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Sanal Gerçeklik (VR) Teknolojisinin İlkokul İngilizce Derslerinde Kelime Bilgisi Öğretimine Entegrasyonu

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Abstract

Language consists of words, so it is important to increase the level of vocabulary in any foreign language learning to a certain extent in order to be able to communicate in that language. As for VR, it is seen that this technology is a new research field in education, the use of which in language teaching is closely related to the principle of proximity to life, one of teaching principles. While learning a foreign language, learners should experience situational learning experiences, recognize real-life contexts, and be able to use the language communicatively in these environments, which is a difficult goal to be attained by 2nd-grade primary school students who have not yet reached full proficiency in their native language but started learning a foreign one. In this direction, this study, a pre-test – post-test research with the control group, examined VR's effect on vocabulary levels and student engagement. The study was conducted in the English lessons of 2nd-grade students from six of the state primary schools in the central district of Çanakkale, Türkiye. The results indicated that instruction with VR did not show any significant difference in vocabulary levels compared to current teaching method but encouraged more student engagement in the classroom. Although more extensive research into the topic is essential, it is hoped that the study will shed light on future research on the use of VR technology, which still has leeway to progress and may form the basis of future education in the coming years.

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Öz

Dil kelimelerden oluşur ve bu nedenle herhangi bir yabancı dilin öğreniminde o dilde iletişim kurabilmek için kelime dağarcığını belirli bir ölçüde artırmak önemlidir. Sanal gerçekliğe (VR) gelince, bu teknolojinin eğitimde yeni bir araştırma alanı olduğu ve dil öğretiminde kullanımının öğretim ilkelerinden biri olan hayata yakınlık ilkesiyle yakından ilişkili olduğu görülmektedir. Yabancı dil öğrenirken, öğrencilerin durumsal öğrenme deneyimlerini yaşamaları, gerçek yaşam bağlamlarını tanımaları ve dili bu ortamlarda iletişimsel olarak kullanabilmeleri gerekir ki bu, henüz kendi ana dillerinde tam yeterlik sağlayamamış ancak yabancı bir dil öğrenmeye başlamış olan ilkokul 2. sınıf öğrencilerinin ulaşması zor bir hedeftir. Bu doğrultuda, kontrol gruplu bir ön test – son test araştırması olan bu çalışma, sanal gerçekliğin kelime bilgisi seviyelerine ve öğrenci katılımına etkisini incelemiştir. Araştırma Çanakkale ilinin Merkez ilçesinde bulunan 6 devlet ilköğretim okulunun 2. sınıf öğrencilerinin İngilizce derslerinde gerçekleştirilmiştir. Sonuçlar, VR ile öğretimin, geleneksel öğretime kıyasla kelime seviyelerinde önemli bir fark göstermediğini, ancak öğrencilerin derslere katılımını teşvik ettiğini göstermiştir. Konuyla ilgili daha kapsamlı çalışmaların yürütülmesi gerekli olsa da mevcut çalışma, hâlâ gelişmekte olan ve eğitimin temelini oluşturabilme potansiyeli bulunan VR teknolojisinin kullanımı için gelecekteki araştırmalara ışık tutacaktır.

Introduction

One of the most important steps to be taken in order to master the target language in the processes of language learning and acquisition is to increase the level of vocabulary (Folse, 2004). Even though traditional methods such as grammar teaching or rule transferring come to mind when language learning is considered, these have diminished influence in the global age, where the concept of language as a means of communication is more common. As Yuca (2018) states, recently, the importance of vocabulary has grown, and the number of vocabulary studies is gradually increasing with many novel approaches, methods, and strategies being developed. Virtual reality (VR), for one is a medium that may be used for teaching vocabulary. With VR's increasing accessibility, a new field of research has emerged in language education, named virtual reality assisted language learning (VRALL) (Berns & Reyes-Sanchez, 2021). Among many benefits VR yield for education, more retention and active participation are the main focuses of this research, which would hold more importance in primary school language teaching classes since the pupils have yet to learn their L1 but started learning EFL (Schmitt, 2000). Therefore, the aim of the study is to teach vocabulary with VRALL in primary school English lessons and reveal the effect thereof on student achievement and student engagement in language when compared to a traditional teaching setting.

The Role of Vocabulary in Language Teaching

Elaborating the importance of vocabulary in the language is necessary for understanding the importance of the study. One of the most important aspects of language learning is vocabulary, but despite this, researchers in the field did not adequately address teaching vocabulary until the late 1980s, neglecting it in fact (Meara, 1980; Ölmez-Çaglar & Saka, 2020; Yuca, 2018). Instead, methods such as grammar and rule teaching, which are repetitive and cannot adapt to the competencies of the modern age, were given more importance. However, as Wilkins (1987, p. 135), one of the famous applied linguists, put it, "without grammar very little can be conveyed, without vocabulary *nothing* can be conveyed" [italics added]. Therefore, it can be deduced that students' abilities in four basic language skills are closely related to their vocabulary levels. Briefly, vocabulary constitutes the main factor of language proficiency, so meaningful communication cannot be established without a certain level of vocabulary knowledge, and the desired meaning cannot be conveyed (Ghazal, 2007; Schmitt, 2010). So, as McCarthy (1990) stated, no matter how proficient language learners are in grammar or pronunciation, if they do not have adequate vocabulary, it is almost impossible for them to express themselves.

As for teaching vocabulary, no strategy such as memorizing isolated words one by one should come to mind. Teaching vocabulary without context would be both inaccurate and incomplete because the concept of vocabulary includes word groups as well as isolated words, and the more they are learned in an authentic context, close to real life, and in a situational manner, the more permanent their retention is (Pan & Xu, 2011). Suggested contexts and activities such as videos, games, and music in the current primary school English curriculum also support these statements (Turkish Ministry of National Education [MoNE], 2018).

So, what exactly does it mean to know a word or a phrase? This question, also asked by Sarıgül (2017), can be answered in two ways. On the one hand, in order to fully know a vocabulary item, it is necessary to have a grasp of all its literal, term, side, and metaphoric meanings, know its oral and written forms, be able to break the words into parts, understand its structure, use the word properly, know its relation to other words, and lastly know the frequency of that item in the language (Richards, 1976). Although it may seem like a lengthy list, as the language learners are exposed to a vocabulary item and use it, they subconsciously begin to decode it, establish the necessary connections, and fulfill all these knowledge requirements in return. On the other hand, there are the statements of Nation (1990, 2001), according to whom, vocabulary is categorized into receptive and productive vocabulary. Receptive vocabulary is the type of information that the study is closely interested in and expresses the ability to understand the word when heard or seen, whereas the productive type is the one required to produce words while writing and speaking. The receptive one is usually wider than the productive one (Sarıgül, 2017).

Virtual Reality and Its Place in Education

Although the exact origins of the VR technology are still being debated, this technology in its modern sense can be traced back to the 1950s. The device developed by cinematographer Morton L. Heilig under the name of Sensorama in 1957 and patented five years later can be considered the first prototype of VR technology (Brockwell, 2016). This development sparked an idea of how people could change how they interact with computers, which made the rise of VR technology possible. Towards the end of the 20th century, this innovative technology, which had been developed and improved, was used in space exploration, the medical field, and military studies (The Board of Trustees of the University of Illinois, 1995). Later, virtual reality as a term was popularized in the late 1980s by a computer scientist, Jaron Lanier,

who is one of the leading contemporary researchers in the field. Thanks to this and many other contributions to the body of VR research by him, Lanier is considered the founding father of the field of virtual reality (Firth, 2013).

Additionally, it is necessary to put the terminology in place as there are many different terms related to reality technologies. The first of these is virtual reality (VR), which is also the subject of the current study. The gradual development of VR is followed by the birth of augmented reality (AR). Although the terms AR and VR are often used together, the difference between them is that while VR creates a completely different reality, AR combines the lived reality with virtual objects and builds upon it (Hecht, 2016; Zhan et al., 2018). Another term is mixed reality (MR), which can be characterized as an enhanced version of AR's virtual content (He et al., 2018). Finally, there is the general term, extended reality (XR), which covers all the reality technologies given in the literature (Daugherty, 2018).

VR's getting a place in education is an occurrence much closer to today. At the beginning of the 2010s, VR technology began to appeal to the general user as VR devices became smaller and more available in the general market, decreased in prices due to the cheaper cost of manufacturing, and similar other reasons, which in turn made its way to education (LSU Online, 2020). Thanks to this technology, which is sophisticated yet accessible and getting cheaper, a different learning path has emerged for students and has provided multiple benefits in education compared to conventional teaching. According to LSU Online (2020), some of these benefits are listed as but are not limited to (i) better perception of space, (ii) realistic learning experiences, (iii) learning by doing, (iv) emotional reaction and retention, (v) improvement in creativity, (vi) visual learning. Each cited benefit is closely related to the Turkish Ministry of National Education's primary school curriculum and the instructional principles mentioned there (MoNE, 2018). VR, as the name suggests, provides the user with a virtual reality thanks to various utilities and hardware, which is in line with the necessity of real-life experiences to ensure the permanence of learning (Takkaç-Tulgar, 2019).

The use of VR in language teaching is also a new occurrence, but the benefits, especially in the context of vocabulary and language skills teaching, demonstrate the importance of VR and other related technologies. As reported by Schmitt (2000), vocabulary learning in students turns into practice with more active participation, and retention in learning increases thanks to reality technologies. In addition, as predicted in this present study, students feel more motivated while receiving a more participatory education in this way (Demir & Özdemir, 2019). So, language teaching is not an exception to the use of reality technologies and is enriched with the use thereof (Erbaş & Atherton, 2020).

To grasp the importance of the current study, it is necessary to take a look at similar studies on VR as well. In a survey conducted by Dolgunsöz et al. (2018) for the study titled "The effect of VR technology on writing performance in English as a Foreign Language", listening (62.85%) and speaking skills (22.85%) took the first two places, but no participant voted in favor of vocabulary on the question for which language skill VR could be used in teaching. However, listening and speaking skills are closely related to vocabulary. Language learners whose vocabulary is not adequate can neither express themselves well nor fully understand what the other person is saying, no matter how well their grammar, accent, or pronunciation is. On the other hand, the participants mostly described the positive aspects of the VR experience as a "realistic environment" (42.3%) and a "feeling of participation" (38.5%). Similarly, in a study aiming to measure student attitudes towards VRALL, Kaplan-Rakowski and Wojdynski (2018) reported that 82% of the participants wanted to learn foreign languages with VR technology. In the question as to whether they agreed with the statement that VR technology is "the future of education", a majority of 59% justified their views by stating that they agreed. Regarding the question of whether there is a positive aspect in terms of language teaching, 91% of the participants gave positive answers.

Educational Psychological Grounds
When associated with the study, the fact that the VR integration provides the student with a vocabulary learning environment close to real life and in an authentic context through various programs, software, and interactive activities indicates that VRALL offers activities for the receptive vocabulary type. However, it should not be forgotten that the vocabulary and language structures presented to children in these activities will be conducted within the framework of Krashen's (1977) monitoring model. Of the five hypotheses put forward by Krashen in the model, the input hypothesis and the affective filter hypothesis are closely related to the study. The input hypothesis argues that learners should be given language inputs that are slightly higher than their current level within the zone of proximal development. As for the affective filter hypothesis, it is seen that this filter is a psychological barrier in language learning or acquisition, which occurs due to the learner's negative emotions. To this end, even a simple emotion such as anxiety, doubting one's own efficacy, or even boredom negatively affects the language acquisition or learning process (Krashen, 1977; Lin, 2008). Accordingly, there is an inverse proportion between the effectiveness of the filter and the learning, so the lower the filter gets, the more effective the learning or acquisition is.

There is another important theoretical framework that should be considered while presenting any material to students, which is cognitive load. In psychology, cognitive load is considered as the whole of the needs imposed on the individual to perform a certain task (Moreno & Park, 2010). Cognitive load has features that overlap with Kantowitz's (1987) mental load theory, which includes the number, shape, and difficulty of tasks, effort required to perform them, and success criteria as well as many factors that can be characterized as subjective experiences such as motivation, competence, skill, training, timing, anxiety, and situational factors. Relatedly, as Moreno and Park highlight, it can be stated that the implication of the cognitive load theory is that the target-related characteristics of the task requested by the learner directly influence the learner's mental load and indirectly the process of learning.

Finally, on the educational psychological grounds, there is the multimedia learning theory with its principles. In the shortest and most concise way, the concept of multimedia learning can be defined as learning with the help of words and images, and the concept of multimedia teaching can be defined as the presentation of materials containing both words and images to support learning (Mayer, 2009). Then, in conjunction with the study, vocabulary teaching with VR glasses, which are used to present visually rich materials, can be related to the multimedia learning and teaching process. In this process, preparing materials by following the twelve multimedia learning principles put forward by Mayer produces effective results (Mutlu-Bayraktar et al., 2019). They constitute the principles of cohesion, signaling, redundancy, spatial proximity, temporal proximity, division, pre-education, form, multimedia, individualization, sound and visual. The most relevant to the current work are the principles of signaling, spatial proximity, pre-education, and multimedia. First, the signaling principle argues that learning is better accomplished by emphasizing the essential element in the core material. Secondly, spatial proximity states that the proximity of the words and images to be taught makes learning more effective. Third, the pre-education principle states that knowing the names and characteristics of the main elements of the course before the multimedia course will increase the effectiveness of learning. Finally, the multimedia principle states that materials rich in graphics and narratives provide better learning, rather than materials containing only words. The fact that most of these principles related to the study are inherent in VR technology on a theoretical basis can be presented as a positive educational feature of it.

Method

The study was conducted as a pretest-posttest control group research from true experimental designs, and quantitative data were obtained by observation and testing. Although the pretest-posttest control group design is used in behavioral research (Dimitrov & Rumrill, 2003), it is also possible to frequently encounter this design in the fields of social sciences, education, and language teaching (e.g., Bardakçı, 2011; Kök & Conbay, 2011; Özerbaş & Kılıç, 2017; Saygın & Karakaş, 2021).

The aim of the current research was to examine the effectiveness of VR technology by integrating it into vocabulary teaching in English lessons. The basis for the examination is the effect of this general purpose on vocabulary learning and improving engagement in language teaching. The measured point was the significant difference between the two groups and amongst the individual groups in pretest-posttest pairs if any.

Research and publication ethics were followed. For this research, the ethical approval was obtained from the Graduate School of Education Scientific Research Ethics Committee of Çanakkale Onsekiz Mart University (Date: 23 December 2021, Number: 22/40). Prior to the study, written informed consent forms were obtained from the parents/guardians of all participants as they were not of full legal age to consent by themselves.

Research Question and Hypotheses

- **RQ$_1$:** What is the effect of the integration of virtual reality technology into vocabulary teaching in primary school English lessons compared to current education, on vocabulary learning and developing a positive engagement in language?

  Three hypotheses have been proposed in connection with the research question.
- **H$_0$:** There will be no positive significant development in students' English vocabulary levels and engagement in learning English.
- **H$_1$:** There will be a positive significant development in students' English vocabulary levels and engagement in learning English.
- **H$_2$:** Although there will be no significant difference in students' English vocabulary levels, there will be a positive and meaningful development in their engagement levels.

Sample of the Study

The population of the study consists of six public primary schools located in the central district of Çanakkale province in Türkiye, and the sample consists of 2nd-grade students. The sample of the study includes 27 control group students (14 boys & 13 girls) and 27 experimental group students (15 boys & 12 girls) participants in the 2021-2022 academic year, who took English lessons. A total of 54 students (29 boys & 25 girls) in total participated to this study. The sample was chosen by randomly assigning participants, stated by Cohen et al. (2007) as a feature of true experimental designs. Consent forms were presented to both students and their parents for ethical reasons in the study.

Data Collection and Analysis

Observation forms are one of the most widely used data collection instruments, which can be used to determine the opinions and thoughts of the participants of a study on the research topic and to gather them in a certain order in a brief time (Ocak, 2019). In this study, the observation form was used to measure the engagement levels of the sample students in language learning both in the pre-test and post-test. In addition, to measure students' knowledge of vocabulary in the pre-test, post-test and delayed post-test, a multiple-choice test was used to collect quantitative data (e.g., McMillan & Schumacher, 2001). In accordance with the developmental levels of the students, which is the basis for the assessment in test evaluation, the measurement was made with visual clues as in the vocabulary cards prepared by Cesur (2020). During the data collection process, the lessons were taught by the English teachers of the sample group, and the researcher was in the classroom as an observer.

In the analysis of the data, the *t*-test, one of the parametric tests, was used for the data showing normal distribution, whereas the Wilcoxon Sign test was used for abnormally distributed data pairs. The *t*-test, which depends on the *t* distribution, is used to determine the significance of a sample mean or to find out whether the difference between the means of two samples is significant (Boyraz, 2019). In the current study, pre-test and post-test scores of the control and experimental groups were examined with SPSS Software, both with the Mann-Whitney U test to find the significant difference between the experimental and control groups, and with the paired-samples *t*-test and Wilcoxon Sign test to find the statistical difference, if any, within the groups. According to McCormick et al. (2015), the Mann-Whitney U test measures the influence of the mean of the two groups by a continuous dependent variable, whereas the paired samples *t*-test assesses the statistical difference between the means measured in two different conditions, such as pre-test and post-test, and Wilcoxon Sign test is the nonparametric equivalent of the paired samples *t*-test, used for abnormally distributed data.

Findings and Discussion

According to the skewness and kurtosis values presented in Table 1, the normality distributions, if the ±1 interval, which is the interval of skewness and kurtosis values specified by Hair et al. (2019), is accepted as a normal distribution, the pre-test, post-test and pre-observation data of the experimental group and the delayed post-test, pre-observation and post-observation data of the control group show normal distribution. While the analysis of these data was done with the t-test, the delayed post-test and post-observation data of the experimental group and the pre-test and post-test data of the control group did not show normal distribution, so the analyses were conducted with non-parametric tests.

Table 1. Normality *D*istributions of the *D*ata

Group	Data	Skewness		Kurtosis	
		Value	Standard Error	Value	Standard Error
Experimental	Pre-test	-0.77	0.45	-0.22	0.87
	Post-test	-0.78	0.45	-0.78	0.87
	Delayed post-test	-1.62	0.45	1.88	0.87
	Pre-observation	-0.94	0.45	0.89	0.87
	Post-observation	-1.32	0.45	0.99	0.87
Control	Pre-test	-1.11	0.45	0.05	0.87
	Post-test	-1.05	0.45	0.09	0.87
	Delayed post-test	-0.90	0.45	-0.55	0.87
	Pre-observation	-0.67	0.45	0.01	0.87
	Post-observation	-0.61	0.45	-0.18	0.87

The first point examined was the statistical differences in the pairs of pre-test and post-test, pre-test and delayed post-test, and pre-observation and post-observation within the groups. According to the results of the t-test given in Table 2 and the Wilcoxon Sign test given in Table 3, a positive significant difference was observed in the engagement

levels of students in language learning in both groups. However, there was a significant difference only in the control group in terms of vocabulary levels, which was only found in the pretest-posttest pair but not in the pre-test and delayed post-test pair. The reason why the experimental group showed no statistical difference in the pre-test – post-test pair, but the control group showed a statistical difference might be due to the fact that the control group participants had the opportunity to watch and repeat their peers' actions and sayings while watching the video material together, whereas the VR users saw the instructional material individually and had no other exposure.

Table 2. Paired Samples t-test Results of the Normally Distributed Data

Group	Pairs	n	M	SD	t	df	p
Experimental	Pre-test – post-test	27	-0.23	6.82	-0.18	26	.86
Control	Pre-observation – post-observation	27	-4.81	8.43	-3.00	26	.01*

*p < .05

Table 3. Wilcoxon Sign Test Results of the Abnormally Distributed Data

	Experimental Group			Control Group		
Pairs	n	Z	p	n	Z	p
Pre-test – post-test	-	-	-	27	-2.32	.02*
Pre-test – delayed post-test	27	-0.90	.93	27	-0.71	.47
Pre-observation – post-observation	27	-3.83	0**	-	-	-

*p < .05, **p < .001

Tablo 4. Comparison of the Groups with Mann-Whitney U Test

	Experimental Group			Control Group					
Data	n	MR	SR	n	MR	SR	U	Z	p
Post-test	27	27.90	753.50	27	27.10	731.50	353.50	-0.20	.85
Delayed post-test	27	30.00	810.00	27	25.00	675.00	297.00	-1.19	.23
Post-observation	27	32.40	874.00	27	22.60	611.00	233.00	-2.29	.02*

*p < .05

The inference here is that VR technology helps develop a positive engagement level in language learning and brings a difference to the lesson for students (Dolgunsöz et al., 2018). The fact that VR lowered the affective filter by getting the student away from stress and in a world full of elements that children love, such as music and cartoon characters, improved their engagement levels more compared to the control group (Krashen, 1977). This statement is backed by the post-observation *p* value (= .02) obtained in Table 4. The motivation factor also comes into play here. As Takkaç-Tulgar (2019) stated, the fact that reality technologies appeal to students' multiple senses and support individual learning with their role in exploring language and interacting with the material can contribute to a significant increase in children's motivation levels. In addition, it is a plus that Mayer's (2009) multimedia principles were also considered.

Based on the findings, it can be suggested that VR technology helps foster a positive engagement level in language and language learning. This inference is closely related to the primary school English lesson goals and achievements because one of the main goals for young learners is to make them enjoy the process of learning a foreign language (MoNE, 2018). On the other hand, although the observation was that VR was effective in developing positive engagement, the integration thereof did not make a significant difference in children's vocabulary levels as seen in Table 4. Contrary to this situation, the control group consisting of students watching the video without VR glasses in the normal lesson setting showed a significant difference in the pre-test and post-test pair, but this difference was not observed in the delayed post-test and the Mann-Whitney U test used to calculate the difference between the groups (see Table 3 and 4). One of the reasons might be that the control group students were exposed to learning materials in an accustomed manner and, in relation, their affective filters were lower (Krashen, 1977; Mayer, 2009). In addition, the fact that they watched the video as a group, unlike the experimental group, before the immediate post-test was administered, must have contributed to better retention in the short-term memory of the control group students as it was observed that the children listened to and repeated the actions and discourses of their friends during the video. However, the experimental group students, who were the subjects of the VR application, were limited to their learning levels and cognitive loads as they performed individual learning. Furthermore, considering that the students in the experimental group, whose readiness levels were observed to be low for this technology, may have been exposed to cognitive overload

in this direction, the reason for not finding a statistically significant difference in vocabulary levels can be explained (Moreno & Park, 2010).

Limitations and Recommendations

As in every study, the current study also had limitations that would affect the findings. The first of these was to select participants in a balanced way in terms of language level and engagement in language learning. The researcher had emphasized that he wanted the groups to be in proximity in terms of levels to each other and consist of participants from all language levels, leaving the choice of participants to the classroom English teachers. However, due to the nature of the random participant choosing the design, a well-balanced distribution could not be achieved. As a second constraint, there was the fact that the students had already grown up with technology as digital natives, and therefore teaching with VR technology may not have brought much innovation compared to the traditional methods for them. Another limitation was the low readiness level of the students; in other words, most of them had no previous experience with VR. Finally, the fact that the study was conducted with a small group of participants also affected the data distribution and findings.

Regarding all these limitations, three steps can be taken in similar future research to fetch better results. The first step may be to create a large-scale participant framework, if possible, and keep the number of cases higher. The second step would be to create a detailed portfolio of the participants to be selected and avoid the random assignment design so that both the experimental and control groups will have more balanced participants in terms of language and engagement levels. The ultimate step, then, would be to familiarize the participant students with VR with a pilot study, thereby minimizing their affective filters and increasing their readiness levels. In this way, it would be possible to reach more reliable findings.

Conclusion

The main topic of the current study was virtual reality technology and vocabulary teaching. The main element of the research was to examine the effect of this technology on the vocabulary levels of the participating students and their engagement levels in language learning by providing the integration of VR technology into the teaching of vocabulary at the 2nd-grade level of primary school. To this end, two important findings were reached, the first one of which is that there is no significant difference in the vocabulary levels of children with the use of VR technology in English lessons. The second important finding is that VR has a significant difference in developing more positive student engagement levels in language learning compared to the lessons taught with conventional instructional methods. In line with all these, the general conclusion reached in the study supports H_2 because although there is no significant difference in the level of English vocabulary of the students, there has been a positive significant development in their engagement levels in learning English. Limitations of the study in addition to the participants' cognitive load, readiness levels, and the fact that the sample consisted of a small-aged group had an impact on this conclusion. On the other hand, it can be inferred that technology may not always be a better alternative compared to current methods that are simply fine as they are, and individual differences should also be considered.

It is hoped that the results obtained will provide an idea to the educational stakeholders who want to use reality technologies in teaching. Considering the inferences, a few implications can be made for school administrators, teachers, and program developers. First, if school administrators and teachers want to invest in technology such as VR and make it widely used in their schools, they should consider that VR only serves to develop positive engagement levels according to the results of this study. If desired to achieve the opposite and increase the student's language levels, the recommendation would be to eliminate the limitations of this study, to conduct more diverse and various levels of research, and to retest the effectiveness of VR with pilot applications in cooperation with the program developers. Program developers, on the other hand, need to determine the level of the general student population, make curriculum arrangements that will provide readiness for VR, and contribute to the development of educational content in connection with VR application developers.

Conflict of Interest

The authors have disclosed no conflict of interest.

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