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The Impact of Blended Mobile Learning on EFL Students' Vocabulary Development*

Harmanlanmış Mobil Öğrenmenin EFL Öğrencilerinin Kelime Gelişimi Üzerindeki Etkisi

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ABSTRACT: The study's objective is to examine the effects of Blended Mobile Learning (BML) on the vocabulary development of EFL preparatory students and their views of BML. As a mixed method study, it was conducted with 40 preparatory students at a state university in Turkey. While the control group studied vocabulary by reading texts only in the classroom by adhering to the textbook, the experimental group, in addition to the same instruction, was taught vocabulary outside the classroom in a virtual classroom opened through the Google Classroom application. A pre-test and a post-test were administered to the students to determine the impact of BML on their vocabulary development. The results of the tests were analyzed with SPSS program and the vocabulary development of groups was compared via an independent T-test. Additionally, a structured interview was done with the students of the experimental group to determine their views of BML. Students' responses were analyzed using the MAXQDA 2020 program with the method of content analysis. This research has led to the conclusion that BML, as a teaching method, strengthens the vocabulary development of the preparatory students and motivates them to learn vocabulary.

Keywords: Blended learning, vocabulary, mobile devices, mobile learning, SAMR.

ÖZ: Çalışmanın amacı Harmanlanmış Mobil Öğrenmenin (BML) İngilizceyi yabancı dil olarak öğrenen hazırlık öğrencilerinin kelime gelişimi üzerindeki etkilerini ve BML'ye ilişkin görüşlerini incelemektir. Bir karma yöntem çalışması olarak, Türkiye'deki bir devlet üniversitesindeki 40 hazırlık öğrencisi ile gerçekleştirilmiştir. Kontrol grubuna kelimeler sadece sınıf içinde ders kitabına bağlı kalınarak okuma metinleri ile öğretilirken, deney grubuna aynı eğitime ek olarak sınıf dışında Google Classroom uygulamasında oluşturulan bir sanal sınıf üzerinden kelimeler öğretildi. BML'nin kelime dağarcığı gelişimine etkisini belirlemek için öğrencilere bir ön test ve bir son test uygulandı. Testlerin sonuçları SPSS programı ile analiz edildi ve grupların kelime gelişimi bağımsız bir T-testi ile karşılaştırıldı. Ayrıca deney grubu öğrencilerinin BML'ye ilişkin görüşlerini belirlemek amacıyla yapılandırılmış bir görüşme yapılmıştır. Öğrencilerin yanıtları MAXQDA 2020 programı kullanılarak içerik analizi yöntemiyle analiz edilmiştir. Bu araştırma ile bir öğretim yöntemi olarak BML'nin hazırlık öğrencilerinin kelime gelişimini güçlendirdiği ve kelime öğrenmek için onları motive ettiği sonucuna varılmıştır.

Anahtar kelimeler: Harmanlanmış öğrenme, kelime, mobil cihazlar, mobil öğrenme, SAMR.

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Vocabulary is the backbone of four major language skills: speaking, listening, reading, and writing (Gorjian et al., 2011), and without extensive vocabulary knowledge, it is not possible to talk about language acquisition (Cortazzi & Jin, 1996). Wilkin (1972) asserted that "without grammar, little can be conveyed; without vocabulary, nothing can be conveyed" (p. 111); therefore, to build a strong base for language skills, any language learner must invest time in building vocabulary. In the long process of vocabulary development, the learners generally apply a particular vocabulary-developing strategy that is appropriate to their learning style. Though traditional vocabulary learning strategies were previously applied more and some of these techniques are still actively applied by learners, technological developments have caused some amendments in learners' vocabulary learning methods (Pun, 2013; Hao et al., 2021). For instance, to expand their vocabulary knowledge many students currently access online dictionaries and vocabulary teaching websites or applications exploiting mobile devices like tablets and smartphones which allow students to access vocabulary-developing materials anytime, anywhere, as well as provide instant feedback on their progress (Abraham, 2008; Chen et al., 2018).

Technology advancements have made it possible to learn vocabulary through a variety of approaches, including blended learning. Blended learning, also called hybrid learning (Olapiriyakul & Scher, 2006), has become a buzzword in education with different definitions that have evolved over 20 years of use (Sharpe et al., 2006). Educators and trainers frequently use the term, but there is no standard definition for it, and its meaning frequently changes depending on the context. According to Garrison and Kanuka (2004), blended learning is "the thoughtful integration of classroom face-to-face learning experiences with online learning experiences" (p. 96), and Graham (2006) defines it as "systems that combine face-to-face instruction with computer-mediated instruction" (p. 5). Dziuban et al. (2004) describe blended learning as "a pedagogical approach that combines the effectiveness and socialization opportunities of the classroom with the technologically enhanced active learning possibilities of the online environment, rather than a ratio of delivery modalities" (p. 3). Although blended learning does not have a standard definition and its meaning changes according to the context, its definition as a blend of face-to-face education and online learning is the most common one (Watson, 2008).

Marsh (2012) noted that instructional and educational methods that are most successful have consistently employed a range of strategies and tactics to improve skill development. According to Palalas (2013), blending is one of the most widely used approaches to learner-centered education in the twenty-first century and blending became one of the most well-liked educational ideas in EFL contexts and higher education after the 2000s (Halverson et al., 2014). Additionally, Watson (2008) asserted that in the future, blending would predominate as a teaching strategy and Kang (2010) stated that in-person or online training is weaker compared to blended learning instruction.

Blending can be accomplished in a variety of ways and with a variety of tools. In the 1990s, blended learning was accomplished with computers and computer-mediated tools, but it may now be practiced with the help of mobile devices, which penetrate into the society. The use of mobile devices to support face-to-face instruction has prompted the rise of the theory of blended mobile learning (BML), which is defined by Wong and

Ng (2018) as the usage of mobile technology in conjunction with the traditional face-to-face classroom environment and other e-learning tools. Suartama (2019) describes BML as "a special form of blended learning and a term used to describe learning opportunities where mobile technology supports situational learning activities and combines students' mobility with the concept of learning opportunities" (p. 6). Being a new term in the literature, the blended mobile learning method highlights that mobile devices can be used in formal education as supportive tools of face-to-face education. Through the combination of mobile language learning devices and face-to-face instruction, students can benefit from the advantages of both traditional and digital language learning tools. With such a method, students can maximize their language learning opportunities with a blend of portable language learning tools and face-to-face instruction.

In the literature, the number of studies pointing to the benefits of mobile devices expanding the vocabulary knowledge of EFL students (Averianova, 2012; Godwin-Jones, 2011; Stockwell, 2013) is not few, but these studies are mostly related to the discrete vocabulary learning, not as a part of the educational curriculum. How vocabulary is learned in a blended mobile environment and how the students' opinions are about the use of BML for vocabulary development are still not clear and need to be investigated. In this study, the impacts of BML on preparatory students' foreign language vocabulary development were investigated, and students' views of merging face-to-face instruction and mobile devices to learn vocabulary were researched. The findings of this study will shed light on the current vocabulary learning strategies and provide insight into BML's potential in the future. This study delves into two questions:

1. What are the impacts of BML on the vocabulary development of EFL preparatory students?

2. What are EFL students' views about the advantages of BML on vocabulary development?

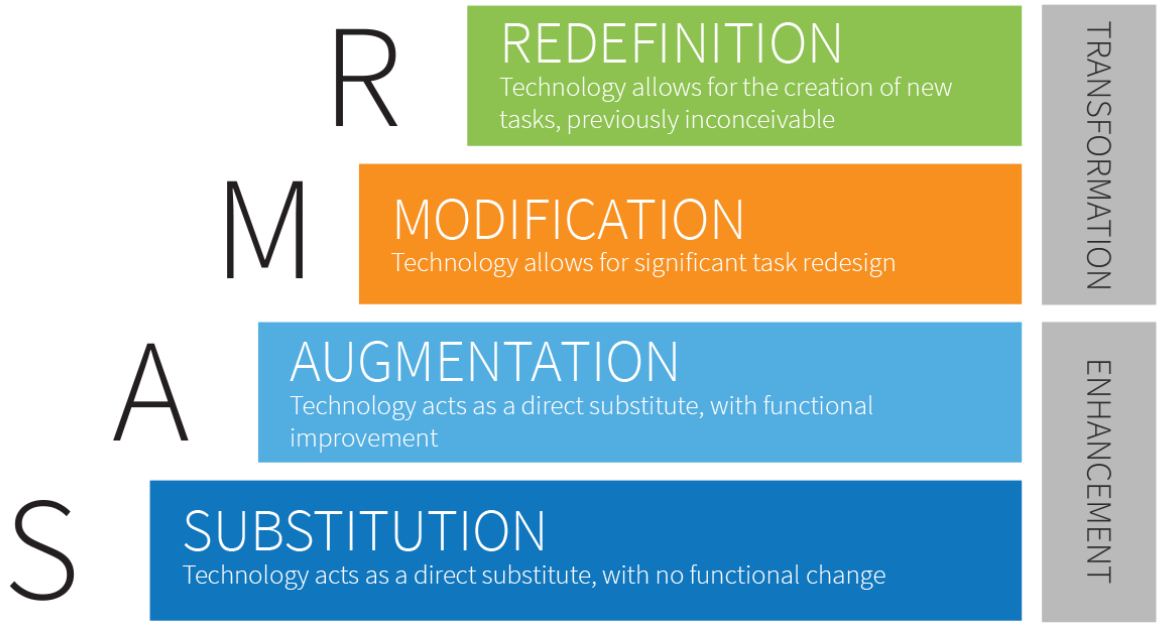
Conceptual Framework

The SAMR Model

In this study, as a technology integration framework, the SAMR Model was implemented. The SAMR, a four-stage model that describes how to use technology as an assisting instrument of face-to-face instruction, was created as a framework by Ruben R. Puentedura (2013) to classify and evaluate activities done via technological devices instead of traditional methods. To promote 21st-century skills for both educators and learners, SAMR facilitates the acquisition of proficiency in modern technologies and software in formal education. (Cummings, 2014). The four distinct processes that comprise the SAMR model are substitution, augmentation, modification, and redefinition. These stages represented visually in a hierarchical manner, are categorized under two separate headings as transformation and enhancement. Substitution and augmentation are designated as enhancement implying that instructors can use technology to enhance or replace current tools in the learning task, whereas modification and redefinition are classified as transformation indicating offering new learning opportunities that would not be easily achievable without technology. The SAMR model is shown with the details of each process in Figure 1.

Figure 1

The SAMR Model



Note. (Puendetura, 2013).

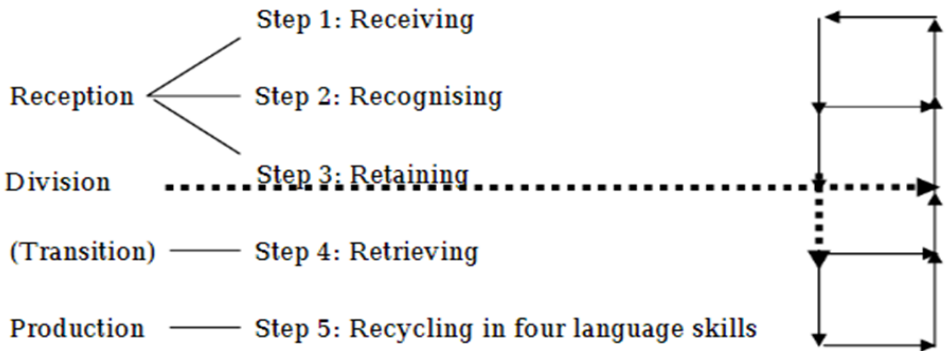
The SAMR model is a method for assessing every learning activity to ascertain the extent and complexity of technology integration (Kirkland, 2014). The model's objective is to motivate teachers to use technological tools or software both within and outside of the classroom to deliver valuable instruction, reduce resources, and save time. For example, it proposes to use an online exam as a substitute for a paper-based exam because it is easier, faster, and more environmentally friendly.

5R Vocabulary Learning Strategy

Another instructional method used in this research is the 5R vocabulary learning model. A study by Brown and Payne (1994) led to the emergence of a model that divided vocabulary learning strategies into five main groups. The first phase is having sources for learning new words, and the second is acquiring a distinct mental image of the new words' shape, whether it is aural, visual, or both. The next steps include understanding what the words mean creating a strong link between the word's form and meaning, remembering the word when needed, and finally employing the words (Hatch & Brown, 1995). These phases outline the actions that students have to take to understand a new lexical item correctly. Subsequently, as Figure 2 illustrates, Shen (2003) named these steps as receiving, recognizing, retaining, retrieving, and recycling (5R).

Figure 2

Steps of Vocabulary Learning



Step 1. Receiving: The learners can consciously or unconsciously be exposed to new terminology through reading, listening, and watching.

Step 2. Recognizing: Following the identification of new words, students consciously or subconsciously acquire the terms' definitions and forms.

Step 3. Retaining: For this level, inferring the meaning and form of the words from context might not be sufficient; thus, the learners may need some assistance from their peers, teachers, or a dictionary.

Step 4. Retrieving: The students can reach the word whenever they need it since the word is already stored in the memory. The learners can use the word but are still unable to spontaneously create sentences.

Step 5: Recycling: At this level, the learners are proficient in using words in all four skill areas.

Theoretical Framework

This study is based on two basic theories: ubiquitous learning and project-based learning. Ubiquitous learning means that learners access the resources and information they need from anywhere at any time (Hwang et al., 2008; Ogata et al., 2009). The penetration of mobile devices into every segment of society allows education to become ubiquitous. Thanks to mobile technology, students may access information and freely enhance their vocabulary knowledge, no matter where they are or what the time is. They can expand their vocabulary at midnight or very early in the morning, whether they are at a restaurant, in a dorm, in their bed at home, or somewhere else. In the application process of this study, students could ubiquitously reach and revise the reading passages and activities shared with them through a Google Classroom and improve their vocabulary knowledge.

Another theory that forms the base of this study is project-based learning, which has its origins more than a century ago in the work of philosopher and educator John Dewey, who founded the Laboratory School at the University of Chicago to study on the inquiry method. Students who take part in a project work on authentic and meaningful challenges related to their lives. By collaborating, students can explore topics, put forth explanations and hypotheses, debate their views, refute the ideas of others, and try out novel concepts in a project-based learning environment (Joseph et al., 2006). In light of technological advancements, problem-solving has become less

complex and can now be approached globally, facilitating the global sharing of solutions for social and environmental issues via social media platforms. In a project about a global issue, the solution or recommendation is commonly provided in English as a lingua franca language; therefore, students are inevitably exposed to words while reading for solutions and producing language while writing or communicating the solution. By facilitating global interaction, mobile devices help students enhance their vocabulary knowledge and allow them to use the words they have instructed.

Literature Review

Within the scope of the first research question of this study, many studies investigated the effect of blended education on EFL vocabulary development, and the majority of these studies showed that blended learning is more effective than face-to-face or online education. To study the effects of various delivery methods on enhancing language abilities, Kurucova et al. (2018) created three groups: the first group received instruction only online, the second group was instructed exclusively in person, and the third group was taught using a blended learning strategy. The researchers identified the linguistic abilities that had improved in each of the three groups by comparing the results of the pre-and post-tests. The reading, speaking, listening, and vocabulary scores of the blended-learning group improved dramatically compared to the others. Conducting a similar study to assess the impact of blended learning on vocabulary development, Sarajari and Gilakjani (2024) implemented a 10-week research involving 120 Iranian intermediate-level students. The findings revealed that compared to face-to-face education, blended learning instruction had a statistically significant positive effect on the vocabulary acquisition of Iranian intermediate EFL learners. Also, Alipour (2020) divided 90 EFL intermediate students into three groups to compare their vocabulary learning with face-to-face, online, and blended education. While giving face-to-face vocabulary training to the first group, she provided vocabulary to the online group with an LMS and to the blended group in a blended learning environment. At the end of a study of eight weeks, after the analysis of pre-and post-test results, she discovered that the blended learning group performed better than the online and in-person groups. Analyzing the results, she asserted that the reason why blended learning group performed better is because students value and need to incorporate technology into their education to make learning more enjoyable and engaging. A comparison study on the effects of traditional and blended teaching on the vocabulary acquisition of EFL learners was conducted by Khazaei and Dastjerdi in 2011. The goal of the study was to determine whether SMS could be effectively used alongside the blended learning strategy to instruct L2 vocabulary. This was assessed based on how well learners could detect and retain vocabulary terms. The findings showed that the group of students who received the learning material through traditional methods performed worse on tests compared to the students who received it through a blended teaching strategy.

Zumor et al. (2013) investigated the language development of EFL students at King Khalid University regarding the benefits and drawbacks of in-person language instruction and blended language learning via the Blackboard learning management system. A 33-item survey was completed by the 160 participants, and the results demonstrated that blended learning may greatly help students to increase their vocabulary in English. Ebadi and Ghuchi (2018) conducted a study on 40 EFL learners

to examine how the blended learning strategy affected Iranian students' vocabulary development in a blended mobile learning context. According to research outcomes, students who employed a blended learning approach demonstrated a statistically significant advantage in their academic performance when compared to those who solely utilized the face-to-face approach. Jia et al. (2012) found that students who took an English blended learning course with individualized vocabulary acquisition performed better in vocabulary acquisition.

There are not many empirical studies in the literature showing that blended learning instruction has a detrimental influence on learners' academic achievement. At Arabian Gulf University, Alshwiah (2009) examined the learning process of 50 students comparing the outcomes of a suggested blended learning method and face-to-face instruction. The results showed no statistically significant difference between the two groups in terms of proficiency. Tosun (2015) carried out a six-week study to examine the efficacy of the blended learning method for vocabulary development among 40 undergraduate students who attended rigorous English lessons at a prep class at the Middle East Technical University in Turkey. The experimental group studied the target vocabulary items using blended learning approaches, whereas the control group learned the same vocabulary using traditional education methods. Following the teaching period, both groups completed a written vocabulary exam. Additionally, semi-structured interviews were conducted with the students to explore their perspectives on blended learning. The study's findings showed that although students were satisfied with and preferred blended learning over conventional classroom instruction for vocabulary instruction, face-to-face instruction improved students' vocabulary proficiency more than the suggested blended learning technique.

The second research question of this study examines EFL students' perspectives on the advantages of BML on the vocabulary development of preparatory students. According to the outcomes of a study conducted by Ebadi and Ghuchi (2018) to explore students' perspectives towards blended learning regarding vocabulary development, blended learning offers benefits such as time flexibility, personalized learning, and organized design. The most significant benefit of blended learning, as indicated by a study conducted at a state university in Turkey by Saltan (2016), is accessibility, which enables students to attend classes whenever and wherever they choose. Following this are the abilities to create a private study area and to be time-efficient, thereby saving students from wasting time commuting to school. According to Delialioglu and Yildirim (2008), the blended approach is effective because it reduces the time students spend in class by about 66% and indirectly impacts teaching expenses. Ono and Ishihara (2012) investigated a new instructional model of blended learning by integrating the traditional Japanese classroom with Wi-Fi-connected mobile tools (iPod Touch, 2nd generation) and learning management systems (LMS). The study's findings demonstrated the positive impact of blended learning on students' vocabulary acquisition revealing that using mobile devices in the classroom increased students' enthusiasm to learn and heightened their awareness of language acquisition techniques. In summary, when considering the advantages of blended learning for vocabulary acquisition, the most prominent positive results include providing a conducive learning environment, saving time, and motivating students.

Methodology

Research Design

The explanatory sequential mixed method was applied for this study. This method involves gathering quantitative data before collecting qualitative data to address the research problem (Cresswell, 2012). By first analyzing quantitative data to measure students' vocabulary development and then gathering qualitative data to assess their opinions on blended mobile learning in vocabulary teaching, the study was able to provide a detailed understanding of the phenomenon under investigation. Employing this method allowed for a comprehensive analysis of the research problem, crucial for obtaining accurate results.

Overview of the Study

In the current study, the blending method consists of combining in-person instruction with online mobile learning. Specifically, face-to-face instruction was integrated with Google tools, such as Google Classroom, Google Docs, Google Slides, and Google Forms. These tools, which are available for free download on any platform, were utilized in the study. Throughout a 14-week study with preparatory students from the School of Foreign Languages of a state university in Turkey, the effects of blended mobile learning on the vocabulary development of B2 level EFL preparatory students were examined, as well as the learners' perceptions of that approach. Both the experimental group and the control group were taught vocabulary by the same instructor who is also the conductor of this study. In addition to the face-to-face instruction, members of the experimental group participated in additional vocabulary-building exercises via a virtual class the teacher had previously set up using the Google Classroom application. The detailed relationship between the application stages of the study and the methods applied in the study is charted and given in the appendix section.

Subjects of the Study

This study was conducted with 40 English preparatory students (33 female and 7 male), aged between 17 and 22, enrolled in the Department of the School of Foreign Languages at a state university in Turkey. These students have successfully passed the Foreign Language Examination conducted by ÖSYM, the official examination center of Turkey, and have been admitted to the departments of English Language Teaching or English Language and Literature. Before progressing to their respective departments, these students undergo a one-year preparatory training program within the framework of the School of Foreign Languages. The administration of the School of Foreign Languages had previously divided the students into two classes at random; therefore, there was no significant difference in proficiency levels between the students. Applying a simple random sampling method, the researcher assigned one class as the control group and the other as the experimental group at the beginning of the semester, before any information regarding the students' proficiency levels was available. Additionally, the fact that the control group performed better on the pre-test suggests that any potential bias in the group selection process was mitigated, as both groups started with similar proficiency levels.

Data Collection Tools and Data Analysis

Since it is a mixed methods study, this research incorporates both quantitative and qualitative data collection tools and analysis methods. In the initial phase of the study, which focuses on investigating the effects of BML on students' vocabulary development, a pre-and post-test, a quantitative data collection method, was utilized, and the gathered data were analyzed using the SPSS program. The subsequent phase of the study involves a qualitative inquiry into students' perspectives on vocabulary development through the BML method. In this part, structured interviews lasting 30 minutes were conducted with the students, and the acquired data were subjected to content analysis using the MAXQDA program. The collected data were transcribed, reviewed, thematically organized, and coded.

Pre-test and post-test: The pre-test included two sections with two parts each, and the questions were taken from the *Use of English* parts of the sample papers of the B2 First Certification Exam applied in 2015 by Cambridge Assessment, ensuring their reliability. After the test was created, it underwent a review of language and content by an expert instructor in the field. Necessary revisions were then made based on the feedback, and the test was piloted with a group of 30 students at the same proficiency level. The test was subsequently edited according to the students' feedback, ensuring its readiness for implementation. As the final version: each section of the test comprises two reading passages that resemble cloze tests. The first section assesses participants' vocabulary knowledge, featuring two reading passages with a total of 16 blanks for lexical items. In contrast, the second section evaluates participants' understanding of lexical item forms, consisting of two reading passages containing 18 blanks that require the correct word forms to be filled in. Then, the pre-test was administered to all participants in both groups to assess their initial vocabulary levels. Following the study period, the same set of questions from the pre-test was used for the post-test, which was conducted for both the experimental and control groups. To determine the difference in vocabulary levels between the two groups, an independent t-test (conducted using SPSS 26) was performed on their pre-test and post-test results.

A structured Interview: In this study, utmost care was taken to ensure that the interview form with five open-ended questions was valid and reliable. Three expert educators were consulted to assess the questions' validity, and their recommendations were taken into account to revise and recreate the questions. After a successful pilot period, the interviews were applied to the experimental group, and 16 out of 20 subjects showed up for the scheduled 30-minute interviews. This not only confirms the credibility of the study but also highlights the participants' willingness to contribute to the research. The researchers employed MAXQDA (2020) to examine the responses of the participants, utilizing content analysis to assess the qualitative data. The process encompassed transcription, rereading, and the creation and classification of codes, following a comprehensive and iterative analysis of the responses, following the approach prescribed by Strauss and Corbin (1990).

The process of qualitative data analysis:

Transcribing: The collected data were transcribed and the participants were randomly numbered from S1 to S16.

Data familiarization: The researcher read and reread the participants' replies to familiarize himself with the information.

Making the first codes: The investigator assigned the initial codes to the data, identifying the important features and assigning them to categories.

Searching for themes: The researcher gathered the primary codes and analyzed their connections with one another to identify potential themes.

Examining and improving themes: Before finalization, the researcher reviewed themes to ensure they accurately reflected the data they wanted.

Identifying and defining themes: The researcher investigated the inner workings of the well-liked themes and assigned them suitable names.

Ethical Procedures

Prior to commencing the study, ethical permission numbered 51974, dated 31.05.2022, was obtained from Istanbul Aydın University. Additionally, students were informed at the outset of the interview that their answers would be used solely for the purposes of this study and would not be shared elsewhere. Only volunteers were invited to participate in the interview, ensuring compliance with ethical standards and avoiding any violations in the study.

Findings

As outlined in the methodology section, the first research question constitutes the quantitative part of the study, while the second research question encompasses the qualitative aspect. The research findings are presented in this section in alignment with each research question.

Impact of BML on the Vocabulary Development

To address this research question, all participants underwent a pre-and post-test. The initial step in analyzing the results involved assessing the normality of the data to establish sample homogeneity. To achieve this, a Shapiro-Wilk test was employed to evaluate the distribution's normality of pre-test results.

Table 1

Test of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Pre-test	0.138	40	0.053	0.981	40	0.710

As depicted in Table 1, the distribution of pre-test results was determined to be normal, as the significance level (0.710) exceeds 0.05, thus permitting the utilization of an independent t-test to investigate the difference between pre-and post-test outcomes.

A t-test was applied to measure pre-test and post-test averages discretely and their t-test ratios, as well as standard deviations.

Table 2

T-test According to the Results of the Pre-test and Post-test

	Group	N	Mean	Std. Deviation	t	p
Pre-test	Experimental Group	20	43.65	11.97	-0.70	.484
	Control Group	20	46.10	9.83		
Post-test	Experimental Group	20	60.50	10.38	3.26	.002
	Control Group	20	49.20	11.48		

As Table 2 illustrates, the pre-test mean scores for the control and experimental groups were 46.10 and 43.65, respectively. Even though this pre-study situation slightly favored the control group, the results of the independent sample t-test support the notion that there is no statistically significant difference between the experimental and control groups' pre-test mean scores ($t = -0.707$, $p > 0.05$). On the other hand, the control and experimental groups' respective post-test means were 49.20 and 60.55 showing a significant difference between the two groups ($t = 3.264$, $p > 0.05$).

Upon analyzing the variance between pre-and post-test results of the two groups, Table 3 illustrates that following the intervention, the experimental group exhibited an average increase of 16.85 points, while the control group demonstrated a mere 3.10-point increase. Also, the independent t-test reveals a statistically significant difference between the outcomes of the two groups ($t = 3.749$, $p < 0.05$).

Table 3

T-test According to the Difference between Pre-test and Post-test Results

	Group	N	Mean	Std. Deviation	t	p
Difference	Experimental Group	20	16.85	-1.59	3.74	.001
	Control Group	20	3.10	+1.65		

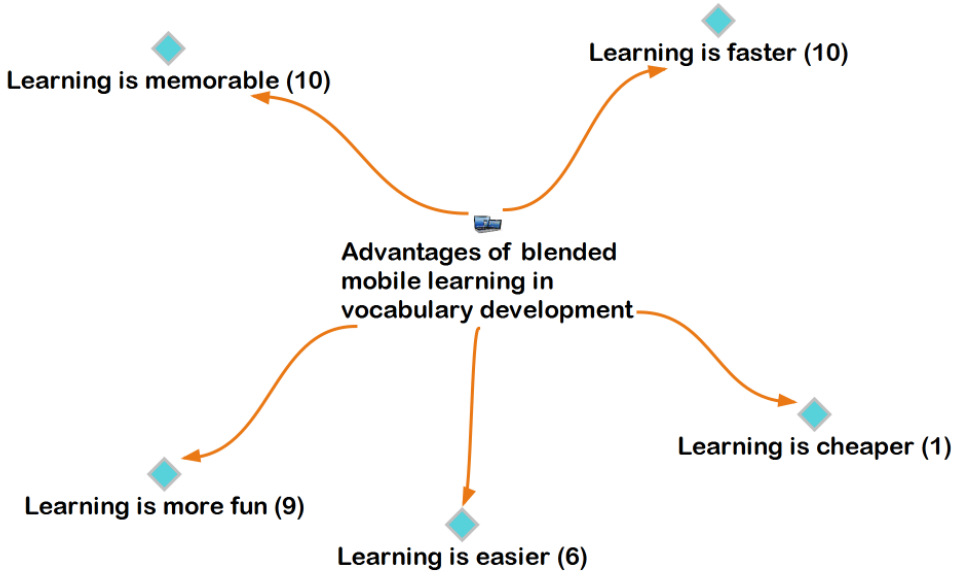
Furthermore, at the end of the study, it was observed that the standard deviation of the control group increased (+1.657), indicating a divergence in the vocabulary knowledge levels of the students in the control group. Conversely, the standard deviation of the experimental group decreased (-1.590), demonstrating a convergence in the vocabulary levels of the students, with their proficiency levels becoming more homogeneous.

EFL Students' Views About the Advantages of BML on Vocabulary Development

While the pre-and post-tests were applied to all participants (n=40), the structured interview was specifically conducted with 16 volunteers from the experimental group. To explore their views about the benefits of the BML in improving the vocabulary of EFL learners, the participants were asked about the advantages of BML. MAXQDA 2020 was used to analyze the data through content analysis. As Figure 3 depicts, EFL students consider that learning vocabulary with BML is more memorable, faster, more fun, easier, and cheaper.

Figure 3

Advantages of BML in Vocabulary Development



The advantages of using the BML method when learning vocabulary are listed below under distinct headings, backed up by the responses provided by the students.

Learning is More Memorable

There are different learning styles, such as visual, auditory, and tactile, and each student varies from the others on this point. According to Mayer (2002), materials containing both visual and auditory items at the same time are comprehended faster. As students expressed, mobile devices now have a wealth of educational applications and resources, and because these materials have many visual and aural components that cater to their learning preferences, learning supported by mobile devices is more memorable.

> My excellent visual memory made it possible for the word and its definition that I saw on the digital page to stick in my mind (S8).
>
> Because the visual effects in blended mobile learning are more captivating, learning is easier and can lead to greater retention of vocabulary in foreign languages (S14).

According to participants, another factor that makes vocabulary learning more memorable with BML was the fact that the apps were game- or puzzle-based, which was incredibly fascinating and captured students' attention more than teacher-led lectures.

> *When the words were in the form of a puzzle, it really helped me learn and retain the words that I was unable to memorize (S16).*

Learning is Faster

Mobile devices are ubiquitous in society, with nearly every adult owning at least one. Thanks to these devices, people can access information whenever they want without being constrained by time or location. Students expressed that in a blended mobile learning environment, they could swiftly and effortlessly acquire the necessary vocabulary without the need to wait for a tutor or attend a traditional course, all facilitated by the Internet.

When we encounter a word we are unfamiliar with, we can quickly learn it by looking up examples of its usage in sentences and solving puzzles involving it (S12).

We can quickly and efficiently find the words we are looking up thanks to mobile tools. It works well to quicken the process of learning vocabulary (S7).

Learning is More Fun

As a tech-savvy generation, many individuals expressed that supplementing traditional face-to-face lessons with technological devices such as smartphones or tablets could make the learning experience more enjoyable. Additionally, they noted that relying solely on in-person instruction to learn new vocabulary could be tedious, whereas utilizing mobile devices to learn on the go added an element of excitement and flexibility.

Being a technologically savvy generation, we find that learning vocabulary online is much more enjoyable. Furthermore, it becomes more enduring when we reinforce it through in-person instruction (S15).

Students have never been interested in learning vocabulary in a foreign language through traditional methods because they find it boring. Lying in bed after a long day and engaging in gamified vocabulary exercises on our smartphones is easier and more enjoyable (S5).

Learning is Easier

In the App Store and Google Play Store, numerous apps are concentrating on teaching language skills, particularly vocabulary skills, and students can reach them without time or place restrictions. Students stated that they could easily learn new words by using these apps or useful websites. That is, students now can access resources online that aid them in their extensive learning process, greatly simplifying what used to be a complex process.

I believe that mobile devices have a significant impact on education because I can memorize words from my phone at any time, which is very convenient (S10).

Nowadays, almost everyone owns a technological device, and accessing the internet is not a difficult task. No more attempting to learn words you do not know by using a pen and paper (S5).

Numerous apps support and ease language learning, thanks to technology (S11).

These days, technology permeates every part of our lives. Learning a language has been simpler as a result of mobile devices (S14).

Learning is Cheaper

Students revealed that they could access a greater variety of resources without having to pay any fees; therefore, they could ultimately save money. Since they previously often had difficulty getting printed resources due to high costs, students could now greatly benefit from this feature of technology. In contrast to the numerous expensive paper sources they previously had to use, they now have apps or PDFs, making learning less expensive.

This is a great thing for us students because, in this day and age of expensive foreign language resources, we have a lot of options with online applications rather than having to buy multiple books (S2).

Discussion

Besides discussing the results of the study, this section presents a comparison of the results with previous research, highlighting both the similarities and differences. Analysis of the impact of BML on students' vocabulary development revealed that,

following the study, the vocabulary knowledge of the students in the experimental group increased noticeably in comparison to the control group. It was detected that after the study of 14 weeks, the mean score of the experimental group grew by 16.86 points in terms of the difference between the results of the pre-and post-test, but the average score for the control group only enhanced by 3.10 points. Since there was a significant distinction between the two groups in the independent t-test findings ($t = 3,749$, $p<0.05$), it can be observed that the experimental group greatly benefited from the study. Additionally, it is notable to go over and compare the pre-test and post-test score distributions of the students in the control and experimental groups to get a clear picture of the effect of BML. When the increase analysis of the minimum scores obtained from the pre-and post-tests was practiced, only a 6-point increase was observed in the control group, compared to a 25-point increase in the experimental group, depicting the efficacy of vocabulary learning with the BML method compared to face-to-face education. Furthermore, the standard deviations of the groups' pretest and post-test results must be examined to conduct a thorough analysis of the study's impact. The standard deviation value is the one that shows how much the results deviate from the mean. The pre-test results showed that the standard deviation of the experimental group was higher than that of the control group, which means that compared to the experimental group, the vocabulary levels of the students in the control group are closer. The post-test, however, does not reveal this similarity because the levels of the experimental group participants converged (+1.657) while the disparity between control group members widened (-1.590).

All in all, contrary to the results of the studies by Alshwiah (2009), who obtained a statistically significant difference between the two groups in terms of proficiency, and Tosun, (2015) who found that face-to-face instruction improved students' vocabulary proficiency more than the suggested blended learning technique, the present study discovered that vocabulary learning in an educational programme conducted with blended mobile learning is quite effective compared to only face-to-face education, which is also compatible with many other studies (Kurucova et al., 2018; Alipour, 2020; Khazaei and Dastjerdi, 2011; Zumor et al., 2013; Ebadi and Ghuchi, 2018; Ono and Ishihara, 2012). It is worth noting that the significant increase in the post-test scores of the experimental group can be attributed to various factors, including the influence of mobile devices on ubiquitous learning. The use of mobile devices as a learning tool can provide learners with unfettered access to educational resources and facilitate learning outside the traditional classroom environment. Furthermore, mobile devices can enhance project-based learning by providing learners with wider and more enjoyable collaborative study areas which may have contributed to the success of the experimental group in achieving higher post-test scores as well.

In the second research question, the students in the experimental group were asked about the advantages of learning vocabulary with blended mobile learning, and the thematic coding was done according to the students' responses. Based on the feedback obtained from EFL students, it can be inferred that blended mobile learning offers a significant advantage in terms of permanent learning. This finding is consistent with the assertion made by Wenyuan (2017) and Khazaei and Dastjerdi (2011) and is in contrast to the observation of Saltan (2016), who posited that blended learning is less effective in terms of vocabulary retention compared to traditional face-to-face

instruction. Faster vocabulary learning is another benefit of BML according to the study's results, which is consistent with findings from studies by Delialioglu and Yildirim (2008), Ebadi and Ghuchi (2018), and Saltan (2016). Students' comments that vocabulary learning in a blended environment is enjoyable also align with the findings of Alipour's (2020) study, which thoroughly analyzed the data and came to the conclusion that students value and need technology because it makes learning more enjoyable, proposing the reason why blended and online learning groups outperform in-person instruction. Based on the feedback provided by the students, it can be inferred that one of the key advantages of BML is its potential to facilitate vocabulary acquisition, as highlighted by Saltan's (2016) concept of accessibility in language learning. Similarly, Ebadi and Ghuchi's (2018) research indicates that blended learning offers advantages like individualized instruction, time flexibility, and a well-organized layout. Finally, a few participants of this study mentioned the money-saving aspects of vocabulary learning in BML. Delialioglu and Yildirim (2008) noted that although the mean scores for the blended and traditional courses did not differ significantly, the blended learning approach worked well because it reduced class time by approximately 66% and had an indirect impact on instructional costs, which is a close result with the current study. Briefly, the findings of the student feedback revealed that the integration of mobile devices with traditional face-to-face instruction has resulted in several noteworthy benefits concerning vocabulary acquisition. Specifically, in the point of vocabulary development, blended mobile learning has been noted to enhance memorability, speed up the learning process, increase enjoyment, improve accessibility, and reduce costs, which makes it a promising pedagogical strategy.

Conclusion

The present study aimed to investigate the effectiveness of blended mobile learning (BML) in enhancing the vocabulary knowledge of students in preparatory classes, as well as their perception of the benefits of learning vocabulary via BML. The study revealed two significant findings. Firstly, BML was found to be highly effective in assisting EFL learners in developing their vocabulary, when compared to face-to-face instruction alone. Secondly, EFL students exhibited a positive attitude towards BML, citing it as a more memorable, faster, enjoyable, and cost-effective method of learning vocabulary, compared to traditional methods. This study adds to the body of research showing that using mobile devices to supplement in-person instruction helps foreign language learners to have a substantial vocabulary boost and enables ubiquitous learning and project-based learning.

Given that the younger generation devotes a substantial amount of their leisure time to mobile devices, educators must consider incorporating mobile tools into the curriculum to maximize learning outcomes. By leveraging blended mobile learning, students can collaborate outside the classroom to improve their vocabulary, thereby promoting a student-centered learning environment. Furthermore, the benefits of mobile devices can potentially alleviate teachers' workload in the classroom. In light of these findings, curriculum organizers and instructors should be mindful of the potential benefits of blended mobile learning and integrate such tools into their lesson plans accordingly.

Including only the advantages of BML and not focusing on the negative side of BML is a limitation of this study. The reason for that is participants' not revealing enough data about the negative side of the BML. The reason for that may be its being a very new method that students could not fully be aware of any negativity, or they thought there were no disadvantages to it. As its application increases, some other studies can focus on the negative side of the BML as well, comparing it to face-to-face learning.

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Statement of Responsibility

The authors have the same responsibility in writing any part of the article.

Conflicts of Interest

The authors have no conflict of interest to disclose.

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Appendix

Overview of the Study

<table>
<tr><th colspan="4">OVERVIEW OF THE STUDY</th></tr>
<tr><th>Vocabulary Teaching Method (5R)</th><th>Background Theory</th><th>Schedule of The Study</th><th>Technology Integration Method (SAMR)</th></tr>
<tr><td>Receiving
Recognizing</td><td rowspan="3">Ubiquitous Learning

Students could study and answer the questions anywhere and anytime without time and place restrictions.</td><td>First Four Weeks
During the first four weeks, a reading passage for each week was shared with students. Those reading passages were including different activities like comprehension or fill-in-the-blank questions. Also, for each week, an activity prepared via Wordwall application was shared with students via Google Classroom. Students' answers were discussed in the class.</td><td>SUBSTITUTION

Technology acts as a substitute, with no functional change.

Instead of the paper worksheets that can be given in the lesson, the students worked on the reading texts shared in PDFs over Google Classroom.</td></tr>
<tr><td>Retaining</td><td>Second Four Weeks
For each week, a reading passage with blanks was shared with the students via Google Classroom. The students were asked to find different forms of the highlighted words from the dictionary and write them down. The answers of the students about the different forms of words (parts of speech) were discussed in class.</td><td rowspan="2">AUGMENTATION

Technology acts as a substitute, with small functional improvement

Students used an online dictionary to check the appropriate meaning of the word according to context. They checked and learned the type of words.</td></tr>
<tr><td>Retrieving</td><td>Week 9
The students read the passage shared on Google Classroom in detail because there were questions about the passage. They also found the meanings of the highlighted words from the Oxford Learners dictionary and shared them on the virtual class on Google Classroom.</td></tr>
<tr><td rowspan="4">Recycling</td><td rowspan="4">Project-based Learning
Students discovered social or environmental problems and wrote a paragraph with solutions to these problems. Students collaborated with each other and corrected their paragraphs. Then they decorated this paragraph with pictures, made a slideshow, and saved this slide in mp4 format. They shared the video with the world and official authorities on their own YouTube channels.</td><td>Week 10
Students used the highlighted words in the passage in an sample sentence and shared their sentences on the virtual class. The classmates discussed these sentences by correcting or commenting.</td><td rowspan="2">MODIFICATION

Technology allows a significant task design.

Using the Google Classroom application provided an environment to the students for discussion and collaboration. With the help of their classmates, they could see their mistakes and corrected them.</td></tr>
<tr><td>Weeks 11 and 12
Students wrote a paragraph about an environmental or social problem and shared it with their friends on Google Classroom. The students evaluated the written paragraphs and made comments.</td></tr>
<tr><td>Week 13
By decorating these paragraphs with pictures. Students turned them into slideshows via Google Slide application.</td><td rowspan="2">REDEFINITION

Technology allows an inconceivable task design that cannot be done with traditional learning.

Sharing the videos in which they found solutions to social problems on their YouTube channels and ensuring that these solutions reach the necessary authorities and the world is an impossible thing to be done with traditional methods.</td></tr>
<tr><td>The last week
Students recorded the slide they prepared as mp4 by adding a background music, and posted it on their YouTube channels.</td></tr>
</table>