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The Impact of Mobile Technology on Vocabulary Learning of L2 Learners: The Case of WhatsApp Application

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Mobile technologies are receiving an increasing attention within diverse educational contexts. However, the scope of research on the affordances various mobile technologies provide to learning outcomes is still limited. The aim of this study was to investigate the effect of using WhatsApp application on vocabulary learning of Iranian EFL learners. Twenty-six female EFL learners at pre-intermediate level of proficiency were selected through convenience sampling to participate in the study. A vocabulary test was utilized for ensuring the homogeneity of the learners and then the participants were divided into two experimental (N = 13) and control (N = 13) groups, followed by assessing their vocabulary knowledge. Then, the 14-session treatment began, which included teaching new words using WhatsApp in the experimental group and traditional face-to-face method in the control group. At the end of the course, a vocabulary post–test was administered to both groups. Additionally, an attitude questionnaire was administrated to both groups for examining their attitude towards using WhatsApp and the traditional vocabulary learning method. The results indicated that the experimental group outperformed the control group. In addition, it was revealed that the learners who used WhatsApp for enhancing their vocabulary skill had a more positive attitude toward foreign language vocabulary learning as compared to the other group. The implications of the study for mobile-assisted vocabulary learning are discussed.

Keywords: MALL, M-learning, foreign language vocabulary learning, WhatsApp, pre-intermediate EFL learners

Introduction

Digital technologies play an important role in modern language learning (Afshari, Ghvifekr, Siraj, & Jing, 2013). Yang and Chen (2007) have suggested that learners can utilize digital technologies to facilitate the process of learning by the various affordances these technologies provide, such as further engagement in social media, using their multimodal affordances, and further interpersonal connectivity. Additionally, Jones and Shao (2011) argued that learners positively react to using new technologies in that they perceive technology as a well-designed and properly combined outlet for learning. Mobile learning has recently appeared as a new trend to assist learners with using materials whenever they need (Lan & Sie, 2010). Mobile learning has been defined as "any educational provision where the sole or dominant technology are handheld or palmtop devices" (Traxler, 2005, p. 262). In this regard, the emergence of new technologies has provided language learning with productive means to contribute to learners' knowledge of various skills and sub-skills (Astika, 2014). In this vein, vocabulary learning via mobile technologies has been one of the areas that has received a considerable attention. Various mobile applications exist that can contribute to students' vocabulary repertoire. One of these affordances is

WhatsApp application, which is widely used all over the world. However, the way this application could be used for vocabulary learning has received little attention, a point the present study aims to investigate.

Literature Review

Mobile-assisted Language Learning

Mobiles have become widely-used devices in current societies and their application has been extended to educational contexts (Nazari & Xodabande, 2020). For second language classrooms, mobile learning has different advantages; for instance, they enable language teachers to provide authentic content, communicative language practice, and task completion activities (Chinnery, 2006). Moreover, mobile assisted language learning (MALL) is a kind of methodology in teaching and learning, which works on smart phones or other handheld devices with different forms of wireless connectivity (Arancon, 2013). Mobile devices have unique qualities such as "accessibility, personalizability, and portability" (Saran & Seferoglu, 2010, p. 253), and the physical characteristics, input/output capabilities, file storage and retrieval, and processor speed (Alzubi & Sabha, 2013) characteristics of mobiles enable them to be useful means for language learning/teaching. Additionally, mobile devices help learners with their special qualities such as intelligibility (Saran & Seferoglu, 2010).

Recent research indicates that MALL is playing a substantial role in various layers of language education. Mobile technologies are not limited to smartphones, and such technologies cover the wide range of "handheld technologies such as smartphones, tablets or gaming devices in a language learning context" (Hsu, 2016, p. 2). In this regard, Nazari and Xodabande (2020) argued that the personalized, portability, and dynamic characteristics of mobile technologies have opened up new streamlines for the growth of theory and research. They also concluded that "if teachers choose to employ mobile phones, both they and their learners can benefit from the outcomes" (p. 25). Similarly, movements such as the "Bring Your Own Device" emphasize engaging with and employing the potentials of mobile technologies in order to increase the standards of learning (O'Bannon & Thomas, 2014).

Mobile-assisted Vocabulary Learning

The scope of research on mobile learning has also expanded over the years. As mobile learning is a new field of education which is used as a gadget for conversation, interaction and instruction (Stowe, 2013), various studies have examined its role in language learning. For example, Huang, Yang, Chiang, and Su (2016) conducted a study which intended to develop a 5-step vocabulary learning (FSVL) strategy; it worked on five steps: encountering, getting, comprehending, consolidating, and using a mobile learning device and knowing about the effect of mobile on motivating the students and improving their English performance. The findings showed that the learners' motivation and performance, who studied via the FSVL strategy and the mobile learning device, were superior to their counterparts, who studied via the FSVL strategy and traditional learning. In another research, Wang (2016) attempted to develop a mobile-assisted learning system and test if it could promote classical Chinese learners' performance. The results indicated that the mobile-assisted learning system gave them the opportunity to have a flipped classroom learning experience anywhere and anytime.

In the context of Iran, Motallebzadeh, Beh-Afarin, and Daliry Rad (2011) utilized Short Massage Services (SMS) to help EFL learners acquire English words. This study was completed in five weeks. During this study, the experimental group revised some words with their definitions and examples via SMS and the control group learned new vocabularies conventionally on paper. At the end of the study, it was revealed that the learners who were in the experimental group outperformed those in the control group. Moreover, the experimental group had positive attitudes toward learning words via SMS. Furthermore, Basoglu and Akdemir (2010) conducted a study on vocabulary acquisition to understand the

dissimilarities of the effects of utilizing smartphones and flash cards on vocabulary learning. The experimental group utilized a mobile application to learn new vocabularies for six weeks while the control group was studying the same vocabularies with flashcards. Their research illustrated a significant difference among experimental and control groups, with the former outperforming the latter.

The important role of new technologies in language teaching/learning, such as vocabulary, is an effective option and there are a number of multimedia softwares that might be accordingly used (Astika, 2014). Particularly in relation to vocabulary learning, research attests to the positive impact of mobile technologies. In addition to the literature presented above, Lu (2008) used SMS for acquiring vocabulary among L2 learners who were in third high school level. The participants who utilized this service showed that they have a positive attitude towards MALL or mobile learning in the post-test. In another study, Lin (2010) utilized video-based computer-assisted affordances to enhance learners' vocabulary proficiency among pupils who were in different English proficiency levels in both skills of reading and listening. The result showed that video-based computer-assisted is a useful tool for participants who had the high ability in reading and listening. Similarly, Suwantara and Orawiwatnakul (2015) investigated the utilization of teaching new words via SMS to the experimental group for 6 weeks outside of the classroom, while the control group received new words in their classroom. The results indicated the outperformance of the experimental group as compared to the control group.

The Current Study

The cumulative results of the studies conducted on the application of digital technologies to vocabulary learning attest to the positive effects of such technologies. Additionally, this line of research highlights the utilization of various mobile applications to contribute to the learners' vocabulary learning. There are many widely-accepted applications which are employed by learners such as WhatsApp, Skype and Go SMS Pro (Jadhow, Bhutkar, & Mehta, 2013) that can be used to enhance learning outcomes. One such widely-used mobile technology is WhatsApp which is invariably employed on identified mobile phones and computers (Ashiyan & Salehi, 2016). WhatsApp is the most extensive messenger app among academic experts (Jadhav, Bhutkar, & Mehta, 2013). WhatsApp is also the most favored mobile application in the world which has over 1.2 billion active users as of January 2017. Moreover, this app can be used on non-identical mobile devices such as Android, Apple, and Blackberry (Bensalem, 2018).

Regarding language learning, Manan (2017) holds that "WhatsApp mobile tool can support communicative learning in second language learning among students" (p. 87). Manan examined the effect of using WhatsApp on EFL learners' speaking and found that the use of this application had a positive effect on the learners' motivation to speak. Moreover, Alghamdy (2019) compared two control and experimental groups (the latter using WhatsApp) in their attitudes and achievement. The results of the study showed that the students had a positive attitude toward WhatApp and their achievement scores increased after being taught using this application. These authors generally highlight the personalization, portability, wide use, multiple affordances, and communication enhancing potentials of WhatsApp in language learning.

Thus, due to its popularity, WhatsApp is widely used among many learners including Iranian language learners. Moreover, WhatsApp provides text-messaging, audio- and video-sharing functions that could be beneficial in vocabulary learning. More specifically, the application allows individuals to mark important contents to be used later, which can be effective for vocabulary learning. However, few studies have investigated whether/how WhatsApp could be leveraged for vocabulary learning, a gap the present study aims to investigate. The study addressed the following questions:

1. Is there any statistically significant difference between the effects of mobile-assisted and conventional vocabulary learning on L2 students' vocabulary knowledge?
2. What is the attitude of the students toward mobile-assisted vocabulary learning?

Method

Participants

This study was conducted with 26 Iranian female students who were at pre-intermediate level of proficiency and their first language was Persian. Thirteen (50%) participants were in the traditional class and thirteen (50%) were in the WhatsApp group for whom the same instructor was teaching the course. The age of the students ranged from 13 to 17. To ensure homogeneity in both experimental and control groups, a vocabulary pre-test was administered.

Instruments

Two instruments were utilized to collect the data including an attitude questionnaire for exploring the students' attitude toward the use of WhatsApp for teaching English vocabulary and a vocabulary proficiency test administered as pre-test and post-test. Research materials involved the WhatsApp application for teaching new words to the experimental class and the pre-intermediate book of Solutions to teach new words in the traditional classroom. The attitude questionnaire (Appendix A) was adopted from (Heidari Tabrizi & Onvani, 2018). It was first translated into Persian and an expert (university instructor) and four teachers verified the validity and reliability of the questionnaire though a back-translation process. This questionnaire is comprised of 15 items, which tap into vocabulary learning from various cognitive and metacognitive perspectives via engaging in WhatsApp. Additionally, the questionnaire has five Likert-type items ranging from "strongly agree" to "strongly disagree". The Cronbach alpha coefficient was calculated for the reliability of the questionnaire and the result was $r = .93$.

To obtain the learners' level of vocabulary proficiency, a vocabulary test was designed and administered at the beginning of the study. This test covered three parts: part A with 9 marks, part B with 6 marks and part C with 10 marks. Part A involved nine fill-in-the-blanks questions in which the learners were asked to read the sentence and complete the words. In part B, eight words were presented to the learners and they were asked to fill in the blanks with the appropriate word(s). Part C included a query similar to part B, yet the number of words in this section was greater (i.e., nine). The total point was 25. This test was chosen for two reasons. First, the test was a commonly-adopted one in the language school where the study was conducted. Thus, the supervisors of the language school were consulted in order to obtain further information about the test. Additionally, four teachers in the school were consulted to cross-check the supervisors' judgment. They verified that this test was suitable for learners who are at this level of proficiency. Second, an expert (a PhD holder of TEFL) was consulted in the next round to comment on the suitability of the test and its accuracy was established by discussion/revision.

Treatment

During the 14-session treatment period, the learners worked on the vocabulary of their lessons via WhatsApp. This application could provide a personalized understanding of vocabulary learning in that the learners could use it in various contexts, through their mobile phones and tablets, while being engaged in different contexts. Moreover, they could use WhatsApp as a supplement to their own materials and use their time efficiently, especially in different social circumstances. In line with this approach, the teacher would share the vocabulary and the relevant realia (such as pictures, pronunciation cues, stickers) to involve the learners in the activities. The activities ranged from various individual and peer work on the words, contextualizing the words, making example, and experimenting with their synonyms and antonyms. If the learners had forgotten their meanings, they could review the words through browsing their vocabulary arsenal on the application and do the activities effectively. Of central focus in the treatment was helping the learners to use the words in new contexts. For instance, the learners would

create stories via the story-making affordance of the WhatsApp so that both their contacts and classmates could see the contextualized words. For an example of the treatment sessions, see Appendix B. In the control group, however, the teacher provided the learners with the meaning of the words either in Persian or English using a teacher-fronted perspective. There was little engagement with technology in the control group and this group would receive the words as dominantly separate from being contextualized in various sentential and inter-sentential constructions.

Procedure

The initial step was administering the vocabulary pre-test to check the vocabulary proficiency level of the participants and ensuring that all the participants were homogeneous. The time allocated for completing this test was 15 minutes. The participants were then divided into two different classes: One experimental group which learned the new English words via WhatsApp and one control group which learned the new words traditionally. Then the treatment began which included teaching new words selected from the Solutions textbook taught by the teacher using WhatsApp in the experimental group and traditional face-to-face approach in the control group. The treatment lasted for 14 sessions. At the end of the term, a vocabulary post–test was administered to both groups whose administration was similar to the pre-test. The post-test was the same test administered in the pre-test phase of the study. Finally, the attitude questionnaire was administrated to both groups for evaluating their attitude towards using WhatsApp and traditional vocabulary learning methods. The reliability indices for the pre-test and post-test were .81 and .78, respectively.

Data Analysis

The data obtained from the pre-test and post-test were analyzed by SPSS. To this end, an independent samples t-test was used to compare the pre- and post-test results between the experimental and control groups. The normality of the data was checked through the ratios of Skewness and Kurtosis over their standard errors and no violations were observed. Moreover, for checking the attitude of the learners toward vocabulary learning, chi-square test was run to probe any significant differences between the WhatsApp and traditional groups' attitude towards learning English words.

Findings

As mentioned previously, an independent samples t-test was run to explore the possible differences between the two groups' pre-test performance. The results of descriptive statistics (Table 1) and the independent samples t-test (Table 2) indicated that there was no significant difference between the two groups' mean scores on the pretest of vocabulary ($t(24) = .110$, $p > .05$, 95 % CI [-4.10, 4.56], Cohen's d = .047 representing a weak effect size).

TABLE 1
Descriptive Statistics: Pretest of Vocabulary by Groups

	Group	N	Mean	Std. Deviation	Std. Error Mean
Pretest	WhatsApp	13	13.62	4.292	1.190
	Traditional	13	13.38	6.239	1.730

TABLE 2
Independent Samples t-test for Pretest of Vocabulary by Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	*Sig.*	*t*	*df*	*Sig.* (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	2.118	.159	.110	24	.913	.231	2.100	-4.104	4.566
Equal variances not assumed			.110	21	.914	.231	2.100	-4.134	4.595

Figure 1 also illustrates that the difference between the two groups was trivial.

Figure 1. Mean on pretest of vocabulary by groups.

Additionally, an independent sample t-test was run to compare the WhatsApp and traditional groups' means on the posttest of vocabulary. Tables 3and 4 show that the WhatsApp group (*M* = 20, *SD* = 3.67) had a higher mean in comparison to the traditional group (*M* = 14.54, *SD* = 3.23) on the posttest of vocabulary.

TABLE 3
Descriptive Statistics: Posttest of Vocabulary by Groups

Group	*N*	*Mean*	*Std. Deviation*	*Std. Error Mean*
Whats App	13	20.00	3.674	1.019
Traditional	13	14.54	3.230	.896

TABLE 4
Independent Samples t-test for Posttest of Vocabulary by Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	*Sig.*	*t*	*df*	*Sig.* (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	.028	.869	4.025	24	.000	5.462	1.357	2.661	8.262
Equal variances not assumed			4.025	23	.001	5.462	1.357	2.659	8.265

Figure 2 also indicates that the difference between the two groups has been significant.
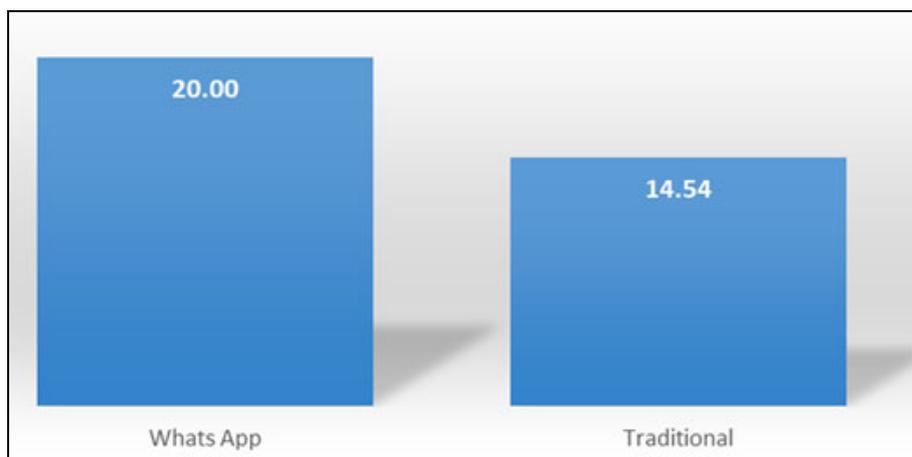

Figure 2. Mean on posttest of vocabulary by groups.

Moreover, a chi-square test was run to probe the possible differences between the WhatsApp and traditional groups' attitude towards vocabulary learning. Tables 5and 6 indicate that the WhatsApp group (N = 95, 49.5 %) selected "strongly agree" more than the traditional group (N = 65, 34%). On the other hand, the traditional group selected "agree" (N = 60, 31.4%) more than the WhatsApp group (N = 53, 27.5 %). The traditional group selected "disagree" (N = 28, 14.7%) more than the WhatsApp group (N = 17, 8.9%). The results also showed that the traditional group (N = 38, 19.9%) selected "no opinion" more than the WhatsApp group (N = 27, 14.1%). Despite these differences, the std. residual values were all lower than +/- 1.96, indicating that the observed differences were not significantly beyond the expected values.

TABLE 5
Frequencies, Percentages and Std. Residuals; Attitude towards Learning Words by Groups

| | | Choices | | | | Total |
		Strongly agree	Agree	No opinion	Disagree	
Whats App	Count	95	53	27	17	192
	%	49.5%	27.5%	14.1%	8.9%	100.0%
	Std. Residual	1.7	-.5	-1.0	-1.2	
Traditional	Count	65	60	38	28	191
	%	34.0%	31.4%	19.9%	14.7%	100.0%
	Std. Residual	-1.7	.5	1.0	1.2	
Total	Count	160	113	65	45	383
	%	41.8%	29.5%	17.0%	11.7%	100.0%

TABLE 6
Chi-Square Tests; Attitude towards Learning Words by Group

	Value	*df*	*Asymptotic Significance* (2-sided)
Pearson Chi-Square	10.607[a]	3	.014
Likelihood Ratio	10.677	3	.014
Linear-by-Linear Association	9.772	1	.002
N of Valid Cases	383		
Cramer's V	.166		.014

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 22.44.

Table 6 also indicates that the results of the chi-square test ($\chi^2(3) = 10.30$, $p < .05$, Cramer's $V = .166$ representing a weak effect size) show a significant difference between the two groups' attitude towards learning words, with the WhatsApp group displaying a higher tendency toward mobile-related vocabulary learning.

Figure 3 illuminates the learners' attitude. It should be noted that one of the choices (i.e., "strongly disagree") was dropped from the analyses of chi-square because its frequencies were zero and four for the two groups.
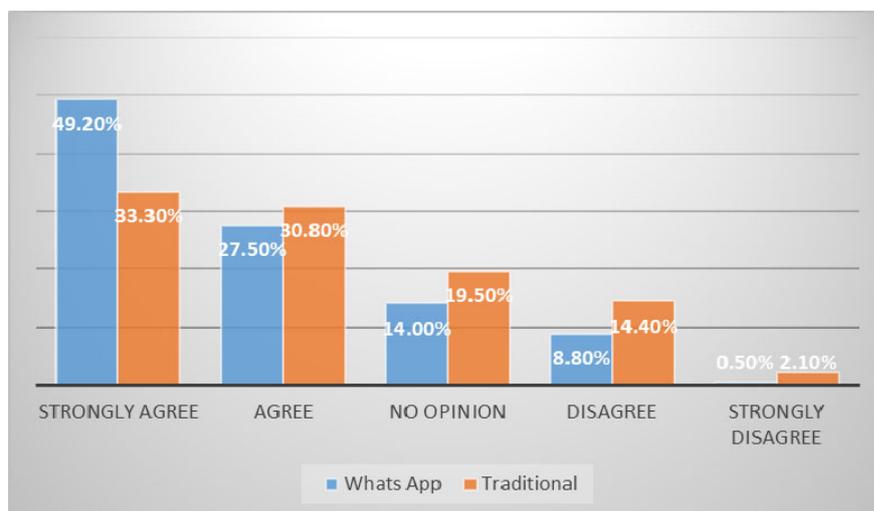

Figure 3. Attitude towards learning words by group.

Discussion and Conclusions

The aim of the current study was to analyze the impact of mobile learning, more particularly the application of WhatsApp, on the enhancement Iranian L2 learners' vocabulary. The results indicated that there was a statistically significant difference between the vocabulary learning of the experimental and control groups. The WhatsApp group had a significantly higher mean on the posttest of vocabulary than the traditional group. This finding is in line with those reported in previous studies (e.g., Motallebzadeh et al., 2011; Yang et al., 2016) regarding the positive impact of adopting digital technologies to enhance vocabulary learning of the learners. This finding shows that using novel technologies influences the process of vocabulary acquisition effectively.

Additionally, the results of the chi-square test indicated the WhatsApp group had a more positive attitude toward using mobile technologies for vocabulary learning. This finding is congruent with those reported in Afshari et al. (2013) and Wang (2016). It appears that the use of digital technologies gradually brings about relevant positive changes in the learners' attitudes as these devices are used by the learners in their social life. When this potential of mobiles is extended to the educational context, learners also take advantage of them and are inclined to experience a learning route that is defined by mobile technologies (Saran & Seferoglu, 2010).

Due to its widespread use across the globe, WhatsApp could be positively utilized in educational contexts for various forms of learning. This application could particularly be leveraged in language classes and more specifically for vocabulary learning. It provides a number of utilities, as mentioned before, that could be effectively employed for transforming vocabulary learning. Due to the crucial role of vocabulary skill and the problem that learners face with, it is recommended that teachers apply mobile phones or applications in EFL classes. This technology engages learners in an amusement venue to improve their vocabulary skills. As the findings of this study indicated, such technologies and specifically the WhatsApp application could facilitate the process of vocabulary learning.

Although the WhatsApp in this study significantly contributed to the learners' vocabulary gains, the results should be interpreted cautiously as other mediating factors such as the teacher's greater effort for the WhatsApp group or the learners' already-existing orientations toward technology could have contributed to the obtained results. Future research may deal with these limitations by adopting other control groups. Moreover, further research should be done to develop the knowledge base of the contributions of WhatsApp to vocabulary learning in more depth. The present study was limited to female learners. Thus, future research may explore both genders' vocabulary learning via WhatsApp. In addition, it would be productive to explore how learners of different proficiency levels utilize WhatsApp in their vocabulary learning. Moreover, examining learners' attitudes toward WhatsApp during the course of instruction would assist with tracking how their perceptions change on a developmental basis.

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Appendix A

Attitude Questionnaire

No	Statements	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
1	What's App helps me understand the lexical points better.					
2	What's App offers opportunities for more effective vocabulary practice.					
3	What's App offers flexibility in vocabulary learning.					
4	What's App allows me to have control over my vocabulary learning					
5	What's App motivates me to find out and discover more vocabulary.					
6	Learning vocabulary via What's App is a valuable extension of the classical learning methods.					
7	Learning vocabulary in a What's App environment is enjoyable and amusing.					
8	Learning vocabulary in What's App can be managed in a better way.					
9	Learning vocabulary via What's App is interesting.					
10	Learning vocabulary via What's App motivating to discover more lexical points.					
11	Learning vocabulary via What's App makes me more proficient.					
12	Learning vocabulary in a What's App environment creates less anxiety for me.					
13	In What's App, I feel less inhibited when working on vocabulary					
14	I am satisfied with application of What's App					
15	I recommend the use of What's App in future vocabulary courses.					

Appendix B

Whatsapp Group