






Comparing Virtual Reality (VR) 360 to 2D Image for Supporting Effective English Vocabulary Learning in Primary School: A Quasi-experiment

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Abstract. Virtual Reality (VR) is a new technology in language learning which provides proximity principle to life. When learning English, students must experience situational learning, recognize real-life contexts, and be able to use language communicatively in that environment. However, the use of VR in language learning is limited because teachers have inadequate skills to use VR. This quasi-experimental study investigated the effectiveness of VR in learning English vocabulary for primary school students by comparing the use of VR with 2D image. The research was conducted on four primary school teachers and 60 primary school students. Research data were analyzed by independent sample t-test and revealed that VR was associated with significantly higher scores on vocabulary recall than 2D images. The possibilities offered by VR education spaces, that is spaces combining both virtual and augmented reality techniques, need more attention in future research as they can provide a dynamic, affordable and multi-sensory learning experience. These findings have implications for instruction in immersive spaces, including in virtual, augmented, and mixed reality-based learning environments.

Keywords: Virtual Reality, VR 360, Media, Vocabulary, English learning

1 Introduction

The use of media is an important factor in the learning system in the classroom. In the process of learning English vocabulary, of course, it cannot be separated from teaching aids as learning media which have a very important position [1]. There are many kinds of learning media, so for a good teaching and learning process, a teacher must be careful in choosing the right learning media. Learning media is anything that can convey messages, can stimulate the thoughts, feelings, and will of students [2].

From initial interviews conducted with elementary school teachers in the city of Surakarta, it is indicated that learning English is still facing various problems. Teachers still use teacher center learning. The learning patterns used still tend not to involve students' activeness optimally. The use of textbooks which are dominated by subject matter in the form of text and the use of worksheets are still used more by teachers in

the learning process. They also stated that students often pay less attention in the learning process, allegedly because English material is considered boring and unpleasant.

This problem is relevant to empirical evidence that occurs in the field, especially in learning English vocabulary in elementary schools. The results of previous research indicate that teachers in elementary schools are more likely to use textbooks and blackboards to teach students [3]. The existence of textbooks as learning aids also does not function optimally because students will only read the textbooks given if asked by the teacher to read or work on the questions in them [4]. These various problems also affect student learning outcomes which are still low so that teachers often have to carry out remedial activities to overcome them. The low interest and motivation of student learning also affects learning outcomes. The results of interviews with teachers in elementary schools in the city of Surakarta, Indonesia stated that around 30% of students had not achieved maximum completeness in the learning process for English. Preliminary supporting research conducted by previous research suggests that low student motivation to follow lessons well also has an impact on student learning outcomes. Only about 50% of students are able to obtain satisfactory grades.

With the development of science and technology, more and more people are starting to realize the importance of multimedia-based learning media. Media-based learning can also help students learn and make the learning process more enjoyable. Selection of appropriate learning media is one of the factors that can influence the achievement of learning objectives in accordance with the expected competencies [5]. Because media can facilitate the transfer of knowledge from professors to students or the other way around, it is one of the elements that contribute to the success of the educational process in schools. Utilizing media creatively can increase and speed up learning so that learning goals are met.

In this digital era, Virtual reality (VR) is one of the promising technology-based learning media for the learning process [6]. In this case, VR is a technological tool that makes its users feel as if they are in a certain environment, and can interact with the environment in a computer-simulated virtual world. In Indonesian, virtual reality is known as virtual reality. VR is the right medium to be used as a medium for learning English, especially in learning vocabulary because this media gives students an extraordinary experience and sensation that makes the user feel as if he is in a virtual world and allows the user to feel a real sensation with the environment in it [7]. Virtual reality technology can display images in the form of three-dimensional or 3D media, in which this process is made with the help of computer components so that the results will look more real and with the support of a number of other devices. Where this will make its users (students) as if they see directly and are physically involved in a predetermined environment [8].

Based on the description above, the purpose of this study was to investigate the effectiveness of VR in teaching English vocabulary for elementary school students by comparing the use of VR with 2D images. This is because research compares which media is more effective in theoretical studies and based on empirical research. Research provides benefits for teachers to be able to take advantage of learning media that are used in teaching English vocabulary learning materials in elementary schools.

2 Method

The researcher decided to use quasi-experimental research because it allows the researcher to identify causal relationships by observing, under controlled conditions, the systematic effect of changing one or more variables [9]. In this study, a quasi-experimental research was used with a non-equivalent control group design. This type of non-equivalent control group design was chosen because the research subjects were not taken randomly from the population but were taken from all naturally formed subjects.

This research was conducted in grade 5 SD Laweyan and SD Kleco, Surakarta City. The two classes used as samples were randomly selected. The two classes are grade 5 at SD Laweyan which consists of 30 students as an experimental group taught using Virtual Reality 360 and grade 5 at SD Kleco consisting of 30 students as a control group taught using 2D image media. A pre-test was administered to both the control group and the experimental group. Following that, 2D image media were used to instruct the control group while 360 Virtual Reality video was used to instruct the experimental group. Finally, a post-test was administered to both the experimental and control groups. A post-test was administered to compare the two groups' performance following the administration of varied learning materials.

The research instrument used by researchers is in the form of tests in the form of pretest and posttest questions. The questions used during the pretest and posttest are the exact same questions. This is because to find out whether there is a difference or an increase in student learning outcomes before and after being given different treatment between the two classes. To measure students' knowledge of English vocabulary. The data analyzed were pre-test and post-test scores from the experimental group and the control group. The data were compared using the t-test formula to prove whether there was a significant difference in students' learning outcomes regarding English vocabulary between the two groups and to find out which media was more effective for learning.

3 Results and Discussion

This research has the aim of this research is to find out whether there is a significant difference in learning outcomes between students who are taught using 3D Virtual Reality videos and students who are taught using 2D images. In the following, data on learning outcomes from the 2 groups will be presented.

3.1 Data Pretest experimental group and control group

Pretest is a test that is carried out at the beginning before the implementation of learning begins. The purpose of this pretest was to determine the initial ability and level of initial understanding of both groups, both the experimental group and the control group, in terms of understanding English vocabulary.

Table 1. Pretest Data for The Experimental Group and The Control Group

Variable	Experimental Group	Control Group
Mean	62,79	62,65
Median	50	45
Std. Deviation	10,98	11,15
variance	135,89	142,65
Minimum	50	50
Maximum	85	80

Based on the results of the descriptive analysis above, it shows that the average score of the learning outcomes of the two groups, both the experimental group and the control group, is not much different, that is, the mean score of the experimental group is 62.79; while the mean score of the control group was 62.65. Based on the data above, it can be concluded that there was no significant difference in the pretest results of the two groups.

3.2 Posttest Data for Experimental Group and Control Group

The posttest conducted in the experimental group was carried out with the aim of seeing changes in student learning outcomes after receiving teaching using English vocabulary learning animations. The instrument from the posttest in the experimental class uses the same questions at the time of the posttest.

Table 2. Posttest Data for The Experimental Group and The Control Group

Variable	Experimental Group	Control Group
Mean	78, 85	64,55
Median	75	60
Std. Deviation	8,58	10,65
variance	70,57	103,78
Minimum	60	55
Maximum	95	80

Based on the results of the data obtained from the two groups, it shows that the average values obtained from the two groups differ significantly, namely for the experimental group the average value (mean) = 78.85 and the average value for the control group is 64, 55.

Table 3. One Sample Test Results

Source	t-count	p-value	Conclusion
Learning Outcome Test	40,24	0,000	H0 is rejected

H0: There is no difference in student learning outcomes between being taught using VR 360 learning media and 2D media

H1: there are differences in student learning outcomes between being taught using VR 360 learning media and 2D media

Based on the summary of the results of data analysis in table 3, the value of t count = 40.24 is obtained with a p-value = 0.000 $< \alpha = 0.05$. Because the p-value < 0.05 , according to the decision-making criteria for hypothesis testing, it can be concluded that H0 is rejected. This means that there are differences in student learning outcomes between being taught using VR 360 learning media and 2D media.

4 Discussion

The diversity of media in learning English vocabulary as explained by will greatly assist the teacher, especially in selecting the right type of media and in accordance with the learning needs of various instructional concepts and objectives. This is what underlies the concept of using media not only regarding its availability but also related to the ability of students to use it in the learning process [10], [11].

In this study, learning vocabulary using VR media is very simple and easy to apply in the process of teaching and learning vocabulary. VR is an effective medium for learning vocabulary because apart from being fun, learning vocabulary using VR also makes students more involved and actively participate in learning [12], [13]. Virtual reality technology is expected to be a form of combination of technology and learning material in the form of attention-grabbing and innovative media, so that the use of technology and material can be an alternative solution to various problems that occur in the learning process[14].

The use of VR 360 is something students have never received before, of course it provides a new, more enjoyable learning experience and is able to attract students' interest to actively participate in English learning activities which last for four meetings. Observations made during research activities showed an increase in students' interest and learning motivation to engage in learning activities in class. From the results of observations, it became easier for students to understand the vocabulary concepts taught in English.

VR 360 presentation of star recognition material using English vocabulary in short durations and combining animal animation and Real animals presented in the form of 360 videos make students less bored and able to repeat themselves when they need to deepen material on a particular subject more easily [15], [16]. Some of the students who were asked by the researcher admitted that it was easier to understand the material presented.

The existence of positive benefits that can be seen from the increase in learning outcomes shows that VR 360 does have advantages related to optimizing the roles and activities of students in learning activities [17]. Based on previous research as described VR as an attracting factor and able to increase students' understanding and learning motivation and explained that VR can improve students' skills and abilities in a number of aspects [18], [19]. The results of this study are consistent with the results of the preliminary research that has been carried out even on different subjects [20], [21]. These kinds of settings have the capacity to provide excellent experiential edu-

cation, go beyond conventional passive teaching and learning settings, and actively include students in a multimodal digital learning ecosystem.

5 Conclusion

Based on the results of the research and discussion, there are significant differences in learning outcomes between students who are taught using Virtual Reality 360 and students who are taught using 2D media. When taught with virtual reality 360, students perform better in writing than when taught with 2D media. The possibilities offered by VR education spaces, namely spaces that combine virtual and augmented reality techniques, deserve more attention in future research because they can provide dynamic, affordable and multi-sensory learning experiences. The ramifications of these findings extend to virtual, augmented, and mixed reality-based learning environments as well as immersive settings for instruction.

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