocabulary development, especially if investigated with a greater number of participants. Second, as we explained above, this study did not explore the vocabulary depth and the role of socioeconomic factors in the learners' vocabulary development. Further research can examine this gaps to develop the body of knowledge in the area. Third, it would be helpful if research examines the learners' ideas and beliefs to document how the learners perceive the process of exposure to vocabulary learning through mobile applications, which was not done in this study. Exploring these gaps broadens the horizons of knowledge on the intersection among MALL, vocabulary development, and YLLs.

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About the Author

Maryam Zakian has been teaching English for about 13 years at different English Language institutes as well as universities. She has carried out a number of research studies, translated many scholarly articles, and presented a number of papers in different conferences and seminars inside the country. Her areas of interest are CALL, language assessment, teacher education, and research statistics. She is currently a faculty member at the state University of Science and Technology of Mazandaran, Behshahr, Iran.