

SCULPTURE AND CARVING ART VIRTUAL MODULE BASED ON 3D AUGMENTED REALITY

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Abstract: Currently, online and independent learning could harm students' understanding about the shape of an object due to students' misconceptions. This statement happens because the cognitive level possessed by each student is different. Educators who are pioneers of the main facilitators of learning in the classroom tend to take resources without considering the results of students' understanding. In sculpture and carving art material, the teacher must download 2D images from the internet, add text, and not touch objects that can provide direct tutorials. This statement is undoubtedly a problem in learning because it is related to misconceptions. In connection with these emergency problems, a module that can display 3D augmented reality objects with audio-visuals is urgently needed to avoid learning misconceptions. This virtual module can be used with independent learning methods or group discussion forums. The teacher will be a facilitator for each basic competence. The module will direct students to follow a structured and interactive learning flow. This development research uses the ADDIE Model method because the instruments and objectives are aligned with the problems on which this product is developed. This development research aims to realize learning media to avoid misconceptions and sculpt/carve following structured and directed learning stages and create expert-validated learning media, evidenced by the validation of media experts 89% and material expert validation 93%.

Keywords: misconception, sculpture and carving art, virtual module.

INTRODUCTION

Indonesian education sector during the Covid-19 pandemic has been distracted. In the education sector, one of the applicable policies is learning from home or online learning. Kurniasari et al., 2020 state that the learning activity from home or online learning has the principle that students can access learning materials and resources without time and place restrictions. This online learning is expected to support the distance learning process and facilitate material dissemination to students.

A study related to the role of technology in the online learning process is by Pujilestari (2020) who conducted research on the impact of online education in Indonesia and by Hanifah Salsabila et al. (2020) with a description of the development of the increasingly developing era of technology. Astini (2020) states that many platforms can assist the implementation of online learning currently using digital technology such as Google Classroom, *Ruang Belajar*, zoom, video conference, telephone, or live chat. Regarding the platform used, a good learning process must contain interactive and fun aspects supported by providing more space for students to develop creativity and independence that aligns with students' talents and interests (Mustaqim, 2017). However, the quality of education is not in the full mode of the learning process. Because to fulfil the interactive, fun, challenging, motivating, and to provide more spaces for students, teachers play crucial roles. However, in practices teachers who are the

leading pioneers in the learning process tend to take much material on the internet that is less specific and boring for students. In decorative materials, teachers still have to download 2D images from the internet, add text, and students do not feel the touch of objects that can provide direct tutorials.

Media is currently used to carry out the face-to-face substitute learning process in the classroom. However, in practice, there are still some obstacles that impact the occurrence of students' misconceptions. A misconception is where a person or student misinterprets a concept. This is reinforced by research by Nuriansyah (2020) about barriers to online learning that occur due to monotonous learning media. The challenge for educators in online learning is choosing the suitable media and how to work on these media so that learning with online media can be maximized without reducing the essence conveyed.

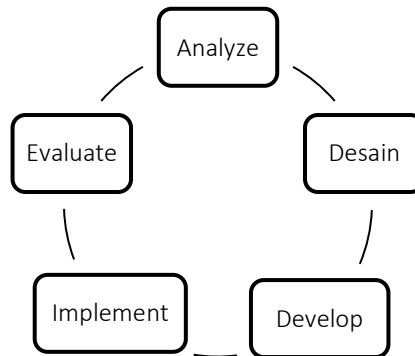
One of them is sculpture and carving art learning, which is prone to students' misconceptions because it includes practical material that requires more than just theory. Besides, in practice, the teacher still has to download 2D images from the internet, add text, and students do not feel the touch of objects that can provide direct tutorials. Students certainly have their thoughts and sometimes conclusions about what they have experienced in passing (Veloo & Ali, 2014). With these problems, learning media that can display interactive 3D objects with audio-visual is needed as a choice to support understanding the material with augmented reality features. Information technology and telecommunications are currently experiencing rapid progress. Likewise, the education system, reinforced in Saputro & Saputra, (2015), the learning media always follows technology development, ranging from print technology, audio-visual media, computers to the combined technology of print computer technology.

In carving art learning, this augmented reality technology is packaged in the form of virtual modules. This virtual module contains virtual objects to enhance the reality side of the object as a tool to help improve the user's perception and interaction with the real world. In addition, this virtual module is equipped with a description of the concept explanation, pre-test, post-test, and tutorial in one learning media development. So, the learning process will be more interesting, like playing games. It can be accessed easily too because it can be operated via smartphones or personal computers. The development of this media has two main objectives. The first main objective is to actualize learning in avoiding the misconceptions of sculpting/carving art learning following structured learning stages with the application of 3D augmented reality technology with interactive learning governance. The second main objective is to contribute the media development in secondary schools, high schools, and universities.

METHOD

This research aimed at describing the process of developing a carving art learning module with augmented reality technology. This research was carried out from January 2021 to June 2021 with a sample of 12 students of class X wood crafts at SMK Negeri 1 Pacitan and 13 samples of students from Universitas Negeri Malang who took sculpture and carving art courses. The development model used in this research is the ADDIE Model development model. The ADDIE development model can be defined as a development model with stages ranging from needs analysis, product design, development of teaching materials, implementation in the field, and evaluation (Nindiawati, Subandowo, and Rusmawati 2021). The stages of the ADDIE development model can be described in the following chart:

Figure 1. ADDIE model stages.



The development process carried out in this study uses the ADDIE model. It can be divided into five stages: analyze, design, develop, implement, and evaluate. This model was chosen because it is systematic, simple, and can provide an opportunity for developers to make revisions in the process they go through (Molenda, 2003).

DISCUSSION

Based on the chart, an explanation of each product stage can be obtained using the ADDIE development model as follows:

1. Analyze

At this stage of analysis, identifying what material will be studied will be carried out. Based on Harjanta & Herlambang's stages (2018), the steps taken in ADDIE development model are conducting a needs assessment. Then, identifying problems and needs, then performing a task analysis (task analysis). In this regard, identification of problem material is carried out through open questionnaires. This study's curriculum material refers to Permendikbud No. 37 of 2018 relating to sculpture and carving art. The sculpture and carving art become part of an ornate image with concave parts (*kruwikan*) and convex parts (*buledan*) that compose a beautiful image (Wijaya, 2017).

The use of augmented reality media is the more appropriate choice because it can solve misconceptions problems. This statement is in line with Aditama et al. (2019), augmented reality is a technology that combines two-dimensional and or three-dimensional virtual objects into a real three-dimensional environment, and then, projects these virtual objects in real-time. Therefore, the development of interactive learning media combined with augmented reality will be beneficial as an intermediary between educators and students in learning that can connect, provide information, and distribute messages to create an anti-misconception, effective, and efficient learning process (Aditama et al., 2019).

2. Design

This design stage will be carried out in media selection, format selection, and initial design (Khadijah et al., 2020). In this design stage, researchers use 1) Adobe Illustrator software as asset design and user interface applications, 2) website inlearnspace.com as a place for digital module products, and 3) unity 3D software as augmented reality technology management.

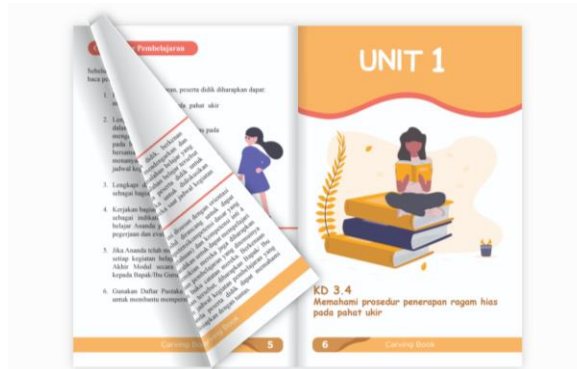
3. Develop

In the development stage, the result of the development of augmented reality in learning media is a virtual sculpture and carving art module based on 3D augmented reality arranged in the form of presenting learning materials that are arranged systematically into

minor learning units to achieve specific learning objectives which are presented in electronic format. The working principle of this module is as follows:

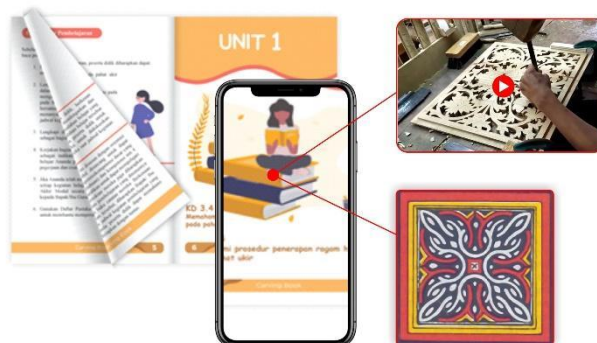
- a. The camera application "Carvingscan" captures data from markers in the real world and sends the information to smartphones.
- b. The software on the smartphone will track the barcode from the marker
- c. When the barcode pattern has been found, the software uses mathematical calculations to calculate the camera's position relative to the barcode on the marker.
- d. Once calculated, the 3D graphic model would appear in the same position and be within the scope of the barcode.

The following is a visual display of the virtual 3D augmented reality-based sculpture and carving art module:



Picture 1. Sculpture and Carving Art E-module

After being given a marker on the virtual module, then a smartphone is used to see augmented reality on several module objects, which can be seen in the following image:



Picture 2. Sculpture and Carving Art E-module

The virtual sculpture and carving art module based on 3D augmented reality is adapted to the characteristics of students who tend to be interested in 3D visuals. The module has functional values as descriptions of concept explanations, pre-tests, post-tests, unique fact features, and evaluations. This module can be used with independent study methods or group discussion forums. The teacher will be a facilitator, and students will understand the steps necessary for each basic competence without even asking the teacher. The module will direct students to follow the learning process like playing a game. The virtual module will be in the form of an application that can be operated on a smartphone or personal computer. This statement is evidenced by the validation of media experts 89% and material expert validation 93%.

4. Implementation

All virtual module designs that have been generated will be implemented to conduct a trial. The implementation stage can be the final stage or a finished product that is ready to be used, but there are still several stages before it is widely used (Harjanta & Herlambang, 2018).

5. Evaluation

This evaluation stage is carried out by evaluating the questionnaire, whether the resulting product is following what is expected. Products designed include virtual modules in carvings that can support applications. Meanwhile, videos and graphic images become objects that appear when the marker is scanned.

CONCLUSIONS AND SUGGESTIONS

The virtual sculpture and carving art module based on 3D augmented reality is designed in such a way as to make it easier for students to understand the material during online learning to reduce misconceptions independently or in an integrated manner. This module is equipped with augmented reality technology and has a function value as a description of the concept explanation, pre-test, post-test, unique fact features, and the last evaluation is carried out on one module. This virtual module is an application that can be operated on a smartphone or personal computer. Suggestion for further development is related to using virtual reality so that the sculpture and carving art material supports STEAM-based learning.

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