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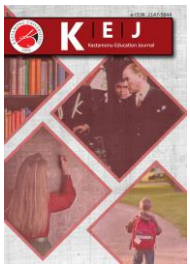

| Research Article / Araştırma Makalesi |

# The Effects of Online Applications in English Vocabulary Learning: Quizlet Application

# İngilizce Kelime Öğrenmede Online Uygulamalarin Etkisi: Quizlet Uygulamasi

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**Keywords**

1. Vocabulary Learning
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3. Ouizlet

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## Abstract

*Purpose:* The main purpose of this study is to analyze the impact of the Quizlet application, a computer-aided vocabulary learning tool widely recognized as an online flashcard application, on the development and retention of English vocabulary among students learning English as a foreign language.

*Design/Methodology/Approach:* The data were obtained from 34 fifth-grade students studying English as a foreign language during 2019-2020 academic year at Yediiklim Secondary School in Karesi district of Balıkesir province. The research was conducted using a quantitative research method within quasi-experimental design without pre-test post-test control group. Quantitative data was collected through pre and post vocabulary achievement tests, retention test and scale. While word tests aim to measure students' vocabulary acquisition, the retention test aims to measure students' retention of vocabulary. The Quizlet Attitude Scale was also used to obtain opinions about Quizlet. Quantitative data were analyzed statistically in SPSS Statistics.

*Findings:* As a result of the analysis, the findings show that there is a significant difference between Quizlet and test scores. According to the results of the survey, it is concluded that the students developed positive perceptions about the use of the Quizlet program.

*Highlights:* In the light of these findings, it is recommended to use computer-based vocabulary learning tools as a student-centered and effective teaching technique in foreign language teaching and to expand their use.

## Öz

*Çalışmanın amacı:* Bu çalışmanın temel amacı, yaygın olarak kullanılan ve çevrimiçi flashcard uygulaması olarak bilinen bilgisayar destekli kelime öğrenme aracı Quizlet uygulamasının, İngilizceyi yabancı dil olarak öğrenen öğrencilerin İngilizce kelime dağarcıklarının gelişimi ve kalıcılığı üzerindeki etkisini analiz etmektir.

*Materyal ve Yöntem:* Veriler, 2019-2020 eğitim-öğretim yılında Balıkesir ili Karesi ilçesi Yediiklim Ortaokulu'nda yabancı dil olarak İngilizce öğrenen 34 beşinci sınıf öğrencisinden elde edilmiştir. Araştırma, ön test-son test kontrol grupsuz yarı deneysel desen kapsamında nicel araştırma yöntemi kullanılarak gerçekleştirilmiştir. Nicel veriler, ön ve son kelime başarı testleri, kalıcılık testi ve ölçek aracılığıyla toplanmıştır. Kelime testleri öğrencilerin kelime edinimini ölçmeyi amaçlarken, kalıcılık testi öğrencilerin kelime bilgisini akılda tutma düzeylerini ölçmeyi amaçlamaktadır. Quizlet hakkındaki görüşleri almak için Quizlet Tutum Ölçeği de kullanılmıştır. Nicel veriler SPSS İstatistik programında istatistiksel olarak analiz edilmiştir.

*Bulgular:* Analiz sonucunda elde edilen bulgular, Quizlet ile test puanları arasında anlamlı bir fark olduğunu göstermektedir. Anket sonuçlarına göre, öğrencilerin Quizlet programının kullanımına ilişkin olumlu algılar geliştirdikleri sonucuna varılmıştır.

*Önemli Vurgular:* Bu bulgular ışığında, bilgisayar tabanlı kelime öğrenme araçlarının yabancı dil öğretiminde öğrenci merkezli ve etkili bir öğretim tekniği olarak kullanılması ve kullanımının yaygınlaştırılması önerilmektedir.

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## INTRODUCTION

One of the main objectives of education is to enable individuals to discover their abilities and powers, as well as to embrace and apply technological developments to become innovative individuals. This objective inevitably necessitates the integration of technology into education (Aydın, 2003), leading to the emergence of various learning tools and approaches that can be integrated into the learning and teaching processes (Kassim & Ali, 2007). With the advancement of technology, the demands, motivations, and interests of students have changed, and these modern students are described differently by various researchers. Prensky (2001) referred to them as "Digital Natives," Jones, Ramanau, Cross, and Healing (2010) called them "Net Generation," and Oblinger (2008) labeled them as "Y Generation." These learners are born and raised in the technology age, constantly exposed to technology, making them more adaptable to new developments. This enables them to respond positively to technology and become more motivated through it. Therefore, teachers should make efforts to provide learning materials containing some technological tools to students (Granito & Chernobilsky, 2012). Similarly, Koehler and Mishra (2005) emphasized that teachers seek alternative ways, integrated with technology, to offer effective learning opportunities to students.

In modern foreign language education, digital instructional methods have started to replace traditional classes, as they allow teachers to enhance their teaching methods or techniques (Golonka et al., 2014). This need brings forth the concepts of ComputerAssisted Language Learning (CALL) and Mobile-Assisted Language Learning (MALL). Computer-assisted language learning refers to language learning supported by technology and computers, while mobile-assisted language learning refers to language learning supported by technology and mobile devices (Kern, 2006). In foreign language learning, alongside the four basic skills of reading, writing, speaking, and listening, vocabulary learning plays a significant role in the second language/foreign language acquisition process. Vocabulary learning is considered a fundamental building block of a language's structure (Nation, 2001; Francis & Simpson, 2009) and an essential element for communication. It is emphasized that communication can be partially achieved without grammar, but nothing can be conveyed without words (Wilkins, 1972).

Learning a foreign language is not an easy task for students (Gass & Selinker, 2008). According to Barr (2016), learners of a new language struggle to understand the words and meanings of the target language, and there is a correlation between this difficulty and the limited size of students' vocabulary. Similarly, the literature indicates that vocabulary learning significantly contributes to language learning and is considered the most challenging part for language learners (Çelik & Toptaş, 2010; Read, 2000). Studies also suggest that students need to find their own learning methods to "learn, acquire, understand, retain, recall, use, and expand" words, which is an individual responsibility (Siriwan, 2007). Therefore, given the close relationship between our era and technology, it is crucial to incorporate technology into the vocabulary learning process to make it easier, more enjoyable, and more motivating for learners.

English language learners, particularly, need to learn thousands of words to become proficient in the target language. However, they often do not have enough time to learn vocabulary in the classroom, especially during formal education hours. The question of which ways students learn vocabulary best still remains a matter of debate. Various techniques, such as objects, pictures, word flashcards, gestures, and mimics, are used in vocabulary teaching. In this study, the Quizlet application was chosen as an efficient flashcard tool with many users and various activities including games, exercises, tests to measure English language learners' vocabulary acquisition and retention, which has been the subject of various research and has shown positive effects on participants. Quizlet, as an online flashcard program, has been chosen for its appeal to the younger generation's interest in technology and its widespread use as an effective teaching method. Based on this information, the following questions are sought to be answered in the study:

1. Does the way units are processed and the use of the Quizlet program affect students' vocabulary learning?
2. Does the way units are processed and the use of the Quizlet program affect the retention of learned words?
3. Does vocabulary learning and word retention level predict students' attitudes toward Quizlet?

## LITERATURE REVIEW

### Vocabulary in Foreign Language Learning

Thoughts are conveyed through language, and words that enable the development of these thoughts are accepted as meaningful sounds or sound unions, words and lexicon. (TDK, 2020). Vocabulary, on the other hand, is defined differently by various researchers. Graves and Watts-Taffe (2002) define vocabulary as the entire stock of words known to an individual or related to a specific knowledge. Neuman and Dwyer (2009) describe vocabulary as the words one needs to know to communicate effectively in speaking and listening. Burns (1972) defines vocabulary as the stock of words used by a person, in a class or in a specific field. Vocabulary knowledge is considered an essential building block of language, and vocabulary learning is seen as the process of developing an understanding of these building blocks (Ramos, 2015). Furthermore, Nation (2001) characterizes the relationship between vocabulary knowledge and language use as "complementary," stating that vocabulary knowledge enhances language use, and language use, in turn, increases vocabulary knowledge.

Researchers like Laufer (2003), Maximo (2000), Read (2000), Gu (2003), Nation (2006), and Marion (2008) emphasize that vocabulary acquisition is necessary for effective second language use and plays a significant role in creating oral and written texts. Güney and Aytan (2014) also support this view, stating that vocabulary is both cultural and social capital for individuals. In other words, the power in all four language skills lies in mastering words (Göçer, 2009), and words are considered an essential component of both oral and written communication (Yağcı, Katrancı, Erdoğan, & Uygun, 2014). It is stated that vocabulary acquisition has become a prerequisite for foreign language learning and most of the studies carried out to cope with the foreign language vocabulary learning process by being analized the nature of words, their pronunciation, spelling, prefixes and suffixes in depth, and it is necessary to give importance to vocabulary in order to gain mastery in the language (Nation, 2001). According to Nation (2001), for a person to claim that they know a word, they should possess the following information about that word:

- Pronunciation of the word
- Spelling of the word
- Meaning of the word
- Grammatical properties of the word
- Frequency of use of the word
- Collocations (word combinations) of the word
- Contextual (content) factors necessary for forming meaningful sentences with the word

Başöz (2013) states that vocabulary knowledge is the fundamental component that provides the infrastructure for students to have good listening, speaking, writing, and reading skills. Webb (2009) also points out that expanding vocabulary is crucial for mastery of a language for English language learners. Mizumoto and Takeuchi (2009) indicates that the task of vocabulary learning for foreign language learners is more challenging since they cannot acquire words naturally, and they have limited opportunities to use the acquired words in social contexts. Overcoming these difficulties, as in other areas, necessitates adopting a fully integrated vocabulary learning approach that keeps up with educational innovations and aligns with the thinking and achievements of modern era. Given this information, it is evident that students need a vast vocabulary to communicate successfully in a second or foreign language, and learning new words in a second or foreign language is a challenging task. Therefore, finding the most effective way to encourage vocabulary knowledge and improve foreign language vocabulary directly has become essential topics in the field of foreign language teaching and learning (Kawauchi, 2008).

## Techniques Used in Vocabulary Teaching

Susanto and Fazlind (2016) present the techniques used in vocabulary teaching as follows:

• Teaching Vocabulary with Objects: This technique involves presenting target words by showing real objects (Takač and Singleton, 2008).

• Teaching Vocabulary through Expressions, Gestures, and Mimics: Teaching using gestures, hand movements, facial expressions, pantomime, body movements, etc.

• Teaching Vocabulary by Predicting from Context: This technique involves teaching target words by having students predict the correct word based on the context in which it appears.

• Teaching Vocabulary through Activities, Spelling, and Active Participation: This technique is used to help students learn and retain new information by familiarizing them with the form and sound of words or vocabulary items (Thornbury, 2002).

• Teaching Vocabulary through Listing and Antonyms: Listing is a collection of elements that include all target words and subheadings in a complete and sequential manner.

• Teaching Vocabulary through Drawings and Pictures: This technique involves teaching target words by drawing pictures or writing and drawing the names and pictures of words on vocabulary flashcards.

#### Vocabulary Learning Through Online Vocabulary Flashcards

Today, the integration of multimedia with learning and teaching English has become an important trend (Hu & Deng, 2007). In recent years, multimedia technologies such as audio, video, slides and such materials have been included in the language and vocabulary learning process, and this integration increases students' interest in learning (Constantinescu, Kim, Chan, & Feng 2007; Abraham, 2008). Moreover, with the popularity of advanced technologies like computers, games, and the internet, their effectiveness in language and vocabulary learning is observed, both individually and in combination with multimedia tools (Martins, Steil, and Todesco, 2004; Ma and Kelly; 2006; Blake, 2013; Ko and Goranson, 2014). For example, in Wang, A. Y., Thomas, M. H., Inzana, C. M., and Primicerio, L. J.'s (1993) study, students using the vocabulary learning app "Learn British English WordPower" showed higher engagement and motivation in the experiment group. Ma and Kelly (2006) emphasize that by using the WUFUN software, students have learned a significant amount of vocabulary in both individual and classroom use. McLean,

Hogg, and Rush (2013) state that the online vocabulary learning program Word Engine has a positive impact, and the participants in the study point out that Word Engine contributes to learners' receptive vocabulary knowledge. Crandell (2017) aims to increase accessibility to the English language for learners and teachers by creating the first 500 words of the Academic Word List in an online vocabulary flashcard program called Quizlet. The study shows that the vocabulary sets created on Quizlet provide significant benefits for foreign language vocabulary learning, and Quizlet users not only see the meanings of the words but also have the opportunity to listen to the pronunciation of the words through this digital vocabulary learning tool.

### Quizlet (Online Flashcard Application) Program Content

The learning tool provided by the website http://quizlet.com.tr, operating in Turkey, is described on its mission page as serving in 18 different languages in 130 countries and having ownership of user-created flashcard study sets exceeding 50 million users every month and 300 million sets that can be used free of charge (Quizlet, 2021). Lees (2013) lists the features available in the Quizlet application as follows:

- A list of words that can be shuffled, reversed, pronounced, and edited when needed.
- Flashcards for words that can be shuffled, labeled, pronounced, played automatically, or manually scrolled.
- A learning software containing modules for the learning, usage, and spelling of words with multiple repetitions and performance tracking.
- A spelling software that pronounces the words in the word list, tests your writing and has multiple-choice translations, true-false questions, highlights and corrects mistakes.
- A testing software containing modules that test the student with editable and trackable writing, multiple-choice translations, and true-false questions.
- A matching game called Scatter, where users compete against each other and create a competitive environment by dragging and dropping words in their native language over the words in the target language.
- A game called Space Race, where users compete against each other and create a competitive environment by writing the translation of the given word to earn scores and level up.

At Tamagawa University in Japan, a study is being conducted with 32 low-level first-grade students learning English as a foreign language. In this study, Barr (2016) asks students to use the Quizlet application and concludes that students' achievements significantly increased as a result. Additionally, the opportunity for students to learn independently is presented as another positive aspect of the program. Crandell (2017) aims to increase accessibility to the Academic Word List by creating the first 500 words in Quizlet, an online flashcard program, and aims to reach users' opinions. It is reported that the word sets created on Quizlet provide significant benefits in learning foreign language vocabulary and Quizlet users can not only see the meanings of words but also listen to their pronunciations through this digital vocabulary learning tool.

Boyce (2016) conducted an experimental study with 7 students who experienced difficulties in learning terminologies related to the science lesson. The researcher analizes the students' academic performance, their behavior during the learning process, and student satisfaction with games. The study highlighted that students with learning disabilities in acquiring science-related vocabulary showed a positive attitude towards the Quizlet application, and their grades improved. On the other hand, Brown and Pallitt (2015) find in their research that students had the opportunity to share data sets with their classmates, and the use of this online program indirectly played a role in increasing sharing and collaboration among students. These findings are consistent with Rossing, Miller, Cecil, and Stamper's (2012) study, which concluded that mobile device application usage encourages active participation in the learning environment among students.

## METHOD/MATERIALS

The research was conducted using a quantitative research model. Quasi-experimental design without pre-test post-test control group was used as a quantitative research method. The quasi-experimental design is preferred when the necessary controls of a true experimental design cannot be provided or when they are not sufficient to be implemented (Karasar, 2009). Due to the small number of participants, a control group was not included in the study.

### Participants

The research sample consisted of 34 fifth-grade students attending Balıkesir Yediiklim Bengi Secondary School during the 2019-2020 academic year. The average age of the participants was 11. The sample of the study was selected through non-probability convenient (availability) sampling method. The students had 18 hours of English lessons per week and the units of these courses are focused on all of the reading, listening, speaking and writing skills.

### Data Collection and Analysis

The vocabulary items selected for this study consist of 100 target words, 25 words for each of the four units, from the Oxford Publications English Plus 1 Student Book. The difficulty level of the taught words in each unit is balanced. These words were

prepared in Quizlet with their Turkish meanings and example sentences. Teaching vocabulary process lasted for 2 weeks for each unit and 8 weeks in total for all four units.

Data were collected through vocabulary tests and a scale. Before starting each unit, students' relevant unit vocabulary knowledge was measured using a pre-test. After the unit was taught, all students worked on the unit's vocabulary using the Quizlet online flashcard tool. To measure students' vocabulary knowledge after the units were covered and Quizlet was used, a post-test was used at the end of each unit. Four pre-tests and 4 post-tests were conducted in total. Additionally, a retention test with 50 questions was given before the application process started to measure students' word recall and the level of vocabulary retention. The mentioned retention test was the first test given to students before any learning activity took place. The same test was applied 2 weeks after the posttest of the related unit as a retention test. At the end of the application process, In order to determine the participants' attitude towards Quizlet, Ranalli's Post Project Survey adapted by Bilcan (2019) was applied.. The data obtained were statistically analysed in SPSS Statistical Programme.

It was determined that the data obtained from the scales showed normal distribution according to the skewness and kurtosis values (Table 1).

**Table 1. Skewness and Kurtosis Values of Scale Scores Used in the Study**

| | İnitial | Unit 1 Pretest | Unit 1 Posttest | Unit 2 Pretest | Unit 2 Posttest | Unit 3 Pretest | Unit 3 Posttest | Unit 4 Pretest | Unit 4 Posttest | Total Score of Pre-Tests | Total Score of Post-Tests | Retention Test | QUIZLET Attitude Scale |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Skewness | .149 | .036 | -.548 | .166 | -.538 | -.159 | -.528 | -.263 | -.944 | -.331 | -.963 | -.586 | -.242 |
| Kurtosis | -.778 | -.871 | -.734 | -.967 | -1.066 | -.988 | -1.100 | -.697 | .840 | -.342 | .299 | -.866 | -.671 |

'Repeated Measures Anova' analysis was applied to test the consistency of the instruments prepared to measure students' knowledge and retention levels. In order to determine the difference in the knowledge level of the students before and after each unit was processed and Quizlet application was used, pre-test mean scores and post-test mean scores were compared with the 'Paired Sample T Test'. 'Pearson correlation analysis' was used to determine the relationship between the two measurements. 'Multiple Linear Regression Model' was used to examine the effect of learning and retention levels on student attitudes towards Quizlet application.

## FINDINGS

In this part of the study, tables are used to present and explain the results after the analyses.

### Comparison of Unit 1 Pre-Test and Post-Test Scores

First, the results of the pre- and post-tests for Unit 1 were compared. The results of the analysis are given in the table below.

**Table 2. Comparison of Unit 1 Pre-Test and Post-Test Scores using the Paired Sample T-Test**

| Measurement | Mean | SD | SE | Min | Max | T | P | df | R | Impact |
|---|---|---|---|---|---|---|---|---|---|---|
| Unit 1 PreTest | 24.00 | 7.785 | 1.335 | 10 | 38 | 48.947 | 0.00 | 33 | 0.35 | 0.99 |
| Unit 1 PostTest | 92.94 | 6.480 | 1.111 | 78 | 100 | | | | | |

The statistical analysis revealed a significant difference between the average scores of the pre-test ($\bar{x}$=24.00 ∓ 7.79) and post-test ($\bar{x}$=92.94 ∓ 6.48) for Unit 1 ($t(33)=-48.95$; $p<0.05$). This indicates that the Quizlet application has been effective in helping students learn the words taught in Unit 1. The impact (e=0.99) is considerably high. The substantial difference in the mean scores between the two measurements (68.94) and the range of values (minimum: 10-78, maximum: 38-100) further support this finding.

## Comparison of Unit 2 Pre-test and Post-test Scores

**Table 3. Comparison of Unit 2 Pre-test and Post-test Scores Using the Paired Sample T-test.**

| Measurement | Mean | SD | SE | Min | Max | Mean difference | T | P | df | R | Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit 2 Pre Test | 23.53 | 7.220 | 1.238 | 12 | 38 | 67.12 | 47.485 | 0.00 | 33 | 0.48 | 0.99 |
| Unit 2 Post Test | 90.65 | 8.721 | 1.496 | 74 | 100 | | | | | | |

There was a statistically significant difference between the Unit 2 pre-test mean (x̄= 23.53 ∓ 7.22) and post-test mean (x̄=90.65 ∓8.72) (t(33)=-47.49; p<.05). According to this, Quizlet application was effective in terms of learning the words taught in Unit 2. This effect (e=0.99) is quite high. The high mean difference between the two measurements (67.12) and the minimum (12-74) and maximum (38-100) values are indicative of this. In addition, the correlation between the two measurements (r= 0.48) is at a moderate level (Table 3). In other words, the probability that those who scored high in the pre-test are the same as those who scored high in the post-test is moderate. In other words, those who scored high in the pre-test also scored high in the post-test. Those who scored low in the pre-test increased their scores in the post-test.

## Comparison of Unit 3 Pre-test and Post-test Scores

**Table 4. Comparison of Unit 3 Pre-test and Post-test Scores Using the Paired Sample T-test**

| Measurement | Mean | SD | SE | Min | Max | Mean difference | T | P | df | R | Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit 3 Pre Test | 25.65 | 6.41 | 1.10 | 14 | 36 | 66.06 | 56.242 | 0.00 | 33 | 0.58 | 0.99 |
| Unit 3 Post Test | 91.71 | 8.18 | 1.40 | 76 | 100 | | | | | | |

The pre-test average (x̄= 25.65 ± 6.41) and the post-test average (x̄= 91.71 ± 8.18) show a statistically significant difference (t(33) = -56.24; p < 0.05). Accordingly, the Quizlet application has proven to be effective in helping students learn the words taught in unit 3. This effect size (e=0.99) is quite high. The considerable difference in the mean scores between the two measurements (66.06) and the range of minimum (14-76) to maximum (36-100) values further indicate this effectiveness.

## Comparison of Unit 4 Pre-Test and Post-Test Scores

**Table 5. Comparison of Unit 4 Pre-Test and Post-Test Scores with Paired Sample T-Test"**

| Measurement | Mean | SD | SE | Min | Max | Mean difference | T | P | df | R | Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Unit 4 Pre Test | 28.29 | 5.93 | 1.02 | 16 | 38 | 64.94 | 60.20 | 0.00 | 33 | 0.48 | 0.99 |
| Unit 4 Post Test | 93.24 | 6.40 | 1.10 | 74 | 100 | | | | | | |

"The pre-test average (x̄= 28.29 ± 5.93) and the post-test average (x̄= 93.24 ± 6.40) show a statistically significant difference (t(33) = -60.20; p < 0.05). Accordingly, the Quizlet application has proven to be effective in helping students learn the words taught in unit 4. This effect size (e=0.99) is quite high. The considerable difference in the mean scores between the two measurements (64.94) and the range of minimum (16-74) to maximum (38-100) values further indicate this effectiveness.

## Comparison of Total Pre-Test Scores and Total Post-Test Scores

**Table 6. Comparison of Total Pre-Test Scores and Total Post-Test Scores with Paired Sample T-Test"**

| Measurement | Mean | SD | SE | Min | Max | Mean difference | T | P | df | R | Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pre-Tests Total Score | 25.37 | 3.59 | 0.62 | 16.50 | 31.00 | 66.76 | 84.49 | 0.00 | 33 | 0.45 | 0.99 |
| Post-Tests Total Score | 92.13 | 4.92 | 0.84 | 81.00 | 99.00 | | | | | | |

The average of total pre-test scores ($\bar{x}$= 25.37 ± 3.59) and the average of total post-test scores ($\bar{x}$= 92.13 ± 4.92) show a statistically significant difference (t(33) = -84.49; $p < 0.05$). Accordingly, processing of the unit and the Quizlet application have proven to be effective in helping students learn the words targeted for teaching in all four units. This effect size (e=0.99) is quite high. The considerable difference in the mean scores between the two measurements (66.76) and the range of minimum (17-81) to maximum (31-99) values further indicate this effectiveness.

## The Effect of Unit Processing and Quizlet Application on Learning Retention: Comparison of Initial Test Scores with Retention Test Scores

**Table 7. Comparison of Initial Test Scores and Retention Test Scores with Paired Sample T-Test.**

| Measurement | Mean | SD | SE | Min | Max | Mean difference | T | P | df | R | Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Initial Test | 23.65 | 6.63 | 1.14 | 12 | 36 | 69.00 | 53.051 | 0.00 | 33 | 0.36 | 0.99 |
| Retention Test | 92.65 | 6.76 | 1.16 | 78 | 100 | | | | | | |

The average of initial test scores ($\bar{x}$= 23.65 ± 6.63) and the average of retention test scores ($\bar{x}$= 92.65 ± 6.76) show a statistically significant difference (t(33) = -53.05; $p < 0.05$). Accordingly, the Quizlet application has proven to be effective in helping students remember the words taught in the four units after the initial test. This effect size (e=0.99) is quite high. The considerable difference in the mean scores between the two measurements (69.00) and the range of minimum (12-78) to maximum (36-100) values further indicate this effectiveness.

## Comparison of Total Post-Test Scores with Retention Test Scores

**Table 8. Comparison of Post-Tests' Total Scores and Retention Test Scores with Paired Sample T-Test.**

| Measurement | Mean | SD | SE | Min | Max | Mean difference | T | P | df | R | Impact |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Post-Tests Total Score | 92.13 | 4.92 | 0.84 | 81.00 | 99.00 | 0.51 | 0.382 | 0.705 | 33 | 0.12 | 0.07 |
| Retention Test Total Score | 92.65 | 6.76 | 1.16 | 78.00 | 100.00 | | | | | | |

There was no statistically significant difference between the average of the total scores of the four post-tests ($\bar{x}$= 92.13 ± 4.92) and the average of the retention test scores ($\bar{x}$= 92.65 ± 6.76) (t(33) = -0.382; $p > 0.05$). Thus, no statistically significant effect (e=0.07) of the time elapsed until the retention test on forgetting the learned words could be detected ($p > 0.05$). It was observed that the students did not forget the words they learned in the four units until the retention test was conducted.

**Table 9. Descriptive Statistics of Post-Test Total Scores - Retention Test Total Scores – QUIZLET Attitude Scale Score.**

| Measurement | Mean | SD | SE | Min | Max |
|---|---|---|---|---|---|
| Post-Test Total Scores | 92.13 | 4.92 | .844 | 81.00 | 99.00 |
| Retention Test Total Scores | 92.65 | 6.76 | 1.16 | 78.00 | 100 |
| QUIZLET Attitude Scale Total Score | 85.03 | 8.14 | 1.40 | 68.00 | 99.00 |

After each use of Quizlet, the total scores of the four post-tests, which were used to measure students' vocabulary knowledge level, ranged from a minimum of 81.00 to a maximum of 99.00, with an average of 92.13 ± 4.92. On the other hand, the students' retention test total scores ranged from a minimum of 78.00 to a maximum of 100, with an average of 92.65 ± 6.76 (Table 9). As observed, there are students who achieved scores close to or at the highest possible scores on all three measurement tools. The average total scores of the post-tests and retention test are quite close to each other.

## Students' Responses to the Quizlet Attitude Scale

**Table 10. Frequency Distribution and Descriptive Statistics of Quizlet Attitude Scale Items.**

| Scale Items | 1 | | 2 | | 3 | | 4 | | 5 | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | n | % | N | % | n | % | |
| 15. I think Quizlet can help improve my vocabulary learning. | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 11 | 32.35 | 23 | 67.65 | 4.68 |
| 18. There has been an increase in the number of English words I have learned. | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 13 | 38.24 | 21 | 61.76 | 4.62 |
| 3. I clearly understood the purpose of using Quizlet | 0 | 0.00 | 1 | 2.94 | 0 | 0.00 | 13 | 38.24 | 20 | 58.82 | 4.53 |
| 17. I learn words more easily with Quizlet. | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 16 | 47.06 | 18 | 52.94 | 4.53 |
| 1. Using Quizlet to learn vocabulary is a lot of fun. | 0 | 0.00 | 0 | 0.00 | 1 | 2.94 | 15 | 44.12 | 18 | 52.94 | 4.50 |
| 16. With the help of Quizlet, my performance increased in English lessons. | 0 | 0.00 | 0 | 0.00 | 1 | 2.94 | 16 | 47.06 | 17 | 50.00 | 4.47 |
| 13. Using Quizlet to learn vocabulary is motivating. | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 19 | 55.88 | 15 | 44.12 | 4.44 |
| 12. Learning vocabulary with Quizlet is different and fun. | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 20 | 58.82 | 14 | 41.18 | 4.41 |
| 7. I liked the 'Match' game the most. | 0 | 0.00 | 3 | 8.82 | 0 | 0.00 | 12 | 35.29 | 19 | 55.88 | 4.38 |
| 11. I learned many words by looking at the example sentences. | 0 | 0.00 | 1 | 2.94 | 3 | 8.82 | 12 | 35.29 | 18 | 52.94 | 4.38 |
| 10. Quizlet's smartphone app is also useful to have. | 0 | 0.00 | 0 | 0.00 | 7 | 20.59 | 10 | 29.41 | 17 | 50.00 | 4.29 |
| 20. Such web tools should be included in language teaching. | 0 | 0.00 | 0 | 0.00 | 6 | 17.65 | 13 | 38.24 | 15 | 44.12 | 4.26 |
| 4. Pictures and example sentences were enough for me to remember the words. | 0 | 0.00 | 1 | 2.94 | 4 | 11.76 | 15 | 44.12 | 14 | 41.18 | 4.24 |
| 14. I have learned how to learn words. | 0 | 0.00 | 0 | 0.00 | 5 | 14.71 | 17 | 50.00 | 12 | 35.29 | 4.21 |
| 5. I did not encounter any technical difficulties while using Quizlet. | 1 | 2.94 | 4 | 11.76 | 1 | 2.94 | 13 | 38.24 | 15 | 44.12 | 4.09 |

| Scale Items | 1 | | 2 | | 3 | | 4 | | 5 | | Mean |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | % | N | % | n | % | N | % | n | % | |
| 19. I will continue to use Quizlet after this lesson. | 0 | 0.00 | 3 | 8.82 | 7 | 20.59 | 9 | 26.47 | 15 | 44.12 | 4.06 |
| 2. Quizlet was easy to use. | 0 | 0.00 | 4 | 11.76 | 3 | 8.82 | 15 | 44.12 | 12 | 35.29 | 4.03 |
| 6. I played the games in Quizlet with the "easy, medium, hard" options set. | 0 | 0.00 | 3 | 8.82 | 10 | 29.41 | 9 | 26.47 | 12 | 35.29 | 3.88 |
| 8. I liked the 'Gravity' game the most. | 0 | 0.00 | 7 | 20.59 | 4 | 11.76 | 9 | 26.47 | 14 | 41.18 | 3.88 |
| 9. I liked the 'QuizletLive' contest the most. | 5 | 14.71 | 5 | 14.71 | 12 | 35.29 | 4 | 11.76 | 8 | 23.53 | 3.15 |

According to Table 10, students have given the highest score ($\bar{x}$=4.68) to the item '15. I think Quizlet can help improve my vocabulary learning'. None of the students gave a score lower than four. Additionally, the second and third items to which students gave the highest scores are '18. There has been an increase in the number of English words I have learned'. and '3. I clearly understood the purpose of using Quizlet'.

On the other hand, the item to which students gave the lowest score is '9. I liked 'QuizletLive' competition the most ($\bar{x}$=3.15)'. Additionally, the second and third items to which students gave the lowest scores are '8. liked 'Gravity' game the most ($\bar{x}$=3.88)' and '6. I played the games in Quizlet with the "easy, medium, hard" options set ($\bar{x}$=3.88)'.

## Students' Quizlet Attitudes Based on Post-Test Total Scores and Retention Test Results

**Table 11. Students' Quizlet Attitudes Based on Post-Test Total Scores and Retention Test Results.**

| Predictor Variables | At 95% Confidence Interval | | Standard B | ß | SE | T | p | R | $R^2$ | F |
|---|---|---|---|---|---|---|---|---|---|---|
| | Lower Limit B | Upper Limit B | | | | | | | | |
| Post-Tests Total Score | 0.191 | 1.270 | 0.730 | 0.441 | 0.265 | 2.760 | 0.010 | 0.468 | 0.169 | 4.347 |
| Retention Test Scores | -0.259 | 0.526 | 0.133 | 0.111 | 0.192 | 0.693 | 0.493 | | | |

According to Table 11, the total post-test scores, which are obtained from the results of the four post-tests measuring students' vocabulary learning levels, are a significant predictor of students' Quizlet attitudes ($F(2,33) = 4.35$; $p < 0.05$). The vocabulary learning level (post-test total scores) explains 17% of the variance in students' Quizlet attitudes. For each one-point increase in the post-test total scores, the average Quizlet Attitude Scale score increases by 0.73 points. The effect of the post-test total scores within a 95% confidence interval ranges from 0.19 to 1.27 (Table 10). As seen in Table 10, the retention test score alone does not have a significant effect on students' Quizlet attitudes ($t(33) = 0.69$; $p > 0.05$).

## CONCLUSION AND RECOMMENDATIONS

In the context of the first sub-problem of the study, the effect of unit processing and the Quizlet program on learners' vocabulary learning was examined. As indicated by the results of Pearson correlation analysis, there are statistically significant differences between 'pre-tests and post-tests' and between 'pre-test total scores' and 'post-test total scores'.Therefore, it can be said that the Quizlet application is effective and supportive in helping students learn the words taught in the units. This finding aligns with the idea that 'Quizlet can be a powerful vocabulary learning tool when used correctly and has the potential to improve

students' test scores and word acquisition' (Wright, 2016) and 'using flashcards is an effective way for students to enhance their vocabulary' (Laufer, Meara, & Nation, 2005).

Additionally, when looking at the correlation between pre-tests and post-tests, it can be observed that the correlation between pre-test and post-test scores in unit 1 (r = 0.35) is low. This low level indicates that learning takes place after the unit is covered and the Quizlet applications, even for students who knew the words very little before. The correlation between the pre-tests and post-tests in units 2, 3, and 4 is at a moderate level. Furthermore, it is concluded that the correlation between the pre-test total scores and post-test total scores is also at a moderate level. In other words, the likelihood of those who received high scores in the pre-tests being the same individuals as those who received high scores in the post-tests is moderate, and those who did not score high in the pre-test also achieved high scores in the post-test. In summary, those who scored low in the pre-tests increased their scores in the post-tests. Based on the above information, it can be said that the Quizlet program has a positive effect on vocabulary learning. The study concludes that Quizlet provides significant benefits for vocabulary learning, facilitates vocabulary learning, and contributes positively to participants' perceptions of learning foreign language vocabulary and English lessons.

In the context of the second sub-problem of the study, the effect of the method of teaching the unit and the Quizlet program on vocabulary retention is investigated. The analysis of the first test scores and retention test scores revealed a statistically significant difference between the students' first test score average ($\bar{x}$= 23.65 ± 6.63) and the retention test score average ($\bar{x}$= 92.65 ± 6.76). Based on this information, it can be stated that the Quizlet application has a strong effect on students' recall of the words covered after the first test. Additionally, the low correlation (r = 0.36) between these two measurements indicates that there is a weak relationship between word recall and prior knowledge, meaning that students' prior knowledge of the words before the first test is not strongly linked to their word recall later.

The analysis comparing the post-tests total scores and retention test scores indicates that no statistically significant difference was found between the mean scores of the four post-tests ($\bar{x}$= 92.13 ± 4.92) and the retention test ($\bar{x}$= 92.65 ± 6.76). In other words, it is concluded that participants did not forget the words they have learned throughout the four units until the retention test was administered. Additionally, the insignificant correlation (r = 0.12) between these two measurements suggests that the variation observed in the scores of each post-test is not related to the retention test scores. The difference observed in the post-test scores of students did not have any relation with their retention test scores.

In the context of the research question, in addition to these analyses, 85.30% of the students showed a positive attitude towards the statement "Pictures and example sentences were sufficient for me to remember the words" in the "Quizlet Attitude Scale." This indicates that integrating pictures, sounds, and example sentences into the vocabulary learning tool has a significant impact on students' ability to remember the words.

In the context of the third sub-problem of the study, the effect of students' vocabulary learning and retention levels on their attitudes towards the Quizlet program was analized. Multiple linear regression analysis was conducted to test the impact of students' vocabulary learning level, represented by the total scores of the final tests, on their Quizlet attitudes. The analysis results revealed that the total scores of the final tests, which measure students' vocabulary learning level, are a significant predictor of their Quizlet attitudes ($F(2,33)=4.35$; $p<0.05$). However, the retention test score alone did not have a significant effect on students' attitudes towards the Quizlet program .

It can be said that the Quizlet programme has a positive effect on vocabulary learning. It is possible to see various studies related to this benefit in the literature. For example, Stroud (2014) states that compared to traditional methods, computer-based vocabulary learning programs such as Quizlet increase cognitive, affective and behavioural development and retention of words even more. In addition, Barr (2016), Dizon (2016), Pham (2016) and Crandell (2017) also investigated the effect of Quizlet on vocabulary development. In the study, it is concluded that Quizlet provides significant benefits to vocabulary learning, the programme facilitates vocabulary learning and contributes positively to the participants' perceptions towards vocabulary learning in a foreign language and English language course.

This positive effect of Quizlet on vocabulary recall is in line with Kalecky's (2016) study, which argues that words are remembered in the long term with the use of Quizlet. This view is supported by the study of Özer and Koçoğlu (2017), who revealed the positive effect of the use of visual and auditory methods on word retention. When the literature is examined, various studies revealing the positive effect of Quizlet on the retention of target words are encountered. Wright (2016) states that creating flashcards by adding pictures, sounds and definitions of target words is much easier on the Quizlet platform. In addition, the programme keeps students motivated as it provides instant feedback and appeals to visual, auditory and kinesthetic learners (Cunningham, 2017). The fact that Quizlet allows participants to learn the correct pronunciation of words enables them to easily grasp the words and their definitions (Özer & Koçoğlu, 2017).

It is clearly seen that the Quizlet programme improves vocabulary learning in English and contributes to foreign language learning. As stated by Baturay, Yıldırım, and Daloğlu (2009) and Kocaman (2015), computer-assisted instruction and digital vocabulary learning tools positively affect students' vocabulary acquisition, enable participants to develop positive attitudes and increase the retention of words.

According to the Quizlet Attitude Scale, all students believe that the Quizlet program improves vocabulary learning and increases their knowledge of English words. Additionally, all participants view the program as easy to use and find it motivating,

engaging, and enjoyable. Except for one student, all students express that their English course performance improved with the help of Quizlet. One participant responded neutrally to this statement, indicating that they had no opinion on this matter. Furthermore, the majority of students (88.23%) state that they learn many words by looking at example sentences. Twenty-seven students believe that having a Quizlet mobile application is useful, while the rest do not have an opinion, possibly due to accessing Quizlet through the web.

Moreover, most students report that they play games by adjusting the difficulty level (easy, medium, hard), while others play the games with the default "medium" option. The "matching" game is the most popular among the students, followed by the "Gravity" game. Regarding the "QuizletLive" game, only 35.29% of the students express that they like it, with 12 students having no opinion, and 10 students being certain that it is not their favorite game.

In summary, the research findings suggest that the Quizlet online vocabulary application is effective in students' vocabulary acquisition and contributes significantly to vocabulary retention. Additionally, students develop positive attitudes towards the Quizlet Attitude Scale. The integration of games and study modes in the Quizlet program appears to motivate students and make vocabulary learning enjoyable. Quizlet, as a digital flashcard application, is proven to be a valuable method for 5th-grade elementary students to improve their vocabulary acquisition and enhance their perception of English lessons.

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**Statements of publication ethics**

We hereby declare that the study has not unethical issues and that research and publication ethics have been observed carefully.

**Researchers' contribution rate**

The study was conducted and reported with equal collaboration of the researchers.

**Ethics Committee Approval Information**

It has been approved with the decision of Balıkesir University Social and Human Sciences Scientific Research and Publication Ethics Committee, numbered 2023-03 and dated 18.04.2023. "Ethics Committee Approval Document" is attached.

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