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Android Based Animation Video Using Millealab Virtual Reality Application for Elementary School

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Abstract

Innovation in education is necessary for teachers and students to follow the learning process because of the limited laboratory facilities in elementary schools; science learning is done. This study aims to analyze student acceptance and understanding concept in using android-based animated videos on Millealab virtual reality in grade V elementary school. The research method process is carried out in several stages, starting from expert testing conducted on three media experts, three subject matter experts, and three teachers from 3 different schools. Test the use of virtual reality video with a sample size of 65 students. Collecting data using a Likert scale questionnaire 1 to 5, and treatment in descriptive analysis. Testing the acceptance of virtual reality videos to students showed that students received virtual reality video media during the learning process. The application of virtual reality (VR) technology in science learning in elementary schools can improve conceptual understanding so that student acceptance of VR is excellent and teachers also feel helped by using VR media to support the learning process. VR technology is better than AR because it is more comprehensive and easier to use by teachers and students.

Keywords: Virtual Reality, Android, E-Learning, Mobile Learning

1. Introduction

Education in the 21st century has developed and improved by developing science and technology. Improvements in education include various components such as teacher competence, quality of education, curriculum, facilities, and infrastructure, as well as more innovative learning methods and strategies (Aji, 2020; Kintu et al., 2017; Nurmanita et al., 2019; Rahardjo, 2019). These changes and improvements will bring the quality of education in a better direction. Improving the quality of education is very important for sustainable development in all aspects (Kurniasari, 2017; Natajaya & Dantes, 2015; Rustiana, 2011; Suryana, 2020). The education system must be developed according to the needs and developments. One of the factors that support development is education (Sujatmiko et al., 2019; Susongko & Afrizal, 2018; Syarifudin, 2020). Education is inseparable from learning activities in schools. Learning is a process of actively changing student behavior through various experiences, seeing, observing, and understanding something being learned (Pen et al., 2020; Setyawan et al., 2020; Syafryadin et al., 2021). In the teaching and learning process, the teacher can realize and create situations that support students to be active and creative.

One way to create a pleasant learning situation for students is to apply an appropriate learning model. In learning, teachers often experience various problems (Bahari et al., 2018; Pertiwi, 2019; Shirish et al., 2021). It is necessary to have a learning model that can help teachers in the teaching and learning process. The model is designed to represent the objective reality, even though the model itself is not the reality of the natural world (Istiandaru et al., 2015; Juliawan et al., 2017; Koh et al., 2010). The learning model is a pattern used as a guide in planning learning in groups and tutorials. Innovative learning models can create a pleasant learning atmosphere for students (Koh et al., 2010; Menon & Poroor, 2020; Surya, 2017). In addition, learning media is one essential aspect that can help students learn (Syahrowardi & Permana, 2016; Yuniarni et al., 2020).

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Learning media is an inseparable part of learning activity in the school. The utilization of learning media is a creative and systematic effort in creating an experience that can help the teacher in a student's learning process. Learning media is a helpful tool or intermediary to ease the learning process effectively between teacher and student (Rachman et al., 2017; Sulistyowati & Rachman, 2017; Syaparuddin & Elihami, 2020). Learning media has many types; one is video-based learning media. During the Covid pandemic, teachers began to be creative in carrying out science learning activities using new media such as additional applications such as YouTube and others, these media as supporting the virtual learning process (Fachriyah, 2020; Mahasneh et al., 2021). However, the current limitation is explaining the subject matter in 3D in science lessons in elementary schools. A video learning media that presents visual and audio-contained learning messages consists of concept, principle, procedure, and knowledge application theory to help comprehend a learning theory (Gowasa et al., 2019; Nurrohmah et al., 2018; Pebriani, 2017).

The previous studies showed that using video-based learning media on android in the study-learning process was not used widely by the teacher (Bustanil S et al., 2019; Jampel et al., 2018; Tse et al., 2019). A study found an increase in understanding of elementary school students in learning science using interactive multimedia based on Augmented Reality (AR) (Herbert et al., 2021; A. Syawaludin et al., 2019). In another study, the use of AR technology was also able to improve university students' abilities (Ahmad Syawaludin et al., 2019; Tycho et al., 2020). In this case, we tried to use another technology, namely Android-based virtual reality, for science learning in elementary schools. In general, virtual reality is not a new technology but has been found in Indonesia and worldwide. In Indonesia, Virtual Reality (VR) is widely used in entertainment and games, even though there will be more benefits if VR technology is used in learning because it will significantly help students learn.

Developments in virtual reality technology can be used as creative and innovative learning media by teachers to help the learning process in the classroom (Chen & Hsu, 2020; Hamilton et al., 2021). The application "Virtual Reality (VR) is a technology that represents the real world into the computer world by displaying a 3D environment using special electronic equipment" (Hariyanto & Köhler, 2020; Kandakatla et al., 2020). Based on the description above, for this reason, VR technology is perfect if applied in science learning in elementary schools, on animal classification material based on android to increase student attractiveness in an interactive and educational learning process. This study aims to analyze student acceptance and understanding concept in using android-based animated videos on Millealab virtual reality in grade V elementary school.

2. Method

The research was using *Research and Development (R&D)* approach, and the method in this research was using survey design research. The subjects of this study were students from three elementary schools, Indonesia. The selected students were in grade 5 elementary schools. The trial phase involved 65 students. Selection of research subjects using purposive sampling, namely determining the sample with specific goals and considerations. The model developed in the research is the ADDIE model (Wulandari et al., 2020). There are five stages in the model development, which are Analysis, Design, Development, Implementation and Evaluation. The survey research method was using a questionnaire as data collection with the objective was to collect information on the number of respondents regarded as representing a specific population (Yoyo Sudaryo et al., 2019). At the analysis stage, Identify the needs and characteristics of students who will carry out learning activities using Millealab virtual reality media. Arrangement of 3D visualization layouts in virtual reality that focuses on learning objectives, selecting target user coverage, and assessing these media tools using software tools in the form of Millealab and hardware devices in laptops and android cellphones. At the design stage, Making a virtual reality media design (flowchart). The flowchart is a development flowchart that describes the application's course from the start of the application to closing the application. Making a storyboard

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illustrates the overall picture of the application being made. Then make questions and collect backgrounds, pictures, and symbols by making pictures using the Millealab application.

At the development stage, Creating virtual reality media is making book media products using Millealab software. Furthermore, media validity is carried out by media experts and material experts by producing criticism, comments, and suggestions in making a product and revising media developed before being tested in elementary schools. This product revision is carried out if, in actual condition, there are weaknesses and strengths by considering criticism, suggestions, and comments from media experts and material experts. At the implementation stage, the product implementation stage can be tested on target users, namely students, about science lessons on Animal Classification material based on the type of food in class. The selection of targets includes all the number of students in the class and the class teacher. The evaluation stage is the stage where the product has reached validity against the research results carried out. This evaluation stage is also helpful in making revisions in terms of product deficiencies that have been made. The questionnaire grids are presented in Table 1, Table 2, Table 3, and Table 4.

Table 1. Result of The Product Feasibility Assessment by Media Expert

Aspect	Indicators	Question Number
Visual	Conformity of the Display with background	1
	Interesting color combination	2
	Conformity of image and animation set	5
	Conformity of image displayed with lesson material discussed	6
	Animation of writings presented are clear and interesting	7
Audio	Conformity of background music with narration	3
	The sound produced is clear	4
Quality	Video Quality is good	8
Content	The video content is in sequence according to material	9

Table 2. Result Of Product Feasibility Assessment by Lesson Material Expert

Aspect	Indicator	Question Number
Content Qualification	The depth of the lesson material presented is suitable to support Basic Competency (BC)	2
	The accuracy of illustration and example is suitable for the student's environment	5
	The conformity of animation video with student’s development level	6
	The conformity of lesson material with the modern-day development	7
	Encourages to find further information	9
	The attractiveness of lesson material presented using animation video	10
	Material presentation with properly through animation video	13
Presentation Qualification	Material completeness presented is suitable with regular daily life	1
	The accuracy of the material presentation sequence in the animation video is suitable for Natural Science learning	3
	Procedure accuracy presented is suitable with Natural Science learning	4
	The sequence and mindset coherence in animation video	8
Contextualization	Conformity with student’s intellectual development level	11
	Conformity with social, emotional development level	12

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Table 3. Result Of Product Feasibility Assessment By Teacher

Aspect	Indicators	Question Number
Visual	Animation (moving pictures) is interesting	11
	Exact color combination	12
Audio	Using sound effect	7
	There is musical content in the media	13
Content	Relevant to the curriculum objectives and learning target	1
	Material presented is corresponded with the Natural Science lesson syllabus in grade V	2
	Material corresponds with basic and standard competency that wants to be achieved	3
	Material presented is corresponded with the purpose of Natural Science learning in grade V	4
	The learning plot is clear	5
	Material clarity	6
	Animation video presented makes material clearer	9
	There is a video containing Natural Science learning in real life	10
Language and Writing	Language articulation is clear and understandable	8

Table 4. Result Of Product Trial by Students

Aspect	Indicators	Question Number
Software Aspect	The animation Video presented makes me interested in following the lesson	1
	Animation video presents an image, and video is straightforward and easy to understand	2
	The material illustration presented by the animation video makes me easy to understand	3
	Overall, I am interested in animation video in the Animal Classification material based on its Food Type	8
Material	The animation video makes me passionate and enthusiastic in following Animal Classification Based on Its Food Type on Video of Natural Science lesson material	7
Visual Communication	The combination of writing, image, and sound presented in the video is very good	4
	The material illustration presented is close to everyday life	5
	Animation video makes the studying mood boring	6

3. Result and Discussion

Results

Based on media experts' validation results, *virtual reality* learning media was stated valid according to input and suggestion (Audia et al., 2021; Mahendra et al., 2021; Zulherman et al., 2021). Data from questionnaire qualification test by media expert has obtained the value of 76% with valid criteria. The validation test in four aspects: visual, audio, quality, and content, where quality and content get the highest score and score 80%, and the lowest visual aspect is 72%, with an average overall aspect score of 76%. In Figure 1, there is a reasonably significant difference where the content and quality aspects are the highest of the other two aspects so that the expert's assessment focuses on the appearance of the media for readers or students who are very influential.

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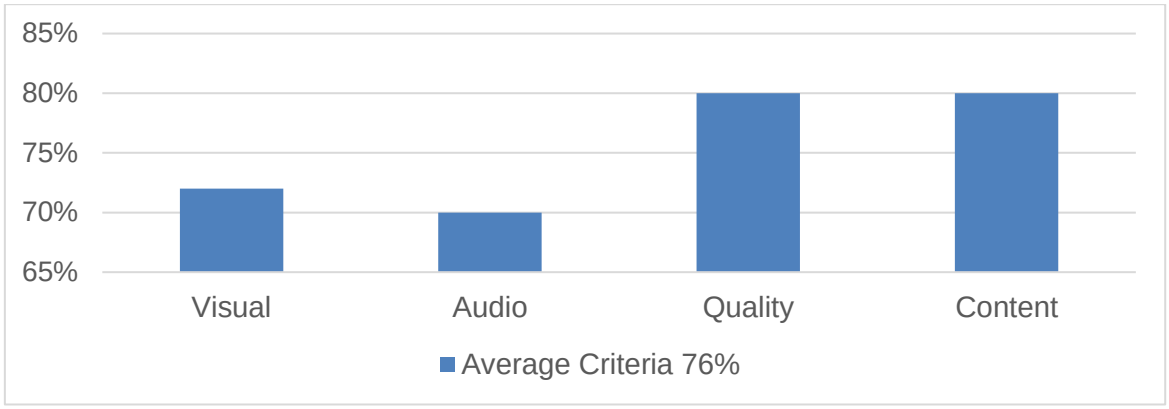

Figure 1. Diagram Result of The Product Feasibility Assessment by Media Expert

Based on the expert validation of the material presented in figure 2 showed, it can be seen that the content of the subject matter is declared valid with revisions according to expert input and suggestions. The feasibility test questionnaire obtained an average percentage per aspect of 81% with very valid criteria. The highest score was in the content qualification aspect of 84%, and other aspects were Presentation Qualification and Contextualization with 80% each.

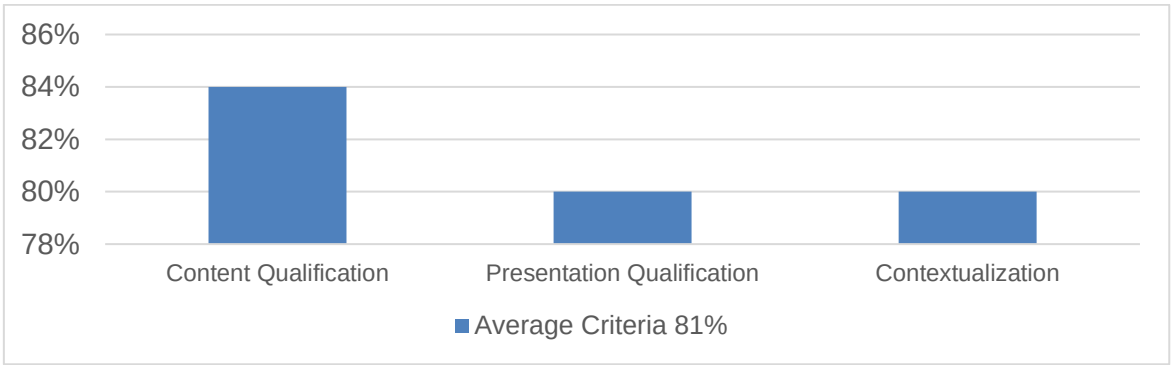

Figure 2. Diagram Result of Product Feasibility Assessment By Lesson Material Expert

Assessment in Virtual Reality learning media by teachers, based on the results of teacher assessments in figure 3, it can be seen that the overall average assessment of virtual reality learning media is 83% with perfect criteria. The highest aspect in language and writing is 87%, and the minor aspect in audio is 77%, so it is concluded that it is perfect. It can be seen that teachers can receive virtual reality learning media that can support science learning in elementary schools.

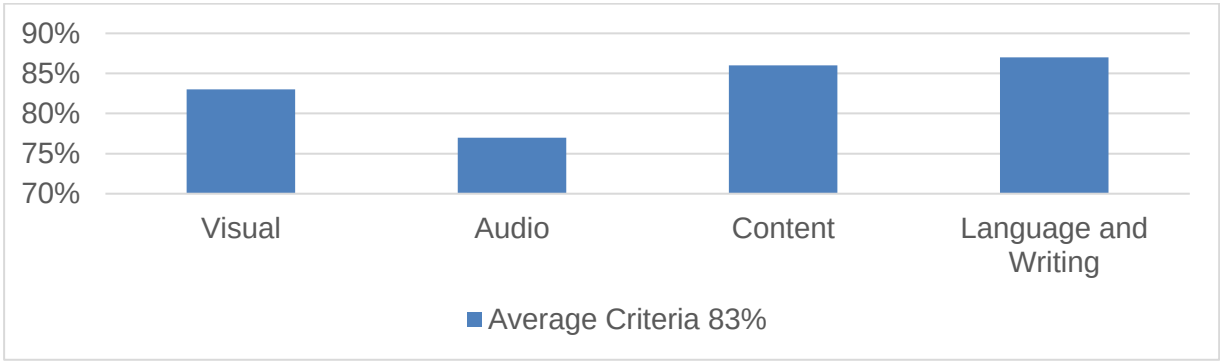

Figure 3. Diagram Result of Product Feasibility Assessment By Teacher

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After the experts and teachers validated the media, the media was tested to determine whether *virtual reality* learning media could support their comprehension of the Ecosystem topic. The result of the media product feasibility trial was obtained average percentage in every aspect as much as 82%, as shown in figure 4. The data shows that media was developed very well, and it can be used to support the learning process on Ecosystem learning in Natural Science. The results of student assessments based on aspects of the software, material, and visual communication with the highest gain in material aspects so that the content in learning content by students is exciting to see because it can motivate students in learning.

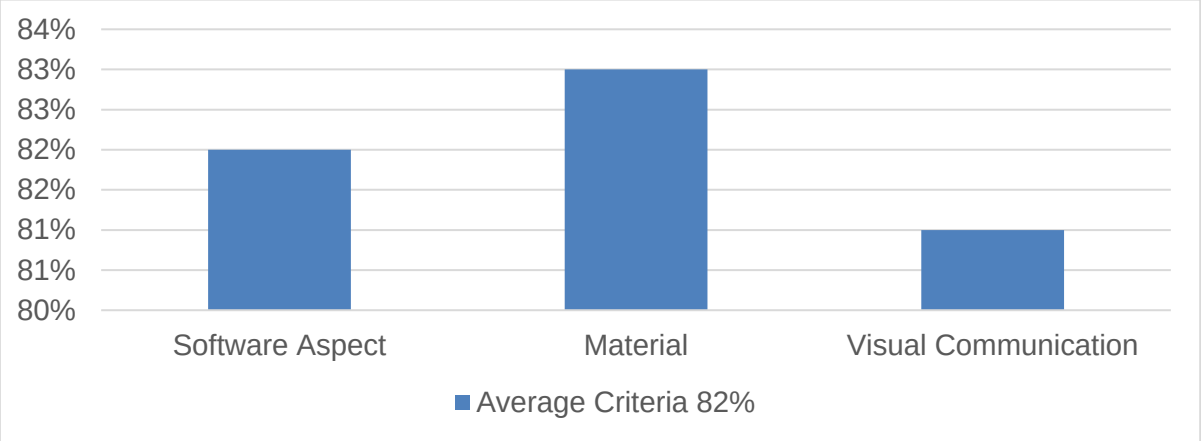

Figure 4. Diagram Result of Product Trial by Student

Below are some examples of display images from animation using VR in Figure 5.

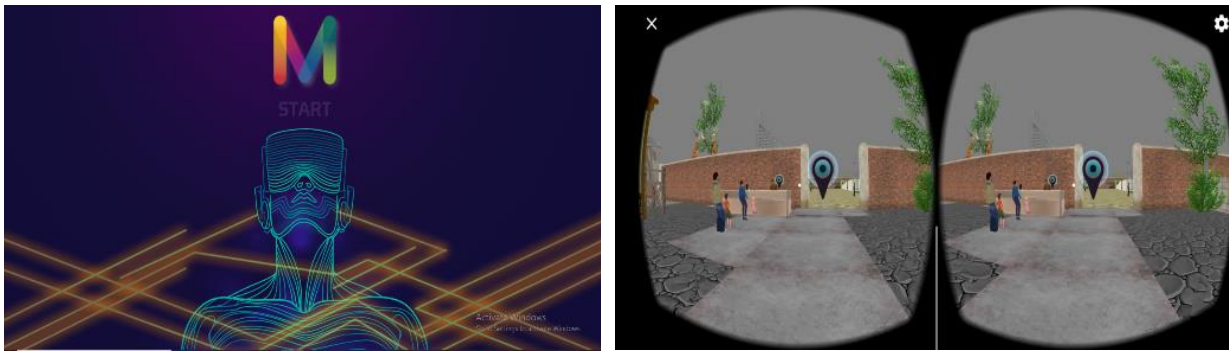

Figure 5. The developed media is in the form of animation using VR

Discussion

Figure 1 shows that the content and quality are very valid, following the criteria and evaluation of the media expert evaluation process. The content aspects will affect the quality of VR media display, so it is necessary to pay attention to display standards (Su & Cheng, 2019; Tycho et al., 2020). The evaluation from media experts dramatically determines the quality of the VR video media produced based on aspects' assessment. Relevant research results, the content and quality aspects had the highest results so that the effect was very significant on the quality of the media produced (Pratiwi et al., 2021; Rostyawati et al., 2021). In other findings, it is explained that applying Virtual Reality-based learning media in learning activities is by the development of information technology in the era of the Industrial Revolution 4.0 so that teachers and students also gain knowledge, skills and are motivated to use Virtual Reality-based learning media, as well as variations in the learning process able to improve the quality of learning (Asikin et al., 2019; Khairudin et al., 2019). The validation of

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media experts shows that virtual reality-based 3-dimensional material and media are very suitable and very suitable for use in learning. So that the 3-dimensional media based on virtual reality developed is valid, practical, and effective.

In Figure 2, in the assessment by material experts for VR, there are three aspects: content qualification, presentation qualification, contextualization, and content with the highest qualifications. Material experts focus on content because the material in VR media is an essential part of student knowledge to get special attention. The relevant research showed the content qualification aspect had the highest results so that it had a very significant effect on the suitability of the material in the resulting VR technology (Djannah et al., 2021; Herbert et al., 2021). Thus, all aspects of this material expert are perfect and following the learning needs of students. The results from the material validation showed that the 3D and media were very appropriate for learning. There is a real benefit to working with 3D virtual reality.

Figure 3 show that Speech, writing, and critical thinking are all required. Meanwhile, audio is at the bottom. It is known that the teacher understands aspects of information that will be readily accepted if the language and writing style are adjusted to age levels. So that the material in VR media will be easy to learn and understand by students (Chen & Hsu, 2020; Hamilton et al., 2021). Educators' role is very dominant in testing VR media because it will continue to students who will learn the material in VR media so that the dominance of education helps adjust students' learning abilities and characters (Sholihin et al., 2020; Yilmaz & Goktas, 2017). These results are also crucial for teachers in following technological developments and being able to produce 3D media based on virtual reality or other forms of media in classroom learning because these media can show concretely the concepts discussed to increase student interest and learning outcomes; education and training (diklat), courses, learning from friends need to be held. This effort needs to be supported by schools by providing facilities and infrastructure to implement multimedia use.

Figure 5 display the effects of the machine and visual contact. The appearance in the material is very dominant in supporting the media in information on the subject matter. Research proves that someone will capture learning media more visually in 3D than learning using 2D media (D. Aji et al., 2020; Chien et al., 2020). One of the 3D learning media can take advantage of Virtual Reality technology. Another study shows that students can interact with the virtual world environment simulated by a computer to be in that environment (Pranata et al., 2017; Ran & Jinglu, 2020). Previous research also shows that using VR media makes students more motivated to learn various disciplines in a virtual environment to be beneficial and efficient in time and cost (Dewantara et al., 2019; Tycho et al., 2020). In other findings, many students believe virtual reality motivates them to learn certain subject skills in particular specific benefits include a better or more productive learning experience, increased or more efficient acquisition of knowledge, and the ability to save time (Kustandi et al., 2019). According to the findings, when virtual reality is used in the teaching and learning process, there is more likely to be improved learning for students.

4. Conclusions and Suggestions

The application of virtual reality (VR) technology in science learning in elementary schools can improve conceptual understanding so that student acceptance of VR is excellent and teachers also feel helped by using VR media to support the learning process. VR technology is better than AR because it is more comprehensive and easier to use by teachers and students. The following research recommendation is to measure student learning outcomes after using VR as a learning medium.

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