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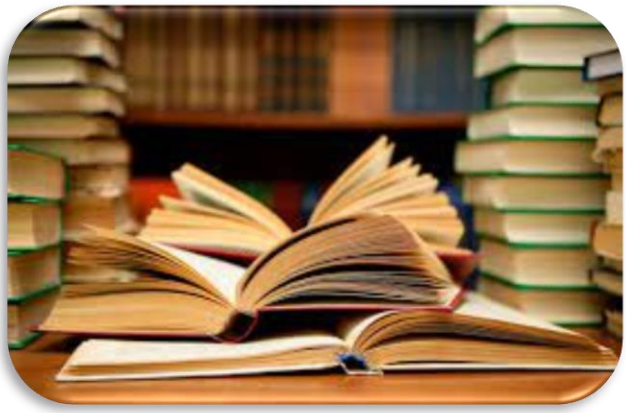

Effects of WhatsApp, Adobe Connect, and Face-to-face Classes on Learning Collocations by Iranian EFL Learners

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ABSTRACT

Technology has crept into every aspect of human life, and second language education is not an exception, giving rise to computer-enhanced language learning and mobile-assisted language learning. This study aimed to investigate the effectiveness of WhatsApp, Adobe Connect, and face-to-face classes on learning collocations by Iranian EFL learners in Qom, and to make comparisons among these three platforms. Thus, a quasi-experimental design was set up in which a number of available intermediate-level students were assigned to a WhatsApp group (WAG), an Adobe Connect group (ACG), and a Control group (CG). The three groups were given a collocation pretest at the outset of the study and they were exposed to collocations from the book *English Collocations in Use, Intermediate* (McCarty & O'Dell, 2005), though through different media (i.e., WhatsApp, Adobe Connect, and face-to-face instruction). In the treatment, which lasted for 10 sessions, for the learners in the WAG and ACG, the collocations were presented via a picture (and/or a video), an example sentence, and a follow-up quiz, which the CG learners received the same collocations in a similar fashion except that they were not provided with videos/pictures. At the end of the experiment, the learners were given a posttest of collocations, and the following results were obtained after running a series of paired-samples *t* tests and a one-way ANCOVA: (a) the three groups of WAG, ACG, and CG were fruitful and the learners in all these environments improved significantly from pretest to posttest of collocations, and (b) ACG learners significantly outperformed WAG learners, who in turn could perform significantly better than the CG learners. The obtained results bear implications for education in general and second language instruction in particular.

Keywords: Adobe Connect, Collocations, Intermediate EFL Learners, WhatsApp, Technology-enhanced Language Learning

تاثیر واتس آپ، ادوبی کانکت، و کلاسهای حضوری بر یادگیری کلمات همنشین توسط زبان آموزان ایرانی

این پژوهش با هدف بررسی اثربخشی کلاس‌های واتس‌اپ، ادوبی کانکت و حضوری بر یادگیری کلمات همنشین توسط زبان‌آموزان ایرانی زبان انگلیسی در قم انجام شد. همچنین هدف دیگر این بود که اثربخشی این روش‌های آموزشی برای یادگیری کلمات همنشین زبان انگلیسی مقایسه شود. بنابراین، یک طرح شبه آزمایشی تنظیم شد که در آن تعدادی از زبان آموزان سطح متوسط در دسترس به یک گروه واتس اپ، یک گروه ادوبی کانکت و یک گروه کنترل تقسیم بندی شدند. این سه گروه در ابتدای مطالعه پیش آزمون دادند و از طریق رسانه‌های مختلف (یعنی واتس‌اپ، ادوبی کانکت، و آموزش حضوری) تحت تدریس کلمات همنشین زبان انگلیسی قرار گرفتند. در پایان آزمایش، از فراگیران پس آزمون گرفته شد و نتایج زیر به دست آمد: (الف) هر سه گروه زبان آموز در این پژوهش مثمر ثمر بودند و فراگیران در همه این محیط ها از پیش آزمون تا پس آزمون به طور قابل توجهی بهبود یافتند، و (ب) یادگیرندگان گروه ادوبی کانکت به طور قابل توجهی بهتر از یادگیرندگان گروه واتس اپ بودند، که آنها هم به نوبه خود به طور قابل توجهی بهتر از یادگیرندگان گروه کنترل عمل کردند. نتایج به‌دست‌آمده، پیامدهایی را برای آموزش به طور کلی و آموزش زبان دوم به طور خاص دارد، همانطور که در پایان این مطالعه مورد بحث و بررسی نشان داده شده است.

کلمات کلیدی: ادوبی کانکت، واتس آپ، زبان آموزان ایرانی سطح متوسطه، یادگیری زبان با فناوری پیشرفته

INTRODUCTION

As a subcategory of formulaic language, collocations have received due attention in the field of SLA over the past few decades (Gitsaki, 1999; Webb & Kagimoto, 2009). According to Cárter and McCarthy (1988), collocations are useful not only for the purpose of English comprehension but also for language production purposes. They contended that "collocations teach students expectations about which sorts of language can follow from what has preceded. Students will not have to go about reconstructing the language each time they want to say something but instead can use these collocations as pre-packaged building blocks" (Carter & McCarthy, 1988, p .75). Because of the fact that the meaning of a word is largely determined by the surrounding words around it, learning/teaching collocations has been given considerable attention in the literature on vocabulary learning and teaching. On the other hand, given the popularity of technological advancements in our daily lives, and given the permeation of technology in virtually every aspect of today's man, it seems promising to examine the effects of technological advancements on the learning of collocations. Probably the most popular technological tool these days are mobile phones (Chowdhury, Breznik, Verdnik, & Prihavec, 2012). They are no longer used merely for sending text messages and making phone calls, but also for a wide variety of uses such as taking online course, watching educational as well as recreational movies, playing games and music, and accessing the internet for a wide range of reasons. Digital dialogues of educational nature between students and teachers have become prevalent during the past decade through such media as SMS, e-mail, Facebook groups, Twitter, Telegram, and WhatsApp.

After banning the use of the social media application Telegram by the government in Iran, the most popular messenger applications among both the lay people and college students alike have been WhatsApp (Ashiyan & Salehi, 2016). That is why in the present study WhatsApp, Adobe Connect, and face-to face classes were chosen to be compared. As the other teaching platform to be investigated in this study, Adobe Connect has been professionally used for presenting online conferences, holding webinars, and delivering online courses throughout the world. This platform offers the features of uploading and sharing files from a PC, sharing the screen, sending the students in to breakout rooms, changing the role of a participant to host or presenter, and so forth (Thomas, 2013). After the COVID-19 outbreak in 2019 and the following pandemic situation all over the world, many state and private institutes opted for choosing this platform for delivering their classes online. Since it has not been a long time after the widespread application of this platform in schools and universities in Iran, it sounds good to investigate its effect on many (language) learning domains such as the learning of English collocations by EFL learners.

Despite the importance of collocations in speech recognition and production, many L2 learners (and even teachers) are not aware of its usefulness, and if they want to gain reasonable understanding of collocations, they are likely not to know how to achieve such a goal. This issue, coupled with the fact that technology has revolutionized virtually every aspect of human life (including education), made the researchers contemplate using technological tools such as WhatsApp and Adobe Connect for the purpose of teaching collocations, and make comparisons between the effectiveness of these technological tools and traditional face-to-face classes. The present study aimed to analyzed the effect of using WhatsApp on EFL learners' learning of collocations. It also examined the usefulness of Adobe Connect for teaching English collocations to EFL learners. Moreover, the study tried to make comparisons among the three

methods of input delivery (i.e., WhatsApp, Adobe Connect, and face to-face classes) to find the differences regarding their effectiveness in teaching English collocations to EFL learners. To this end this study aimed to find out whether there are any statistically significant differences among WhatsApp, Adobe Connect, and traditional face-to-face classes regarding their effects on learning English collocations by Iranian EFL learners.

LITRATURE REVIEW

In a more recent study, Beyranvand and Rahmatollahi (2021) investigated the possible effect of Instagram and Adobe Connect on Iranian undergraduates' technical vocabulary enhancement in digital ESP settings. The results indicated that both groups made progress with respect to their vocabulary mastery, but the Instagram group outperformed the other. In another recent study, Namaziandost, Anwar, and Neisi (2020) compared the impact of spaced instruction and massed instruction on learning collocations among EFL learners. The results indicated that there was a significant difference between the posttests of spaced and massed groups. In fact, the spaced group outperformed the massed group on the posttest. Moreover, Yaghoobi and Razmjoo (2019) investigated college students' barriers and motivations for testing reading comprehension ability using the newly designed software. The study found that using the newly designed software in the classroom generally enhances learning and other outcomes. This novel software does not only aim to reduce barriers in conventional testing environment but also highlights the positive aspects which enhance motivation.

Asgari and Salehi (2018) investigated the impacts of using web-quests on learning vocabulary by Iranian pre-university students. They concluded that the students in the experimental group, who used the web-quest resources for learning vocabulary, performed significantly better than the students in the control group, who learnt vocabulary through traditional method of learning vocabulary. In the same year, Khakzadan and Bemani Naeini (2018) investigated the effect of the Interactive Whiteboard (IWB) usage on the learning and retention of non-congruent collocations among 60 homogenized Iranian EFL learners. The results revealed that the experimental group outperformed the control group, suggesting the effectiveness of the IWB for the purpose of learning and retention of non-congruent collocations, thus providing support for the interactive function of instructional materials, such as IWB. Moreover, Dehghan and Tabatabaei (2018) investigated the effect of performing Focus on Form (FoF) which was text reconstruction task, Focus on Meaning (FoM) which was discussion task, and Focus on Forms (FoFs) which was word list collocations task on the development of collocational knowledge among Iranian intermediate EFL learners, and explored any significant differences on the achievement of the participants' collocational knowledge among three groups. After the treatment, the participants' scores in FoM group were considerably higher than the students' scores in FoF and FoFs groups, but the learners' scores in FoF and FoFs groups did not have any significant difference with each other. In the foreign context, Celikbas (2018) described that the introduction of Adobe Connect Live Learning Program (LLP) between the students in Live Learning conversation classes and the instructor at a language school called, EFINST International House Istanbul offered good opportunities for students to learns English. The results revealed that LLP enabled the students to be able to talk and practice a foreign language sooner

than anticipated. Furthermore, LLP became a motivation source for the students providing them with rich information through the features of online learning.

Naderi and Bagheri (2017) examined the extent to which form recall of target lexical items by learners of English as a foreign language (EFL) is affected by a) repetition and b) by the type of target item; single words versus collocations. The findings showed a large effect of spaced repetition on form recall of single words and collocations. However, the participants in class A who were treated with single words outperformed the other group. In a foreign setting, Suranakkharin (2017) explored the effect of flipping a classroom on Thai learners' English collocation knowledge, and compared this instructional design with traditional instruction. The findings revealed that flipped instruction helped enhance the students' collocation knowledge. Interestingly, the results yielded no significant differences between the flipped and traditional approaches. Most flipped learners generally had a favorable perception of the flipped classroom. In similar vein, Ashiyan and Salehi (2016) investigated the use and effect of mobile applications such as WhatsApp on school work and out of school. The results in each group were evaluated and the findings manifested that the experimental group who used WhatsApp application in learning collocation significantly outperformed the control group in posttest.

Thomas (2013) explored the role of a task-based approach with international students learning business communication in English with a focus on the use of two collaborative digital technologies to aid blended learning: the video conferencing software Adobe Connect and the virtual world of Second Life. The research highlights the importance of a number of design principles necessary for effective task-based learning in a blended approach and calls for more research on the type of support required by international undergraduates to aid them fulfil their potential in foreign language environments. Furthermore, Mahvelati and Mukundan's (2012) study was conducted to measure the relative effectiveness of explicit versus implicit collocation instruction with regard to learners' knowledge of both lexical and grammatical collocations. The results indicated that although both methods of teaching collocations proved effective, the explicit method of consciousness-raising approach was significantly superior to the implicit method of input flood treatment. In the last research, Yousefzadeh (2012) investigated the superiority of mobile-based collocation words learning in comparison with classical paper-based collocation words learning. Eighty students from a high school in Ardabil were chosen randomly. After the pretest 10 participants were excluded from study, because of their partial knowledge of collocation words. Then they were divided into two groups: mobile-based (n = 35) and paper-based (n = 35). The pretest was administered in order to identify the level of participants' prior knowledge of collocation words. The result of pretest showed that there were no significant differences between the participants. In treatment sessions, the mobile-based group received a list of unfamiliar collocation words via SMS while, the paper-based group received the same list on sheets of paper. After treatment sessions, the result of posttest indicated the superiority of mobile-based group over paper-based group.

METHODOLOGY

Participants and Sample

The participants were intermediate EFL learners studying English in a language institute in Qom. Their proficiency level at the institute was intermediate, but for good measure, their proficiency level was also measured by the OQPT. The participants were selected based on non-random convenience sampling as

random selection of the learners in a language school was not feasible for the researchers. For reasons of probable lack of cooperation, the researchers were not able to choose the learners from all the classes in the institute and had to choose the learners in three intact classes and carry out the study on them. These learners formed the three groups of WhatsApp group (WAG, *n* = 25), Adobe Connect group (ACG, *n* = 26), and control group (CG, *n* = 23).

Instruments

Oxford Quick Placement Test (OQPT)

OQPT was used to check the homogeneity of the learners in terms of their overall language proficiency. The OQPT test is an internationally-recognized and widely-used test used by many researchers to determine the proficiency level of EFL/ESL learners. Based on the scoring rubric of the test, the learners who obtain a score ranging from 30-47 are labeled intermediate.

Pretest and Posttest of Collocations

This test contained 20 sentences/items in the form of multiple-choice questions in which one of the components of the targeted collocation had to be selected and circled by the learners. This test was piloted prior to being used and the reliability of the test was checked through the KR-21 method of estimating reliability (0.88), and its validity was approved by three ELT experts in the language institute, and modifications were made based on the comments provided by those experts. The posttest of collocations was similar to the pretest in terms of the number of items and its content, with the only difference being that the order of presentation of the items and options were altered so as to prevent the practice effect on the performance of the learners on the posttest. Reliability and validity checking procedures similar to those of the pretest were run for the posttest, and the KR-21 reliability index was found to equal 0.86.

Instructional Materials

The collocations which were taught to the learners were chosen from the book *English Collocations in Use*, *Intermediate* by McCarty and O'Dell (2005). Fifty collocations were chosen randomly from the different units of the book and taught to the learners in addition to the regular lessons they were given in the institute. The pretest and posttest of collocations included items testing these 50 collocations.

Data Collection Procedure

As the first step in the collection of the data, the researchers received permission to conduct the study in the institute. Six classes at the intermediate level were selected and assigned to the three groups of WAG, ACG, and CG. The OQPT was then administered to the 167 learners in the three groups and those whose scores were not in the 30-47 range (out of 60) were excluded from the study (though they were present in class and they were exposed to the testing instruments and instructional materials). This gave rise to the three groups of WAG, ACG, and CG, comprising 25, 26, and 23 students, respectively. The pretest was given to the learners to make sure the three groups were similar in terms of their knowledge of collocations at the beginning of the study. The results confirmed the equality of the three groups with respect to their knowledge of collocations at the outset of the study.

Treatment for the WAG Learners

The learners in the WAG received collocations in WhatsApp in the form of a picture, an example sentence, a follow-up quiz, and sometimes a video. The pictures related to the collocations had been found on the net and the example sentences had been selected from online dictionaries such the Longman, Cambridge, Oxford, McMillan, and Cobuild dictionaries. For each collocation, two or three sentences were used. The follow-up quiz included a matching exercise and a fill-in-the blank exercise, in which the students were supposed to choose the best collocation and complete the sentences. Each of this mini-quiz activities comprised five items, covering the five collocations taught in each session. The material was sent in a WhatsApp group created for these learners. 10 sessions included this treatment and five collocations were presented to the learners in each session.

Treatment for the ACG Learners

The ACG learners were given the collocations when they were using the Adobe Connect platform. The procedure for the presentation of the materials was the same for both experimental groups. That is, in the ACG as well, the collocations were presented via a picture (and/or a video), an example sentence, and a follow-up quiz. Since the materials that were used for both of the experimental groups were the same, the pictures had been collected from the internet and the example sentences had been found in the mentioned online dictionaries. Two or three example sentences followed each collocation. Then, two activities including a matching exercise and a fill-in-the blank exercise were given to the learners. The learners were also asked to provide their own example sentences in the chat box. Once again, 10 sessions were used to implement the treatment, and five collocations were taught in each session.

Instruction for the CG Learners

The learners in the CG were exposed to a rather similar kind of instruction though in an environment where both the teacher and students were present; that is, they were taught the same collocations with their meanings, example sentences, and quizzes. After the instructional period ended and the 50 collocations were taught to the learners of the three groups, the collocation posttest was administered. The data obtained from the pretest and posttest were tabulated and made ready for analysis by the SPSS software.

Research Design and Data Analysis

This study had a quasi-experimental design (Farhady, 1995) because randomization of the participants was not possible in the current study, but other components of experimental research (such as pretest, posttest, treatment, placebo, experimental group, and control group) were all included in the design of the study. The independent variable in this study was the type of instruction (i.e., via WhatsApp, Adobe Connect, or face-to-face), while the dependent variable was the learners' knowledge of collocations.

After checking the assumption of normality, the OQPT scores of the WAG, ACG, and CG learners were compared using a one-way ANOVA. The pretest and posttest of the learners in the WAG were compared with a paired-samples *t* test. This was done to see if the WAG learners made any improvements in the course of the study. The same statistical test was used to compare the pretest and posttest scores of the learners in the ACG and CG. Moreover, a one-way ANCOVA and Bonferroni post hoc test were

conducted to compare the posttest scores of the learners in the three groups (while controlling for their pretest scores).

RESULTS

WAG Learners' Improvement from Pretest to Posttest

In order to find out whether the WAG learners improved significantly from the pretest to the posttest of collocations, a paired-samples *t* test was conducted:

Table 1

Descriptive Statistics for Comparing Pretest and Posttest Scores of WAG Learners

Tests	Mean	N	Std. Deviation	Std. Error Mean
Pretest	5.96	25	2.03	.40
Posttest	14.16	25	1.79	.35

It can be seen in Table 1 that there was a substantial difference between the pretest (M = 5.96) and posttest (M = 14.16) collocation mean scores of the learners in the WAG. To see whether the difference between the pretest and posttest scores of the WAG learners was statistically significant or not, the following *t* test table (2) had to be checked:

Table 2

Results of the Paired-Samples t Test Comparing Pretest and Posttest Scores of WAG Learners

	Paired Differences					*t*	*df*	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pretest Posttest	-8.20	.76	.15	-8.51	-7.88	-53.68	24	.000

Table 2 displays the fact that there was a statistically significant difference between the pretest (M = 5.96) and posttest (M = 14.16) scores of the WAG learners because the p value under the Sig. (2-tailed) column was less than the significance level (i.e., p = .000 < .05). This means that learning collocations on WhatsApp was effective as far as the collocational knowledge of the Iranian EFL learners was concerned. The results obtained from the aforementioned analysis are graphically represented in the bar chart in Figure 1:

Figure 1

Collocation pretest and posttest mean scores of the WAG learners

The bar chart in Figure 1 shows that the WAG learners improved significantly from pretest to posttest. In fact, the WAG learners, because of being exposed to instruction through WhatsApp, managed to get significantly higher scores on the collocation posttest compared to the pretest they had taken.

ACG Learners' Improvement from Pretest to Posttest

In order to find out whether the ACG learners, who were taught through the Adobe Connect platform, also improved significantly from the pretest to the posttest of collocations or not, a paired-samples *t* test was conducted again:

Table 3

Descriptive Statistics for Comparing Pretest and Posttest Scores of ACG Learners

Tests	Mean	N	Std. Deviation	Std. Error Mean
Pretest	5.46	26	2.13	.41
Posttest	15.69	26	1.71	.33

Table 3 shows that there was a considerable difference between the pretest (M = 5.46) and posttest (M = 15.69) collocation mean scores of the learners in the ACG. To figure out whether the difference between the pretest and posttest scores of the ACG learners reached statistical significance or not, the following *t* test table (Table 4) had to be examined:

Table 4

Results of the Paired-Samples t Test Comparing Pretest and Posttest Scores of ACG Learners

	Paired Differences					*t*	*df*	*Sig.* (2-tailed)
	Mean	*Std.* Deviation	*Std.* Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pretest - Posttest	-10.23	1.06	.20	-10.66	-9.79	-48.76	25	.000

It could be inferred from Table 4 that there was a statistically significant difference between the pretest (M = 5.46) and posttest (M = 15.69) scores of the ACG learners, p = .000 (2-tailed). This result indicates that learning collocations in the environment of Adobe Connect was also effective in boosting the collocational knowledge of the learners. The results of this analysis are graphically shown in Figure 2:

Figure 2

Collocation pretest and posttest mean scores of the ACG learners

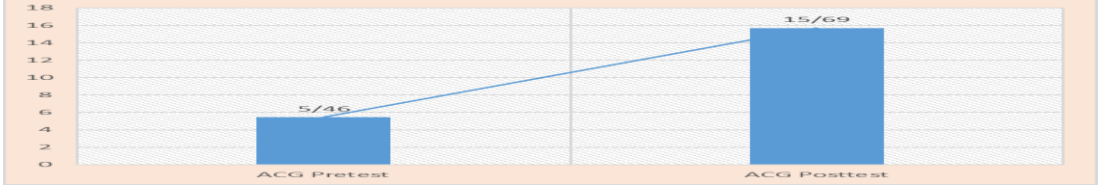


Figure 2 depicted the fact that the ACG learners' knowledge of collocations improved significantly from pretest to posttest. That is, the ACG learners, who were taught in the Adobe Connect platform, succeeded to obtain significantly higher scores on the posttest of collocations compared to their pretest scores.

CG Learners' Improvement from Pretest to Posttest

To figure out whether the CG learners, who were exposed to conventional face-to-face instruction, also experienced a significant improvement from the pretest to the posttest of collocational knowledge or not, another paired-samples *t* test was conducted by the researchers:

Table 5

Descriptive Statistics for Comparing Pretest and Posttest Scores of CG Learners

Tests	Mean	*N*	*Std.* Deviation	*Std.* Error Mean
Pretest	5.82	23	2.38	.49
Posttest	12.95	23	1.87	.38

In Table 5, it could be noticed that there was a large difference between the pretest (*M* = 5.82) and posttest (*M* = 12.95) collocation mean scores of the learners in the CG. In order to see whether the difference between the pretest and posttest scores of the CG learners was large enough to be of statistical significance, the *t* test results in Table 6 had to be consulted:

Table 6

Results of the Paired-Samples t Test Comparing Pretest and Posttest Scores of CG Learners

	Paired Differences					*t*	*df*	*Sig.* (2-tailed)
	Mean	*Std.* Deviation	*Std.* Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pretest - Posttest	-7.13	1.01	.21	-7.56	-6.69	-33.73	22	.000

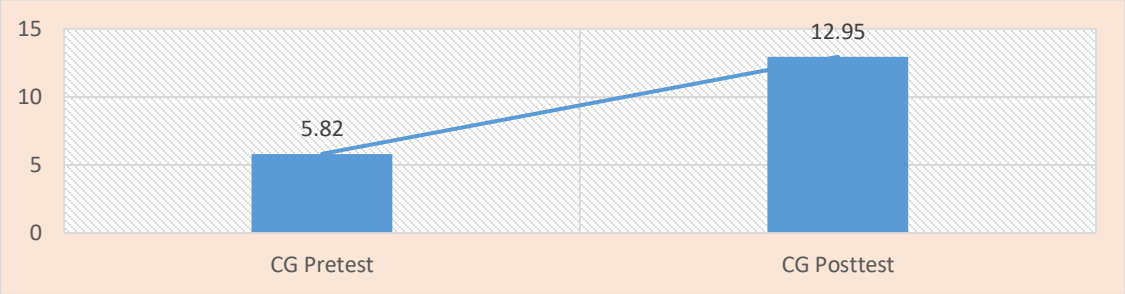
The conclusion which could be arrived at from Table 6 is that there was a statistically significant difference between the pretest (*M* = 5.82) and posttest (*M* = 12.95) scores of the CG learners ($p = .000 < .05$). This means that learning collocations in conventional face-to-face classes was also effective in augmenting the collocational knowledge of the EFL learners. The bar graph in Figure 3 presents the results of this analysis.

The bar graph in Figure 3 demonstrated that the CG learners' knowledge of collocations experienced a significant boost from pretest to posttest. Differently put, the CG learners, who were taught in a conventional face-to-face class, could get significantly higher scores on the posttest of collocations in comparison with their pretest scores. Now it is high time we saw whether the learners in the WAG, ACG,

and CG improved to the same extent or whether the differences among these three groups had been considerable.

Figure 3

Collocation pretest and posttest mean scores of the CG learners



Improvements in Collocational Knowledge: WAG vs. ACG vs. CG

To unveil whether there were significant differences among the WAG, ACG, and CG learners' mean scores on the posttest of collocations, one-way ANCOVA was conducted. This way the researchers could control for any possible differences among the three groups on the pretest scores, and then compare their (adjusted) posttest scores. The results of the ANCOVA test are presented in Tables 7 through 9:

Table 7

Descriptive Statistics for Comparing the Posttest Scores of the WAG, ACG and CG Learners

Groups	Mean	*Std.* Deviation	*N*
WAG	14.16	1.79	25
ACG	15.69	1.71	26
CG	12.95	1.87	23
Total	14.32	2.09	74

Descriptive statistics such as mean and standard deviation are shown for WAG, ACG, and CG learners in Table 7. The collocation posttest mean score of the ACG learners (M = 15.69) was found to be greater than the collocation posttest mean score of the WAG learners (M = 14.16), which was in turn higher than the collocation posttest mean score that the CG learners received (M = 12.59). To determine whether these differences were of statistical significance or not, the researchers had to look down the Sig. (2-tailed) column and across the row labeled Groups in the ANCOVA table that follows:

Table 8

One-way ANCOVA for Comparing the Posttest Scores of the WAG, ACG, and CG Learners

Source	Type III Sum of Squares	*df*	Mean Square	*F*	*Sig.*	Partial Eta Squared
Corrected Model	277.87	3	92.62	153.14	.000	.86
Intercept	902.51	1	902.51	1492.21	.000	.95
Pretest	185.51	1	185.51	306.73	.000	.81

Groups	113.47	2	56.73	93.81	.000	.72
Error	42.33	70	.60			
Total	15504.00	74				
Corrected Total	320.21	73				

In Table 8 shows that *p* value here was smaller than the specified level of significance ($p = .000 < .05$), indicating that there were statistically significant differences among the WAG ($M = 14.16$), ACG ($M = 15.69$), and CG ($M = 12.95$) learners' collocation posttest scores. Under Partial Eta Squared, the effect size value across the Groups row was .72, which shows that being in different groups accounted for 72% of the variance in the posttest scores. To find the exact locations of the differences among the three groups, the results of the post hoc test tables should be checked:

Table 9

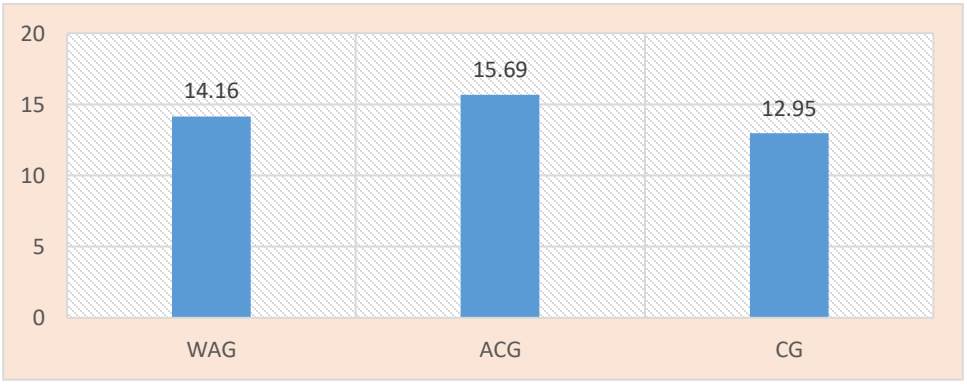
Post Hoc Test for Comparing the Posttest Scores of the WAG, ACG, and CG Learners

(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
WAG	ACG	-1.90*	.21	.000	-2.43	-1.36
	CG	1.10*	.22	.000	.55	1.65
ACG	WAG	1.90*	.21	.000	1.36	2.43
	CG	3.00*	.22	.000	2.45	3.55
CG	WAG	-1.10*	.22	.000	-1.65	-.55
	ACG	-3.00*	.22	.000	-3.55	-2.45

The top row in Table 9 reveals that the difference between the ACG and WAG was significant, and so was the difference between the WAG and CG. It is also found in Table 9 that ACG learners significantly outperformed their counterparts in the CG. In fact, the bar graph below shows the differences among the three groups of learners on the posttest of collocations:

Figure 4

Collocation posttest mean scores of the WAG, ACG, and CG learners



As it was noted above, ACG learners excelled the WAG learners significantly, and WAG learners in turn managed to obtain significantly higher mean scores than did the CG learners.

DISCUSSION

Previous literature has shown that the ability to put words together appropriately (i.e., collocation competence) is notoriously difficult for L2 learners to acquire (e.g., Altenberg & Granger, 2001; Siyanova & Schmitt, 2008; Laufer & Waldman, 2011). It has been claimed that collocations are useful in distinguishing among more proficient and less proficient; thus, they should be incorporated into rating scales for advanced-level L2 proficiency testing (Forsberg Lundell, Lindqvist, & Edmonds, 2018; Paquot, 2018). In addition, a large number of researchers have emphasized the importance of teaching collocations and assessing collocation knowledge in academic context (Ackermann & Chen, 2013). This becomes even more necessary in EFL contexts like that of the Iranian society where learners have fewer opportunities to engage in natural and native-like English conversations (Rezvani, 2011).

Second and foreign language learning and teaching have embraced new technologies and new tools catering for learners' needs and helping them learn English more effectively. Nowadays, ESL/EFL learners belong to a generation known as "digital natives" (Prensky, 2001). They are familiar with technology from an early age, and use different technological devices such as computers and mobile phones to surf the net and stay in touch with their friends. This became even more conspicuous with the rise of the COVID-19 pandemic, requiring online classes and platforms for teaching and learning. The application of mobile technologies in general and mobile phones in particular is now ubiquitous due to the fast evolution and spread of technological innovations. Global System for Mobile Association (GSMA) has reported that there are now more than five billion mobile users in the world (GSMA, 2018). In Iran where English is taught as a foreign language and where students do not have much exposure to the language outside the classroom, teachers can employ platforms such as WhatsApp and Adobe Connect to deliver educational content to their students to check outside the classroom; hence, learning English will no longer be confined to classrooms. Since mobile phones are easy to carry, students will be able to learn and practice English wherever they are and whenever have free time. Students will have the chance not only to reinforce classroom lessons but also to practice and learn new materials. Therefore, this study aimed to examine the potential differences among WhatsApp, Adobe Connect, and traditional face-to-face classes regarding their effects on learning English collocations by Iranian EFL learners.

The results indicated that for all the three groups (WAG, ACG, and CG) there was a statistically significant difference between test scores of the learners on the collocations pretest and posttest. In other words, all three conditions significantly improved the learners' knowledge of collocations. However, the results of data analysis comparing the effectiveness of the three conditions rejected the null hypothesis in focus, revealing that there were significant differences among WhatsApp, Adobe Connect, and traditional face-to-face classes regarding their effects on learning English collocations by Iranian EFL learners. More specifically, it was revealed that the difference between the ACG and WAG was significant, and so was the difference between the WAG and CG. It was also found that ACG learners significantly outperformed their counterparts in the CG. In other words, Adobe Connect was the most effective condition followed by teaching collocations on WhatsApp in second place and face-to-face

traditional conditions being the least effective of the three given conditions. Thus, technology-enhanced methods of teaching proved to be more effective for teaching L2 target forms.

The results of this study are in line with previous research findings on technology-enhanced methods of L2 teaching in general and showing the effectiveness of mobile phones in language teaching and learning in particular (Başoğlu & Akdemir 2010; Zhang et al. 2011; Abdollapour and Maleki, 2012; Abbasi & Hashemi, 2013; Muhammed, 2014; Rahimi & Miri, 2014; Suranakkharin, 2017; Asgari & Salehi, 2018; Haron, Al Abri, & Alotaibi, 2021). Some reasons underlying the effectiveness of MALL when compared to other modes of vocabulary teaching and learning could be related to the rich multimedia provided for students via portable devices that can boost learners' interest and help them acquire and retain L2 target forms (Suranakkharin, 2017). Moreover, the present findings lend further support to those Namaziandost, Anwar, and Neisi (2020) who compared the impact of spaced instruction and massed instruction on learning collocations among Iranian EFL learners. Providing more support for our findings, they concluded that spaced vocabulary learning via the medium of mobile phones can be more effective than massed learning through the traditional paper-based medium. The effectiveness of WhatsApp and Adobe Connect in teaching collocations in this study may also be due to the easy access and portability that mobile phones offer to users.

The findings of this study are also compatible with those of a similar study conducted by Ashiyan and Salehi (2016). They investigated the effect of WhatsApp on learning and retention of collocation knowledge among Iranian EFL learners, and similar to our findings they also reported that usage of WhatsApp application to acquire collocations can reinforce and enhance the process of collocations acquisition and it can guarantee retention of collocations. Nevertheless, it should be noted that in Suranakkharin's (2017) research, the results showed no significant differences between the flipped and traditional approaches to teaching collocations. On the contrary, learners in both of the technology-enhanced groups in this study outperformed their counterparts in the traditional face-to-face group. The findings further confirm the results obtained by Khakzadan and Bemani Naeini (2018) who investigated the effect of the Interactive Whiteboard (IWB) usage on the learning and retention of non-congruent collocations among Iranian EFL learners. They also reported that the IWB group outperformed the control group with regard to learning of collocations, suggesting the effectiveness of another technology-enhanced tool for the purpose of learning L2 target forms such as collocations. In a more recent study, Haron, Al Abri, and Alotaibi (2021) examined the use of WhatsApp in teaching and learning English during the COVID-19 pandemic, concluding that the intervention of WhatsApp improved the learning achievement of the participants. Evidently, many researchers, including us, have reported the effectiveness integrating technology into ESL/EFL classrooms to achieve better L2 learning results. Thus, the incorporation of technology into L2 teaching and learning needs to be taken into account more seriously given the ways it provides to attract the students' interests to learn through technology.

CONCLUSION AND IMPLICATIONS

The results of data analysis resulted in two major conclusions drawn from the study. Firstly, it was revealed that all the three conditions (i.e., WhatsApp, Adobe Connect, and traditional face-to-face classes) led to improvement of Iranian EFL learners' knowledge of collocations. In other words, for all

the three groups (WAG, ACG, and CG), there was a statistically significant difference between test scores of the learners on the collocations pretest and posttest. There have been many studies in the literature that confirm the positive effects of face-to-face classes (Rezvani, 2011) and technology-enhanced classes (Khakzadan & Bemani Naeini, 2018) on teaching collocations. Secondly, the results of data analysis comparing the effectiveness of the three conditions revealed that there were significant differences among WhatsApp, Adobe Connect, and traditional face-to-face classes regarding their effects on learning English collocations by Iranian EFL learners, with the ACG being the most effective followed by WAG standing second in terms of effectiveness. In other words, learners in both of the technology-enhanced conditions significantly outperformed their counterparts in traditional face-to-face classes. In sum, WhatsApp, as one of the messaging applications, and Adobe Connect as an online platform have turned to be fruitful for teaching collocations among EFL learners in various classroom settings. The great possibilities of these technology-enhanced tools have provided an invaluable resource for teaching L2 target vocabulary. Nonetheless, it was no surprise that Adobe Connect, which has been specifically designed for delivering classes online excelled WhatsApp, which is very widely used by everyone as a messaging application. Anyway, this study shed light on the reality that using mobile applications, no matter what, can facilitate the acquisition of collocations among Iranian EFL learners.

The findings of the present study have implications for EFL learners, teachers, and materials developers in the realms of EFL and ESL teaching in particular and education in general. It helps teachers in accomplishing their challenging task of teaching English collocations more effectively in various EFL contexts such as Iranian language schools where learners have less exposure to language compared to ESL contexts. EFL learners must know that technology-enhanced tools such as WhatsApp and Adobe Connect are versatile platforms for teaching and learning different language skills and areas of language such grammar and vocabulary. The contribution of technology in general and MALL in particular should be fully realized by EFL learners to alleviate their L2 learning difficulties. Students will be able to not only develop communication skills but also exchange ideas and gain other benefits from their interactions in their collaborative learning environment of such platforms. Integration of new technologies in education will improve students' classroom engagement and increase their academic achievements. Moreover, EFL teachers and materials developers are highly recommended to integrate technology-enhanced language learning tools such as WhatsApp and Adobe into their EFL classrooms and materials. It is high time technology received more serious attention from all practitioners and policy-makers in educational and language teaching circles. The Covid-19 pandemic changed the normal teaching environment conditions allowing teaching activities to move from offline to online, from teaching face to face to online and from students' learning from classroom to autonomous learning where students can take control of their learning by learning independently. The use of online applications will help generate excitement and enthusiasm towards learning, mainly when it caters to difficult learning situations.

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