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Research Article

Virtual Reality Trimatra and Dwimatra Laboratory Visual Art Materials for Higher Education

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Abstract.

Dwimatra and trimatra are currently the main material for university fine arts courses. As a partner campus for the MBKM program, it is obligatory to provide compulsory courses in two dimensions and three dimensions. However, this course is prone to learning misconceptions. As a learning process that prioritizes aesthetics, students are not provided an optimal environment in understanding and experiencing aesthetics due to the lack of accessible virtual infrastructure. This research aims to reduce the misconceptions of the learning problem by providing virtual infrastructure for virtual reality laboratories. The research uses the ADDIE Model method (analysis, design, development, implementation, and evaluation) to develop learning empirically, structurally, and holistically. Validation tests were carried out by material and media experts to determine the media validity. The match pair test is used as a data analysis technique to determine the level of learning outcomes in pre-test and post-test. The hypothetical decision-making guideline on the match pair test refers to the significance value (Sig) if Sig. (2 tailed) < 0.05, then $H_0$is rejected and $H_a$is accepted, if Sig. (2-tailed) > 0.05, then $H_0$is accepted and $H_a$is rejected. The practicality test was conducted to determine the level of media practicality that is obtained from R/SM x 100% with the information R (Achievable Value) and SM (Maximum Score). In this regard, the design of virtual reality laboratories for trimatra and dwimatra art materials for higher education can avoid misconceptions about learning with virtual infrastructure technology.

Keywords: trimatra, dwimatra, misconceptions, virtual reality

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1. Introduction

The implementation of online learning provides its own challenges for education actors, such as educators, students, institutions, and even provides challenges for the wider community such as parents [1]. In practice, educators must find ways to continue to deliver learning material and be easily accepted by students. Likewise, students are required to be able to adapt to situations and conditions like today, one of which is to avoid learning misconceptions [2]. Every college system must be close to technology that allows them to learn faster, better, better understood, and more structured [3]. Information Technology is the key to a better future school model [2]. Analysis of the research team, on 5 universities that carry out practical learning related to art courses still use conventional media in their implementation.

Studies related to the role of technology in education were carried out by [4] about the effectiveness of online learning and [5] on the impact of online education in Indonesia. This is also in line with [6] describes almost all learning media today, there are many platforms that can help the implementation of online learning such as e-learning, google classroom, and zoom.

However, all of these things do not facilitate the basic courses of nirmana because there are many misconceptions due to conventional learning media [7]. Nirmana is very important for students, nirmana is a basic and emergency element for students who is an element in the image, design, and beauty of art in order to create a work of art that is good and has aesthetic value. Nirmana also cannot be separated from the elements of form and the principles of art (creation and design) [8]. This course is given mandatory in semester 1 under the name of a bi-dimensional subject (Nirmana flat 2 dimensions) and in semester 2 under the name of a tridimensional course (Nirmana 3-dimensional space). As a result of this, students who do not understand the nirmana course will find it difficult to understand the process of working during the middle and final semesters. With these problems, learning media is needed that can display interactive 3D objects with audio-visual as an option in understanding the material [9]. The ideal learning media is virtual reality learning media in the form of a virtual laboratory [10]. Lecturers will still be facilitators, then students can interact directly through virtual reality images in a virtual laboratory. This media is interesting and has a high functional value because of the application of virtual reality technology such as playing games and can be operated via smartphones or personal computers.

This research encourages to produce innovative applied products that are worthy of funding for three years to prepare inclusive and structured higher education learning to face a digital world that is not limited by space and time. The specific purpose of this research is to provide convenience for three things: (1) College students can learn without being limited by space and time with bi-dimensional and tri-dimensional materials, (2) College students learn faster, better, understand better, are more structured, and there are no misconceptions of understanding, (3) For universities, virtual laboratories form international inclusive learning to support the Merdeka Learning Campus Merdeka (MBKM).

2. Method

This study uses the ADDIE Model pengembangan development procedure (Rosset, 1987) in [11]. The selection of the ADDIE model is used to support a constructive and innovative flow of material in learning syntax [12] can be viewed sistematically [14]. The stages of this learning media development development model have the following flow chart:

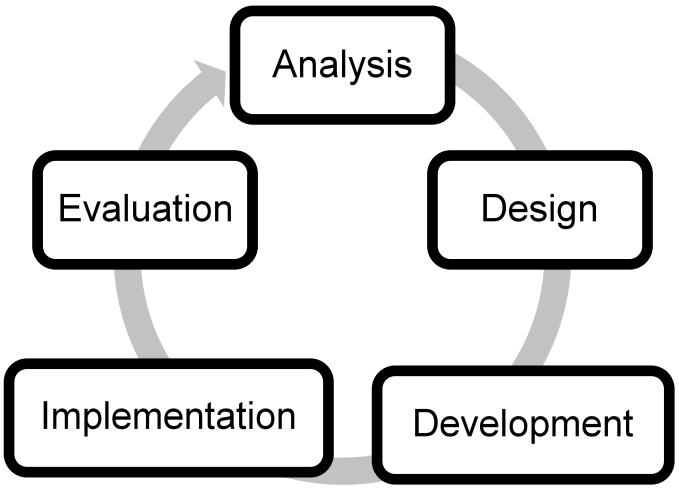


Figure 1: ADDIE Model flowchart (Sugiono, 2019).

The final measurement of the validation level using the following formula:

$$V.ah = \frac{TSe}{TSh} \times 100\%$$

Description:

V.ah. : Expert validation

TSe : Total Empiric Score

TSh : Total Expected Score

The value data from the pre-test and post-test were analysed through a prerequisite test using Kolmogorov Smirnov with the basis of decision making if the value (Sig.) > 0.05 then the data distribution was normal and if (Sig.) < 0.05 then the data distribution was not normal. The proposed hypothesis is H_0 there is no significant increase between pre-test and post-test and Ha there is a significant increase between pre-test and post-test. Then data analysis and hypothesis decision making use the match pair test which refers to the guidelines if the significance level (Sig) <0.05 then H_a is accepted, and vice versa if the significance level (Sig) is 0.05 then H_a is rejected and H_0 is accepted. Then the product practicality test was carried out which was measured by five indicators, namely the ease of user interface in using the media, time efficiency, can be used as a tool, durability of the tool, development and maintenance costs. Measurement of practicality test uses the following formula:

$$Practicallity = \frac{Acquitition\ Score}{Maximum\ \ Score}\ x\ 100\%$$

The assessment of the practicality test is based on the level of achievement if 81% - 100% are classified as very practical.

3. Finding and Discussion

3.1. Material Identification and Software Workflow

Virtual laboratory in principle is a form of integration efforts with learning objectives in full which is run by hardware (hardware). The concept of a college virtual laboratory refers to a practical technical simulation [15]. The flow of material presented in the development media has the following path:

In this regard, the process of developing tri- and dwimatra virtual reality laboratory visual art materials for higher education can be seen in the following user interface:

3.2. Data Analysis: Measurement, Analysis and Testing

Based on the results of the material validation test by the validator on all aspects of the material obtained 93.76% so that it was declared very feasible. While the results of the media validation test measurement by media validators on all aspects of the media obtained 92% so that it was declared very feasible.

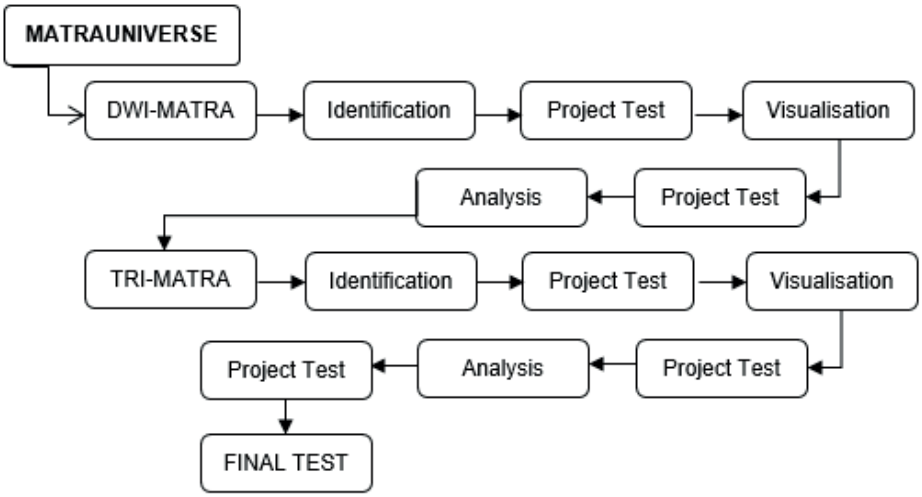


Figure 2: Material flow.

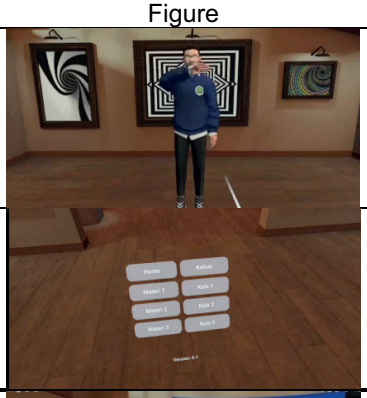
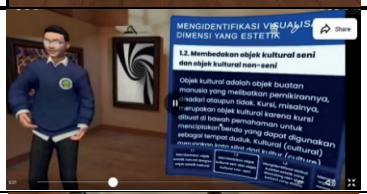
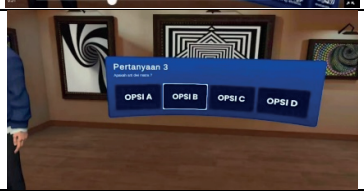
Figure	Description
	Opening subject explanation
	Material menu
	Material explanation by virtual mentor
	Quis display

Figure 3: Figure and Description.

The results of the Kolmogorov Smirnov prerequisite test show that the significance value (Sig.) 0.000 is less than 0.05 or 0.000 <0.05, so it can be concluded that the data from the pretest and posttest results are not normally distributed. So that the analysis of hypothesis testing uses non-parametric analysis of match pair test. Based on the results of the statistical test, it shows that the significance value is 0.000, meaning less

than 0.05 or 0.000 <0.05, then Ha is accepted. This means that there is a significant increase between the results of the pretest and posttest after the implementation of virtual reality media for three-dimensional and two-dimensional laboratories for higher education art materials.

Test Statistics[a]

	Post Test - Pre Test
Z	-13.638[b]
Asymp. Sig. (2-tailed)	.000

Figure 4: Statics Test.

Based on the results of the analysis of the results of filling out the media practicality questionnaire by students, the overall results obtained are 93.13%. So based on the level of achievement of the media practicality test, it is classified as very practical.

4. Conclusions and Suggestions

Three-dimensional and two-dimensional virtual reality laboratory visual art materials for higher education can contribute to collaborative learning of two-dimensional and tri-dimensional materials based on interactive virtual reality that supports independent learning on an independent campus and is accessed within and outside the oculus hardware.

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