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INVESTIGATING THE IMPACT OF ONLINE VS. BLENDED LEARNING ON VOCABULARY LEARNING: EVIDENCE FROM IRANIAN INTERMEDIATE EFL LEARNERS

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Abstract
This study aimed to examine the effect of online vs. blended learning on improving vocabulary learning among Iranian intermediate EFL learners. The current study followed a quasi-experimental, pretest-posttest control group research design. The researchers selected a sample of 120 EFL intermediate learners from a private English Language Institute in Lahijan, Iran for this purpose. The researchers divided the participants into three groups of 40 students each. The researchers used three instruments: 1) a Solution Placement Test (SPT), 2) a Vocabulary pre-test 3), and Vocabulary post-test. The control group only learned vocabulary through traditional lecture methods and face-to-face teaching. The LMS instructional model and the blended learning instructional model were used to teach vocabulary to the online learning group and the blended learning group, respectively. After 10 weeks, students were tested again using a before and after design. In the L2 vocabulary test, both the online and blended learning groups performed better than the control group, in addition, no significant difference was observed between the online and blended learning groups. That is, both online and blended learning instructions have been effective in the development of EFL learners' vocabulary learning and have had a statistically significant effect on the vocabulary learning of Iranian intermediate EFL learners. The researchers suggest that EFL students can benefit from learning L2 vocabulary through online and blended learning. The findings have practical implications for teacher education programs to promote prospective teachers' interest and willingness to implement web-based systems. The findings also have important implications for web-based application developers. They should consider a clear model for blended learning and teachers should have the right to choose a blended learning model that suits their teaching contexts to manage the classroom and provide a more effective learning environment.

Keywords: blended learning, EFL learner, online learning, vocabulary learning

Introduction
Learning English as a foreign language (EFL) is likely to be challenging for a wide range of learners. In addition, vocabulary is the main component or the heart

of learning another language for them (Coady & Huckin, 1997; Tozcui & Coady, 2004). As a result, without vocabulary knowledge, learning a foreign language is difficult (Nation, 2013; Yang & Dai, 2011). In addition, vocabulary knowledge correlates with their language use; that is, the knowledge probably supports the input and output of their language (Nation, 2001). Likewise, learning vocabulary is essential because it is the foundation of all language skills (listening, speaking, reading, and writing) (Aghajanzadeh Kiasi & Pourhosein Gilakjani, 2023; Barcroft, 2004; Hógain, 2012; Namaziandost, Pourhosein Gilakjani, & Hidayatullah, 2020; Namaziandost, Razmi, Tilwani, & Pourhosein Gilakjani, 2022; Nation, 2001; Shabani, Parseh, & Gerdabi, 2014; Taati Jeliseh & Pourhosein Gilakjani, 2022). Communication may fail for those who master grammar but lack vocabulary knowledge. Many learners feel that they cannot recall the word quickly in a conversation because of their limited vocabulary. This feeling of insufficiency prevents further language development. Learners can use vocabulary to form sentences and communicate in meaningful ways (Harmon et al., 2009; Linse, 2005; Meredith, 2012; Tosun, 2015).

Even though vocabulary is essential in language learning, a lack of vocabulary knowledge is already a serious and obvious problem for many students. Vocabulary knowledge is considered as an essential component of the learner's competence and is a contributing factor to the learning process. It is widely accepted that a lack of vocabulary knowledge limits students' comprehension of texts and hinders their ability to engage in listening, reading, writing, and communicative skills (Noprianto & Purnawarman, 2019). Hunt and Beglar (2005) suggested that many EFL learners probably have less vocabulary knowledge when using English. Schuth, Köhne, and Weinert (2017) stated that many EFL learners struggle to understand spoken language, when there are no visual images. In addition, Khan et al. (2018) found that a lack of vocabulary knowledge makes it difficult for many EFL learners to understand passages or sentences they read in English. These studies showed barriers for EFL learners due to lack of adequate vocabulary knowledge.

Lack of vocabulary knowledge can lead to stress and anxiety, which demotivates learners and discourages them from participating in the language learning process (Al Zahrani & Chaudhary, 2022). Therefore, the importance of acquiring new words to facilitate the process of learning foreign languages has been overemphasized (Alharthi, 2020; Masrai, 2020). Adunyarittigun (2002) investigated Thai students who learned English as a foreign language from the fifth grade until the end of secondary school. The study revealed that the students could not predict the meaning of unfamiliar vocabulary in context due to their lack of vocabulary knowledge and sentence structure.

Online learning and blended learning have become more common since COVID-19 pandemic started. Many platforms for learning have been created to support these modes of learning. Online learning means providing learning programs using digital technologies (Liimatainen, 2021). New technologies can help students to enhance their learning outcomes, particularly in developing four language skills (Ahmad et al., 2018). Online learning is an educational environment where course objects can be delivered using different online strategies. Hybrid learning, also known as blended learning, is a combination of online and face-to-face learning. These environments have advantages and disadvantages. Online

learning has some benefits, such as a cozy environment, a lower cost, access to materials, and the possibility of staying at home. Lack of interaction between students and teachers, unsolvable problems, and technical problems can be mentioned as disadvantages of online learning (Baczek et al., 2021; Mustafa & Hama Saeed, 2023; Salleh et al., 2020). Blended learning brings advantages like inspiring students to learn, strengthening classroom relationships, improving students' academic writing, and reducing students' study stress (Albiladi & Alshareef, 2019). Blended classes take time to prepare, current technology may be difficult for casual users, and teachers must prepare lectures for online and face-to-face learning (Albiladi & Alshareef, 2019). Online and blended learning can help EFL learners to improve their reading culture and overcome the challenges that students and teachers encounter during the course (Khalid Mustafa et al., 2021; Mustafa & Hama Saeed, 2023).

Efforts have been made to increase students' vocabulary knowledge through different types of instruction, especially using technology (Bozorova & Salixova, 2019). Blended learning is one of the most effective types of technology-assisted learning. Blended learning aims to facilitate the language learning process both in online and face-to-face instruction. This type of training is the most suitable solution for many teachers working in physical classrooms who need to use technology as an aspect of their practice in the development of educational technology (Motteram & Sharma, 2009). Among different teaching methods, blended learning provides an opportunity for teachers and students to interact through face-to-face and online learning sessions (Singh, Steele, & Singh, 2021)

This research addresses critical variables, as English language teachers are expected to benefit from its results in creating an effective learning environment within the classroom at the intermediate level. The results of this study can contribute to conceptualizing training programs based on the style of blended learning in teaching for intermediate learners. The study is expected to open a way to start new research and studies related to the current variables and the extent of their impact on the psychological, educational, and educational variables. It can benefit English language curriculum designers at the intermediate level by using blended learning in building English language lessons.

The positive effects of online and blended learning on learners' vocabulary are assumed, based on the potential abilities of technology to enhance language learning. This research aimed to investigate the impact of online and blended learning on the vocabulary learning of Iranian intermediate learners, given that students have different methods of learning vocabulary in EFL contexts and EFL teachers need to create learning materials that match their students' needs. Therefore, the following research question was posed: "Do types of vocabulary instruction (online vs. blended learning) have any statistically significant effect on Iranian intermediate EFL learners' vocabulary learning?"

Literature Review

Vocabulary knowledge is essential in second language (L2) learning (Barkat & Aminafshar, 2015; Reynolds & Shih, 2019). When learning English as a second language, acquiring vocabulary is more important than mastering other language skills, such as listening, speaking, reading, and writing (Lukas et al., 2020). This is because vocabulary acts as the foundation for learners to communicate using the

language (Lukas et al., 2020). The centrality of vocabulary knowledge has been well documented in the related literature. The high importance of vocabulary in language learning is emphasized by Renadya (2002) who stated that vocabulary plays an important role and grants much of the basis for how well learners listen, speak, read, and write. Qian and Lin (2020) conceptualized this strong connection by contending that vocabulary knowledge is a key prerequisite for successful language learning.

Many authors who have researched general language addressed the interrelationship of vocabulary knowledge and four basic languages skills – reading (Laufer, 2013; Schmitt, Jiang, & Grabe 2011; Şen & Kuleli 2015), writing (Karakoç & Köse, 2017; Yüksel, Mercanoğlu, & Yılmaz, 2020), then listening (Stæhr, 2009; Teng, 2014a; van Zeeland, 2012) and speaking (Koizumi & In'nami, 2013; Nation, 2015). Harkio and Pietilä (2016) found a positive correlation between vocabulary knowledge and reading comprehension for intermediate and advanced proficiency level L2 learners. Kiliç (2019) found that vocabulary knowledge was significantly related to performance in writing and speaking. Ataş (2018) found moderate and significant correlation between vocabulary knowledge and listening comprehension. Uchihara and Clenton's (2020) research yielded rather confusing results on the relationship between vocabulary knowledge with respect to its size and speaking.

Teachers can use blended learning to combine two or more methods or media for teaching. Blended learning is a teaching method that uses both online and offline resources and technology to support learning. It also involves different types of instruction and strategies to help learners achieve the desired learning outcomes (Sudewi, 2020). Blended learning is an educational program that involves active learning in two ways: partly online, where the learner can choose the time, place, and pace of their learning, and partly in a physical location away from home, such as a school or a workplace (Tucker, 2003). Blended learning is a learning method that focuses on the student and integrates online and face-to-face learning experiences (Attard & Holmes, 2020; Kerzˇič et al., 2019). Blended learning uses online tools for teaching, training, presenting, assessing, and communicating (Adiguzel et al., 2020; Alammary, 2019). Online learning lets the students join classroom activities anytime and anywhere (Hadiyanto, Sulistiyo, Mukminin, Haryanto, & Syaiful, 2022; Nathan & Rajamanoharane, 2016; Pourhosein Gilakjani & Rahimy, 2020). It enables students to collaborate and share their work or present to the whole class, which fosters student-to-student interaction. Teachers can also provide clear guidance and realistic goals for individual and group work, according to Singh and Singh (2017) and Jamshidi Saleh and Pourhosein Gilakjani (2021). They can design blended activities for online and face-to-face learning and help students acquire 21st century skills through academic tasks in and out of the classroom.

Blended learning has been proven to be effective in improving participants' learning outcomes, engagement, and motivation (Bhagat, 2020). For instance, an undergraduate biology course that used BL approach had better performance and interaction with the instructor than a traditional approach, according to Riffell and Sibley (2005). A meta-analysis by Vo et al. (2017) compared the effectiveness of BL and traditional classroom teaching on participants' achievement in higher education and found a small but significant advantage for blended learning. They

suggested that BL could improve learning outcomes for participants in higher education. The blended learning approach helped learners of English improve their reading skills, according to Kazakoff et al. (2018). Miyazoe and Anderson (2010) examined how students' learning outcomes and views of online writing were influenced by blended courses using three online writing tools for EFL in a blended learning environment. The students improved their language learning by taking the blended courses.

Rusanganwa (2013) explored how using computers or not using computers in college English vocabulary instruction for specific purposes affected the learning outcomes (ESP). The blend task is increasingly shown to be important for students' vocabulary learning. Ma and Lee (2021) found that blended learning improved students' perceptions of attention, confidence, and satisfaction more than online or offline learning alone. Blended learning improved the students' English conversation skills, and the students enjoyed the blended course, according to Wang (2021). A blended approach was effective in improving students' listening and speaking skills and developing their learner autonomy, according to Cui (2014). According to Jia et al. (2012), students improved their vocabulary acquisition performance with an English blended learning class that had individualised vocabulary acquisition.

Blended learning has been used with learners in EFL/ESL settings in many studies. Many researchers have found that blended learning approach has many positive effects on improving vocabulary knowledge. Zhang, Song, and Burston (2011) compared how well students at a Chinese university learned vocabulary through mobile phones and paper material. They studied two groups of students who used either text messages or paper material to learn a chosen list of vocabulary. One group of students learned a selected list of vocabulary by using text messages, while the other group of students used paper material for the same list. The results showed that mobile phones helped students learn vocabulary better in the short term than paper material. Khazaei and Dastjerdi (2011) also explored how traditional and blended teaching influenced EFL learners' vocabulary learning. Students took a test on how well they recognized and remembered vocabulary items. The test results showed that the students who learned the content with a blended teaching approach outperformed the students who learned the content in a traditional way.

Some studies found that blended learning improved learners' vocabulary knowledge. For example, Djiwandono (2013) examined how Indonesian students' vocabulary learning and their views on the blended learning experience were affected by blended learning approaches. Krishnan and Yunus (2019) also investigated how blended learning affected vocabulary learning for low-proficient learners based on the global CEFR scales. The study used blended learning to help low-level learners develop their vocabulary. These studies showed that blended learning improved EFL students' vocabulary knowledge. Some studies also recommended using the Seesaw application as a blended learning tool. For example, Javis and Martin (2018) found that Seesaw could motivate students and positively affect elementary school students' learning. Riadil (2020) also conducted a study to explore the effect of using Seesaw as a literacy medium to enhance learners' vocabulary. This study indicated that Seesaw could improve learners' vocabulary knowledge and reading skills. Blended learning with primary level participants had positive effects on vocabulary learning. Rosetta Stone Computer

Software's effect on Iranian students' vocabulary learning was examined by Sharifi et al. (2015). The results showed that the groups that learned vocabulary with computer assistance performed better on post-tests than the groups that learned vocabulary with teacher guidance.

Khodaparast and Ghafournia (2015) examined the effect of online, offline, and hybrid methods on Iranian EFL learners' achievement in vocabulary. They selected 100 participants for this research. The traditional method was significantly different from the other three methods they studied. This means that computer-assisted teaching methods greatly influenced the vocabulary growth of language learners. Mahmoudi (2020) investigated how online teaching via smartphone affected Iranian EFL students' grammatical accuracy. They chose two groups of upper-intermediate students, one as a control group and one as an experimental group, for this purpose. The control group received traditional teaching for grammar, while the experimental group received online teaching. The findings represented that the experimental and the control group had significant differences, and the intervention improved the performance of the experimental group more than the control group.

Rezai Fard et al. (2021) studied how Iranian students learned vocabulary. They discovered that using the flipped classroom to teach ESP vocabulary helped Iranian students improve their vocabulary learning. They chose 60 ESP students based on their scores on the OQPT. The experimental group learned vocabulary in a flipped classroom, while the control group used a traditional method. The one-way MANOVA indicated that flipping classes significantly improved Iranian students' vocabulary development.

There are contrasting evidences regarding the effect of blended learning on language development. For example, Chang, Shu, Liang, Tseng, and Hsu (2014) examined the impacts of blended e-learning on participants' performance. The participants were two classes of 11th graders in a vocational high school in Taiwan. They were randomly selected and assigned to two experimental groups that studied through blended e-learning or a control group that studied through traditional classroom learning. The results indicated that blended e-learning did not have a significant effect on students' achievement test scores, but it did significantly affect their self-assessment scores.

Yick, Yip, Au, Lai, and Yu (2019) investigated the impact of blended learning on undergraduate students and compared the students' grades in a blended learning and in a traditional face-to-face classroom. The results did not show a significant difference in the actual grades of students who used blended learning modules compared to students in the control group. Similarly, Berga, Vadnais, Nelson, Johnston, and Olaiya (2021) conducted a study on blended learning versus face-to-face learning at an undergraduate university in Alberta, Canada. A total of 217 second-year undergraduate nursing students participated in this research. Data were collected and analyzed using descriptive and inferential statistics. According to the findings, there were no significant difference in self-efficacy scores between groups or in the pre-post surveys over time. The results also indicated that there is no significant difference in knowledge between the blended online and face-to-face groups.

Blended learning is a complex way of learning that integrates online and offline learning settings, learning materials, methods, and assessments. These

elements cooperate to help students acquire essential knowledge and enhance their language abilities. Despite the importance of blended and online learning, these new methods of teaching and learning English are not very common in Iranian EFL contexts. Most English classes are done in person rather than through online instructions. The effects of these new teaching methods on the vocabulary knowledge of Iranian EFL learners were investigated in this study, since these methods have not been extensively examined in the Iranian EFL context.

Method

Research design

This study used a quasi-experimental, pretest-posttest control group research design. Participants were randomly assigned to two experimental groups of the same size- an online learning group (OLG) and a blended learning group (BLG)—and a control group (CG). This research design was quasi-experimental because it did not use randomization, which is a key feature of the true experimental research method. Randomization of samples is mostly ideal for fully- experimental designs in which samples are selected randomly for control and experimental groups (Shadish et al., 2002). Therefore, we had two classes as our experimental group and one class as our control group, each with forty participants. The treatment was carried out in experimental groups –an online learning group through the LMS instructional model and a blended learning group through the blended learning instructional model, the control group held their usual classes using the traditional teaching method (lecture and face-to-face teaching). The Learning Management System (LMS) is a key web-based advancement for improving e-learning systems that combine classroom instruction and online instruction in the learning process. In educational institutions, whether in open-source programming (e.g., MOODLE) or commercial programming (e.g., Blackboard), learning management system is launched to encourage learners to schedule courses with a variety of resources, such as discussion boards, forums, chat, online grade upload, online review, file sharing, task management, syllabuses, planning, notices and curricula (Cole et al., 2019).

Participants

In the process of choosing the participants for this study, a Solution Placement Test (SPT) was used on the vocabulary of the participants to homogenize them, who were a sample of a private English language institution. One hundred and twenty students participated in this experiment. Participants were randomly divided into two experimental groups of the same size- an online learning group (OLG) and a blended learning group (BLG), which received LMS instructional method and blended learning instructional method respectively—and a control group (CG), which followed the traditional learning method (each group had 20 male and 20 female intermediate EFL learners). The participants were aged between 18–20 years.

Instruments

Solution placement test (SPT)

SPT helped the researchers to determine the level of their subjects (i.e. elementary, pre-intermediate, intermediate). A proficiency test was given to 120 EFL learners to check their similarity. This placement test has three parts: 50

questions with multiple choices about grammar and vocabulary, a reading passage with 10 questions to check how well students understand it, and an optional writing task that shows how well students can produce the language.

Vocabulary pre-test

The purpose of the pretest was to check if there was any difference in the vocabulary knowledge of the experimental and control groups. For this purpose, a pretest involving 60 multiple choice cloze and vocabulary tests with 30 grades based on the learners' textbook (Family and Friends 2) was used to determine the participants' vocabulary learning. It was utilized to measure students' vocabulary knowledge in all groups before treatment. To make sure the test was valid and reliable, the researchers chose another group that was similar to the experimental and control groups to do the experiment. They checked how reliable and consistent the SPT items and vocabulary tests were by doing a small study with 30 EFL learners before they did the main statistical analyses.

Vocabulary post-test

The vocabulary post-test was the third tool that this research used. A standard and reliable test similar to the pretest was used as a posttest after ten training sessions at the end of the treatment to test the participants' vocabulary knowledge. The same test as the pre-test was used for the post-test. The form and number of items of the post-test were identical to the pre-test. The only difference between the post-test and the pre-test was that the questions and options were reordered so that the students could not recall the answers from the pre-test. This helped the researchers measure the impact of the treatment on students' vocabulary knowledge

Procedure

120 Iranian EFL learners were divided them into three groups of equal size: a group that learned online (OLG), a group that learned in a mixed way (BLG), and a group that did not receive any treatment (CG). All groups took a pre-test to determine initial differences or similarities in their vocabulary knowledge. Then the training program started which lasted for 10 weeks. The teacher taught vocabulary to the control group using a regular curriculum and traditional methods (lecture and face-to-face teaching). When students came to class, they did not have a proper understanding of the subject. Students have to do more detailed knowledge at home which is called homework. In each session, the teacher taught 10 words. She instructed the students to read the words and learn their meanings and spellings. Then, she taught an English text that contained the words. Finally, she assigned the students homework to write the words and meanings again at home.

An instructor taught vocabulary to the first experimental group (online group) using LMS. Participants chose authentic practice materials. A place was considered for exchanging opinions and solving the problems of the participants. The teacher trained the first experimental group on how to use the LMS and overcome its challenges before the experiment started. The teacher showed the participants how to access the content online, how to use the LMS, and how to communicate with the instructor online for specific training sessions. The purpose of this work was to ensure that the online group participants could handle the LMS teaching format without any issue in the test and finish the general English tasks and online tasks

for the rest of the training program. The instructor made a question or problem about a certain topic and put her students in pairs in the online class. The researchers gave each pair of learners enough time to find the right answer and asked the students to say their answers in their own words. This group learned 10 words in each online session like the control group. The students received all the words and they had to say their meanings. The students searched for meanings, synonyms, and antonyms of the words and posted them in the online group. The teacher added images of each word in the group to make word learning more interesting for the students.

This group was given a text with the target words to help them learn the words in related sentences. The instructor taught the same English vocabulary to the second experimental group with blended learning model. The teacher taught 10 words in person for 45 minutes to blended learning group in each session. The students got the translation of the words; they learned their synonyms and antonyms; and they studied the text. For the rest of the time, they received a picture of each word in the group and did exercises online. The teacher was available online to assist them if they required it. The participants were in a school that used technology and they could use the computer to communicate with each other and the teacher. The same teacher taught all three groups with the same goal and content of the course. Each session lasted for 45 minutes for all students. At the end of the study, all learners took the vocabulary post-test after 10 weeks of training sessions. The post-test was identical to the pre-test, which was a valid and reliable test. They scored the pre-test and post-test objectively and the scores of pretest and posttest were between 0 and 30.

Data analysis

The researchers analyzed the data based on the research objectives after they collected enough data. They checked the normality of data in the Skewness analysis using Shapiro-Wilk test. Then, they used statistical tools such as paired samples t-test and One-Way ANOVA to see the effect of treatment on improving learners' receptive skills. They used SPSS version 22, a statistical software program, to analyze the data.

Results of the reliability analyses

The researchers checked how reliable and consistent the items of the SPT and the vocabulary tests were by doing a small study with 30 EFL learners before they did the main statistical analyses. The reliability analyses results are presented in Table 1.

Table 1. Reliability statistics for the SPT and the vocabulary tests

Instrument	Cronbach's Alpha	N of Items	N of sample
SPT	.88	60	30
vocabulary test (pretest)	.77	60	30
vocabulary test (posttest)	.79	60	30

The estimated value of Cronbach's alpha for the SPT (α= .88) was considered a "very good" value based on the reliability standards suggested by (DeVellis, 1991). The reliability of the vocabulary tests showed that the values were acceptable (α pretest=.77; α posttest=.79).

Findings and Discussion

Results of solutions placement test (SPT)

SPT was used to ensure that the participants were similar. They chose 120 intermediate EFL who got 31+ in grammar and vocabulary, 8+ in reading, and 8+ in writing section as the main sample for this study based on the SPT test direction. The SPT results are displayed in Table 2.

Table 2. Statistics for the solutions placement test

SPT		
N	Valid	120
	Missing	0
Mean		53.1333
Median		54.0000
Mode		54.00
Std. Deviation		3.30503
Variance		10.923
Skewness		-.047
Std. Error of Skewness		.221
Kurtosis		-.877
Std. Error of Kurtosis		.438
Range		12.00
Minimum		47.00
Maximum		59.00
Sum		6376.00

Table 3 gives the group statistics for the placement test scores. It shows the average (53.13), the middle (54.00), and the most frequent (54) scores for the SPT. It also shows how much the scores differ from the lowest to the highest (12.00), how much they spread out (10.92), and how much they are away from the average (3.30). It also shows how much the scores are not symmetrical (-.047) and how flat or sharp they are (-.877).

Assessing the assumptions of one-way ANOVA

The researchers checked the assumptions before they did one-way ANOVA. The assumption of independence was checked by examining the research design. It was found that three groups were independent from each other. The normality assumption was checked by using the Shapiro-Wilks test, which is a common test that uses a significance level of alpha (α=.01). From this test, the Sig. (p) values were compared with the alpha level and it was decided to reject ($p < \alpha$) or retain ($p > \alpha$) the null hypothesis. The normality assumption was also verified by using the standardized skewness measure of normality along with the Shapiro-Wilk test, which is a usual test that has an alpha significance level.

Table 3. Tests of normality for pre and posttest scores of the vocabulary

	Groups	Shapiro-Wilk				
		Statistic	df	Sig.	skewness	kurtosis
pretest	Control	.961	40	.186	-.078	.171
	OLG	.930	40	.016	-.211	-.874
	BLG	.934	40	.021	-.077	-.948

	Groups	Shapiro-Wilk				
		Statistic	df	Sig.	skewness	kurtosis
posttest	Control	.950	40	.077	-.090	.514
	OLG	.939	40	.033	-.006	-.851
	BLG	.940	40	.036	.015	.733

The researchers used Shapiro-Wilk test to check if the pretest scores for each group were normal. The test revealed that pretest scores for "control group" were not significantly different from normal (p = .186), while pretest scores for both "OLG" (p = .016) and "BLG" (p = .021) were significantly different from normal. In addition, the p-value for posttest scores of "control group" came to (p = .077), for posttest scores of the "OLG" was (p = .033), and for posttest scores of the "BLG" came to (p= .036). The vocabulary scores followed a normal distribution based on (p) values from Shapiro-Wilks test and using a significance level of (α = .01). As seen in Table 4, the skewness and kurtosis measures were between -2 and +2, so the data met the assumption of normality. The samples satisfied the normality assumption. The next step was to check the assumption of variances using Levene's test, which tests the homogeneity of variances. Table 4 shows the results of this test.

Table 4. Test of homogeneity of variances

	Levene Statistic	df1	df2	Sig.
pretest	.208	2	117	.813
posttest	1.822	2	117	.166

The results of Levene's test showed that pretest and posttest scores had no significant difference in variance; F pretest scores (2, 117) = .208, p= .813; F posttest scores (2, 117) = 1.822, p= .166) with a significance level of .05. Therefore, the sample satisfied the assumption of equal variance and the Levene statistics supported the hypothesis of equal variance of the group (Figure 1).

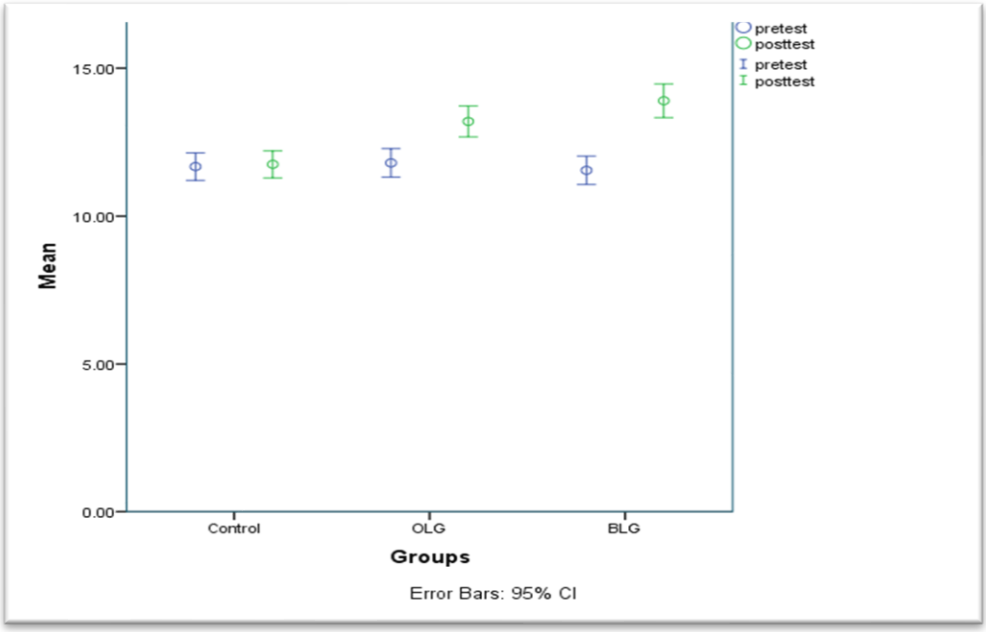

Figure 1. Error bars for examining the homogeneity of variances assumption (Pretest and posttest)

As indicated in the figure above, the degree of variation from the mean score in the participants' vocabulary performance was similar both at the beginning and at the end of study. The pretest and posttest scores were analyzed with descriptive statistics after confirming that the variance was homogeneous among the three groups.

Results of the descriptive statistics

The purpose of conducting pretest at the beginning of study was to create a basic measurement through which the EFL learners' achievements in the post-test could be examined and explained. The students took posttest to measure their vocabulary improvement. The data from the pretest and posttest were summarized using descriptive statistics. Table 5 presents the summary statistics for vocabulary scores before and after the intervention.

Table 5. Descriptive statistics for vocabulary test scores

		N	Mean	SD	95% Confidence Interval for Mean		Min	Max
					Lower Bound	Upper Bound		
Pretest	Control	40	11.6750	1.45686	11.2091	12.1409	8.00	15.00
	OLG	40	11.8000	1.50555	11.3185	12.2815	9.00	14.00
	BLG	40	11.5500	1.50128	11.0699	12.0301	9.00	14.00
	Total	120	11.6750	1.47906	11.4076	11.9424	8.00	15.00
Posttest	Control	40	11.7500	1.42775	11.2934	12.2066	8.00	15.00
	OLG	40	13.2000	1.63613	12.6767	13.7233	10.00	16.00
	BLG	40	13.9000	1.78023	13.3307	14.4693	11.00	17.00
	Total	120	12.9500	1.84186	12.6171	13.2829	8.00	17.00

The means vocabulary scores for the three groups in the homogeneous subsets are revealed in Table 6. For the pretest of vocabulary, the means of control group, OLG, and BLG were (M= Control = 11.67, M OLG = 11.80, and M BLG =11.55), respectively. They differed by some points around their average in the vocabulary pretest. The control group had a mean that was .125 points higher than the BLG and .125 points lower than the OLG. The OLG group had a slightly better performance than the other two groups in pretest. The standard deviation values showed that the three groups had almost the same variation of the scores. Figure 2 shows the pretest mean of three groups.

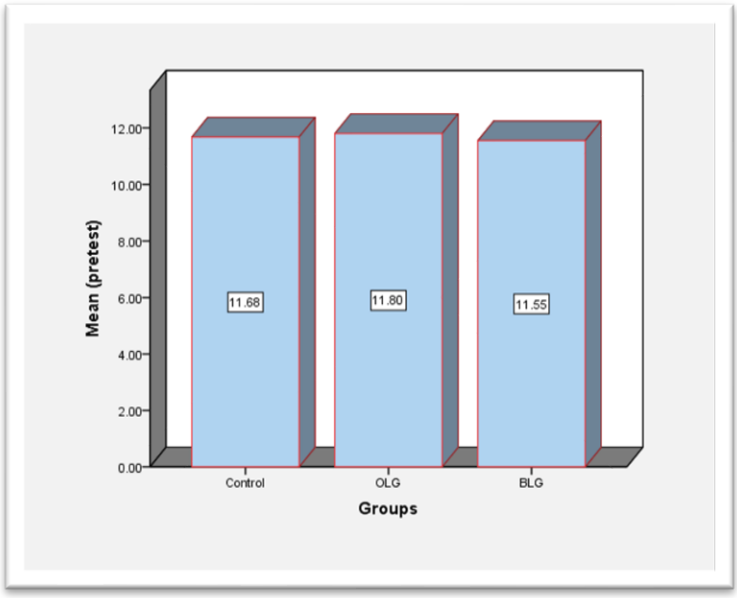

Figure 2. The comparison of means of the three groups in pretest

The posttest scores had the following means for control group, OLG, and BLG: (M= Control = 11.75; M OLG = 13.20; and M BLG=13.90). BLG group performed the best among the three groups. The control group had a mean that was 1.45 points smaller than the OLG and 2.150 points lower than the BLG. The largest difference in the posttest was between control group and BLG group (mean difference= 2.15). The smallest difference among the two experimental groups was observed (mean difference= of .700). Regarding the difference of scores from the mean scores, the BLG group reflected a relatively higher variation in scores than the other two groups. The posttest mean of three groups is indicated in Figure 3.

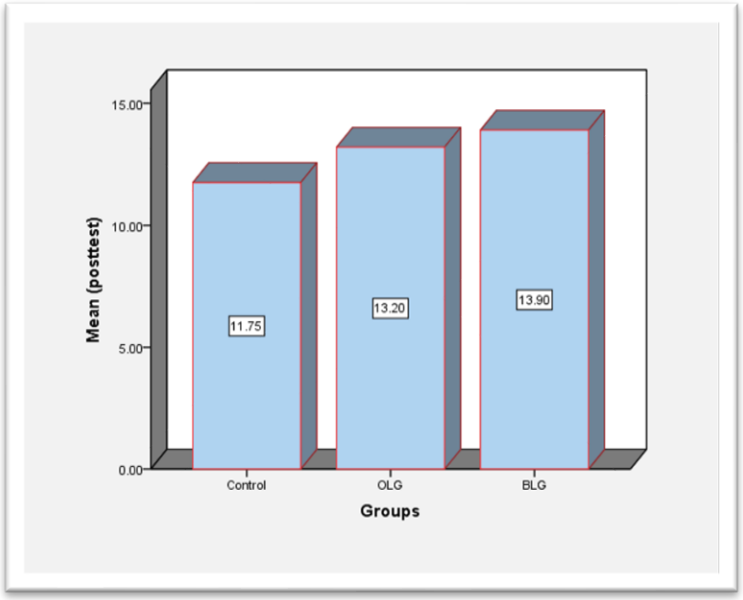

Figure 3. The comparison of means of the three groups in posttest

The posttest of vocabulary showed that the performance of the three groups was different. The control group scored the lowest mean in the post-test. On the other hand, the second experimental group that was exposed to blended learning had highest mean score among the other groups.

Results of the inferential statistics

Table 6 shows that the mean scores of the three groups in the vocabulary pretest and posttest were not the same. The post-test had larger mean differences than the pretest. The vocabulary scores before and after the intervention were compared using one-way ANOVA to see if the mean differences were significant. Table 6 depicts the results of the analysis.

Table 6. One-Way ANOVA for the pretest and posttest

		Sum of Squares	df	Mean Square	F	Sig.
pretest	Between Groups	1.250	2	.625	.282	.755
	Within Groups	259.075	117	2.214		
	Total	260.325	119			
posttest	Between Groups	96.200	2	48.100	18.301	.000
	Within Groups	307.500	117	2.628		
	Total	403.700	119			

Table 7 shows that the vocabulary pre-test scores of the three groups had no significant difference in their means (F 2, 117= .282, Sig. = .755≥.05; p≥ .05). Before the specific treatments were applied, three groups had comparable levels of English vocabulary knowledge. On the other hand, the ANOVA table shows that the F significance value for post-test scores was lower than (.05). The ANOVA F ratio for the vocabulary post-test scores was statistically significant (F 2, 117= 18.301, Sig. = .00≤.05). Due to the significance of the overall group, several comparisons were also conducted.

Table 7. Results of Scheffe test for the purpose of multiple comparisons

Dependent Variable	(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Pretest	Control	OLG	-.12500	.33274	.932	-.9500	.7000
		BLG	.12500	.33274	.932	-.7000	.9500
	OLG	Control	.12500	.33274	.932	-.7000	.9500
		BLG	.25000	.33274	.755	-.5750	1.0750
	BLG	Control	-.12500	.33274	.932	-.9500	.7000
		OLG	-.25000	.33274	.755	-1.0750	.5750
Posttest	Control	OLG	-1.45000*	.36251	.001	-2.3488	-.5512
		BLG	-2.15000*	.36251	.000	-3.0488	-1.2512
	OLG	Control	1.45000*	.36251	.001	.5512	2.3488
		BLG	-.70000	.36251	.160	-1.5988	.1988
	BLG	Control	2.15000*	.36251	.000	1.2512	3.0488
		OLG	.70000	.36251	.160	-.1988	1.5988

*. The mean difference is significant at the 0.05 level.

The vocabulary scores of the three groups were compared using the Scheffe test. The test revealed that there was no significant difference ($p \geq .05$) among the three groups in their pretest scores. However, the control group scored significantly lower ($p \leq .05$) than each of experimental groups in posttest. The post-test scores of experimental groups did not differ significantly from each other ($p \geq .05$). The figures below show the mean graphs of the pretest and post-test vocabulary.

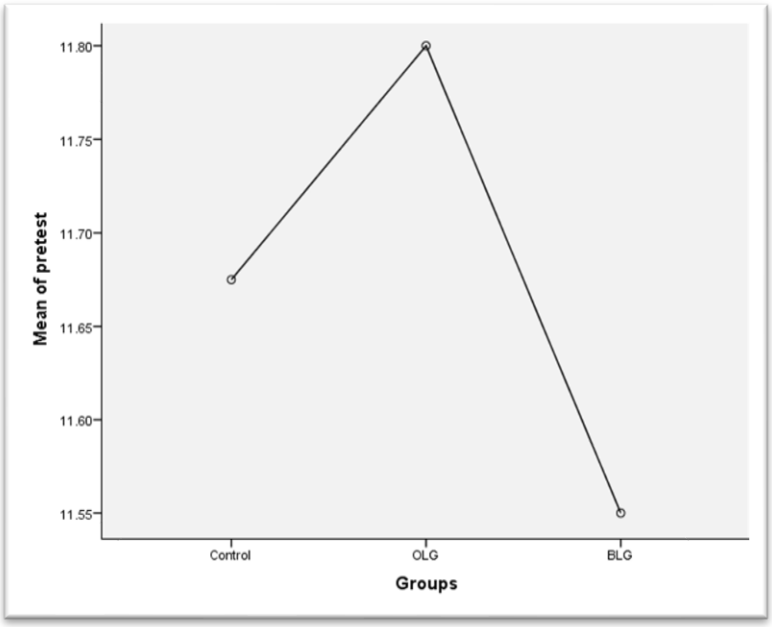

Figure 4. Mean plot for the results of the pretest of vocabulary

As it was indicated in Figure 4, the pretest graph showed that the three groups had similar scores.

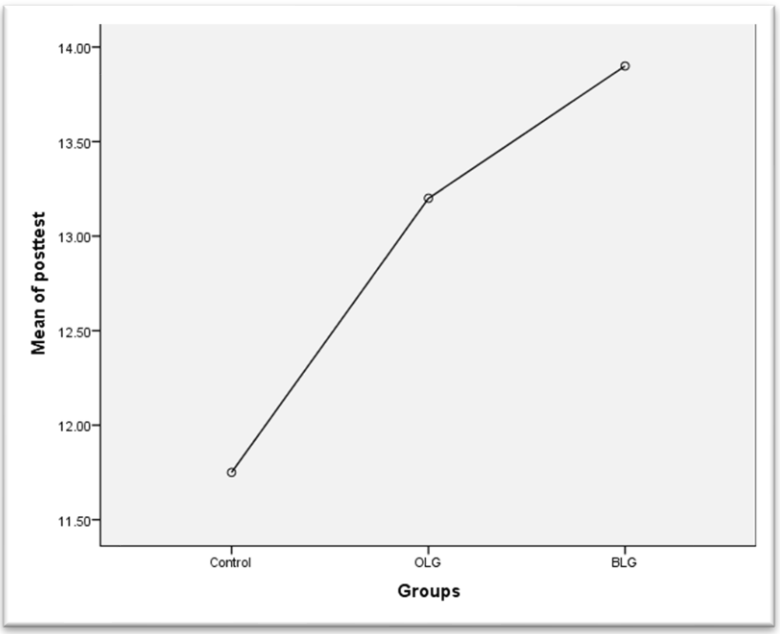

Figure 5. Mean plot for the results of the posttest of vocabulary

Figures 4 and 5 show the group means and how they are related linearly. The chart for the posttest had significant differences among three groups. The means of three groups were significantly different from each other, as shown by the F statistics in Table 7. Participants who received blended vocabulary learning training outperformed their peers who only practiced online vocabulary training and the control group. Second, the group that worked on online vocabulary learning through LMS performed better than the control group. The difference between the means was tested with a post-hoc follow-up test. The post-hoc test (Scheffe) showed that control group and BLG group had the largest difference in their means. The effect of the two types of vocabulary training on the vocabulary improvement of Iranian EFL learners was tested using paired-sample t-test. The test also compared the progress of each group within itself.

Table 8. Paired T-test for the vocabulary tests

Groups			Paired Differences				t	df	Sig. (2-tailed)
			Mean	SD	95% Confidence Interval of the Difference				
					Lower	Upper			
Control	Pair 1	pretest - posttest	-.075	.41	-.20	.05	-1.13	39	.262
OLG	Pair 1	pretest - posttest	-1.40	.67	-1.61	-1.18	-13.18	39	.000
BLG	Pair 1	pretest - posttest	-2.35	1.09	-2.70	-1.99	-13.52	39	.000

The paired t-test showed that the participants' vocabulary learning improved in post-test phase for all three groups. However, the experimental groups that received specific vocabulary instruction had more progress than control group. The control group had a .075 point increase from the pretest to posttest. The second experimental group that used blended learning improved their vocabulary more than the first experimental group that only had online instruction through the LMS. While OLG group improved by 1.40 points, this progress reached 2.35 points for BLG group. The paired t-test revealed that the control group had a slight improvement, but it was not significant ($p \geq .05$). On the other hand, two experimental groups had a significant improvement in vocabulary from the pretest to posttest ($p \leq .05$).

Discussion

The post-test scores of the three groups for the dependent variable were significantly different from each other, as indicated by ANOVA test. The three groups started with the same level of vocabulary learning, but after the experimental group received specific treatments, they had a significant difference in their vocabulary improvement compared to the other two groups ($p \leq .05$). The post-test scores of control group were lower than the scores of two experimental groups that received online and blended vocabulary instruction, respectively, according to statistical analysis. The two experimental groups that had specific vocabulary training did not differ significantly in vocabulary learning, according to Scheffe test. Unlike the control group, two experimental groups improved significantly from the pretest to posttest, as shown by paired t-test results. Therefore, the null

hypothesis that the three groups had the same mean was rejected ($p < .05$). The conclusion was that online and blended learning instructions helped learners develop their vocabulary learning and had a great impact on Iranian intermediate learners' vocabulary learning.

The data analysis showed that the experimental groups that used LMS or a mix of LMS and face-to-face instruction had better vocabulary learning than the traditional instruction group. There are several possible reasons for the success of these experimental groups. First, it can be explained that LMS created an opportunity to implement useful learning practices in an active environment that was interesting and motivating for the learners. It was possible for the users to do online vocabulary activities and thus learning could happen beyond the classroom and they were prepared for classroom activities. It was easy for teachers to upload vocabulary lessons into the LMS and develop different types of vocabulary practice programs to support learners with different learning needs. Teachers could easily track learners' vocabulary improvement and provide feedback on learners' language performance. The control group participants did not get immediate feedback when they made mistakes. Participants in the two experimental groups had the opportunity to check their answers immediately and develop their understanding of the vocabulary exercises. These findings are consistent with Khodaparast and Ghafournia's (2015) research and show that online platforms facilitate the provision of feedback and improve learners' vocabulary gains.

Another explanation is that there were many opportunities for teachers to provide authentic and rich input to learners. They can also plan, implement, and evaluate learners' vocabulary learning using LMS. The frequency of chances teachers had to assess learners' vocabulary promoted learners' vocabulary achievements and led to more opportunities for learners to experience target words, which had a positive effect on their word retrieval in the two experimental groups. This is line with research by Timmis et al. (2016) who have demonstrated that technology offers many potential opportunities for assessment practices. This result correlates well with previous studies such as Bancha (2012) wherein he showed that the rate of testing makes learners put more effort into vocabulary learning and enhances vocabulary recall and retention.

The integrated implementation of LMS and classroom teaching enabled active participation of learners in educational process. The LMS program enabled the participants of both experimental groups to store information in their memory through three different ways: seeing, hearing, and understanding. Visual encoding, vocabulary items presented as stimuli seen in the LMS program can be stored, remembered, and retrieved with the help of the visual images (Khenissi et al., 2017). LMS users and those using blended learning had a wide choice of vocabulary learning strategies to use, including guessing, repeating words for practice, and encoding. This means that the LMS program and blended learning allow learners to experience a dynamic vocabulary learning process that includes metacognitive choices and cognitive implementation of different strategies.

The other issue was the availability of LMS outside the classroom and this can be useful in helping learners to be autonomous language learners who can their learning to their own success. When the LMS was combined with face-to-face learning, it created a blended learning environment where learner autonomy was developed. They accessed the lessons as many times as they needed. They could

learn at their own speed and be accountable for their own learning, as well as finish tasks and extend their learning outside the classroom setting. It is argued that a personalized learning environment is created in blended learning which helped both the gifted learners and those less skilled who may not perform well in conventional classroom learning. Moreover, the availability of LMS exercises allowed learners to do the exercises as often as needed so that they could practice the vocabulary exercises more skillfullly. Hajebi et al. (2018) reached a similar result. They found that access to vocabulary exercises in online platforms such as LMS helped learners remember words more efficiently.

The previous studies that demonstrate the advantages of blended teaching for EFL learners' language learning are supported by this research (Kafes & Caner, 2020; Taysi & Basaran, 2018; Yesilbag & Korkmaz, 2021). This study verified that online learning through LMS and blended learning in mixed online and face-to-face learning environments both yielded relatively similar outcomes. The average scores of blended learning group were higher than the scores of LMS group, but this difference was not important. The findings of many studies (Krishnan & Yunus, 2019; Mustafa et al., 2019; Novitasari et al., 2018; Shabaneh & Farrah, 2019) supported the effective role of LMS in improving learners' vocabulary development. The reason for the difference between two experimental groups is that blended learning group saw more words than LMS group and participants interacted through online and face-to-face learning because of blended learning (Singh et al., 2021). Consistent with previous studies (Yunita, 2020), it was observed that the LMS was an effective supplement to classroom instruction. That is, online teaching vocabulary resources work best when they are accompanied by teachers' explanations in a blended environment. Therefore, learners' vocabulary learning is improved by the combination of technology and face-to-face instruction, according to the findings.

However, contrasting evidence exists about the effect of blended learning on language learning. For instance, a study conducted in China found that while students believed that blended learning had a positive impact on their achievement, empirical evidence showed no significant improvement (Chang et al., 2014). Similarly, research conducted in Hong Kong, China did not show a significant difference in learning achievements between blended and traditional approaches (Yick et al., 2019). The findings of this study are in contrast with the study conducted by Al-Qatawneh et al. (2020), which found no significant difference in attitudes toward blended or traditional approaches, which could be due to either internal or external factors.

A study conducted at Point Loma Nazarene University in the USA also found no significant difference between blended and traditional instruction, and students also spent less time learning in blended courses (Botts et al., 2018). Finally, students in a blended learning course at an undergraduate university in Alberta, Canada, despite positive perceptions of blended learning, had no significant differences in self-efficacy and knowledge scores compared to those who used non-blended learning (Berga et al., 2021).

Conclusion

The findings indicated that the combined use of classroom teaching along with the LMS Web-based technology helped teachers plan, implement, and assess

students' vocabulary learning more efficiently than using the LMS program in developing learners' vocabulary learning. The creation of specific educational conditions is needed for the successful use of technologies, and teachers should know the digital skills of learners before using a web-based LMS. Although the implementation of web-based technologies has its difficulties, a balanced combination of LMS system with face-to-face teaching can be more effective by encouraging collaboration and participation between teacher and learners and providing useful experiences while working in LMS. That is, classroom training can be supported by integrating the LMS system to solve the problems of traditional classes like time constraints and instructional facilities. It is also concluded that technology helps improve vocabulary learning and LMS can facilitate vocabulary learning experience. In addition, teachers should encourage their learners to use advanced technology and provide them with accessible learning materials that are modified based on learners' preferences and characteristics so that learners can experience an effective blended learning environment. Most importantly, implementing effective blended learning requires developing a method to help learners become motivated to learn vocabulary.

The findings have practical implications for teacher education programs to promote teachers' interest and eagerness to implement web-based systems. Future teachers need to develop a positive attitude towards using LMS system and learn how to effectively integrate LMS into their classroom teaching through pre-service and in-service training courses. The study findings have important implications for web-based application developers. A clear model for blended learning should be considered and teachers should have the option to select a blended learning model that fits their teaching situations in order to control the classroom and offer a more effective learning environment. Educators should arrange workshops for students to improve their computer skills and help them develop a positive attitude towards using web-based programs for learning vocabulary, since the attitude and digital competence of learners towards LMS is important in the development of their language learning.

Limitations of the study

This study showed how vocabulary learning can be facilitated by online and blended learning, but it has some limitations. First, the study only focused on examining the effects of LMS as a web-based program and blended learning on the vocabulary development of EFL learners in a language institute. Therefore, the findings may not be generalizable to other educational contexts such as public or private schools. To get a broader picture of the implementation of blended learning, extensive research can be conducted in other educational settings like universities or public schools. Furthermore, the study examined the effects of LMS at the intermediate level and therefore cannot represent other levels. The sample size was also limited to 120 EFL learners. The other limitation of this study is that among various features of word knowledge, this study has focused only on meaning. In other words, other word features like pronunciation, spelling, word parts, and word accents were not evaluated when judging learners' vocabulary development.

Suggestions for further research

Further studies are suggested to investigate the advantages and disadvantages of the LMS system and to examine the challenges LMS users face while learning a foreign language. The problems that prevent learners from successfully using the system to improve their vocabulary and the benefits that motivate them to work in the LMS system can be comprehensively studied in future studies. Future research can be done to investigate the educational opportunities that can be created by integrated uses of LMS system and classroom teaching regarding teacher-student collaboration. In addition, future work on online and blended learning could enhance language skills and sub-skills or other language components like grammar through the use of web-based programs such as mobile apps or social media applications as well as online software, which are available in the market. A more comprehensive methodology such as a mixed method can be used in future research. For example, triangulation can be achieved by conducting interviews, administering questionnaire, and conducting observations to obtain more detailed information about the effects of online vocabulary instruction on language learners' vocabulary development. Finally, studies can be carried out to examine the possible effects of using online platforms on learners' word knowledge in more specific areas such as their understanding of collocations, syntactic associations, and grammatical functions of words.

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