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The Effects of Plickers on English Vocabulary Achievement, Motivation and Anxiety

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Abstract

The purpose of this research is to examine whether the use of Plickers in English language teaching has any effects on students' motivation, anxiety and academic achievement. In this context, this study was held with 61 students studying in the ninth grade of a high school that is located in a rural region in the east part of Turkey. In this research, the effects of Plickers tool on students' vocabulary learning motivation, anxiety and academic achievement within the scope of English lessons were discussed. The result of the analysis showed that the motivation and academic achievement of the study group increased significantly compared to the control group. A significant increase was seen in the control group students while a significant decrease was found in the experimental group students in terms of the anxiety variable.

Keywords: Plickers, Foreign Language, Anxiety, Motivation, Vocabulary

1. Introduction

Being accepted as the common language, English has come to the fore in the field of science, art, literature, education and business, thus learning English and acquiring English language skills have become a necessity (Rao, 2019). Knowing English is the most important way of communicating all over the world, being aware of the world and making your voice heard. At the point of English, countries have different language teaching-learning policies and curricula in accordance with these policies (Jarvis, 2005). It can be claimed that English education curricula are determined on the needs of societies, and the needs of society are affected by developments such as the advancement of technologies used in daily life and the emergence of new teaching methods and techniques.

The majority (90%) of educators in Europe are using technology to prepare their lessons (Chhabra, 2020). Technology has become an important fact of society that supports students in terms of understanding the world in deep and is not limited to what they learn in the classrooms (Warschauer, 2000). Today, it can be thought that technologies such as computers, mobile phones, tablets, and internet connections are parts of daily life and this situation causes technology to create a global infrastructure for students to learn. Technology has changed the learning habits of today's generation Z students (Masita & Mağaza, 2020). In educational environments, teachers need new methods and techniques that can meet the requirements of students, which is the reason why teachers

use various applications among which interactive boards, tablets and web 2.0 tools can be considered (Kozikoğlu & Babacan, 2019). In addition to changing the roles of teachers in the classroom, information technologies also offer various software and websites that can be handled in educational processes (Ruthven, Hennessy, & Deaney, 2005; Seal & Przasnyski, 2001). With this research, the effects of Plickers web 2.0 tool that can be considered within the scope of information technologies, on English vocabulary were discussed.

1.1. Technology Assisted Language Learning

As technology becomes a part of people, educators are looking for ways to adapt technology to education and enable students to make the most of technology, and studies on technology integration in education are being carried out (Bradley, 2020; Burch & Mohammed, 2019; Selli Hernawati, 2019; Silva, Silva, & Bilessimo, 2020). Mobile Learning, as its name implies, often takes place outside of the classroom while waiting or wandering around (Stockwell, 2008), and this indicates a transition from the traditional computer-assisted (CALL) language learning concept that often occurs within a classroom (Stockwell, 2012). Mobile technologies can effectively increase students' proficiency in language acquisition process (Sung, Chang, & Yang, 2015). Yang (2013) stated that the improvement of mobile technology also improves language teaching and learning processes.

Digital technology has been recognized as one of the most prominent driving force behind language learning, particularly in the last decade, has attracted attention as an educational tool, drastically changing the tradition of teaching English (Abbasova & Mammadova, 2019). Nawaila, Kanbul, & Alhamroni (2020) stated that technology is inevitable at the point of fostering teaching and learning. Based on this statement, it can be said that technology use in English teaching and learning can facilitate the learning process. Students who learn English often need the basic skills (listening, speaking, reading and writing) exercises to enhance their abilities (Ybarra & Green, 2003). These needs in foreign language learning can be covered with ease by using technology (Nawaila et al., 2020). In this study, within the scope of students' basic language skills, vocabulary knowledge was discussed and the effects of the Plickers tool were investigated.

In a research made by Saran, Seferoğlu, & Çağiltay (2012) some techniques were examined such as mobile devices, web pages via computers and classic paper format to investigate the most functional method. The research result showed that learners who used mobile devices to practice English vocabularies learned more. Basoglu & Akdemir (2010) stated that learning vocabularies using mobile devices is more efficient than paper formats such as flash cards. Sandberg, Maris, & De Geus (2011) stated that using smart phones to learn English is better for students as mobile devices can be taken everywhere, which allows continuity of learning, and "anytime, anywhere" specialty. Learning vocabulary with mobile technologies has a positive contribution on student learning as well as increasing the teachers' effectiveness (Chen & Li, 2010; Kim & Kim, 2012). Mobile technology use for English vocabulary can enhance learning thanks to the facilitation technology can provide (Basoglu & Akdemir, 2010; Cavus & Ibrahim, 2009; Thornton & Houser, 2005). Mobile devices can be used as a dictionary and students can easily reach these dictionaries, allowing them access to relevant information, thus saving time. Song & Fox (2008) stated that students could use mobile devices as "internet-supported dictionaries" that facilitate students to improve their vocabulary skills. In addition, Sato, Matsunuma, & Suzuki, 2013 concluded that acquiring foreign language vocabulary by using mobile technologies increases knowledge of vocabulary. Thus, students save on cognitive resources that they can refer to later for reading, resulting in successful reading comprehension in a foreign language (Sato, Matsunuma, & Suzuki, 2013).

Information technologies that can be used in foreign language education include computers, smartphones, tablets and interactive boards, as well as various web 2.0 software such as Facebook, YouTube, Kahoot, Plickers, Socrative and Padlet. Macaskill & Owen (2006) describes Web 2.0 tools as "web-based platforms" where users can share their content such as video, audio, text, graphics and pictures, write notes, comment on these contents, and interact. Harris & Rea (2019) stated the necessity of Web 2.0 tools in education with the following words: "Web 2.0 tools expand the classrooms and even make the world itself a class."

Plickers is a web 2.0 application that enables the interaction between cameras and mobile phones by scanning QR-Code cards via a mobile application and is used within the scope of assessment and evaluation. In this study, the assessment and evaluation dimensions of web 2.0 tools are discussed. Among the most known web 2.0 tools that

can be considered as assessment and evaluation processes are tools such as Kahoot, Plickers, Quizizz etc. In order to use Kahoot and Quizizz applications in teaching process, both students and teachers must use technology actively. This may become impossible for students studying in disadvantaged regions in terms of technology accessibility. On the other hand, the Plickers tool, which is planned to be used in this study, only requires the use of technology by the teacher. Thus, the necessity for students to have a computer, tablet or smartphone is eliminated, making applicability easier. Instead of such technologies, students are given QR codes that are automatically prepared by the system in advance, and students are involved in the process with these code cards. Students answer the questions by rotating these cards given to them.

1.2. The Aim and Importance of the Research

Foreign language teaching in Turkey has not reached a successful level (Deregözü, 2021). Anxiety and motivation levels in foreign language education can be counted among the reasons that affect performance (Becirovic, 2020). Language is important in terms of providing opportunities for the individual in many ways such as generating ideas, revealing the produced ideas, learning and gaining personality (Özbay, 2010). Without words, the smallest structure of the language, these abilities cannot be formed (Ersoy & Boyacı, 2018). In other words, it can be said that a person cannot fulfill the language function without vocabulary.

Vocabulary knowledge in a second language is essential to have an effective communication, and therefore vocabulary is often seen as a substantial matter for foreign language students (Alqahtani, 2015). Learning vocabulary elements in English learning is thought to take a significant part in all language skills “listening, speaking, reading, and writing” (Nation, 2013). Vocabulary knowledge while learning a foreign language has an essential part in high-level language acquisition processes such as reading comprehension, text model and grammatical structure comprehension (Chall, 1987). Based on these, it can be concluded that it is a necessity to have vocabulary knowledge in foreign language acquisition. This study is also important as it addresses vocabulary knowledge directly.

Low motivation is a vital problem in vocabulary knowledge as well as learning English (Tanaka, 2017). When students listen to the meaning, pronunciation and spelling of new words from their teachers in a passive way, their motivation to learn vocabulary decreases (Huyen & Nga, 2003). This situation pushed researchers to study student motivations in foreign language and vocabulary learning (Aydın, 2020; Bai, 2018; Tanaka, 2017; Wang, Huang, & Hsu, 2015). This study is important in terms of addressing vocabulary learning motivation.

It can be said that learning vocabulary in a foreign language takes time, and this can be considered as one of the reasons why students always experience anxiety in learning vocabulary (Su-chun, 2012). Although studies show that there is a negative correlation between vocabulary knowledge and second language anxiety (Chen, 2015), there are limited studies on vocabulary learning anxiety rather than foreign language anxiety in general (Chen, 2015; Önem, 2015). According to the Input Hypothesis, students can acquire the target language by accepting comprehensible inputs when they have high motivation, self-reliance, and low anxiety (Krashen, 1992), and it can be said that foreign language vocabulary learning process also requires these conditions. This research is essential in terms of contributing to the literature on students' vocabulary learning anxiety.

Various researches on the use of the plickers tool in teaching and learning processes were found in the literature review (Chng & Gurvitch, 2018; Kent, 2019; Krause et al., 2017; Wood et al., 2017; Zengin et al., 2017). In addition, some studies can be found regarding Plickers in foreign language education (Michael et al., 2019; Nguyen, 2019; Sasmiko et al., 2019). However, in the literature review conducted within the scope of this research, no study regarding Plickers tool was found for vocabulary knowledge in English language education processes. In this study, the use of Plickers in English lessons was discussed, and on this occasion, the variables of vocabulary learning motivation, vocabulary learning anxiety and academic achievement were examined. This study is thought to be important as it contributes to the literature in terms of the Plickers tool with motivation, anxiety and vocabulary knowledge in English language education.

This study aims to examine whether Plickers use in English language teaching has any effect on students' motivation, anxiety and vocabulary achievement. As mentioned in the problem situation of the study, it is thought

that vocabulary knowledge, vocabulary learning motivation and vocabulary learning anxiety have an essential place in English language teaching and learning. In this context, this study aims to examine students' vocabulary learning motivation, vocabulary learning anxiety and academic achievement regarding English Vocabulary using the Plickers tool.

In this context, answers are being sought to the questions given below.

1. What is the effect of using Plickers on vocabulary learning motivation?
2. What is the effect of using Plickers on vocabulary learning anxiety?
3. What is the effect of using Plickers in English classes on academic achievement?

2. Method

2.1. Research Model

In this study, quasi-experimental design with pre-test -post-test control groups was used within the scope of quantitative research methods.

2.2. Study Group

The study group includes 9th-grade students in a rural area in Van province of Turkey. The study was carried out in the first term of the 2020-2021 academic year. In determining the participants, convenience sampling was taken as a basis. A total of 61 students, 31 of them in the research group and 30 of them in the control group, took part in the research. Descriptive data regarding the control and experimental groups are shown in Table 1.

Table 1: Descriptive Data Regarding Control and Research Groups

	Demographic features	Category	Number (N)	Percent (%)
Control Group	Gender	Male	16	53
		Female	14	47
	Computer use	Yes	5	17
		No	25	83
	Phone use	Yes	10	33
		No	20	67
Experimental Group	Gender	Yes	19	61
		No	12	39
	Computer use	Yes	5	16
		No	26	84
	Phone use	Yes	17	55
		No	14	45

The control group includes 16 (53%) male and 14 (47%) female students. Five (17%) of the students use a computer while studying, 25 (83%) of them do not use a computer. Ten students (33%) use a phone while studying, 20 (67%) do not use a phone while studying.

The experimental group includes 19 (61%) male and 12 (39%) female students. Five (16%) of the students use a computer while studying, 26 (84%) of them do not use a computer. Seventeen students (55%) use a phone while studying, 14 (45%) do not use a phone while studying.

2.3. Context and Data Collection Process

The participants of this research consisted of 9th-grade students who study in a rural area in Van province of Turkey. As the students live in a rural area, majority of the participants' interaction with digital-technology realize only at school environment. Interactive boards and internet infrastructure are available at the school. The study was conducted during the first term of the 2020-2021 education year in a time interval that the schools were open

temporarily due to the COVID-19 pandemic. As the shutdowns and openings due to the pandemic were not foreseen, accessibility to the schools and students was the priority while conducting this research. Taking this into consideration the samples were determined. Although the samples consisted of students with similar backgrounds, due to the constraints of sampling, the first measurement results of the groups were taken as the covariance variable. Thus, ANCOVA was used to eliminate the weakness of the sampling. More importantly, as it was stated by Dugard & Todman (1995) “an ANCOVA on post-test scores, with pre-test scores as co-variate usually provides a more appropriate and informative analysis”.

Within the scope of the pre-test, the participants in the research and control groups were applied a vocabulary learning motivation scale, vocabulary learning anxiety scale and vocabulary achievement test. Vocabularies were studied by using the Plickers tool for three weeks with the experimental group, while in the control group, classes were taught using worksheets containing matching and multiple-choice exercises. For the last step of the process, vocabulary learning motivation scale, vocabulary learning anxiety scale and vocabulary achievement test were applied to the research and control groups within the scope of the post-test.

The data collection tools were examined with the authorities of the institute and it was evaluated that the participants would not be harmed physically or psychologically in any way, and that their identity privacy was protected; therefore, it has been stated that there is no need for an ethics committee decision.

2.4. Data Collection Tools

In this research, four data collection tools were used: demographic information form, vocabulary learning anxiety scale, vocabulary learning motivation scale, and vocabulary achievement test. Detailed information on these data collection tools is given below.

2.4.1. Demographic Information Form

A form was created by bringing together the variables frequently encountered in the literature review on the subject of the research by the researcher. Through this form, students' information such as gender, age, and whether they use a mobile phone while studying or not.

2.4.2. Vocabulary Learning Anxiety Scale

The vocabulary learning anxiety scale aims to define the anxiety level of the learners while learning foreign language. The vocabulary learning anxiety scale created by Zhao et al. (2016) including 10 statements in 5-point Likert type. These items are brought together to determine the anxiety level of learners experience once they face with unknown vocabularies while reading. Participants answered 10 items on a Likert scale between 1 “strongly disagree” and 5 “strongly agree”. Zhao et al. (2016) found the internal consistency value (Cronbach's alpha) of the scale as 0.81. Since the scale of vocabulary learning anxiety is not in Turkish, two English teachers whose native language is Turkish first translated it into Turkish. As a result of the first translation study, the translation was evaluated by a total of three people, including a specialist academician and two English teachers who have graduated from the Computer and Instructional Technology Department (CEIT). With an agreement on the translation, two experts translated the scales back into English. At the end of this process, it was concluded that the translation was compatible with the source language, and small changes were made in the scales in a way that would not affect the meaning in order to adapt the scale semantically. A pilot study was conducted to determine whether each item has the same meaning for each student. The translated version of the scales was examined with a group of 20 people.

Content validity and structural validity were examined at the point of validity of the scale. Seeking an expert opinion is among the possible ways to test the content validity (Büyükoztürk, 2004). In this context, the opinions of four experts, two of whom are foreign language experts and two of them are experts in the field of CEIT, were taken. In order to establish the expert opinions on the validity of the scale items, a form with two responses as “appropriate / valid” and “not applicable” was used. The agreement levels of the experts for each scale item were

determined to be 90% -100%. In line with this ratio, it is accepted that the scale has content validity (Büyüköztürk, 2004).

Exploratory factor analysis was used to check the structural validity. According to the Barlett test ($p = 0.000 < 0.05$), the variables were seen to have a relationship. As a result of the KMO, sample size suitability was calculated as $0.655 > 0.60$. This value is considered sufficient for factor analysis (Kalaycı, 2010). The varimax method was used in the factor analysis and the structure of the variables was not changed. As a result of the factor analysis for the vocabulary learning anxiety scale, a factor was determined and it was concluded that this factor explains approximately 57% of the variance. The explained variance can be accepted as sufficient evidence for the validity of the scale. Explanatory Factor Analysis revealed that the items have factor load values varied between 0.49 and 0.72 in a single factor scale structure. Since the factor loads of each item are higher than 0.30, it has been found that the items are suitable for a single factor scale structure (Tabachnick & Fidell, 2013).

For the reliability of the scale, a Cronbach's alpha test was runned to observe internal consistency. The Cronbach's alpha value was seen as 0.72, which indicated that the scale reliable enough to be used in Turkish.

2.4.3. Vocabulary Learning Motivation Scale

The aim of the vocabulary learning motivation scale is to define the motivation level of the learners while acquiring a second language. The vocabulary learning motivation scale (Ersoy & Boyacı, 2018) consists of 24 items in 3-point Likert type. The scale aims to determine the motivation levels of students in learning vocabulary while learning a second language. In the development study of the scale, Cronbach's alpha value was found 0.85. The scale consists of 3 sub-dimensions: intrinsic motivation, extrinsic motivation, and purposeful motivation. Cronbach's alpha internal consistency value was reported as 0.85 in the scale's development study.

2.4.4. Achievement Test

The aim of the achievement test is to identify the vocabulary achievement level of the learners while learning a foreign language. The questions were obtained from the attainment tests published by the experts in the field, working at the a public school as English language teachers. The questions in the achievement test were gathered based on the 9th grade English textbook in public high schools called Teenwise. The achievement test includes 20 multiple-choice questions. The test was evaluated over 100 points, with five points for each question. The KR21 internal consistency value of the achievement test used for this study was found as 0.96.

3. Findings

In order to examine the pre-test and post-test data regarding the motivation, anxiety and academic achievement variables of the research and control group students for the research questions, paired sample t-tests and ANCOVA tests were performed. Findings obtained regarding the tests are listed below.

3.1. Motivation

The students went through two different processes, the Plickers tool in the research group and the paper based method in the control group. The results of ANCOVA performed to find out whether the change in vocabulary learning motivation of students in the research and control groups differ significantly is shown in Table 2.

Table 2: Vocabulary Learning Motivation Pretest - Posttest ANCOVA Results

Source of Variance	Sum of Squares	df	Mean Square	F	P
Between Subjects	8,754	60			
Group	,007	1	,007	,050	,824
Error	8,747	59	,148		

Within Subjects	1,682	61			
Measurement	,165	1	,165	6,646	,012
Group*Measurement	,054	1	,054	2,175	,146
Error	1,463	59	,025		
Total	10,41	121			

Considering Table 2, it is concluded that the vocabulary learning motivation levels of students who went through two different processes did not differ significantly in terms of pretest and posttest. In other words, the common effects of being in different groups and repetitive measures factors on vocabulary learning motivation are not significant, $F(1,59) = 2.175$, $p > .05$. This finding shows that Plickers do not have different effects on increasing students' vocabulary learning motivation compared to traditional methods.

In this study, the researcher's focus is on testing the effects of only two different applications on increasing students' vocabulary learning motivation, so the common effect of group and measurement factors are emphasized. Analysis also includes basic impact tests of group and measurement. The two main impact tests mentioned in this study can be interpreted in this way: There is no significant difference between the total mean scores obtained from the pre-test and post-test scores of the individuals in the experimental and control groups, $F(1,59) = .050$, $p > .05$. As can be seen, this test does not take into account the changes of the groups from pre-test to post-test. Regarding the main effect of measurement, it can be said that there is a significant difference between the pre-experiment and post-experiment motivation scores of the individuals involved in the study without making a group distinction, $F(1,59) = 6,646$, $p < .05$.

Since there is no significant difference in the motivation of the control group ($t(29) = -.59$, $p > .05$) as a result of the paired sample t test performed for the vocabulary learning motivation variable of the experimental and control groups of the study, only the experimental group data are presented. Experimental group data are given in Table 3.

Table 3: The Paired Sample t Test Results Regarding the Vocabulary Learning Motivation Variable

Group	Scale and sub-dimensions		N	\bar{x}	SD	T	df	P
Experimental	Motivation (total)	Pre-test	31	2,43	,37	-4,90	30	,00
		Post-test	31	2,54	,27		30	,00
	Internal	Pre-test	31	2,40	,41	-3,94	30	,00
		Post-test	31	2,48	,31		30	,00
	External	Pre-test	31	2,37	,39	-5,04	30	,00
		Post-test	31	2,52	,34		30	,00
	Purposeful	Pre-test	31	2,58	,41	-2,79	30	,00
		Post-test	31	2,71	,30		30	,00

When Table 3 is examined, the experimental group students' total motivation pre-test mean score is found to be 2.43 (SD = ,37) and the post-test mean score is found to be 2.54 (SD = ,27). As a result of the paired sample t test, this increase in the motivation variable is found to be significant ($t(30) = -3,24$, $p < .05$).

3.2. Anxiety

The students went through two different processes, the Plickers tool in the experimental group and the traditional method in the control group. The results of ANCOVA performed to find out whether the change in vocabulary learning anxiety of students in the experimental and control groups differ significantly is shown in Table 4.

Table 4: Vocabulary Learning Anxiety Pretest - Posttest ANCOVA Results

Source of Variance	Sum of Squares	Df	Mean Squares	F	P
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Between Subjects	1227,081	60			
Group	1187,129	1	1,115	1,647	,204
Error	39,952	59	,677		
Within Subjects	1,877	61			
Measurement	,196	1	,196	10,346	,002
Group*Measurement	,564	1	,564	29,780	,000
Error	1,117	59	,019		
Total	1228,958	121			

Considering Table 4, it is concluded that the vocabulary learning anxiety levels of students who went through two different processes differed significantly in terms of pretest and posttest. In other words, the common effects of being in different groups and repetitive measures factors on vocabulary learning anxiety are significant, $F(1,59) = 29.780, p < .05$. This finding shows that Plickers has different effects on students' vocabulary learning anxiety compared to traditional methods.

The focus of this research is on testing the effects of only two different applications on students' vocabulary learning anxiety, so the common effect of group and measurement factors are emphasized. Analysis also includes basic impact tests of group and measurement. The two main impact tests mentioned in this study can be interpreted in this way: There is no significant difference between the total mean scores obtained from the pre-test and post-test scores of the individuals in the experimental and control groups, $F(1,59) = 1,647, p > .05$. As can be seen, this test does not take into account the changes of the groups from pre-test to post-test. Regarding the main effect of measurement, it can be inferred that there is a significant difference between the pre-experiment and post-experiment anxiety scores of the individuals involved in the study without making a group distinction, $F(1,59) = 10,346, p < .05$.

The paired sample t test data for the variable of vocabulary learning anxiety related to the experimental and control groups of the study are given in Table 5.

Table 5: Paired Sample t Test Results Regarding the Vocabulary Learning Anxiety Variable

Group		N	\bar{x}	SD	T	df	P
Experimental	Pre-test	31	3,13	,73	5,02	30	,00
	Post-test	31	2,91	,63			
Control	Pre-test	30	3,18	,45	-2,30	29	,02
	Post-test	30	3,24	,47			

When Table 5 is examined, it is found that the anxiety level pre-test mean score of the experimental group students is $\bar{X} = 3.13$ ($SD = .73$) and the post-test mean score is $\bar{X} = 2.91$ ($SD = .63$). The change in anxiety level is found to be significant in favor of the experimental group as a result of the paired sample t test ($t(30) = 5.02, p < .05$). The anxiety level pre-test mean score of the control group students is $\bar{X} = 3.18$ ($SD = .45$) and the post-test mean score is $\bar{X} = 3.24$ ($SD = .47$). The change in anxiety level is found to be significant against the control group as a result of the paired sample t test ($t(29) = -2,30, p < .05$).

3.3. Achievement

The students went through two different processes, the Plickers tool in the experimental group and the traditional method in the control group. The results of ANCOVA performed to find out whether the change in academic achievement of students in the experimental and control groups differ significantly is shown in Table 6.

Table 6: Academic Achievement Pretest - Posttest ANCOVA Results

Source of Variance	Sum of Squares	df	Mean Squares	F	p
Between Subjects	11404,098	60			

Group	218,144	1	218,144	1,151	,288
Error	11185,954	59	189,592		
Within Subjects	72,302	61			
Measurement	51,403	1	51,403	7,084	,010
Group*Measurement	19,436	1	19,436	2,679	,107
Error	1,463	59	7,256		
Total	11476,400	121			

According to Table 6, it is concluded that the academic achievement levels of students who went through two different processes did not differ significantly in terms of pretest and post test. In other words, the common effects of being in different groups and repetitive measures factors on academic achievement are not significant, $F(1,59) = 2.679, p > .05$. This finding shows that Plickers do not have different effects on increasing students' vocabulary learning motivation compared to traditional methods.

In this study, the researcher's focus is on testing the effects of only two different applications on increasing students' academic achievement, so the common effect of group and measurement factors are emphasized. Analysis also includes basic impact tests of group and measurement. The two main impact tests mentioned in this study can be interpreted in this way: There is no significant difference between the total mean scores obtained from the pretest and post-test scores of the individuals in the experimental and control groups, $F(1,59) = 1,151, p > .05$. As can be seen, this test does not take into account the changes of the groups from pretest to post-test. Regarding the main effect of measurement, it can be said that there is a significant difference between the pre-experiment and post-experiment achievement scores of the individuals involved in the study without making a group distinction, $F(1,59) = 7,084, p < .05$.

The paired sample t test data for the academic achievement variable related to the experimental and control groups of the research are given in Table 7.

Table 7: Paired Sample t Test Results Regarding Academic Achievement Variable

Group		N	\bar{x}	SD	T	df	P
Experimental	Pre-test	31	38,70	7,84	-3,24	30	,00
	Post-test	31	40,85	8,85			
Control	Pre-test	30	36,83	11,63	-,68	29	,50
	Post-test	30	37,33	10,96			

When Table 7 is examined, it is seen that the experimental group students' academic achievement pre-test mean score is 38.70 (SD = 7.84) and the post-test mean score is 40.85 (SD = 8.85). As a result of the paired sample t test, it is seen that this increase in the academic achievement variable is significant in favor of the experimental group ($t(30) = -3,24, p < .05$).

When Table 7 is examined, it was found that the experimental group students' academic achievement pre-test mean score is 36.83 (SD = 11.63) and the post-test mean score is 37.33 (SD = 10.96). It is observed that the increase in the academic achievement variable is not significant as a result of the paired sample t test ($t(29) = -,68, p > .05$).

4. Results and Discussion

In this research, it was seen that the use of Plickers had significant effects in favour of the experimental group in increasing students' vocabulary learning motivation compared to traditional methods. Supporting this result, Sasmiko et al. (2019), in a research they conducted with secondary school learners concluded that when the Plickers tool is integrated into English classes, students' motivation to understand what they read in English is higher than traditional methods. Sasmiko et al. (2019) made the comment that the Plickers tool positively affects students' motivation in reading foreign languages. In another study conducted with primary school learners, it was found that the use of the Plickers as an assessment tool significantly increased students' motivation towards lessons compared to traditional methods (Daradkah, 2020). In the study conducted by Daradkah (2020), unlike this study,

Plickers was studied on general lessons rather than being limited to English lessons. Likewise, in another study carried out with high school learners, it was observed that students' motivation towards biology lesson increased significantly with the use of Plickers (Fortney & Wells, 2017). In this study by Fortney & Wells (2017), Biology lessons were discussed, but as in this study, Plickers was selected among web 2.0 technologies. Fortney & Wells (2017) commented that the Plickers tool increased students' motivation towards biology lessons. These results support the results found in this study. In the literature review conducted within the scope of this study, in studies conducted with the Plickers tool on motivation, no study was found indicating that the Plickers tool did not cause a significant change in motivation. On the other hand, Demir & Eren (2020) conducted another web 2.0 tool, KAHOOT! application and found out that there was no significant change in the motivation of the learners. The study conducted by Demir & Eren (2020) differs from this study in terms of the demographic characteristics of the study group and web 2.0 tool used. Demir & Eren (2020) attributed the reason for this result which contradicts the literature, that the motivation of the teacher may have affected the motivation of the students. Considering these studies obtained from the literature, it can be concluded that the motivation of the students generally increased in the lessons conducted with the Plickers application. On the other hand, it can be said that in studies in which an application similar to Plickers was discussed and a significant difference was not observed, the result could be explained by other variables rather than the tool used. The results reached in this research are generally similar to the results obtained from the studies carried out with the Plickers tool. In other words, it can be said that Plickers usage in English lessons increases learners' motivation.

In this study, it was observed that the use of Plickers had significant effects in reducing students' vocabulary learning anxiety compared to paper based methods, and there was a decrease in the level of anxiety in the research group, unlike the control group. Supporting the findings of this research, Park et al. (2020) found out in a study assisted with university students studying in a foreign language-teaching programme that the Plickers application reduced students' anxiety. Although the study group of Park et al. (2020) differentiates in terms of having different demographic features, it is similar to this research at the point of Plickers usage. However, in a research conducted in English lessons with 8th-grade students at a school located in a rural area in Samsun (a city in northern Turkey), it was observed that the Plickers tool did not contribute to reducing test anxiety compared to traditional methods (Korkmaz, Vergili, Çakır, & Erdoğan, 2019). In the study of Korkmaz et al. (2019), the participants are secondary school students living in a rural area and it can be said that this result may be due to their limited opportunities in terms of technology due to the rural location. Likewise, Tuncer & Şimşek (2019) concluded in their study with 5th-grade students from three different secondary schools in Diyarbakır (city centre in the south-east of Turkey) that the use of Plickers did not cause a significant difference in students' anxiety levels towards mathematics lessons. The study conducted by Tuncer & Şimşek (2019) differs from this study in that it is carried out for primary school students and in mathematics lessons. Tuncer & Şimşek (2019) stated in their study that the lack of significant difference in students' anxiety levels might be affected by the course teacher's good communication with the students which allows the students feel a comfortable classroom environment. Considering these studies obtained from the literature, it can be concluded that students' anxiety generally decreased in the lessons conducted with the Plickers application. However, it can be said that in studies with no significant difference, the result can be explained by other variables rather than the tool used. Taking the literature review and the findings of this research into account, it can be said that the use of Plickers positively affects the anxiety levels of students in foreign language vocabulary.

In this research, it was seen that the use of Plickers has different effects in favour of the experimental group compared to traditional methods in increasing students' vocabulary achievement. Supporting this result, in another study conducted with secondary school learners using Plickers, it was seen that the academic achievements of students for understanding English reading texts significantly differentiated in favour of the group studied with Plickers (Sasmiko et al., 2019). The research carried out by Sasmiko et al. (2019) is similar to this study in that it is implemented with Plickers, one of the web 2.0 tools, in English classes. Sasmiko et al. (2019) made the comment that the Plickers tool positively affects students' academic achievement in foreign language reading. Daradkah (2020) concluded in a study conducted with elementary school 3rd-grade students that using Plickers as an assessment tool significantly increases the academic achievement of learners in lessons unlike paper based methods. In the study conducted by Daradkah (2020), unlike this study, although it was studied on general lessons with primary school students, it was handled by using Plickers, as in this study. In another study conducted with high school students, it was observed that the academic achievement of learners in biology class increased

significantly with the use of Plickers (Fortney & Wells, 2017). Rather than foreign languages, biology was the subject in the study of Fortney & Wells (2017), but as in this study, Plickers was selected as web 2.0 tool. Based on their findings, Fortney & Wells (2017) commented that the Plickers tool increased students' academic achievement in biology lesson. Likewise, Tuncer & Şimşek (2019) concluded that the academic achievement increased significantly at the end of the three-week Plickers study they conducted for mathematics lessons. Rather than a foreign language, mathematics lessons were discussed in the study of Tuncer & Şimşek (2019), but as in this study, among web 2.0 technologies, the Plickers was selected. These results support the results obtained in this study. However, Korkmaz et al. (2019), in a research conducted with 8th-grade students studying in a rural area in Samsun, concluded that the use of Plickers did not statistically significantly affect the academic achievement of students in English lessons. Korkmaz et al. (2019) stated that although there was no significant difference, academic achievement increased a little and interpreted this increase by attributing it to the decrease in anxiety. Considering these studies obtained from the literature, it can be concluded that the academic achievement generally increased in the lessons conducted with the Plickers application. However, it can be said that in studies where no significant difference is observed, the result can be explained by other variables rather than the tool used. Based on the literature review carried out and the findings of this research, it can be concluded that the use of Plickers has a positive effect on learner's academic achievement in terms of foreign language vocabulary.

5. Suggestions

According to the findings of this study, it was found that Plickers implementations can be associated with motivation anxiety and academic achievement, as in similar studies. However, there are studies implying that these variables are not affected by using such tools. Therefore, studies that are more comprehensive can be carried out by including different variables in the research with similar web 2.0 tools.

This research was conducted in a rural area with the participation of socioeconomically disadvantaged students. Due to the students' inability to use such tools and their socioeconomic level, they may encounter a novelty effect when they have such opportunities, and a difference may have arisen in their motivation, anxiety and academic achievement. For this reason, results that are more meaningful can be obtained in determining the effects of the Plickers application by conducting such a study with students from different socioeconomic levels.

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