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The Effect of Mobile Technology on Vocabulary Development of English Language Learners: A Case Study of A2 Adult Learners

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Abstract: In today's digital age, technology can provide many opportunities for language learners, and the widespread use of mobile devices may be a viable solution to their challenges. This study aimed to determine the effectiveness of Mobile Assisted Vocabulary Application (MAVA) in developing language learners' vocabulary knowledge and their attitudes towards the vocabulary extension activities. To reach these aims a quasi-experimental study was followed with the data collected through pre-post tests and semi-structured interviews. The researcher designed vocabulary extension activities in two distinct formats to allow learners to practice the newly acquired vocabulary items as extracurricular tasks. The experimental group completed vocabulary extension activities on their mobile devices while the control group completed similar tasks using pen and paper. Pre- and post-tests were administered to both groups to assess their vocabulary knowledge before and after the intervention. The results indicated that there was no significant difference between the two groups in terms of achievement. The students from both groups exhibited relatively higher results on the post-test. Upon analysing the individual subsections of the pre-test and post-test, it became apparent that

students in the experimental group displayed relatively higher scores in the reading and pronunciation subsections of the post-test, whereas the control group exhibited higher scores only in the reading subsection. It can be posited that the MAVA had a more positive effect on the students' abilities to pronounce them correctly, in contrast to the effects observed with vocabulary worksheets. A semi-structured interview was conducted to determine the attitudes of the learners in experimental group towards MAVA. Qualitative data from the interview suggested that MAVA had superior features by allowing the learners to use it at their convenience and ubiquitously acquire new vocabulary items.

Keywords: Mobile-Assisted Language Learning (MALL), vocabulary learning, vocabulary knowledge, vocabulary extension activity

Introduction

Language serves as a fundamental tool not only for communication but also for individuals to express their thoughts and emotions to others. By this reason, vocabulary instruction is crucial in foreign language teaching and learning (Ying, 2022). As one of the biggest challenges for English learners is learning new vocabulary items, mobile-assisted language learning can provide the joy and entertainment to the process. Given that, mobile devices have primarily been viewed as stimulative and motivational tools rather than content-carrying digital tools in educational environment (Gürkan, 2018).

In Turkey, foreign language learners frequently encounter limited exposure to the foreign language in everyday situations, as Turkish is the sole official language used within the country's borders. As a result, learners have limited sources to learn English and struggle to internalise new vocabularies. To overcome this lack of exposure to authentic language in their everyday lives, students must utilise a variety of resources to learn new vocabulary items. According to Lee (2019), students in mono-lingual counties can benefit from already existing technologies to overcome certain unfavourable language learning conditions such as limited opportunities of learning and using English in their daily lives. The advent of mobile devices has provided language learners with wide range of language input. Thus, it gains importance to find out about user experience and learners' needs when using mobile-assisted vocabulary applications.

Presently, learners are eager to acquire new skills, create content, and share it using technological tools, thanks to their status as digital natives (Bozna & Yuzer, 2020). Therefore, the use of technological tools appears to be one of the best options for English language learners to reduce the time required to learn new vocabulary items and acquire new words more permanently. According to Hu (2011), many learners are motivated and excited to use mobile devices. For students, these devices provide more enjoyable and varied ways to learn new vocabularies compared to long word lists and piles of flashcards (Li & Hafner, 2022). Course books merely offer contextual examples for new vocabulary and extensive lists. Additionally, classroom activities often do not meet the expectations of the learners when it comes to acquiring new vocabulary. Worksheets and other extensive activities are provided to support vocabulary learning. However, students may ignore these activities as they may not be convenient to carry around, especially during travel or breaks at school. On the other hand, these activities can be completed on a mobile device at the learner's convenience. Arvanitis and Krystalli (2021) highlighted that mobile devices enable innovative teaching practices that are not possible with other learning tools. They also added that mobile devices provide teachers and learners with the opportunity to access educational resources anytime and anywhere, and to participate in new learning situations in various spaces, not just in a traditional classroom setting. This study attempted to fill the gap and enrich the data

related to mobile tools to facilitate vocabulary learning and to examine the attitudes of the language learners.

Research Problem

In language acquisition, mastering vocabulary is pivotal; however, within the conventional language classroom setting, learners often rely on limited resources like vocabulary lists found in course books and supplementary vocabulary materials (Ying, 2022). Not only the sources for words but also the time devoted to learning is very limited in a language class (Alemi et al., 2012). Therefore, the language learners should be supported with some other out-of-classroom activities.

Conversely, research on the impact of repetition on vocabulary acquisition indicates varying amounts of repetition required to grasp different facets of word comprehension. Webb's (2007) study states that ten-time encounter with an unknown word in context may cause sizeable learning gains; however, to develop full knowledge of a word more than ten repetitions may be needed. Thus, the learners should be supported with well-designed vocabulary extension activities in order to increase the repetition of facing with newly taught words.

All in all, learning vocabulary there is a demanding task for every foreign language learner. The main reason for the difficulty in learning vocabulary is the lack of exposure in daily life of a language learner. Moreover, EFL learners have limited sources and limited time for vocabulary learning in language classes. This causes inadequate number of repetition for internalising the new vocabulary items. Therefore, learners require some beneficial and practical ways to learn new words.

Research Focus

As technology continues to evolve, mastering English is increasingly essential to stay abreast of the swiftly evolving digital landscape and actively contribute to it. While this digital transformation necessitates English language proficiency, it also provides a wide range of tools, mobile devices, and highly connected communication facilities. At this point, it is necessary to analyse the impact of technology on the language learning process in order to evaluate its true value objectively. It is important to determine whether technological platforms facilitate the process of learning vocabulary and accelerate the digital transformation of language learning training. Therefore, individuals can receive more effective language education enriched by technological advances. This study offered insights into the use of mobile technologies for vocabulary acquisition by presenting the opinions of real learners based on their personal experiences.

Research Aim and Research Questions

The objective of this study was to determine the most effective forms of vocabulary extension activities for acquiring new vocabulary items out of the classroom. To achieve this, the use of vocabulary worksheets and the Mobile Assisted Vocabulary Application (MAVA) were compared in terms of students' vocabulary achievement and attitudes towards the two forms of vocabulary practice including newly taught vocabulary items. The study compared the effectiveness of two vocabulary extension activities, MAVA and vocabulary worksheets, as homework after language classes. The study aimed to determine which forms of activity are more effective in terms of students' vocabulary achievement and to assess learners' attitudes towards the two activities.

Furthermore, this study contributed to gain insights into research problems by reflecting the attitudes of real learners towards the use of mobile devices in their learning process. This leads to new perspectives for considering the positive and negative feedback of real learners regarding their

experience with mobile devices. To achieve the objectives, the following research questions were answered.

1) Are there any significant differences in vocabulary knowledge of the experimental group using MAVA and the control group using vocabulary extension worksheets?

2) What are the attitudes and opinions of the participants related to MAVA?

Literature Review

Mobile Learning

One undeniable effect of developing technology is that it enables people to use mobile devices extensively (Fojtik, 2017). Mobile devices include various equipment that can be easily carried, such as laptop computers, tablet computers, personal digital assistants, and smartphones, which have become an indispensable part of everyday lives (Becker et al., 2018). Each device has its own facilities and constraints when being used (Özer & Akay, 2023). These devices share the common function of enabling active internet use. The core concept in mobile learning is considered that the electronic devices are carried easily so they support the mobility in everyday life of the learners (Kukulska-Hulme, 2020). Mobile-assisted language learning (MALL) represents one of the most popular subsets of mobile learning which has emerged from the changing and developing technology landscape (Elaish et al., 2019). The advent of wireless technology has enabled the easy portability of personal computers, which has in turn facilitated the ability to learn at any time and in any location. MALL differs from computer-assisted language learning in its use of personal, portable devices that enable new ways of learning, emphasising the continuity or spontaneity of access and interaction across different contexts of use (Kukulska-Hulme & Shield, 2008). The most important point differentiate mobile learning from the others is not only supporting the learning with the help of web-based mobile devices but also providing the opportunity for the learners to learn whenever and wherever they want to (Mahmood, 2019).

Recent studies on the effect of MALL in developing vocabulary knowledge

Chen (2013) defines mobile assisted language learning (MALL) as the formal or informal learning of a foreign language with the assistance of mobile devices. As expected, mobile learning provides personalised, enjoyable and supplementary learning opportunities, so there are variable studies related to vocabulary learning via out-of-class activities. Earlier studies mostly included SMS researches such as the effect of using SMS in vocabulary teaching (Derakhshan, 2011; Kim, 2011), SMS vocabulary learning and its effect on reading comprehension (Alemi & Lari, 2012), the comparison of SMS delivery and e-mail delivery in vocabulary teaching (Katz, 2014). Whereas the findings related to the effect of SMS technology on the vocabulary achievement varied, the attitude the participants had towards that technology was found to be positive.

Another type of MALL studies focus on the reading skill in language learning. Kılıçkaya and Krajka (2010) use ten reading passages to teach vocabulary using a glossing program online and traditional paper-based way. They conducted an experimental study and used pre- post- and delayed post-test to compare students' achievement between the two groups. The results showed that the students who used online glossing program to read the passages and learn the words from context significantly outperformed than the traditionally trained group in post and delayed post-test. A similar study was conducted in Iranian settings by Gorjian (2011). The researcher prepared 12 expository passages and made the first group read them on papers and only use dictionaries and offered the other group web-based texts including a variety of glosses or annotations for words in the form of text, graphics, video and sound. The students only read for comprehension of the text and learned the words not on purpose

only peripherally. According to the results, the Web-Based Language learning approach had a significant effect on the retention of vocabularies in the short term. More recently, Valizadeh (2022) conducted a similar study to find out the effect of mobile-assisted reading in learners' vocabulary knowledge. The findings supported that the easy access to the texts via the digital tools contributed to vocabulary knowledge of the learners in resulting in obtaining significantly better results.

Studies on vocabulary teaching via technology generally focus on the difference of vocabulary gains between traditional vocabulary teaching based on paper and pen and vocabulary instruction using technological devices. Chen et al. (2020) reviewed 80 experimental and quasi-experimental studies and their findings demonstrated that the use of mobile devices had a greater effect on language learning than conventional methods. A comparison study about the medium used for learning vocabulary was conducted to the students in an academic English class. It was common to find some research studies conducted to compare two ways of teaching which were mobile phones and flash cards. Rahmani et al. (2022) demonstrated that the use of digital word cards significantly improved the knowledge of high-frequency words in short- and long-term periods. A similar study was accomplished by Li and Hafner (2022) in order to demonstrate the effect of mobile-based word cards in two word knowledge components: receptive knowledge of form-meaning connections and productive knowledge of collocations. The study showed that vocabulary learning was improved by both mobile and paper-based word card tools as well. Another study including digital flash cards (Anki App) was conducted by Hanson and Brown (2020) in order to define the efficiency of spaced-repetition on the long-term retention. High-usage students benefited from the app. In addition, the study found a positive correlation between the numbers of days spent studying with Anki and the level of Spanish attained, even after controlling for baseline abilities, motivation, self-efficacy, and epistemological beliefs at the beginning and end of the semester. Similar findings in other studies (Xodabande et. al., 2022; Zakian et al., 2022) supported that the use of digital flashcards contributed to the achievement in vocabulary learning.

Most SMS studies lack of interaction or facilities supporting the self-directed learning. Likewise, digital flashcards could move beyond simple drilling activities. Wong and Looi (2010) emphasised the gradual shift in the focus of MALL research from content based (delivery of learning content through mobile devices) to design oriented (authentic and /or social mobile learning activities) studies, one prominent study of which focused on the effects of smart phone application on vocabulary learning was implemented by Wu (2014; 2015). In her study, a smart phone app including Unknown words function, which was a word list students could create to look at afterwards, and Sample Test function which produces vocabulary tests to check the learning of the students were followed and the results reflected that smart phone applications facilitate vocabulary learning in a better way. In addition, Lee (2019) emphasised that the quality in informal digital learning of English (IDLE) benefited better than quantity in IDLE. In the research article, it was found that Frequent engagement in IDLE activities did not necessarily ensure successful acquisition of L2 vocabulary. It also claimed that it was essential to be exposed to both form- and meaning- focused language learning to achieve L2 vocabulary learning.

Recently it is possible to use some web-based, self-directed content development websites in order to develop students' vocabulary knowledge. One of well-known websites is Kahoot. Reynolds and Taylor (2020) investigated the impact of Kahoot on students' vocabulary knowledge. The findings indicated a marked increase in vocabulary knowledge whereas there was no significant difference between the control group and experimental group results.

Most of the recent study also investigates the learners' attitudes toward mobile assisted vocabulary learning. The findings reveal that using mobile assisted language learning in vocabulary learning is highly effective in terms of enhancing lexical competence (Sabiri & Shah, 2023), self-regularity capacity (Lei et al., 2022), sustainable self-directed learning experience (Jeong, 2022).

Considering the gradual change and the flexibility of the developing technologies, the present study aimed to find out the effect of a web-based application providing a wide variety of activity choices in the vocabulary instruction. The present study aimed to investigate the effect of MAVA on students' vocabulary acquisition comparing with the effect of vocabulary extension worksheets on students' achievement on vocabulary acquisition in terms of gains in orthographic, pronunciation and meaning features of the target vocabulary. It also aimed to find out the attitudes of the beginner learners towards mobile assisted vocabulary learning process.

Materials and Methods

The study aimed to compare the effects of two different types of vocabulary extension activities on learners' vocabulary acquisition. The mixed methodology to research was utilised in this study so as to define the possible effect of MAVA on vocabulary acquisition of A2 students and describe learners' attitudes towards the use of MAVA. The study employed a quasi-experimental research design with a comparison group. Participants were recruited using convenience sampling. The experimental group practices newly taught vocabulary using MAVA after class while the control group completes vocabulary extension worksheets as out-of-classroom activities. Prior to implementation, all participants completed a vocabulary pre-test to assess their knowledge. Assignments were given over a 12-week period. At the end of the study, a vocabulary post-test was conducted to measure the extent of vocabulary acquisition. At the end of the study, participants from both groups underwent a semi-structured interview to express their thoughts and perceptions regarding both types of vocabulary extension activities.

Sample and Participants

This study involved the participation of 29 students from various departments at a state university, ranging in age from 18 to 25 and at an A2 level of English proficiency. Convenience sampling was used to recruit the participants. Due to the absence of procedures for randomly allocating research subjects to experimental conditions, the experimental group comprised 18 students, 10 of whom were female and 8 of whom were male. The control group contained 11 students, 9 of whom were female and 2 of whom were male. The participants were A2 level English language learners and they attended the general English Course at the weekends during 12-week period. The students in the experimental group used MAVA to expand their vocabulary learned during the lessons. The students in the control group completed vocabulary extension worksheets, which had been redesigned by the researcher.

Instruments and Procedures

During the study, the experimental group learned new vocabulary including A1 level words by using MAVA as an out-of-class activity while the control group learn the same vocabulary items by doing vocabulary worksheets as assignments. The intervention takes a 12-week period in an academic term. Before the intervention, a pre-test was taken by the members of the two groups. At the end of the term, the two groups took a post-test to define their vocabulary gains. After intervention, seven participants in the experimental group were interviewed about the vocabulary application, namely MAVA.

The study utilised two identical vocabulary achievement tests, one as a pre-test to determine participants' vocabulary achievement and the other as a post-test to measure possible vocabulary knowledge gain after implementation. The use of identical pre-test and post-test was to eliminate the memory factor and ensure thorough coverage of the target A2 level vocabulary list. For the current study, identical pre-test and post-test were chosen due to the need for comparability. As Mackey and Gass (2015) suggest, a word frequency index can be consulted to ensure comparability of tests. The test items were written based on their frequency of occurrence in the course book to ensure comparability.

Another way to reduce the threat of test bias is to test all sentences on a comparable group of individuals to ensure that no test items are more difficult than others. If some items are more challenging, it's advisable to include a similar proportion of difficult and easy items in each test. The test items were adjusted for item difficulty after pilot testing, and there was satisfactory equivalence between the two identical tests.

Two vocabulary tests were used to obtain quantitative data while an interview form was used to investigate the participants' attitudes towards MAVA. After implementation, seven participants from the experimental group were interviewed to define their perceptions about MAVA.

Mobile Assisted Vocabulary Application (MAVA)

This application was designed to offer various activities to practice new vocabulary. It can be accessed through a web browser on either a desktop computer or a mobile phone. The researcher defined the content of the application, which was based A1 vocabulary list on English Vocabulary Profile Corpus. The application included eight different types of activities. The course book was used to determine which words and phrases will be taught in each unit. The word list was created using the course book. Once the word list was defined, data were collected, including the word's meaning and a sample sentence containing the target word, using English Vocabulary Profile corpus. Photos were downloaded from Google Images to represent the meaning of the words or phrases and obtained word audios from text-to-speech websites.

MAVA contained a teaching part for each group of vocabulary, which includes the word itself, its definition, a representative photo and its pronunciation. After this teaching part, eight different types of activities take place to practice the pronunciation, spelling and meaning of the word.

Pre- and Post-Vocabulary Tests

Two identical vocabulary tests were prepared and examined by the experts and found valid. Cronbach- α is computed to find out how reliable of the results of the pre-test and post-test. The Cronbach's α reliability coefficient for the pre-test was determined to be 0.90, while for the post-test it was calculated to be 0.92. It was stated that the results from the tests have high reliability due to the fact that the co-efficiencies of both pre-test and post-test are higher than 0,70.

Two identical vocabulary tests, one of which was used as a pre-test and the other one was used as a post-test, were applied to compare and contrast the vocabulary knowledge of the two groups before and after the implementation. The tests were prepared to assess the knowledge of A2 vocabulary knowledge of the students and try to evaluate the target vocabulary list in the study (see appendix 4 for the target vocabulary list). Administration procedures including pace and time control were determined after a pilot study. Vocabulary achievement tests contain 4 parts called receptive oral, receptive written, productive oral and productive written parts. Both tests contain 102 items at the very beginning. After tests were piloted for item development, items with insufficient item facility, item discrimination and distractor efficiency indices were modified. After item analyses, there were 58 items. First 10 items are related to recognition of what is listened. There are 16 items to evaluate the knowledge of how to write the words. 26 items aim to evaluate the word meaning. The last 6 items were for evaluation of the pronunciation of the words. Table 1 indicates the question distribution in the achievement pre- and post-tests.

Table 1

Different Aspects of Vocabulary and their Weigh in Achievement Tests

	Receptive Oral	Receptive Written	Productive Written	Productive Oral
Pre-test	1-10 items	20.-34. 42.-52. items	11.-19. 35.-41. items	53.-58.items
Post-test	1-10 items	20.-34. 42.-52. items	11.-19. 35.-41. items	53.-58.items
Total Points	10 items x 2,5 (25 pts)	26 items x 1pt (26 pts)	9 items x 2 7items x 1 (25 pts)	6 items x 4pts (24 pts)

Data Analysis

When homogeneity of variances, which is one of the assumptions of hypothesis testing (T-test), were investigated, all P values were seen as more than 0,05 and H0 hypothesis, which is a stated assumption that there is no difference in parameters for two or more populations, was accepted. This is evidence that variations were homogeneous; thus, the assumption was proved.

Shapiro-Wilk test was used in order to investigate the normality, which is another stated assumption of hypothesis testing. Shapiro-Wilk test was used in the study because it is a test which is used in the studies whose sample size is under 50. When this test was conducted in the study, it is observed that both experimental and control groups' scores in pre-test listening and post-test pronunciation, experimental group's scores in post-test listening and writing and control group's scores in pre-test reading were not ranged normally. Due to the fact that p value is under 0, 05 in the aforementioned tests and sections, and H1 hypothesis, which is a stated assumption that the data is not suitable for normal distribution, is accepted. Except from the aforementioned tests and sections, distribution normality assumption is proved in the other sections.

Due to the fact that normality assumption is proved for the most sections of the tests and especially homogeneity of variations is proved for all the groups, independent group t-test was conducted to examine the difference between the experimental and control groups and paired t-test was conducted to examine the difference between pre-test and post-test results.

The content analysis was used by the researcher in order to analyse the qualitative data from interviews. The responses of the participants were categorized according to the key words and common themes. The responses were then commented on and a general conclusion was drawn.

Results

Quantitative Data

In this section the results of the experimental and control groups are examined and discussed in relation to research question 1. The pre-test and post-test results were examined in detail in order to find the answer to the research question below. To do this, the overall test scores were compared and contrasted to see if there was a significant difference between the scores of the experimental group and the control group.

1) Are there any significant differences in vocabulary knowledge of the experimental group using MAVA and the control group using vocabulary extension worksheets?

Table 2

Analysis of the Whole Tests' Results

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	(2-Mean Difference	Std. Difference	Error 95% Confidence Interval of the Difference	
									Lower	Upper
PRE- TEST	Equal variances assumed	1,730	,200	,298	26	,768	2,06111	6,90664	-12,13570	16,25792
	Equal variances not assumed			,326	23,733	,747	2,06111	6,32227	-10,99519	15,11741
POST- TEST	Equal variances assumed	,197	,661	,140	26	,890	1,04444	7,46664	-14,30346	16,39235
	Equal variances not assumed			,132	15,876	,897	1,04444	7,90361	-15,72108	17,80997

When the table 2 is examined, The Levene's Test for equality of variances shows that p value is found as 0,768 for pre-test scores. It could be said that there is not a significant difference between the pre-test scores of experimental group and control group before the experiment started. P value for the post test is found as 0,890 and H1 hypothesis is rejected because this value is above 0,05. Consequently, it is concluded that there is not a significant difference between the post-test scores of the both groups after the experiment.

Table 3

The Analysis of the Experimental Group Scores From Pre-test and Post Test

Paired Samples Test										
			Paired Differences							
					95% Confidence Interval of the Difference					
Group No			Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. 2-tailed
Experimental group	Pair 1	Pre-Test Post-Test	-8,33333	17,08026	4,02586	-16,827	,16048	-2,07	17	,054
	Pair 2	Pre-Test Receptive Oral Post-Test Receptive Oral	-3,33333	6,58653	1,55246	-6,6087	-,05793	-2,14	17	,046

Pair 3	Pre-Test Productive Written Post-Test Productive Written	-1,55556	4,52733	1,06710	-3,8060	,69583	-1,45	17	,163
Pair 4	Pre-Test Receptive Written Post-Test Receptive Written	-4,55556	5,34924	1,26083	-7,2157	-1,8954	-3,61	17	,002
Pair 5	Pre-Test Productive Oral Post-Test Productive Oral	1,11111	9,48614	2,23591	-3,6062	5,82846	,497	17	,626

Upon examination of Table 3, it becomes evident that there is a notable discrepancy between the scores obtained in the receptive oral and receptive written sections of the pre-test and post-test. Moreover, the mean scores of the experimental group in the receptive oral section increased by 3.33 on average. Therefore, it can be concluded that MAVA is an effective method for improving listening skills. The average increase in the mean scores of the experimental group in the receptive written section was 4.56 points. Consequently, it can be asserted that MAVA has a positive effect on improving reading skills as well.

Table 4

Analysis of the Control Group Scores from Pre-test and Post Test

Paired Samples Test										
Paired Differences										
95% Confidence Interval of the Difference										
Group No		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. 2-tailed	
Control group	Pair 1	Pre-Test Post-Test	-9,35000	15,95140	5,04428	-20,7609	2,06095	-1,85	9	,097
	Pair 2	Pre-Test Receptive Oral Post-Test Receptive Oral	,75000	4,72141	1,49304	-2,62749	4,12749	,502	9	,627
	Pair 3	Pre-Test Productive Written Post-Test Productive Written	-2,20000	4,61399	1,45907	-5,50065	1,10065	-1,508	9	,166
	Pair 4	Pre-Test Receptive Written Post-Test	-4,70000	5,22919	1,65362	-8,44074	-,95926	-2,842	9	,019

	Receptive Written								
Pair 5	Pre-Test								
	Productive								
	Oral	-3,20000	10,11929	3,20000	10,43890	4,03890	1,000	9	,343
	Post-Test								
	Productive								
	Oral								

Table 4 indicates a significant difference between the scores obtained by the control group in the pre-test and post-test for the receptive written section. The average score for the control group in the receptive written section increased by 4.70 points. Consequently, the traditional approach to teaching and distributing worksheets as an assignment is an effective method for improving reading skills.

It can be posited that both vocabulary worksheets and the MAVA have a positive impact on students' academic performance. Upon analysis of the pre-test and post-test sections individually, it becomes evident that students in the experimental group exhibited higher scores in the reading and pronunciation sections of the post-test. It can be concluded that the MAVA has a more pronounced effect on students' abilities to recognize words and pronounce them correctly, in contrast to the vocabulary worksheets.

Qualitative Data

This section presents the data obtained from interviews conducted with participants in the study. Two interview forms were prepared for the experimental and control groups. The first form contained twelve questions related to MAVA, while the second contained eight questions related to vocabulary extension worksheets. The researcher interviewed seven participants from the experimental group recording their answers using a voice recorder. The researcher transcribed the interviews and analysed the data using content analysis. The data was coded under three themes and enhanced the inter ratter reliability with expert opinions.

2) What are the attitudes and opinions of the students related to the mobile assisted vocabulary application and the vocabulary worksheets for vocabulary development?

Table 5

Participants' Perspectives about MAVA

Participants' experiences	Frequency	"I had used it very often at the very beginning. Now I do not use so often because my laptop is broken." S1 "After you had given us the code for entrance, I used it very often almost every day. However, after that, when the lessons at the department got more difficult and I had to study them more, I have never used for a month." S6
	Completion	"I completed the parts, I mean, one or two groups even though I could not complete the whole unit." S3 "I tried to do every week but the last several weeks... during the midterm exams, I cannot do but I try to use the app whenever I find opportunity." S3
	Convenience	"mostly at home or on the bus" S2

		<i>"at the dormitory in the evenings"</i>S1 <i>"Generally at work during the break time... I do activities such as matching and choosing correct words and at home I practice pronunciation."</i> S4 <i>"(I use it)during lunch time at school and at the dormitory when I take a break from studying."</i> S6
Participants' opinions	Efficiency	<i>"very efficient because the words are memorable for me after I study on the application."</i> S6 <i>"Well, for me it is very good. Well, if it is done regularly, its efficiency can be more."</i> S1 <i>"Certainly I thought it is efficient."</i> S4
	Favorite Activities on MAVA	<i>"More correctly it defines word. We find which word it is by listening to the options. I loved it most but I do not know why. (Read and find by listening activity)"</i> S1 <i>"For example, you listen to (the word) you write there accordingly. You write there by choosing the letters. (Listen and write activity)"</i>S3 <i>"My problem is saying I mean pronunciation, word pronunciation. Therefore, I like pronunciation part. (Look and pronounce activity)"</i> S5
	Challenging Activities on MAVA	<i>"(I had difficulties) in pronunciation part. The application sometimes gets what I said and sometimes not. For example, one word could be in two different activities. In one of the activity the device gets the voice but in another it does not."</i>S2 <i>"Pronunciation. Maybe the device does not get the voice. It occurs because of the phone or because of me. This was a big problem. When I pronounced the word correctly the problem occurred for instance."</i>S3
	Immediate Feedback	<i>"For me, it is beneficial because some (web) sites generally ... (provide) this at the end. Let's say, you did some questions correct and some others wrong ... however, generally I do not notice my right and wrong answers because I do not know which answers are correct and which ones are wrong."</i>S4 <i>"Of course it is a good thing. It is better to learn immediately that you made mistake. If the assessment is given last, it is quite boring. To see a lot of mistakes... Immediate feedback is better."</i>S5 <i>"Certainly, according to the immediate feedback, I search and learn the correct answer."</i>S7
Suggestions for MAVA	Suggested Facilities	<i>"Now, I can give such an advice as a software expert. In order to integrate the people in the learning process, it could be better if the application gave opportunity to the users to save the words they have difficulty in learning and to revise them in</i>

		<i>certain intervals. The photos are quite good. It is good to match the photos with the words but it can be beneficial to match the words with some phrases.” S4</i> <i>“I mean, it would be only as an application and we could download from google play so we do not have to get online in each time.”S6</i>
	Duration	<i>“It could be a little shortened for instance. There are eight words (in the group) and there are sixty activities. It takes long time. It could be more effective if it takes shorter time.” S2</i>
	Content	<i>“It would be better if there was an activity which included sample sentences and a section which had some practices.”S7</i>

Participants reported that they used the MAVA frequently initially, but later faced limitations due to academic commitments and technical issues. Participants expressed that they could not do the activities on a regular basis. While most participants reported using MAVA primarily at home or in their dormitories, some also utilised it during breaks at work or school, as well as while traveling on the bus. The availability of MAVA through smartphones allows participants to use their leisure time more efficiently, anytime and anywhere. The accessibility of MAVA has also increased the effectiveness of vocabulary learning.

Participants find MAVA very effective. There are eight different activities in the MAVA and therefore the answers vary in terms of which activity is preferred. Participants tend to enjoy activities where they can produce correct answers themselves, such as writing and pronunciation activities. When asked which activity they liked best, participants gave different answers. When asked which activity they thought was the most efficient, the answers varied too. The participants think that the activities in which they can practice listening outside the classroom are very effective. It is obvious that this type of listening activity is very effective in situations where there is not enough time in the classroom or where the students have different levels of some language skills, such as listening and speaking. Participants acknowledge the effectiveness of the immediate feedback provided by the application. They explain the effectiveness of instant feedback by giving examples from their past experiences about web-based language learning activities.

Participants' responses indicated that they preferred activities that they found challenging, as they found them more stimulating. Particularly, they expressed a preference for activities that required them to write the correct answers, rather than those that required them to choose the correct answer from a list of options. It is noteworthy that the same activity was identified as the most challenging by all participants. The learners claimed to have difficulties with the pronunciation activities. There were two reasons for this: firstly, mispronunciation due to the learners' A2 level and secondly, technical problems that occurred during the activity. When investigating the technical problems, it is assumed that the device may not have captured the learner's voice, either because of the device itself, the web browser or the noisy environment in which the learner pronounced the words.

Participants generally found MAVA useful. However, the main problem with MAVA is the inability of the device to accurately record pronunciation and occasional mismatches between photos and words. It takes longer to complete each section in MAVA because there are more words in the sections and eight types of activities. Chen et al. (2020) highlighted in their review study that the major type of learning approaches is self-directed learning in MALL studies. The responses in the present study indicated that

participants wanted to define their own needs and become an autonomous learner as well. Allowing learners to define their own content can be very effective for our education system, which aims to achieve personalized learning and foster autonomous learners. With the continuous development of technology and new systems, the convenience of smartphone applications has become a necessity for students who have become accustomed to them. MAVA is a web-based system that requires an internet connection and a web browser. Participants in this study expressed a desire to download the application and access its content offline. Finally, the participants suggested that this application needs to have an activity where they can use the words in sample sentences to make it better.

Discussion

The present study confirmed the effectiveness of mobile-assisted vocabulary learning in acquiring new vocabulary, consistent with findings from numerous previous studies (Li, 2022; Namaziandost et al. 2021; Xodabande & Atai, 2020). The present study showed that both vocabulary extensive activities contributed to vocabulary acquisition of the participants (Li & Hafner 2022; Rahmani et al., 2022). However, MAVA could be claimed to be more effective in improving participants' pronunciation (Deris & Shukor, 2019).

MAVA provides visual and auditory input to support language learners in learning concrete words with their visuals and practicing pronunciation. Deris and Shukor (2019) added the pronunciation feature of the words help learners pronounce them correctly. Klimova and Polakova's (2020) study contradicted the notion that the pronunciation feature in the mobile app was beneficial for participants. This was due to the fact that the participants were B2 and C1 level English learners with high confidence. In brief, the usefulness of the pronunciation feature may differ depending on the learner's language proficiency. Novices find the feature helpful and efficient, while advanced learners tend to avoid extensively using it.

In the present study, it was proved that mobile assisted vocabulary learning helped students learn new vocabulary items. MAVA is found effective in learning new vocabulary by the participants. Similar effects were stated in a similar study in which participants read some texts by the help of a digital app called Vocastyle (Gürkan, 2018). According to Aslan and Tütüniş (2021), prep students find mobile assisted vocabulary learning effective in terms of portability of the devices, easy access to the information and providing various activities. Similar results obtained in a study (Polakova & Klimova, 2022) also support that the reason for student's satisfaction with digital vocabulary application was improved vocabulary knowledge, ease of use and enhanced motivation. However, the limited number of participants in this study precluded the ability to demonstrate the true impact of MAVA on the acquisition of learners' vocabulary. It is recommended that a similar study be conducted on a larger sample size.

According to interview data, learners found MAVA effective for several reasons. They find MAVA beneficial because it allows them to learn vocabulary anytime and anywhere, thanks to the accessibility provided by mobile apps. Klimova and Polakova (2020) also pointed that students appreciated the mobile app due to its accessibility anytime and anywhere compared to print books. In conclusion, the present study indicated that participants had positive attitudes towards mobile-assisted vocabulary learning, namely MAVA, as in other similar studies (Enayati & Gilakjani, 2020; Lei et al., 2022; Sun & Gao, 2019).

Another important point is that the facility of using MAVA without internet connection was suggested by the participants. MAVA is a web-based program, which requires a consistent internet connection. However, learners expressed a preference for downloading and using MAVA offline. Deris and Shukor (2019) noted that the requirement for internet access when using the app has led to

learners' reluctance to use it. Therefore, it should be considered that new mobile-assisted applications provide the offline facilities with them.

Conclusion

Golonka et al. (2014) reviewed 350 studies on technology use in foreign language learning and teaching, including classroom-based technologies, individual study tools, network-based social computing, and mobile and portable devices. They concluded that evidence of efficacy is limited despite the abundance of publications on the topic.

The present study aims to investigate which vocabulary extension activities are more effective, the use of traditional vocabulary worksheets or mobile applications. The most crucial point in teaching vocabulary is the maintenance of the vocabulary items which are newly taught. For this aim, the most common out-of-class activity is vocabulary worksheets. It is vital to bring vocabulary learning to more enjoyable platforms at these times when the technology penetrates all parts of our lives. For this aim, in this study two different groups of students are assigned in two different ways. The experimental group is assigned to do the activities on MAVA while the control group is given vocabulary extension worksheets as homework. So these two groups could find a chance to study again the words they have just learnt in class.

According to the results obtained from the study, both groups have achieved in learning vocabulary. When compared the test results from pre-test and post-test of these two groups, it is seen that the achievement of vocabulary level increases for both control and experimental group. When the scores from every sub-section of the tests are investigated, for experimental group, scores from the reading and listening sections increase significantly while for control group this significant increase happens only in reading section. The results reveal that the participants in the both groups are successful to recognize the words in written form on the other hand, it could be claimed that the experimental group shows a significant difference in recognizing words in spoken form better. The general scores of the experimental and control groups from the pre-test and post-test increases %8,3 and %9,4 in order. Considering this result, it might be said that both out-of-class activities have a positive effect on vocabulary acquisition.

Upon analysing the qualitative data from this study, it becomes evident that MAVA has several advantages over traditional vocabulary worksheets. The first benefit is that the students can practice the newly taught words on MAVA without the limitation of place. Bachore (2015) claims that this advantage of mobile-based language learning stems from the two main characteristics of mobile devices: portability and connectivity. On the other hand, the students from the control group who practice the words by doing vocabulary worksheets inform that they could do the vocabulary worksheets only at their dormitories. The students who used the MAVA state that they could use the MAVA at their workplace and schools when they had breaks as well as at their homes and dormitories.

The second superior side of MAVA is that it provides audiovisual data to the students. While the students are using MAVA, they can both listen to the pronunciation of the vocabulary items in the teaching part and in the other activities they have the same chance many times. Mobile phone applications have the potential to be effective pedagogical tools due to their accessibility, manageable interface, and multifunctional components (Jeong, 2022).

The participants stated that it was beneficial to practice the vocabulary on MAVA. They claimed that the activities they did during this study have benefited their vocabulary acquisition. Students using MAVA expressed confidence in the pronunciation activity. When asked about challenges faced while using MAVA, the experimental group reported difficulties primarily with correct word pronunciation.

The students of the experimental group also suggest that MAVA should offer the learners some choices to shape the word lists according to their learning pace and their own interests. Consequently, they demand to define their own lists from a word bank offered by MAVA.

By the way, it causes some problems for the smart phone users that MAVA is based on the net and is only used by a web browser. Therefore, the users stated that MAVA should be transformed into a smart phone application.

Implications for Pedagogy

In today's world, lifelong learning skills are getting more crucial day by day. By the help of the recent technology, it is possible to reach any kinds of information wherever and whenever people need or want. Lin and Lin (2019) claims that the learning of L2 vocabulary is potentially facilitated by mobile technologies if they are used as pedagogical tools. Therefore, it is unavoidable to transform language learning into a more virtual area. By the way, constructing personalised information is more convenient by using personal mobile devices such as smart phones than formal language instruction in crowded classrooms.

Through the process of designing a mobile-assisted application, it is important to consider the needs of the target participants. In this respect, the present study considers the immediate needs of target participants and shapes the content accordingly. On the contrary, the participation of the students in the present study is unexpectedly low due to some factors such as their own classes and exams at their own departments, workplace tasks. Consequently, such a mobile assisted application is made available for a longer period which covers the holidays; hence, the students have more free time to be able to spare more time to use the application rather than just a term.

Considering the scores obtained by the experimental group from the sub-sections, reading and listening, it is claimed that the feature of MAVA providing audio-visual data related to target words helps students recognise the word they listen to and remember the word meaning by the help of visuals representing the target words better than the control group. Compared to the vocabulary extension worksheets, that is traditionally given paper and pen aids, it is obviously seen that mobile assisted vocabulary activities offer more multi-sensational contents easily and help more comprehensive vocabulary knowledge such as how to pronounce a word, word recognition by listening, etc.

All in all, technology is an inseparable part of our everyday life. Using such technological advances in language learning process should be primarily priority of the educational institutions especially public schools and state universities because of the fact that they are more common and available for every citizen in Turkey and responsible for equality in education.

Suggestions for Future Research

The limited number of participants in this study could not produce certain results to show us the real effect of MAVA on the achievement of the learners' vocabulary acquisition. It is suggested that the same study should be conducted on a larger sample.

Another suggestion is that it seems necessary to conduct the practice vocabulary on MAVA as a classroom activity. In this study, the logs kept by the application revealed that some students hardly ever used the application and the student who used MAVA at most completes only 42% of the activities. For this reason, it might provide some more concrete data when some classroom time is spared for the students to use MAVA.

In this study, the researchers predominantly designed the content of the Mobile-Assisted Vocabulary Application (MAVA). Future research could explore the perceptions and attitudes of teachers who independently develop content for similar applications. The opinions and attitudes of the teachers could be scrutinized in another future study.

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Conflict of Interest

None.

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