

## PAPER

# Boosting Adolescent English Proficiency: Psycholinguistic Benefits of Mobile Platforms

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## ABSTRACT

In the modern study circle, the topic of digitization in education and its impact on learning is one of the most important issues. The purpose of the study is to analyze the impact of the use of digital platforms on the study and development of English language skills in teenagers. This study also aims to fill a gap in the field of language education and psycholinguistics, particularly the aspect of word recall, using the application of a mobile digital platform for practice. Existing studies have generally emphasized the importance and effectiveness of traditional language learning methods, but the number of studies analyzing the use of digital platforms is still limited. The study used a pre-post survey method, which aimed to determine the baseline performance of all participants and the rate of change after practice using Quizlet for Group 1 compared to the traditional methods used by Group 2 for English learning and memorization of new words. The sample consisted of 100 students from Russia studying English. Students were divided into two groups, where Group 1 used the Quizlet app and Group 2 used traditional word study methods. After two weeks of studying vocabulary, the participants demonstrated positive dynamics of word memorization. Findings showed that in Group 1, which used the program, 30% of participants successfully achieved a high level of vocabulary, while an additional 57% saw their vocabulary skills improve to an average level. Only 12% demonstrated a low level of vocabulary. In contrast, Group 2 showed minimal changes in their vocabulary. Only 14% of participants retained a high level of vocabulary, 70% were medium, and 15% were low. The obtained results can help develop new educational programs and mobile applications for language learning based on interactive methods and approaches. The obtained results can be useful for language education in terms of the possibility of integrating methods using the Quizlet program to improve the development of students' vocabulary and lexical expressions of the English language. This study makes a significant contribution to the field of foreign language learning, providing results that emphasize the effectiveness of using digital mobile resources for learning English and have a positive effect on the psycholinguistic aspect of memorizing new words. By demonstrating significant improvements in vocabulary among participants, this study highlights the potential of mobile applications to support traditional teaching methods and offers a viable alternative for language teaching, especially in the digital age.

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**KEYWORDS**

education, interactive methods, English language skills, learning, learning efficiency, memory, quizlet, vocabulary

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**1 INTRODUCTION**

In the modern world, where the study of foreign languages occupies one of the leading links in the specializations of an educational career, the study of the development and improvement of the effectiveness of language acquisition becomes a very important topic for society [1]. Modern technologies have permeated the daily lives of not only adults but also teenagers. This is due to the ability of teenagers and children to adapt to innovations and rapidly master mobile resources. Today, the lives of teenagers cannot be imagined without smartphones or computers, because in today's world, people need these technologies not only for entertainment but also to facilitate the learning process and improve its efficiency [2]. Thus, the majority of teenagers in different countries have wide access to various digital resources and platforms. However, there is another group of teenagers who use mobile resources in smaller quantities or do not use them at all. This situation can be caused by many factors, for example, low living standards, network problems, a lack of funding to provide the necessary digital devices, etc. [3]. Today's teenagers develop in step with trends and new technologies, and therefore approaches to learning in the educational system must also develop and improve. Today's teenagers depart from past standards and are always willing to learn new things. However, at the same time, in the fields of education and everyday life, teenagers often face problems in their lives that require serious solutions. Some of these problems are lack of motivation, emotional and mental "burnout," an insufficient resources for interest and encouragement in the educational process, etc. [4]. Nevertheless, there are complex problems and challenges behind this obvious trend. These issues require in-depth analysis from a psycholinguistic perspective. According to the study findings, adolescents have significant variability in the level of activity and involvement in the process of learning a foreign language. Such aspects as a decrease in the level of motivation, the process of adaptation at the initial stages, and a significant mental load can negatively affect their learning result [5]. Traditional methods of learning have proven their effectiveness over the years, but in the context of a globalized world where technology is developing at a rapid pace, traditional education methods must also be modified and changed according to modern norms. Adaptation of traditional methods of language learning is one of the most common problems in the modern education system. Some schools and higher education institutions have already been able to adapt to the new changes; for example, in China, during the period of COVID-19, schools and other educational institutions quickly moved online and adjusted the educational process within the digital community. [6]. In such educational institutions, employees and students were able to effectively transition to a digital learning process through the implementation of a complex consisting of a number of measures aimed at introducing digital resources into the learning process, including the introduction of interactive methods, mobile platforms, and other digital resources. After the pandemic, some schools and institutions went back to normal mode; however, traditional learning was improved with the help of new technological tools, which were carried out over some time because when learning with innovations, students showed effective learning results [7].

Teenagers utilizing various digital resources to learn English have become more engaged in the educational process and have demonstrated an increased willingness to learn in an interactive environment. The problem of student motivation is also one of the most common problems, as it covers psychological aspects and consequences of learning in the conditions of globalization. Not taking into account the aspect of motivation can lead to negative consequences for teenagers both in the educational environment and psychologically, which are subsequently accompanied by reluctance to learn and a loss of interest in the learning process as a whole [8]. Modern teenagers quickly adapt to new conditions, and with the popularization and development of new technologies, they are used to receiving information quickly and in various formats. Therefore, for some teenagers, traditional methods of learning a foreign language may seem boring and cause a decrease in motivation in the learning process. To overcome this problem, it is important to introduce teaching methods that contribute to a virtual, but at the same time realistic, language environment [9]. Interactive applications and online courses can integrate elements of conversational practice as well as provide an opportunity to interact with native speakers through chats and video conferences. This feature mitigates isolation from the real language environment and promotes the more effective development of communication skills among adolescents learning English on mobile platforms [9].

The lack of practice in a real-language environment is a pressing problem for teenagers learning English without native speakers in educational institutions. It deserves deeper consideration and analysis. In general, not all institutions of higher education teach a foreign language to native speakers [10]. This problem affects their language skill development and many other aspects of their education and personal growth. Therefore, it is necessary to introduce an integrated approach that allows adolescents to interact with native speakers and immerse themselves in authentic language environments. Examples can be language clubs, studying in international environments, and virtual exchanges with native English speakers. This approach facilitates a more comprehensive and in-depth study of the English language, enhancing adolescents' communication skills. Consequently, it has a positive impact on their education and personal development [11]. The high digital literacy of modern adolescents is an important prerequisite. They have grown up in an era when technology and the Internet became integral parts of their daily lives. Consequently, they have acquired skills in using mobile devices and applications, which make the learning process on mobile platforms more accessible and intuitive for them. A high level of digital literacy allows adolescents to successfully navigate in a virtual learning environment [11].

Modern mobile applications and online courses actively integrate interactive teaching methods for more effective assimilation of the material. These methods improve and facilitate learning, maintaining the high motivation of adolescents. The effective use of mobile platforms for learning English can lead to significant success in academic performance. However, there are potential risks associated with time management, addiction, and the impact on social skills. Given these risks, it is crucial to develop strategies for more efficient and safe use of these platforms. Despite some problems associated with the use of mobile platforms, the positive aspects of this situation still prevail. With the help of mobile technologies, teenagers can more effectively learn not only language skills but also many other useful skills, such as creativity or the development of creative, analytical, and critical thinking [12]. In the context of language learning, digital platforms have become an indispensable helper that is always in touch and helps to make learning more interesting, useful, and easy. Thanks to the implementation of the use of digital technologies in classes, and educational programs, students will be able to learn useful

skills and necessary information for themselves and their studies. Global experience shows that the effective use of mobile platforms for language learning depends on a balanced approach involving motivation, activity, language environment, and the quality of teaching methods [13]. Further study and development of more effective educational resources can maximize the benefits of mobile platforms in learning English for adolescents. This paper aims to make a significant contribution to the global body of knowledge. The study attempts to broaden the understanding of the psycholinguistic dynamics associated with the use of mobile platforms by adolescents to learn English. It also offers ideas for improving language education in the digital age. This study is a valuable contribution to the scientific component of the field of education, particularly in the context of foreign language learning. In the era of globalization, characterized by constant changes in the technological industry, investigating the integration of digital technologies into foreign language learning processes holds significant importance in contemporary society. Along with the development of the technological industry, educational institutions must also follow new trends and keep pace with new methods and practices in foreign language learning. The theoretical background and practical results of this study serve as an important contribution to the educational system of teaching practice because, thanks to the methods proposed in this study and the visible results after their use, teenagers, as well as adults or children, can have more opportunities to learn English effectively using digital resources. This study also aims to fill a gap in the field of language education and psycholinguistics, particularly the aspect of word recall, using the application of a mobile digital platform for practice. Existing studies have generally emphasized the importance and effectiveness of traditional language learning methods, but the number of studies analyzing the use of digital platforms is still limited.

## 1.1 Research problem

In the contemporary context, there is a compelling necessity to investigate the influence of digital resources on the educational system, particularly regarding the learning of foreign languages. More and more new strategies and approaches to learning foreign languages appear in life. Learning foreign languages is one of the most difficult specializations in education because it takes a lot of time, effort, and work. Thus, in order to improve the learning of a foreign language and make it less difficult, it is worth paying attention to the study of the use of digital resources in the process of language learning. In particular, this study examines the impact of using the Quizlet mobile platform for learning such an aspect of the English language as memorizing new words and analyzing the effectiveness of the application in the learning process compared to traditional language learning methods. The purpose of the study is to analyze the impact of the use of digital platforms on the study and development of English language skills in teenagers. This study uses a quantitative design to evaluate the effectiveness of the Quizlet mobile application in the foreign language learning process for teenagers. The motivation for this study is the desire to study different aspects of this problem and resolve contradictions. The paper aims to shed light on the effective integration of mobile platforms in teaching adolescents according to psycholinguistic aspects. As a result, this study can contribute to improving educational practice and providing adolescents with more opportunities to master English. These results can be extremely important in the modern world, which is facing globalization and the need to speak

several languages. To achieve the goal of the study, it was necessary to complete the following tasks:

1. Determine the involvement of adolescents in the use of mobile platforms for language learning.
2. Investigate the influence of mobile platforms on the language memory of adolescents when learning English.

### Research questions

1. How does the use of the Quizlet mobile application affect the memorization of new words by teenagers?
2. What changes are observed in the academic results of teenagers after using the Quizlet application for a certain time?

## 1.2 Literature review

The discussion on the use of mobile platforms by adolescents to learn English is an urgent topic. It has received wide attention in various countries [14]. Studies related to this issue have many common trends. In the modern world, one can notice a steady trend toward the growing popularity of mobile applications and online resources as effective tools for learning English among adolescents [15]. This trend is global and covers a variety of cultural and linguistic contexts. To understand the factors that cause this growth in popularity, as well as its scale, it is important to consider several key aspects. One of the main factors contributing to the widespread use of mobile applications for learning English among adolescents is the universal availability of mobile devices. Today, almost every teenager has access to a smartphone or tablet [16]. These devices provide a convenient and personalized way to access educational materials and applications anytime and anywhere. Another key factor in the growing popularity of mobile applications for learning English among adolescents is access to high-speed Internet. In many countries around the world, the Internet infrastructure has become more accessible and stable. Therefore, adolescents can quickly download applications, stream educational content, and communicate with other students online [17]. Modern mobile apps for learning English have become more interactive and motivating. The platforms offer students interesting lessons, quizzes, and rewards for achievements, which maintain motivation for learning. This feature attracts adolescents and makes learning English more engaging [18]. Many studies in different countries emphasize the importance of interactive teaching methods that can support the motivation of adolescents. Effective applications provide feedback and personalized tasks [19]. Researchers in this field emphasize the importance of the need to introduce digital resources into the educational process because, when learning with new approaches that include interactive elements, students absorb information better and become more involved in the so-called language learning process. The use of mobile platforms of various formats, such as Duolingo, Kahoot, Memrise, HelloTalk, and others, is becoming increasingly popular in today's world, as such applications include interactive features and gamification elements that are interesting for teenagers and children and encourage them to effectively learn languages [20].

Some studies also emphasize the importance of developing conversational skills, as this aspect is key to language learning. Approaches to developing these skills may vary, but the emphasis is on communication. There are concerns about possible addiction



and its negative effects on health and social skills. Consequently, researchers from different countries pay attention to the regulation of time spent by adolescents on mobile platforms. In addition, mobile platforms can serve as a means to promote social interaction and language exchange between adolescents from different countries. It is important for the expansion of cultural understanding and communication skills [21].

Nevertheless, there are disagreements in the methodologies and tools used in studies evaluating the effectiveness of mobile platforms in teaching English among adolescents. This problem is a significant limitation and raises important questions in the interpretation of the results. Researchers can apply a variety of methodologies, including quantitative and qualitative studies, questionnaires, observation, interviews, data analysis from mobile applications, and so forth [21]. The variety of methods complicates the comparison of results and the formulation of generalized conclusions since each method implies different perspectives on the studied problem. Study contexts may also vary. The contexts can range from schools and training centers to home environments. These educational environments can significantly affect the results due to differences in resources, support, and access to technology [22]. Even when measuring motivation and satisfaction, researchers can apply different scales and methods, which makes the comparison highly challenging. In addition, motivation and satisfaction can be contextual and change over time. Another conflict may be the dialectical nature of mobile platforms. On the one hand, mobile platforms can stimulate motivation and facilitate access to learning. However, on the other hand, these tools can cause dependence and distract from other important aspects of adolescents' lives [23]. Conflicts can also arise due to regional differences. For instance, a strategy effective for one country may not always apply to another due to differences in culture, access to education, and language context [24]. As for gaps and limitations, many studies present only short-term estimates and do not provide data on the long-term consequences of using mobile platforms. There is a need for additional study to understand the full impact. Motivation is a key success factor in language learning, but many studies do not provide detailed data on the motivation of adolescents using mobile platforms [25]. Many studies focus on the technical and linguistic aspects of learning. However, these studies avoid psychological aspects, such as the development of self-regulation and time-management skills [26]. All these conflicts and gaps point to the need for further study. It is necessary to cover a wider range of factors and contexts to find the best approach to integrating mobile platforms into the educational process of adolescents. One of the main problems in the modern education system is the need to adapt traditional methods to the conditions of technological development and adapt education workers and teenagers to the educational process with elements of digitalization. According to the results of other studies, traditional methods are not gradually fading away and are no longer as effective for today's teenagers, who are rapidly developing and keeping up with technology [27]. Also, in this field, an important factor is the definition and finding of new strategies for learning languages, the analysis of their use, and the display of consequences and results in the process of language learning. Studies in this field indicate the positive consequences of using digital resources in the learning process; however, with technological development and the emergence of new platforms for the educational process, it is worth analyzing new methods of using such platforms in various aspects of the development of adolescents' skills, in particular psychological factors that directly affect the process of learning English [28]. However, in the modern scientific environment, there is still a limited number of studies devoted to the topic of studying the impact of new mobile platforms on the effectiveness of English language learning among teenagers and the impact on psychological

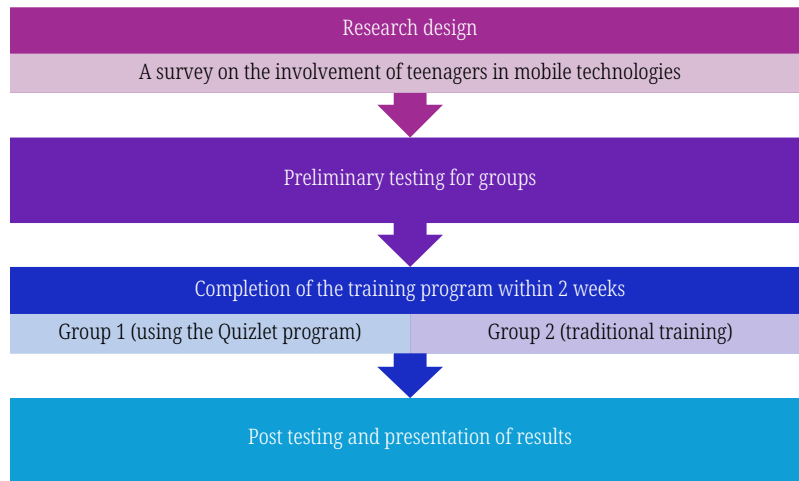
aspects, in particular, the memorization of new words. Previous studies in this field have included analyses of the impact of digital resources on the educational success of children or adults, but the study of this aspect in the learning process of adolescents is still limited. Previous studies have mainly focused on studying the influence of such mobile platforms as Duolingo or Dipl, but only a small number of studies are related to studying the influence and effectiveness of the mobile application Quizlet. Thus, this study provides that the use of the Quizlet mobile application for English language learning by teenagers can become an effective method for the development of students' language skills, in particular, the ability to memorize new words, and will contribute to greater efficiency due to interactive functions compared to traditional methods of English language learning. This study is focused on discovering new opportunities for teenagers to effectively learn English from the perspective of psycholinguistic factors with the help of digital learning methods. To do this, the study analyzed the stage of involvement in mobile technologies among teenagers in the modern world. The study also analyzed how the proposed digital approaches affect the improvement and development of memory in teenagers learning English. This study contributes to educational science in the field of foreign language learning through the expansion of existing knowledge about the implementation of digital technologies in the learning process, as well as the proposed approach to foreign language learning using a digital program for more effective English language learning. This study expands the choice of opportunities and new approaches for students to learn English effectively, conveniently, and easily in the modern world. Conducting and presenting the key factors in this study is extremely important in the context of the globalization of modern education in the field of English language learning. Foreign languages are extremely popular fields of study for modern students and teenagers. English is one of the most demanded and popular languages for learning in foreign language schools. Thus, this study holds significance for advancing and enhancing the current state of English language education among students. It provides them with increased opportunities to explore and adopt the new methodologies proposed herein, aiming for greater efficacy in the learning process.

## 2 METHODS AND MATERIALS

### 2.1 Research design

This study utilized a survey to gather information from adolescents about their utilization of mobile applications for learning a foreign language (see Figure 1). The effectiveness of a mobile application called Quizlet in enhancing adolescents' memory and success in learning English was assessed through language tests. Initially, the students underwent a pre-test to assess their vocabulary proficiency level. Subsequently, the students allocated two weeks to the study of the words, with Group 1 utilizing a mobile platform and Group 2 employing the traditional method. Subsequently, the students underwent post-testing to evaluate their vocabulary proficiency after two weeks of group practice. This design, which includes pre-post testing, is often used in studies and is an effective study method to assess changes that have occurred over time with the use of additional resources. This study is based on Mayer's cognitive theory of multimedia learning, where researchers believe that by using multimedia technologies and interactive and digital resources in the learning process, students can learn new words more effectively and improve their language skills, and it will also contribute to increasing the level of motivation.

During the constant practice of learning new words, the interactive environment has a positive effect on the process of memorising words and makes it easier for students and schoolchildren.



**Fig. 1.** Study design development process

Source: Elaborated by the author.

## 2.2 Sample

The sample for the study included 140 adolescents who studied English at various vocational colleges of foreign languages in Russia. The age distribution of participants was 15–17 years. The participants for the study were selected at this age since 15–17 years is the period of adolescence in humans. Therefore, one of the most important sampling factors was taken into account for this study. The participants of the study are college students and, accordingly, are studying the English language provided by the program of the educational institution. At the age of 15–17, students can often face the problems of learning new vocabulary and grammar, since this stage of the beginning involves learning a large volume of words and vocabulary through the curriculum in schools and colleges.

## 2.3 Survey

The first stage included sending invitation forms to students who participated in the study. These invitations contained information about the study, its purpose, and a request to participate. The invitations also provided instructions for further actions, in particular completing them. After the students confirmed their readiness to participate, they received questionnaires via e-mails. These questionnaires contained carefully selected questions about the use of mobile platforms for learning English. The questionnaires aimed to collect relevant data on the use of mobile programs and applications. After the students submitted the completed questionnaires, the data was collected and prepared for further analysis. Then the students took an online test to determine their knowledge of vocabulary in English. The survey was initially conducted in an online format, where students were sent a link with tasks to complete within a certain time frame. The tasks mainly included vocabulary and grammar questions. In this way, the performance of these tasks made it possible to



determine how well students were prepared and what level of language proficiency they had at the initial stage. After testing, each participant's response was saved and analyzed by the study team for errors. Each answer was worth a certain number of points. Students with the highest number of errors were classified as low-level students, those with an average number of errors as medium-level students, and those with the fewest errors or no response errors were classified as high-level participants. Accordingly, the number of correct answers from each group was obtained, and the percentages of the number of participants with the corresponding level were calculated using the Microsoft Excel program. All participant responses were rigorously checked by the study team, who agreed with the teenagers' teachers at their colleges online. This ensured the reliability of the obtained data with the classification of the participants' answers according to their research levels. The participants were divided into two groups (Group 1 and Group 2). Group 1 studied words using flashcards in the mobile application called Quizlet for 2 weeks. Group 2 studied words in the traditional method (by memorising, doing exercises, and reading). Three times a week, students received mini-tests that showed the number of learned words. After a two-week practice, additional post-testing of both groups took place to determine the effectiveness of memorizing words using Quizlet for learning English. The post-test was similar in structure to the first test, to assess whether certain changes occurred during training with the application. Also, post-testing aimed to determine how effective learning using the application was compared to using traditional language learning methods. The empirical results were collected by the study team after each test and systematised. All the obtained data were also rigorously checked by the students' teachers, who were also included in the process of checking the results and, together with the study team, classified the results according to the language proficiency levels. In this way, the data was collected, systematised, and displayed in the form of tables in the results.

## 2.4 Statistical processing

The study employed a statistical comparative analysis of the mini-test results between Group 1 (which used the Quizlet mobile application) and Group 2 (which used the traditional method). For this purpose, it was necessary to use statistical processing methods, such as the ANOVA test. An Excel program with built-in functions for convenient calculation was used to collect data from a questionnaire aimed at determining the involvement of teenagers in mobile technologies. Also, the data collected as a result of pre- and post-testing were subjected to calculations using the Excel program.

## 2.5 Research limitations

A two-week training period may be insufficient to determine the long-term impact of using mobile apps on learning. The study did not address the possible influence of external factors, such as individual levels of motivation and support, on learning outcomes. The sample size may also be one of the limitations of this study. For more detailed results, it is worth choosing a larger sample size, which consists of 200 or more people. Also, one of the limitations is that the study considered only foreign language learning for the experimental group using one mobile application without additional digital resources. For more detailed and extensive results, it is

worth adding other types of digital technologies to the use of the mobile application, such as viewing video materials or gamification elements.

## 2.6 Ethical issues

All participants provided their voluntary consent to participate in the study. The ethics committee of vocational colleges of foreign languages in Russia approved the study. All personal data of study participants and personal answers to tests were not to be disclosed to third parties. All data were systematized only by the study group directly during the study. The confidentiality rights of the participants were not violated. All participants gave their personal, informed consent to participate in the study.

## 3 RESULTS

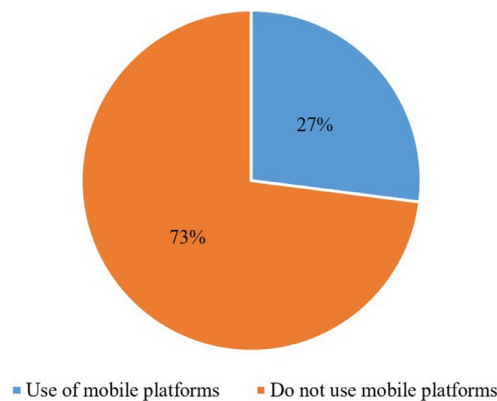
The first stage of the study involved a survey of students on the use of mobile platforms for learning English (see Figure 2). This stage was key in collecting important data for further analysis of the impact of mobile applications on learning English. The questionnaires included carefully selected questions to ensure the collection of high-quality and relevant data. The participants reported their use of mobile phones to learn English, including the frequency of use. They also provided information about specific mobile apps they used and discussed how the functionality of these apps motivated them to learn. The questionnaires also gathered data on the duration of mobile application usage and assessed students' interest in learning English through these tools. Another important part of the questionnaire included questions about the advantages and disadvantages of using mobile applications. There were also questions concerning the possible difficulties that students could face using these apps for learning.

<p><b>Survey</b></p> <p>Mobile platforms for learning English as a foreign language</p> <hr/> <p>How often do you use your phone to learn English?</p> <p><input type="radio"/> Every day</p> <p><input type="radio"/> Several times a week</p> <p><input type="radio"/> Rarely</p> <p><input type="radio"/> Never</p>	<p>Do you think that using mobile apps facilitates the process of learning English?</p> <p><input type="radio"/> Yes</p> <p><input type="radio"/> No</p> <p><input type="radio"/> Possibly</p> <hr/> <p>What advantages do you see in using mobile apps to teach English? (select all suitable answers)</p> <p><input type="checkbox"/> Convenience</p> <p><input type="checkbox"/> The ability to study anywhere</p>
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**Fig. 2.** Survey of students on the use of mobile platforms for learning English

Source: Developed by the authors.

The questionnaires revealed that among 140 study participants, a vast majority (102 people, which is 72% of the total) used mobile applications for active English learning. This number is a significant proportion of participants, which indicates the tendency to use mobile platforms for learning. At the same time, 38 students noted that they mainly used textbooks and additional paper sources of information (see Figure 3).



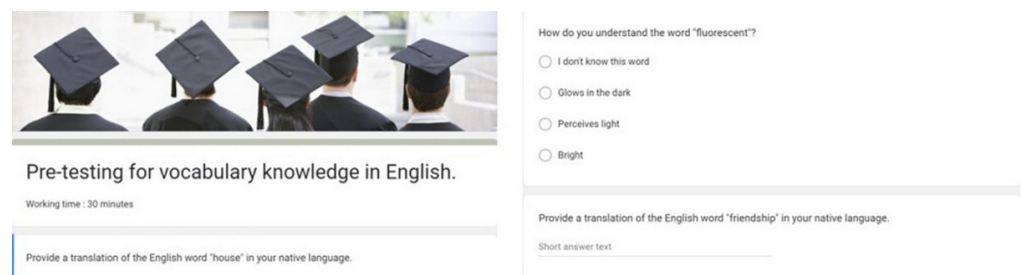
**Fig. 3.** The survey results

Source: Developed by the authors.

Such a large number of participants using mobile applications for teaching English indicates the significant impact of this method of learning on the modern educational environment. Therefore, it is crucial to continue the analysis to investigate how this impact affects the learning and psycholinguistic processes of participants.

The next step in the study was to divide the participants into two groups, Group 1 and Group 2. This stage included a preliminary test to determine their initial levels of vocabulary in English. A preliminary assessment of the language proficiency in each group was necessary for creating a baseline for further comparative analysis.

Initially, the participants were carefully and impartially sorted into two groups based on specific criteria, including their level of English proficiency, prior learning accomplishments, and other relevant factors. This process guaranteed the comparability of the groups while eliminating any potential influence of prior experience on the outcomes. Moreover, both groups participated in an initial assessment aimed at gauging their English vocabulary proficiency (see Figure 4). This assessment was carefully crafted to evaluate their grasp of English words and phrases. Participants responded to questions related to vocabulary, the translation of words and phrases, and the application of words in sentences. The outcomes of this assessment yielded crucial information about each participant’s existing vocabulary proficiency prior to the commencement of the training.



**Fig. 4.** The preliminary assessment of participants (vocabulary)

Source: Developed by the authors.

The test results indicate a range of English vocabulary levels among the participants in Group 1 and Group 2 (refer to Table 1). This test aimed to show the current state of their language skills and vocabulary before the training based on mobile applications.

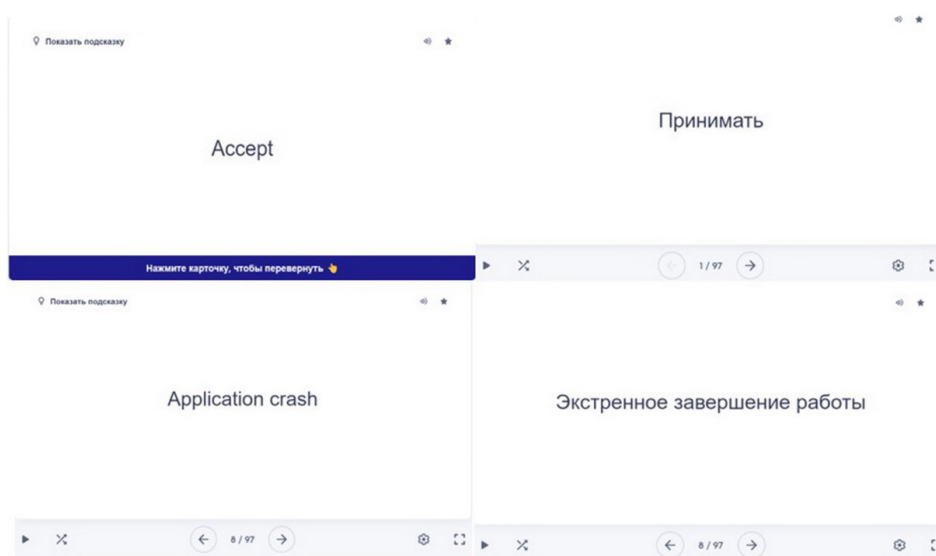
**Table 1.** The preliminary assessment results of Groups 1 and 2

Levels	Group 1	Group 2
Advanced	15 (21%)	9 (12%)
Intermediate	42 (60%)	50 (71%)
Beginner	13 (18%)	11 (15%)

An advanced level implies that students have an expanded vocabulary and can comfortably express their thoughts and ideas. An intermediate level of vocabulary proficiency suggests a basic vocabulary and an ability to understand and use common words and phrases. Learners with a low vocabulary proficiency level (beginners) have a limited vocabulary and face difficulties in expressing their thoughts and understanding a foreign language. In Group 1, about 21% (15 participants) had an advanced level of English vocabulary. Some participants (42, or approximately 60%) had an intermediate level. Finally, 13 participants (approximately 18%) had a low vocabulary proficiency level. In Group 2, nine participants (approximately 12.8%) had an advanced level of vocabulary proficiency. Most participants (50, or approximately 71.4%) had an intermediate level of vocabulary proficiency, and 11 participants (approximately 15.7%) had a low level. After the test, the students received two weeks of training. Group 1 studied words on the Quizlet Mobile platform; Group 2 studied words using traditional methods and memorization.

### 3.1 Group 1 (Quizlet)

Group 1 participants studied words using Quizlet. This mobile app provides a convenient way to learn and repeat words by using flashcards and other interactive methods (see Figure 5). Over a span of two weeks, they methodically engaged with new vocabulary, completed exercises and assessments within the application, and monitored their advancement. Three times per week, students underwent brief tests to evaluate their grasp of the newly learned words and gauge their academic development.

**Fig. 5.** Learning words from Quizlet flashcards (Group 1)

Source: Developed by the authors based on materials from Quizlet.

### 3.2 Group 2 (traditional methods–memorization)

Group 2 participants learned words following the traditional approach—by repeating and memorizing words by heart. They used conventional teaching tools, such as textbooks, notebooks, and notes. For two weeks, students improved their vocabulary skills within the framework of this traditional method. As in Group 1, the participants took mini-tests three times a week to measure their progress.

Thus, the training allowed the participants to gain intensive experience learning words in different formats. Group 1 used an interactive and mobile approach, while Group 2 improved their skills using traditional methods. After completing the two-week training, participants in both groups underwent additional testing. This testing aimed to assess changes in the level of vocabulary proficiency after the training (see Figure 6). The second test was the key point of the study, as it determined how effectively each method affected the vocabulary of students.

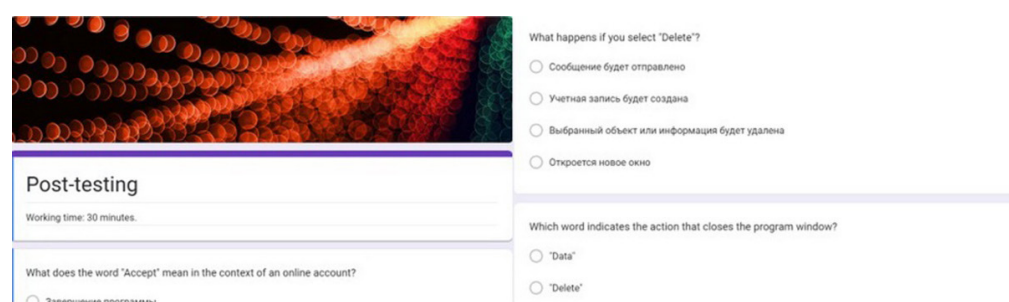


Fig. 6. The post-test of participants' vocabulary

Source: Developed by the authors.

The post-test results indicate significant changes in the knowledge of participants in both groups (refer to Table 2). To evaluate the results obtained after the test, the answers were classified according to correct and incorrect. The number of correctness and incorrectness answers in each group was analyzed using Microsoft Excel, after which the built-in t-test function was applied and the data were processed with percentage values according to the students' proficiency levels.

Table 2. The post-test results of Groups 1 and 2

Levels	Group 1	Group 2
Advanced	21 (30%)	10 (14%)
Intermediate	40 (57%)	49 (70%)
Beginner	9 (12%)	11 (15%)

Source: Developed by the authors.

**Group 1. Advanced level of vocabulary:** After completing a two-week training in Quizlet, 21 participants improved their vocabulary and achieved an advanced level. This is 30% of the total number of participants in this group. This indicator is very impressive and confirms the high efficiency of using the mobile application for learning.

**Intermediate level of vocabulary:** The other 40 participants achieved an intermediate level of vocabulary (57% of all participants in Group 1). This result is



also positive, as the percentage of intermediate level students increased by 3% after training in the Quizlet app.

**Low level of vocabulary:** Only nine (12%) participants demonstrated a low level of vocabulary. This result indicates that most participants improved their vocabulary level.

**Group 2. Advanced level of vocabulary:** In Group 2, the percentage of students with advanced vocabulary remained almost unchanged, with 10 participants at this level (14%).

**Intermediate level of vocabulary:** The number of participants with an intermediate level of vocabulary in Group 2 decreased to 49 people (70%). This fact indicates that the traditional method has had almost no effect on improving vocabulary.

**Low level of vocabulary:** 11 participants remained at a low level of vocabulary (15%).

After the post-test, many participants expressed their thoughts and comments on using the Quizlet platform for learning English. These comments reflect various aspects of the study and the correlation of the results.

### 3.3 Advantages of Quizlet

According to the participants, the following benefits were reported:

**Convenience and accessibility:** Many participants noted how convenient and accessible it was to use Quizlet to study words. They mentioned that the application was easy to install on mobile devices and that it provided the opportunity to study anywhere and at any time.

*“Quizlet has been helping me study well since my school days. And the cards are available on the road, which is very saving in college.”*

Source: The participant's comment.

**Interactivity:** The participants noted the interactivity of learning through Quizlet. They were involved in doing exercises, testing their knowledge, and cooperating with other users.

**Increased motivation:** The mobile app created additional motivation for learning. Participants noted that contests, schedules, and the ability to track progress contributed to their desire to learn. With the help of learning using a digital program, students were able to learn words at a more comfortable and relaxed pace, individually according to their abilities and skills. Students emphasized that in this way, learning is more interesting and convenient, and it makes them want to study the material further. Because participants could see their progress, i.e., the number of words they had already learned in the app, they felt happy about the effort and being able to see the results afterwards. Also, an important factor emphasized by the students is the support and feedback from the application, because when a student incorrectly chooses the translation of a word or names it incorrectly, the application takes this factor into account and, in the future, more often displays those words with which the student has difficulties.

**Improved memorization:** Many participants admitted that, due to Quizlet, it became easier for them to remember words. They felt their memory improved after using the program.

*“Quizlet helped me move from passive memorization to active. Therefore, I remember information faster than when rereading notes.”*

Source: The participant's comment

### 3.4 Limitations of using Quizlet

The participants noted the following drawbacks:

*Need for self-discipline:* The use of a mobile app for learning requires self-discipline. Some participants noted that they were easily distracted from learning because of other functions of their mobile devices.

*Need for Internet access:* Quizlet requires Internet access, which can be challenging in some cases. The students also emphasized that the quality of the Internet should be stable for studying with the help of this application. You can use the application both on a mobile device and with the help of a laptop, tablet, or computer. You can use the application from any smartphone; however, it is impossible to use it when using push-button telephones of old models.

These results are extremely important for understanding the impact of mobile platforms, in particular Quizlet, on memorizing words and the memory functions of adolescents learning English. A detailed analysis of the results reveals improvements in vocabulary and perception of information among the study participants.

The participants in Group 1 demonstrated notable achievements in learning English vocabulary. In general, 30% of the participants achieved an advanced level of vocabulary, which is a significant improvement. At the same time, the percentage of participants with intermediate levels in this group also saw a considerable increase, reaching 57%. This result indicates that the mobile application not only facilitated the memorization of words but also improved the ability to recognize other linguistic aspects. The interactivity of Quizlet could increase the attention and concentration of adolescents, leading to vocabulary improvement. In addition, improvements in memory functions could also be a key factor. The participants managed to memorize words better, as the training rested on exercises that implied active participation and stimulated the memorization process.

Compared to Group 1, Group 2 did not show significant improvements in vocabulary. Even participants with advanced vocabulary remained almost at the same level. This result may indicate that traditional learning based on memorizing and performing exercises is ineffective for adolescents who seek to improve their vocabulary. Therefore, the importance of using modern mobile platforms in the educational process is extraordinary. These tools can increase the memorization of words as well as improve the memory functions and perception of information among learners. The results of this study demonstrate an important step towards using technology to improve language learning.

For the analysis of several variables, the ANOVA test showed the following results:

The main effect of method:  $p = 0.03 (< 0.05)$ , a meaningful interaction, indicating that the method of training (using Quizlet versus traditional) has a considerable impact on vocabulary development.

The main effect of language proficiency level is  $p = 0.01 (< 0.05)$ , a highly significant effect showing that the entry level of language proficiency has a positive effect on learning vocabulary.

The effect of interaction:  $p = 0.02 (< 0.05)$ , a statistically significant result that shows that the effect of the teaching method on vocabulary improvement varies with the initial level of language proficiency.

In general, the results showed a positive effect of using the Quizlet mobile application on improving the process of memorization, effectiveness, and success in the process of learning a foreign language. The beneficial impact of using the application is attributed to the observed changes in results following a two-week training period with the application. Compared to the experimental group, the group that used traditional methods showed lower test results, which indicates a lower effectiveness of using traditional methods in the process of learning English compared to using digital resources. Thus, the cognitive theory of multimodality is confirmed by the results of this study, which show a direct positive effect of the use of interactive resources compared to traditional methods. Thus, the purpose of this study was to show how effective the use of mobile applications and digital resources is in the process of learning foreign languages by teenagers. The goal was achieved by conducting an experimental analysis using the mobile application by teenagers, after which they demonstrated better results than before starting to use the application.

## 4 DISCUSSION

It is necessary to find the similarities and discrepancies between the above results and previous studies on the impact of mobile platforms on English language learning. The comparison can highlight important aspects and identify discoveries in this area. Researchers have already studied the effects of mobile apps such as Anki or Memrise on word memorization. The results indicated a significant improvement in memorization and an increase in vocabulary levels among users of these applications [29], [30]. This study also showed the effectiveness of the Quizlet program in learning a foreign language. The results of both studies point to the positive effects of using digital resources to memorize new words. However, in this study, the aspect of memorization was analyzed from a psycholinguistic point of view, from which it follows that the use of the Quizlet mobile application affects not only the academic level of success but also the motivation of students and their encouragement to study. Another study focused on the use of interactive learning applications on mobile devices for teaching foreign languages. It showed that the applications can improve memory and help users memorize new words better [31]. Some papers have studied the influence of game-based learning methods on word memorization. Their authors have confirmed that gaming aspects of mobile applications stimulate memory and improve learning outcomes [32]. Some researchers compared different mobile platforms for learning words and vocabulary. They found a difference in effectiveness between different applications and highlighted which ones are most useful for improving memorization. Another study investigated the impact of mobile platforms on English language teaching among children and adolescents. The results showed that children who used mobile apps to learn words were more likely to achieve better results in memorization and vocabulary proficiency [33]. This study also analyzed the impact of using the application specifically for teenagers. Compared to children's education, teenagers usually find it more difficult to adapt to new changes because they already have an established understanding of the organization of the educational process. While for children, everything is new, and they are just trying the methods suggested by the teacher. However, this study shows that the use of mobile resources is fully suitable for teenagers, as they easily adapted to innovations in

the educational process and indicated that their level of motivation and interest in the subject increased. This indicates that the use of the Quizlet application can be suitable and effective not only for teenagers but also for children and probably for adults.

Considering these previous studies, one can conclude that mobile platforms for learning English foster word memorization and develop vocabulary. Some studies have also presented the results of traditional teaching methods, such as the use of textbooks, lectures, and memorizing words by heart. The results showed that those methods were effective and significantly improved the vocabulary of the participants [34, 35]. In other studies, researchers considered individual differences among participants, such as motivation level, learning style, and previous knowledge. They noted that some participants can achieve better results using traditional methods, while others may prefer mobile platforms [36]. Study results can largely depend on external factors, such as Internet access, the quality of mobile devices, the level of support from teachers, and so forth [37], [38]. For example, in regions with limited access to the mobile Internet, traditional teaching methods may be more effective due to the lack of access to mobile applications [39].

Considering the above examples, the effectiveness of traditional methods of teaching English can vary and depends on many factors, including the individual characteristics of participants and external conditions. This study expands this understanding by showing the benefits of using mobile platforms to teach words and vocabulary. The general context of previous studies indicates that the use of mobile platforms for teaching English facilitates the memorization of words and expands vocabulary. This trend is a constant factor in language education studies. This study confirms that the Quizlet program is an effective tool for learning new words. This conclusion is consistent with previous studies that have also noted the effectiveness of this application in the learning process.

The results of the studies may differ due to the different approaches, methods, and contexts in which they were conducted. Some studies may favor traditional teaching methods, while others emphasize the advantages of mobile platforms. Another important factor is the individual characteristics of the participants. Study results may vary depending on the level of motivation, learning style, and previous knowledge of each participant.

Overall, despite variations among studies, the prevailing consensus underscores the significance of employing mobile platforms in contemporary language education. Previous and current studies suggest that these applications improve skills and expand vocabulary, making learning more interactive and interesting. The results of this study indicate the importance of mobile platforms, in particular the Quizlet program, in teaching English among adolescents. Thus, this study, compared to previous ones, shows not only the impact of digital resources, in particular the use of the Quizlet mobile application, on the success of students in learning a foreign language but also provides new empirical evidence that the use of the mobile application also affects the level of motivation of students. Also, this study, compared to the previous ones, which focused on the study of the impact of using digital resources in the process of teaching children, shows the effectiveness of using a mobile application, especially among teenagers.

The concept of “mobile learning” encompasses modern approaches to education, including mobile technologies and interactive teaching methods. The results contribute to the existing corpus of data on the use of mobile platforms for teaching English. The findings broaden the understanding of the learning process and vocabulary

improvement through mobile applications. Another important contribution is the demonstrated effectiveness of the Quizlet program in this context.

## 5 CONCLUSIONS

The results of this study emphasize and provide new empirical data on the use of digital resources in the language learning process. The findings indicate the favorable outcomes of utilizing digital resources, specifically the Quizlet mobile application, in English language learning. In particular, the results indicate an increase in the effectiveness of memorizing new words in English for teenagers. Also, the study provides valuable results on increasing the level of motivation among teenagers when using the application and encouraging their desire for the educational process. This study highlights the importance of using new technological tools and new approaches in the modern education system and provides new insights into how traditional learning can be improved through the use of digital tools. The study also provides valuable results on how the use of new approaches with elements of digital technologies can affect psychological aspects such as memorization and motivation in adolescents. The numerical metrics validate the efficacy of Quizlet in teaching English vocabulary to adolescents. The results underscore the significance of incorporating contemporary mobile platforms into language education. These findings can inform the creation of innovative curricula and mobile applications for language acquisition, utilizing interactive methods and approaches. Furthermore, this study lays the groundwork for future studies in the realm of language education and the integration of mobile platforms for learning. Further studies could explore alternative methods and programs, as well as delve into how individual differences may influence learning outcomes.

### 5.1 Practical implications

The practical value of this study also lies in the provision of information that can be used in the context of language education, particularly when learning English. Educational institutions can build on the results presented in this study and take into account the methodology for use in teaching English. In particular, the study of the vocabulary of English words can be better learned by students after using these methods. In the era of globalization, characterized by ongoing global change, the field of language education and practice is evolving and advancing. This study provides valuable information about the effectiveness of using mobile platforms to learn English. With the help of the integration of mobile platforms, the quality of learning English, in particular the learning of the lexicon, improves and becomes more effective. Educational institutions can add the Quizlet mobile platform during the development of English language curricula and engage students in learning English more effectively. When developing educational programs, educators can pay attention to the inclusion of various mobile platforms and digital resources to improve the effectiveness of English language learning. Mobile platforms in the learning process can also be supplemented with gamification elements or video and audio materials that will serve as auxiliary resources for effective language learning. Further study in this field can study how effective the use of digital resources is for adults and how it affects their psychological aspects in the process of learning foreign languages. Also, further study can be done to study how effective is



the implementation of digital resources for learning another foreign language, for example, European or Eastern languages such as Chinese, Korean, German, French, etc. Also, further study can study the effectiveness of using other digital resources, such as Memrice or Duolingo mobile applications, or using machine learning to improve language skills.

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## 7 CONFLICT OF INTERESTS

The authors declare that they have no conflict of interest.

## 8 DATA AVAILABILITY

Data will be available upon request.

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## 10 APPENDIX

### 10.1 Survey on mobile application use for learning a foreign language

**Introduction.** This survey aims to understand how adolescents use mobile applications for learning foreign languages. Your participation is voluntary, and your responses will remain confidential.

#### Demographic information

Age: \_\_\_\_\_

Gender:

- Male
- Female
- Prefer not to say

How many years have you been studying foreign languages?

- 1 year
- 2–3 years
- More than 3 years

#### Mobile application usage

How often do you use mobile applications to study a foreign language?

- Daily
- Several times a week
- Once a week
- Occasionally

Which language are you currently learning through mobile apps?

- English
- Spanish
- French
- German
- Other: \_\_\_\_\_

Which apps do you use most frequently? (Check all that apply)

- Duolingo
- Memrise
- Babbel
- Busuu
- Other: \_\_\_\_\_

#### Learning preferences

Which language skills do you focus on the most when using these apps?

- Vocabulary
- Grammar
- Listening
- Speaking
- Reading
- Writing

Do you use these apps independently or as part of a formal class?

- Independently
- As part of a class

### Effectiveness and motivation

How effective do you find mobile applications in helping you learn a foreign language?

- Very effective
- Moderately effective
- Slightly effective
- Not effective

What motivates you to use mobile applications for language learning? (Check all that apply)

- Enjoyment
- Convenience
- Requirement for school
- Desire to improve skills
- Social interaction on the app
- Other: \_\_\_\_\_

### Challenges and suggestions

What challenges do you face when using mobile applications to learn a foreign language? (Check all that apply)

- Lack of time
- Difficulty in understanding content
- Lack of interaction with a teacher
- Motivation issues
- Technical problems with the app
- Other: \_\_\_\_\_

How could these mobile applications be improved to help you learn more effectively?

(Open-ended response)

The pre-test: <https://docs.google.com/forms/d/e/1FAIpQLSeQn5iMZNlnTv-3v1DRVfEjZfhmRtb8KQ983DXpUqX1CDvFj5g/viewform>.

The post-test: [https://docs.google.com/forms/d/e/1FAIpQLScq70bt5ECzxSnQux-aWDe9pAk3b0\\_PdG57B2YVgo0E8JHh1cg/viewform](https://docs.google.com/forms/d/e/1FAIpQLScq70bt5ECzxSnQux-aWDe9pAk3b0_PdG57B2YVgo0E8JHh1cg/viewform).

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