

Virtual Reality-Based Teaching Materials in Elementary Schools

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ABSTRACT

In this digital era, the use of technology in learning is very rampant. One technology that is currently new and modern is virtual reality. This technology is capable of creating a virtual display that can bring someone into a virtual world by utilizing a VR headset. This technology uses smartphone media equipped with VR applications and headsets. The use of this technology has been widely applied in several countries. For example in America, many learning has used this technology. By using this technology students will gain direct experience of the teaching materials provided. The use of this media will increase students' understanding of the material and student activity independently. Students can explore on their own with this media because the basic concept of virtual reality teaching materials is almost the same as a simulator.

Keywords: *Teaching Materials, Virtual Reality, Elementary School*

1. INTRODUCTION

Times that are increasingly changing have given rise to increasingly sophisticated technology. Long before the existence of advanced technology, people considered typewriters to be the most modern things. Increasingly, people only need to use gadgets or smartphones to help with daily work. The use of gadgets in this era is increasingly prevalent, even one person has more than one gadget. Even now children at the age of 2 can use gadgets proficiently.

The use of advanced technology such as smartphones has been widely used in various fields. In the field of education, advanced technology such as gadgets/smartphones are very widely used. Starting from elementary school to college have used advanced technology to help deliver the material. In elementary schools, the use of advanced technology has been widely used, especially in urban elementary schools. One of the many technologies

The use of smartphones in education varies widely, from the use of Learning Management Systems to the use of Virtual Reality technology. The use of Virtual Reality technology is now starting to be widely used in learning.

The use of virtual reality technology in learning in schools has been widely applied in several countries. In

Indonesia, the use of this technology is still rare. The application of this technology requires higher costs because it has to provide smartphones and VR headsets.

This virtual reality technology can create a virtual display that brings someone into a virtual world by utilizing a VR headset. Students can also interact with teaching materials in this media so that student activity is maximized. With the advantages possessed by Virtual Reality technology, it is possible to maximize learning.

2. DISCUSSION

2.1. Teaching materials

Teaching materials are an integral part of the learning process. Without teaching materials, the learning process cannot run well. Teaching materials can be interpreted as learning resources [2], [3]. Learning resources are the origin of the material studied by students.

Teaching materials contain subject matter for students to learn. Teaching materials are also sometimes defined as learning media, because in teaching materials sometimes there are also tools to convey messages [4], [5]. Learning media is a tool for delivering subject matter to students.

Today, with the development of technology, teaching materials are developing rapidly. In ancient times, teaching materials were only in the form of textbooks and teachers. This causes learning in the past to be dominated by teachers.

Teaching materials in this digital era are more diverse. Not only from books but also interactive multimedia, from the internet, videos, etc. Many academics and education practitioners have developed digital teaching materials. Teaching materials are developed as attractive as possible so that students are interested in learning.

The development of a teaching material must be based on an analysis of student needs. There are several reasons why it is necessary to develop teaching materials, as follows.

- Availability of materials according to the demands of the curriculum, because the curriculum is a basic reference for the development of teaching materials.
- Target characteristics, meaning that the teaching materials developed can be adapted to the characteristics of students as targets, these characteristics include the social, cultural, geographic, and developmental stages of students.
- The development of teaching materials must be able to answer or solve problems or difficulties in learning.

Thus, the development of teaching materials in schools needs to pay attention to student characteristics and student needs according to the curriculum, which demands more student participation and activation in learning. The development of student activity sheets is an alternative teaching material that will benefit students in mastering certain competencies, because student activity sheets can help students add information about the material being studied through systematic learning activities.

Teaching materials have several characteristics, namely:

- Self Contained, namely all subject matter from one competency unit or sub-competency being studied contained in one teaching material as a whole.
- Stand Alone is a teaching material that can be used without the need for other teaching materials.
- Adaptive, namely teaching materials must be able to adapt to student characteristics and technological developments.
- User Friendly, namely the teaching materials developed must be able to be used by students easily both in terms of accessing teaching materials and their use in learning.

2.2. Virtual Reality

Virtual reality is a technology that allows users to enter a virtual world. In this virtual world, users can interact so that they feel real [6] - [9]. This technology was first developed in 1977 by MIT. When it was first developed, this technology was not yet user friendly. The equipment developed is impractical to carry around.

Along with the rapid development of technology, virtual reality technology has developed to create virtual reality technology that is practical and user friendly. Virtual Reality (VR) technology which is currently being developed using the main smartphone device that supports gyroscope processors. The smartphone is then installed in a virtual reality headset and worn like glasses so that all eyes are covered by the smartphone screen. In the headset, there is a lens that will direct the light right at the retina of the eye so that the user will see what is on the smartphone screen as a whole [10] - [13]. This headset makes users see the virtual world that appears on the smartphone screen.

These virtual reality devices are like swimming goggles. This virtual reality device will cover the user's eyes. The lens in this Virtual reality headset can be adjusted so that the projection of the display is right on the retina of the eye. The simplest virtual reality headset is that it only has a VR lens and box. For more sophisticated VR headsets, there are several sensors to determine the direction the headset rotates.

The sensation that will be obtained when using this technology is like we are in another real world [14] - [17]. If what is displayed in virtual reality is a cliff, we will feel afraid of falling, even though we are in reality only in a room using VR. This technology allows us to visit a virtual place.

Further development of virtual reality technology is that users can interact with objects in virtual reality [18], [19]. The use of this technology is widely used for job simulations that contain many risks such as astronauts who have to practice when in outer space. This technology is also widely used in the gaming world. Users will feel the sensation of entering directly into the game.

Many technology support devices have also been developed. One of the supporting technologies that have been developed is a joystick that is connected to a VR device so that it allows users to interact realistically with the environment in virtual reality [20], [21].

There are several types of virtual reality technology that have been developed at this time. Based on virtual reality devices are divided into nits.

1. Virtual Reality Website

This virtual reality is the simplest. Only requires a smartphone device, a browser on the smartphone and a

simple VR headset. VR video is opened through the smartphone browser, then the smartphone is inserted into the headset and used. The use of this type of VR is usually for office tours, sales properties, and can also be used to show tourist attractions.

2. Virtual Reality Mobile / Apps

This type of virtual reality utilizes applications that must be installed on a smartphone. This application will present a virtual reality display that is more real. Users will be able to feel in a virtual environment. Wherever the user faces, the video display will follow the user's movement. So that users will feel in a virtual three-dimensional world that feels real.

3. Virtual Reality Glasses

This type of virtual reality is the most sophisticated. This VR device does not use a smartphone, but its device specifically for virtual reality. This device will provide the sensation of entering a virtual world that is more real. Users can interact with the environment in the virtual world.

2.3. Implementing Virtual Reality in Learning

The use of virtual reality which has been widely used is still limited to some subject matter in several subjects. For example, in the material of the human body skeleton and human blood circulation. By using virtual reality media students will be able to see directly with a three-dimensional view and students can also interact in the media.

For other materials, you can use virtual reality media, it's just that to develop learning media with virtual reality requires a large fee. Indeed, not all material can be facilitated by this media, but this media can facilitate material that is difficult if it is explained using images or video media only.

For example, for the material of the solar system, using virtual reality students will get a more optimal experience because students can enter the visuals of the solar system and interact in it. Many science subjects can be facilitated with this virtual reality media. With this medium, natural science learning will be more interesting and more optimal.

In social science material, the use of virtual reality is very suitable, because it can display a virtual place/location that can be seen directly by students. Students will feel they are in that location even though they are actually at school. With this technology, students can visit various countries, various places, various times very easily and very real.

In mathematics, subjects can be used in arithmetic, addition, subtraction for low-grade elementary school students. For high-grade students, it can be used to measure the area of a plane, volume, and others.

In Indonesian subjects, it can be used in the material of understanding short stories. By using this media short stories can be enjoyed by students with a more real experience.

In the subject of civic education, virtual reality media can show videos of behavior following norms. The video that will be seen by students will be more memorable because students feel like they are seeing directly where the video was recorded.

3. BENEFITS OF VIRTUAL REALITY IN LEARNING

There are so many benefits that can be obtained from the use of virtual reality technology in education. The following are the benefits of using virtual reality technology in the field of education.

1. Make it easier for students to learn

VR technology can produce a three-dimensional effect that can visualize an object in real terms because the object will have a length, width, and height. This can make students better understand the lessons being taught. Especially when learning something that has not been imagined at all, VR technology will help students more.

2. Increase the Spirit of Learning

With VR technology, it can make students 'enthusiasm for learning to increase because this technology can increase students' curiosity in learning. This curiosity makes students want to learn again and again. Moreover, it is assisted by VR technology which can visualize the lessons being learned.

3. Lowering Boredom and learning more fun

If the learning activities take place for a long time, the learning activities will appear bored. However, by using VR technology in learning boredom can be overcome. This is because learning using VR is more interesting and less boring when compared to conventional learning activities. The use of VR technology in education will make learning more enjoyable. When learning can be done in an interesting and fun way, the students' boredom in learning will decrease. So it is hoped that learning outcomes will increase.

4. Facilitate the Delivery of Material

Apart from the benefits of VR technology for students, this technology also has benefits for teachers or teachers. The use of VR as an intermediary for the delivery of material will facilitate the teaching and learning process. Teachers also do not need to convey too much material orally because they have been assisted by this technology. Besides, the positive impact of using VR in delivering material is that it can increase the effectiveness of student learning.

4. CONCLUSION

The use of this technology has been widely applied in several countries. By using this technology students will gain direct experience of the teaching materials provided. Indeed, not all subject matter can use this media, but the use of this media can create more interesting and enjoyable learning.

The use of this media will increase students' understanding of the material and student activity independently. Students can explore on their own with this medium. With the VR technology will increase students' interest in learning, it will also increase students' enthusiasm in learning activities. With the many advantages of VR technology, this technology has the potential to improve the quality of education in the future.

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