



ASSESSMENT OF MEDIA LEARNING BASED ON LEARNING VIRTUAL REALITY IN INDUSTRIAL WORK PRACTICES IN SMK

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Abstract

Purpose of Study: The development of science and technology as it is today will greatly affect the learning process and the preparation of vocational school graduate workforce. Law Number 20 Year 2003 on National Education System explains that the purpose of vocational education is to prepare learners to be ready to work in certain fields. Virtual reality-based learning media can help grade XI SMK students to know the world of industrial work practices so that students of class XI SMK are better prepared in carrying out industrial work practices.

Based on the above reasons, the research problem can be formulated as follows: ([Baroughi & Zarei, 2013](#)) what is the definition of virtual reality-based learning ?; ([Chao liu, 2012](#)) how are the procedures and steps to create virtual reality ?; ([Citra parameswari, 2008](#)) what are the advantages and disadvantages of virtual reality-based learning media ?; and ([Matandare, m. A. 2018](#)) how is the tendency of utilization of virtual reality-based learning media to industry practice in SMK?

This study aims to: ([Baroughi & Zarei, 2013](#)) know the meaning of virtual reality; ([Chao liu, 2012](#)) know the procedures and steps to create virtual reality; ([Citra parameswari, 2008](#)) analyzing the advantages and disadvantages of virtual reality-based learning media; and ([Matandare, 2018](#)) to analyze the tendency of utilization of virtual reality-based learning media on industry practice in SMK.

Methodology: Research carried out through this literature study yields the following conclusions: ([Baroughi & Zarei, 2013](#)) virtual reality is a technology that allows users to interact with a computer-simulated environment; ([Chao liu, 2012](#)) procedures and steps to create virtual reality is to record the atmosphere and activities of industrial workplaces and processed into virtual reality-based learning media; ([Citra parameswari, 2008](#)) the advantages of virtual reality-based learning media can provide more interesting and interactive learning, while the weakness of virtual reality-based learning media is costly and requires a long time to create; and ([Matandare, 2018](#)) the use of virtual reality-based learning media shows an increasing trend in the implementation of industrial work practices.

Results: To make a video into a VR Box, prepare a camera with a minimum quality of 8 megapixels. Record the location that will be the object. The location we want to take is the location where the world of work.

Implications/Applications: The advantages of using VR to teach educational purposes are similar in many ways with the advantages of using computers or interactive simulations, especially three-dimensional computer simulations. Computer-based simulations have been used for many years in computer-assisted instruction (CAI).

Keywords: *Virtual Reality, Learning Motivation, Industrial Work Practices*

INTRODUCTION

Along with the development of science and technology, that the preparation of quality workforce has always been a demand in the world of work, including the preparation of vocational graduates. Based on the survey in the field of class XI students majoring in soft engineering after doing perakerin they get little knowledge and work experience. This is because students have difficulty adjusting as well as limited knowledge and briefing about the world of work before students go to the place of industrial work practice.

In this digital era, one of the most commonly used technology is multimedia technology that also develops has made the delivery of information can be delivered with more interactive and effective because it can reach the human senses, for example, is technology VR (Virtual Reality) ([Yulianto, Dimas Agung, 2012](#)).

Virtual Reality is a technology that enables users to interact with a computer-simulated environment, an actual environment that is imitated or really an environment that exists only in imagination ([Barakhsanova, Savvinov, Prokopyev, Vlasova, & Gosudarev, 2016](#)).

With the picture of activities that are aired through the Virtual Reality, Box will be able to provide motivation for students to improve learning in order to know the picture of the real world of work in the field of software engineering.

Based on that reason, the researcher want to make learning media with Virtual Reality Box technology, with the purpose then the researcher makes the formulation of the problem as follows: ([Baroughi & Zarei, 2013](#)) what is the definition of virtual reality-based learning ?; ([Chao Liu, 2012](#)) how are the procedures and steps to create virtual reality ?; ([Citra Parameswari, 2008](#)) what are the advantages and disadvantages of virtual reality-based learning media?; and ([Matandare, 2018](#)) how is the tendency of utilization of virtual reality-based learning media to industry practice in SMK ?.

Experimental Details

Virtual Reality (VR) was first named in 1989 in several magazines and newspapers by Jaron Lanier who was the founder of the VPL Research Company. VR is a technology that uses computers and electronic technology to produce a realistic three-dimensional atmosphere so that users can feel through sight, hearing, touch and to form a virtual world ([Chao Liu, 2012](#)).

Virtual Reality is a technology that enables users to interact with a computer-simulated environment, an actual environment that is imitated or really an environment that exists only in imagination ([Psootka, 1994](#)).

VR technology is a kind of interface technology between humans and machines that can manually simulate people like being in a natural environment including with sight, hearing, movement, and other actions. Not only can it clearly describe the environment in real terms, but VR also allows users to observe virtual environments and feel like they are there (15).



Figure 1. Simulasi Pelatihan Parasut Dalam Penerapan VR

The basic concept of VR is to try to make a world inside a computer. Users use a variety of tools to translate their movements so they can be used to manipulate virtual objects. Although VR brings its users to explore the real world through simulations, for example on simulated exploration in space, VR cannot be denied to remain a map and not an area in the real world. The VR ignores people around the wearer, ignores the user's seat bench, and other real aspects. It can be said that the VR focuses on simulating real-world attempts into computers rather than directly manipulating objects or the real world to solve a problem ([Putu Widhiartha, 2007](#)).

Users are actively manipulating the VR environment, as well as through standard input equipment such as keyboards, or through specially designed gear such as virtual gloves. Simulation environments can be similar to the real world for example, in simulations for pilot training or combat-or can be significantly differentiated with reality, such as molecular simulations, or on VR games.

Virtual reality actually refers to a very deep system, although it has long been used to describe systems without virtual gloves and so on. VRML (Virtual Reality Modeling Language) is a programming language created specifically for creating 3D objects. Objects created with VRML will have three dimensions of length, width, and depth, so they can be viewed from every angle. VRML uses a highly structured but simple language structure. VRML does not require programming logic in making it, and its commands are quite easy to memorize as they are formed from simple English

similar to HTML. The VRML program structure that uses curly brackets and divides each part of the program into objects, much like C or C++ ([Brunner, José Joaquín, and Francisco Ganga-Contreras. 2018](#)).

It is not easy to create a VR with a high level of similarity in the real world. The problem is still around the limitations of data processing technology, image resolution, and communication bandwidth. However, it turns out that this limitation can encourage the development of processors, images, and data communications technology more sophisticated and efficient.

The development of computers and software allows all the 'real' images to exist in all areas of life, from gaming, medicine, to business. For example for marketing, VR technology allows sellers to present products directly to the minds of consumers more real, something that can not be done conventional media campaign. Example for the tour, with VR potential tourists, can feel the first tour 'maya' tourist attraction to be visited.

Some of the methods used in making VRs include simulation-based, Avatar images, image projections, desktops, and VRs that are absolutely perfect. In VR based simulation the example is driving simulation. The simulator consists of several systems ie visual highway complete with inclines, potholes and traffic lights. Full devices that are very similar to real cars, as well as supporting sensors. People who drive simulated cars will feel the same conditions persist when on the actual highway. Including if he passes through the potholes will also feel the shock ([Citra parameswari, 2008](#)).

For box-based VRs, real-life modeling plays a major role in VR applications such as robotic navigation, construction modeling, and aircraft simulations. To get real modeling, accurate 3D data is required. The camera can help to model an object with a close shooting distance.

It should be recognized recently that VR-based technology is growing rapidly along with advances in computer technology and smartphones that can support VR box. Almost all areas can take advantage of virtual reality, the world of education can also feel it.

RESULTS AND DISCUSSION

Procedures and Steps to Create Virtual Reality

To make a video into a VR Box, prepare a camera with a minimum quality of 8 megapixels. Record the location that will be the object. The location we want to take is the location where the world of work.



Figure 2. Programmer workspace

Once the video is finished you can convert normal 2D video to VR to enjoy on Oculus or Google Cardboard by converting your video in VR headset with 3D effect, you need to convert 2S video into 3D SBS MP4 or 3D SBS MKV supported by VR. Video Converter Ultimate is a professional 2D to VR Converter. With that, you can convert normal videos like MP4, MKV, AVI, WebM, MXF, MPG, FLV, MTS, M2TS, etc. to VR headsets that support 3D-effect video formats like Top-Bottom, Side-by-Side 3D MP4 and MKV. In addition, he can convert video to play on Gear VR via Samsung Galaxy S7 / S6 / S5, Galaxy Note 5, etc. ([Lewis, 2014](#))

Step convert 2D video to 3D with video converter application:

- a. Import video source Launch VR video converter and click "Add File" to import your 2D or 3D source video files. Batch conversion is supported so you can add multiple files for conversion at once.



Figure 3. The initial view of the Video Converter application

- b. Select Video Mode After importing your video, select the video mode by clicking "Video Mode: settings". They can be 2D 360 degrees, 3D 180 degrees up / down, 3D 180 degrees left / right, 3D 360 degrees up / down and 3D 360 degrees left / right. By the way, the 2D 180-degree video is normal, not the VR video



Figure 4. Display Select Video Mode

- c. Select Output Format Now "Output Format"> "Device"> "VR" and select "HTC Vive", "Samsung Gear VR" or "Oculus Rift" as the output device to suit your needs. You can also select "3D MP4 (side by side)" from the "3D" category as output format.



Figure 5. Display select output format

- d. Convert Normal Video to VR Click "Convert" button to start and finish the 2D conversion to VR. After conversion, click "Open Folder" to quickly find existing videos. Now you enjoy your VR videos with a perfect experience with VR players.



Figure 6. Display Convert Normal Video to VR

Advantages and Disadvantages of Virtual Reality

Advantages

The advantages of using VR to teach educational purposes are similar in many ways with the advantages of using computers or interactive simulations, especially three-dimensional computer simulations. Computer-based simulations have been used for many years in computer-assisted instruction (CAI). In fact, the advantages of computer-based simulations are well known. Zacharia (2003), referring to Chou (1998) asserted that "researchers attribute the success of simulations to student empowerment, unique instructional skills, support for new instructional approaches, cognitive skills development, and attitude development" (Yulianto, dimas agung. 2012). Simulation is just a real-life representation, there are features that can enhance the real-life experience. For example, simulations can provide authentic and relevant scenarios, utilize stress situations that exploit user emotions and force them to act, they provide unlimited and playable options ", references (Baroughi & Zarei, 2013). Steinberg (2000) argues that " students should know that simulations make it possible to explore new domains, make predictions, design experiments, and interpret the results "(Veronica Pantelidis. 2010).

One of the main advantages of using virtual reality to teach its purpose is that it is very motivating. Investigations by Mikropoulos, Chalkidis, Katsikis, and Emvalotis (1998) on students' attitudes toward cyberspace as a tool in the educational process, and to a virtual learning environment in particular disciplines, found that students had a good attitude toward virtual reality in the educational process.

VR grabs and gets students' attention. This has been documented in a number of research reports. Students find it interesting and challenging to walk through the environment in three dimensions, interact with the environment, and create their own three dimensional (3D) world.

Virtual reality can more accurately describe some features, processes, and so on than in other ways. VR allows an extreme close-up examination of an object. VR provides opportunities for insights based on new perspectives. Seeing an object model from inside or top or bottom shows areas never saw before.

For example, once a molecule is modeled in a VR, students can study it in detail, get into the molecule, walk around, and become familiar with the parts. VR allows inspection of objects from a distance, showing the whole and not the part. The VR model of an environment provides a different perspective on the interconnection between buildings, streets, and open areas.

VR can change the way a learner interacts with the subject matter. VR requires interaction. This encourages active participation rather than passive. Participants who interact with the virtual environment are encouraged to continue to interact by seeing results immediately. VR gives students the opportunity to make previously unknown inventions. New perspectives are made possible by real-world modeling, and studying models can provide unprecedented insights. VR Allows disabled people to participate in experiments or learning environments when they can not do otherwise. They can

do chemistry and physics laboratory experiments and learn by doing. VR allows a learner to proceed through experience at his own pace. Learners decide what to do when interacting with a virtual environment. VR allows a learner to proceed through experience over a wide period of time that is not determined by a regular class schedule.



Figure 7. Schools that utilize VR box in China.

VR allows a learner to learn by doing a constructivist approach. VR provides experience with new technology through actual usage. Simulating a new process with new equipment can train workers. VR provides a way for multiple purposes to be taught through distance education that previously was not possible to be taught in that way.

a. Weakness

The disadvantages of using virtual reality are mainly related to costs, the time it takes to learn how to use hardware and software, possible health and safety effects, and face the aversion to using and integrating new technologies into courses or curricula ([Yulianto, dimas agung. 2012](#); [Nazoktabar & Tohidi, 2014](#)).

Like all new technologies, each of these problems can fade with time and virtual reality becomes more commonly used in areas outside of education.

Health concerns about the use of VR, Wilson (1996) suggests that many new technologies experience some kind of public reaction and this could be due to a number of reasons. This technology may be oversold, its impact on the environment and people's lives is generally unpleasant (such as a motor car) or there is a backlash due to the frequency and duration of use (eg office computer office). Both he and Howarth (1994) drew parallels with the introduction of Visual Display Units (VDUs) in the early 1980s and health speculation surrounding the use of VR equipment. ([Costello, 1997](#))

With the VR system, similar problems seem to be revealed. The introduction of VDU is said to cause physical, physiological and psychological problems and this is exacerbated by the technological limitations on screen at the time.

Here, lies one of the biggest problems in determining problem areas due to new VR technology and continuously improved and developed by different manufacturers. We only need to look at the HMD range in the market to appreciate the different approaches to the design of one aspect of VR technology. Therefore, one should pay attention to the attributes of the VR system being used.

Similarly, one should expect a very diverse user population. This is an important consideration when considering the design of equipment to be placed on the body. Custom fitting may be relatively easy to achieve in the workplace where there may be limited users but the use of VR for public space entertainment.

The application means that the equipment is available for a potentially large user base that may have little or no knowledge of the health and safety issues involved and little knowledge of how to properly use the equipment.

Finally, one must consider the demands of the task itself. For example, a target tracking task that induces sufficient head movement may be more uncomfortable than a task that requires little head-like motion

Reading the document, However, we must consider the complex interaction of various factors. If the system lag is high and the headset is heavy, tracking may be uncomfortable. If the system lag is low, and the headset is light, such a

tracking task may not be a problem. Kolasinski (1995) identifies the number of potential factors that may be associated with the onset of symptoms of simulator disease in VE. These factors are reproduced in Table 1 below.

Table 1: Potential Factors Associated with Simulator Sickness in Virtual Environments (adapted from Kolasinski, 1995)

Individual	System VR / Simulator	Task
Age	Display with Binoculars	The altitude above the plains
Level of concentration	Calibration	Level control
Ethnicity	Color	Duration
Experience with real-world tasks	The distance between the eyes	Global visual flow
Adaptation	Contrast	Head movement
Fusion flicker frequency threshold	Field of view	Lighting level
Gender	Blinking	Unusual maneuvering
Diseases and personal characteristics	Motion platform	Linear acceleration rate or rotation
The ability of mental rotation	Lag phosphorus	Method of movement
Style perceptual	Position tracking error	Speed of self-motion
Postural stability	Refresh rate	Sit vs stand up
	Fill the scene	Veksi
	Pause time (delay transport)	Type of application
	Update rate (image ratio)	
	View region	

When one considers that these factors are involved in the onset of a simulator disease alone, it becomes clear that the origin of the symptoms may be due to the highly complex interactions between the factors in each of the three areas shown above. This may be the case with all the suggested symptoms, and the focus of current research is to try to determine the most important factor for the emergence of certain symptoms ([Costello. 1997](#)).

In the end, there are questions about what side effects actually occur, and the more strange ideas brought about by the general hype surrounding the technology, its applications and its symptoms. Surely there is rigorous research, and no one is involved in the VR dispute that the fact that unpleasant symptoms can occur but little is known. Current unanswered questions include issues such as the

duration of symptoms, predicting individual susceptibility, handling strategies adopted by VR users and impact on VR tasks and consequent activities such as driving or operating heavy machinery ([Parth rajesh desai, pooja nikhil desai, komal deepak ajmera, dan khushbu mehta. 2014](#), [Paul moore. 1995](#)).

The trend of the utilization of Virtual Reality-based learning media

Learning media that can be used based on the tendency of the utilization of virtual reality-based learning media:

- a. Learning media to facilitate the learning process of visual learners because visual learners more easily learn by looking, then the learning media suitable for this learner is a learning medium that relies on the visual sense / visual material. Like virtual reality, photos, illustrations, flashcards, drawing options and snippets, graphics frame films, charts, diagrams, posters, maps, cartoons, posters, bulletin boards and more. In addition, teachers can also invite students to illustrate ideas into an image.
- b. Learning media to facilitate the learning process of auditorial learners Unlike visual learners who rely on vision, this type of auditorial learner relies on the sense of hearing to learn, so that the appropriate learning media used is the audio media (hearing media), such as radio, tape recorder, telephone, laboratory language, etc. In addition to the use of hearing media teachers can also collaborate the media with learning methods that involve the sense of hearing such as: discuss ideas with children verbally, using music to teach children to invite learners to record the subject matter into the cassette and encourage him to listen to it before going to sleep.
- c. Learning media to facilitate the learning process kinesthetic learners This type of learners process information through a series of activities that move part / whole limbs and practice the things learned so that the activities of holding, touching with the movement of the body or hands will facilitate it to learn. So that the appropriate learning medium used is touchable/touchable media like three-dimensional objects that can be touched and touched by students, using a computer or calculator, hand puppets, drawing clippings, and so on.

With the learning media to facilitate the learning process of learners easier to learn by looking at the visual, then the appropriate learning media to simulate industry work practices is a learning medium that relies on the visual sense / visual material.

The use of virtual reality show learning media shows an increasing trend in the implementation of industrial work practices.

CONCLUSIONS

Based on the study of various literature and experimental results, it can be concluded that:

- a. Virtual reality is a technology that allows users to interact with a computer-simulated environment;
- b. Procedures and steps to create virtual reality is to record the atmosphere and activities of industrial workplaces and processed into virtual reality-based learning media;
- c. The advantages of virtual reality-based learning media can provide more interesting and interactive learning, while the weakness of virtual reality-based learning media is costly and requires a long time to create; and
- d. The use of virtual reality-based learning media shows an increasing trend in the implementation of industrial work practices.

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