Nat. Volatiles & Essent. Oils, 2021; 8(6):3859-3867

NVEO
Natural Volatiles &
Essential Oils

Utilization Of Wood In Making Karawitan Musical Instruments As A Promotion Media Of Arts And Culture Through Virtual Reality-Based Application

Hindayati Mustafidah[1] , Abdul Madjid Winarto[2] , Suwarsito[3]

[1,2]Faculty of Engineering and Science, Universitas Muhammadiyah Purwokerto, Indonesia

[3]Faculty of Agriculture and Fisheries, Universitas Muhammadiyah Purwokerto, Indonesia

Abstract

As an agricultural country with a tropical climate, Indonesia has many forests that produce various types of wood. Wood can be used for multiple basic house materials, household appliances, boats, and musical instruments. One of the legendary Indonesian cultural arts is Karawitan. Unfortunately, based on a survey conducted, it turns out that many people, especially millennials, do not know this type of musical instrument. Along with advances in information system technology, this research develops an android-based using Virtual Reality (VR) technology application to introduce traditional Karawitan musical instruments, mostly made of wood. This application can clearly show the wood material in musical instruments with the VR. VR works by manipulating the human brain to make virtual things feel real. The devices introduced are Saron, Bonang, Gender, Kendang, Siter, Flute, Gong Kempul, and Gong Ageng. In addition to images of musical instruments, this application is equipped with the sound of each musical instrument. Application users can interact directly with traditional tools originating from Central Java in virtual objects that resemble natural objects. The attractive presentation of this VR-based application can provide insight into the Indonesian people in particular and the world community in general. This research is also an effort to preserve traditional Indonesian musical instruments, namely Karawitan, which are mostly made of wood and are being abandoned by millennials. In addition to conservation efforts, Karawitan musical instruments are also a medium for promoting Indonesian cultural arts to foreign countries.

Keywords: wood, application, karawitan, traditional musical instruments, virtual reality

Introduction

Indonesia is an agricultural country with a tropical climate with many forest areas that produce various types of wood. Wood can be used for multiple basic house materials, household appliances, boats, and musical instruments. In addition, Indonesia is known as a rich country in traditional cultural arts. One of them is the art of music, whose development slowly began to recede. Regional music has a characteristic in the song content, which is characteristically in the lyrics and melodies that use the local language and style. Its uniqueness is also found in musical instruments based on organology, playing techniques, and presentations. Almost all traditional Indonesian arts have a high collectivity spirit so that the distinctive character of the Indonesian people can be recognized, namely friendly and polite. Classic art acts as an identity and an expression media for supporting the community [1]. Gamelan, known as **Karawitan** as a musical instrument, consists of percussion instruments made of metal base materials such as iron, brass,

and bronze. In addition to percussion instruments, in a gamelan set, there are also other musical instruments played by plucking, stringing, banging, and blowing [2].

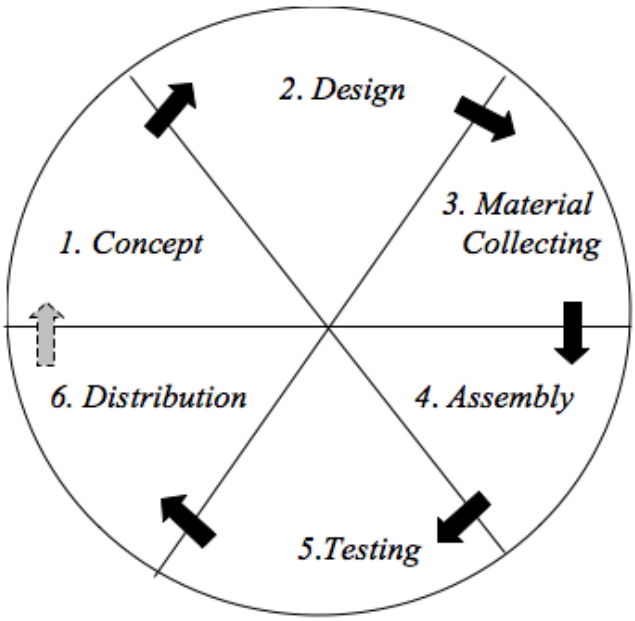
The lack of awareness of the Indonesian people for traditional arts is caused by several factors, such as the lack of introduction and understanding of traditional crafts from an early age. Lack of availability and lack of experts, people, now think that conventional art does not keep up with the times and is far behind with modern art, which has begun to grab the attention of the Indonesian people, especially at the youth level [3]. Based on the survey conducted, many people do not know the name of the traditional musical instrument of karawitan. They are not interested in one reason because the media is still conventional, and the tools are difficult to access because they are in particular places. The problem is how to introduce the traditional musical instrument so that people are interested in the country arts.

Multimedia as a conveying information tool is needed, especially in education as a learning medium [4] and cultural promotion [5]. Innovations in multimedia, namely Virtual Reality (VR) technology, can allow users to interact with the environment in a virtual world simulated by a computer. This innovation impacts the natural feeling of the user because they feel they are in the natural environment[6]. The development of VR technology has boosted the sophistication of multimedia, especially in the education world[7] and [8]. It even continues to be developed in a manufacturer [9]. Based on the existing situation related to culture in Indonesia, an application was developed using VR technology to preserve traditional musical instruments and, at the same time, as a promotional medium to introduce Indonesian culture to foreign countries. With the rapid development of information technology in mobile programming and the increasing number of Android smartphone users, the application is developed based on Android with an attractive presentation so it can be accessed anytime and anywhere without having to turn on a computer device.

Method

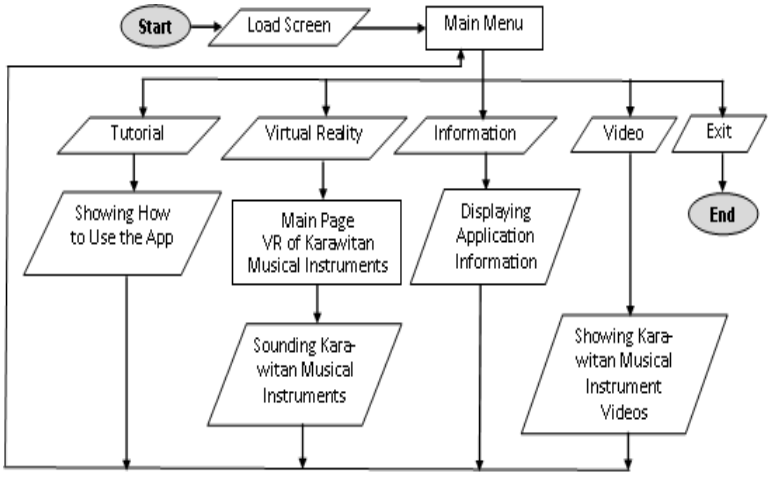
This application was developed using the Multimedia Development Life Cycle (MDLC) model, as shown in Figure 1. The six stages were carried out sequentially from concept to distribution [10].

Figure 1. MDLC development model



Conceptually, the object content presented consists of eight musical instruments: **Saron, Bonang, Gender, Kendang, Siter, Suling** (Flute), **Gong Kempul,** and **Gong Ageng**. We developed the presentation of the eight musical instruments through the design stage in the form of a flowchart (Figure 2).

Figure 2. Application flowchart for the introduction of musical instruments



The next stage after the concept is collecting material. The materials needed to develop this application are text, images, sound, and video. Text material describes the names of musical instruments, while image materials relate the shape and face of each musical instrument with a .jpg file type. Meanwhile, sound materials are in the form of .mp3 files, and video is in.mp4.Those files are used to present a compilation of musical sounds in playing and accompanying a song.

Based on the previously created flowchart and integrating all the objects or multimedia materials collected, we do the assembly stage by developing the application source code. The next stage is to test the application using the alpha test as an internal and the beta test as external using the questionnaire methods. The last stage is distribution. At this stage, we compile the project file into a .apk file with version 1.0. After that, this .apk file is distributed to users who need it. Temporarily distribution via social media.

Results and Discussion

Implementation

The applicationdevelopment was inspired by research on the introduction of Baturraden tourism which was developed through a game **Baturraden Adventure**[5]. This research aims to introduce and promote the rich values of Indonesian art, such as virtual reality karawitan, which raises traditional arts. This application contains exciting content, namely the interactive process between the application and the user. This musical instrument application displays several musical instruments totaling eight pieces involving user interaction.

The VR Karawitan music instrument application was developed using a mixed language interface, namely Bahasa and English. At the start of this application, the main menu interface appears with five buttons, namely **Tutorial**, **Virtual Reality**, **Information, Video**, and **Exit** (Figure 3), as shown in the design in Figure 2. Each button will go to its respective page according to the description of the control represented. The first page is the tutorial. This page contains the images and text in instructions and a button to return to the main page (Figure 4).

Figure 3. Virtual reality application main menu

Figure 4. Tutorial menu interface

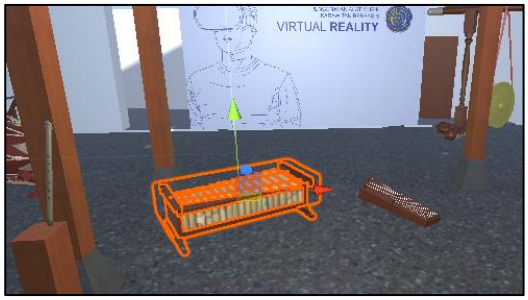
As shown in Figure 4, the application tutorial scene contains instructions for using the application. The movement instructions are to move the head vertically and horizontally. The first instruction for the 360° horizontal movement is to move the head to the left and right, while the second instruction is a vertical movement by moving the head up and down. The third instruction is **move**, which means to bow the head down, which serves to drive places, and the fourth direct the pointer to the object of the musical instrument, namely to sound or play a musical instrument.

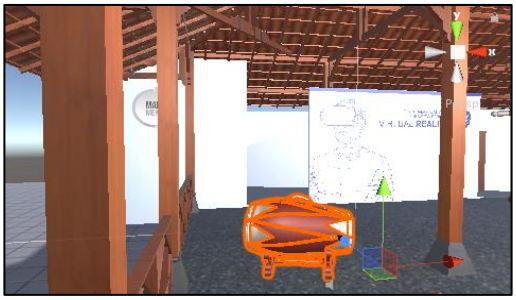
The Virtual Reality page contains a 3D object model,as in Figure 5. Button symbolizes each musical instrument that can produce sound and information represented by the musical instrument. There is a back button to the main page. There are eight musical instruments in the musical instrument scene, and it is equipped with a **Home** menu to return to the main menu.Figure 5 represents a VR scene that contains eight keys for musical instruments.All musical instrument components are described 3D visualized, and each scene is illustrated in Figures 6 and 7.

Figure 5. Interface scene of Karawitan musical instruments

Figure 6. Display of musical instruments: a. Kenong; b. Saron; c. Gender; d. Kendang

a **b**



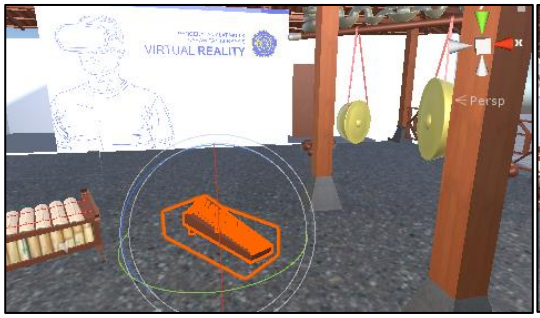


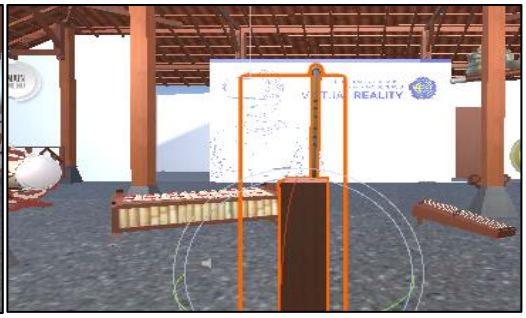
c **d**

The image content of **Kenong** is made with an elongated shape consisting of one component of a musical instrument container containing six Kenongs. Kenong is round with a lump at the top. Playing Kenong is by hitting with a bat. This instrument is a chord filler or harmony in musical playing and serves as a determinant of gatra boundaries and emphasizes rhythm (Figure 6a). Figure 6b shows the visualization of **Saron** as a form with a combination of wood and iron materials. The Saron component consists of six gold-colored iron plates, one percussion instrument, and one container component as the iron plate holder.

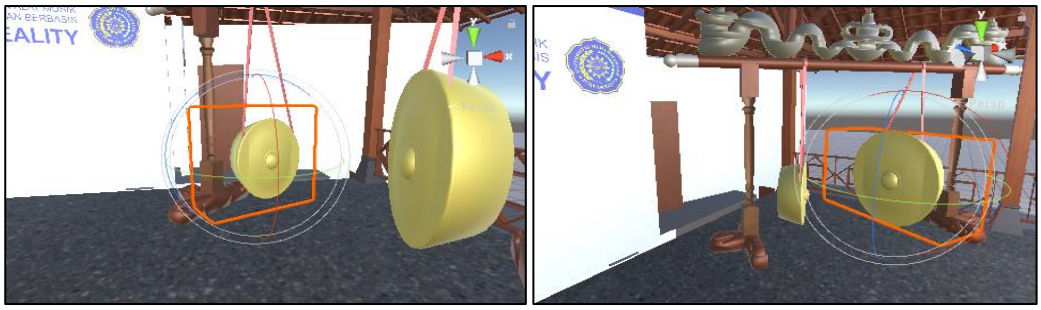
Meanwhile, Figure 6c visualizes the musical instrument **Gender**. The Gender component consists of eighteen iron plates extending sideways and semi-conical. Another component is a pile of bamboo sticks positioned under an iron plate. Figure 6d shows the **Kendang** musical instrument in the form of 3D visualization. It has two colors, namely maroon and light brown. The maroon color represents the wood component of the device, while the light brown color represents the leather component and its string.

Figure 7. Display of musical instruments: a. Siter; b. Flute; c. Gong Kempul; d. Gong Ageng





a **b**



c **d**

The following four types of Karawitan musical instruments are **Siter** (Figure 7a), **Flute** (Suling) (Figure 7b), **Gong Kempul** (Figure 7c), and the last one is **Gong Ageng**(Figure 7d). The Siter button component contains three things that are represented in 3D. The first component is the Siter holder as the base and the holder for the zither cord with dark brown color, while the second component is the cord holder, which is made of wood and uses a dark brown color. The third component is the cord, which has eight pieces with white paint and is elongated. The picture of the Flute represents its actual shape. The object is made of a cylinder with six-pitch holes and one blowhole. Textured material from Flute used real bamboo photos to look more natural. Visualization of Gong Kempul has the shape of a circle with gold color positioned parallel to the Gong Ageng. The basic form of Gong Kempul is almost the same as Gong Ageng; only it is smaller in size. The word “Ageng” in Javanese means big. Gong Ageng has a golden yellow color and is positioned with one support with Gong Kempul, as shown in Figure 7d.

All of the eight kinds of Karawitan instruments mentioned above contain types of wood, except for Gong Kempul and Gong Ageng. Nonetheless, both have bats made of wood. Thus, wood materials cannot be replaced with metal-type materials because of the peculiarities of the nature of wood.

As shown in Figure 8, the Information page contains the text for the research title and the developer. Meanwhile, the Video page contains videos on musical instruments, as presented in Figure 9.

Figure8. Information Scene

Figure 9. Video scene

Testing

The testing phase was carried out using two methods, namely Alpha and Beta tests. The alpha test was conducted to test the compatibility between what was designed and the output results in the VR application. The test results show that the application of musical instruments is said to be valid because the performance follows the design. Meanwhile, Beta testing aimed to find out the user response. This stage is done by distributing questionnaires to obtain information from respondents. This test method sought to determine whether the VR application has met the community's needs as a medium for introducing musical instruments. The questionnaire scale used four ranges: Poor, Moderate, Good, and Excellent. The number of respondents in Beta testing is 30 people, while the number of items in the questionnaire is five as follows:

1. How does the Virtual Reality application look to introduce this android-based Karawitan musical instrument?

2. How is the information contained in this Virtual Reality application?

3. Is the application attractive?

4. How is the font used?

5. How is the background sound used?

Graphically, Figures 10 and 11 represent the results of Beta testing.

Figure 10. Distribution of answer data on Beta testing from respondents

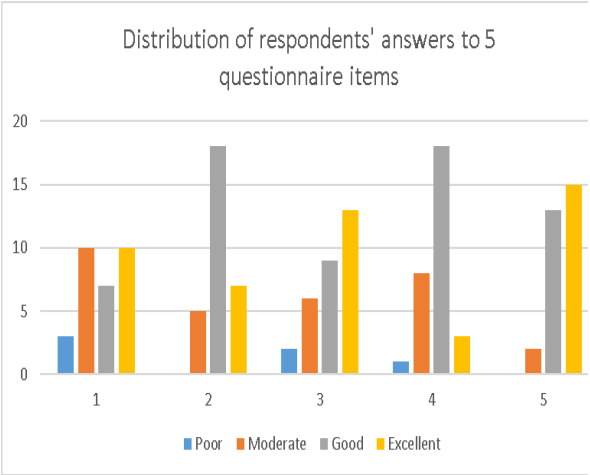


Figure 11. Achievement of the application assessment

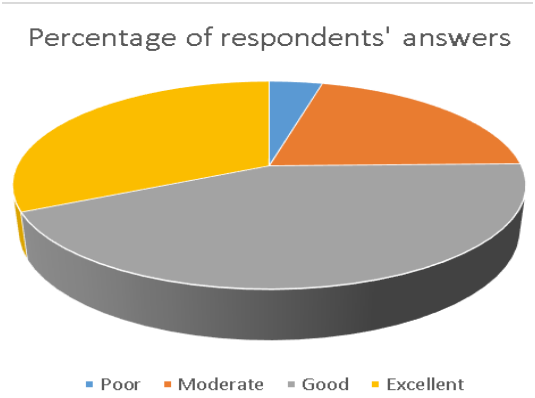


Figure 10 shows that all respondents gave a moderate to the excellent rating from the five questions. Meanwhile, the highest rating achievement was good with 43.33%, followed by Excellent with 32%, as in Figure 11. Thus, this VR application is good and worthy to be used as a tool for introducing traditional musical instruments Karawitan and a medium for promoting Indonesian traditional cultural arts to the wide world.

Conclusion

This application for introducing traditional Karawitan musical instruments based on Virtual Reality (VR) can provide solutions for using wood as a forest product and presenting Indonesian traditional arts and culture to the community, especially the millennial generation and even the world community. This study only shows eight standard musical instruments and uses mixed languages. Therefore, we suggest adding other musical instruments such as Bonang, Rebab (Fiddle), and others for further research. We also recommend developing this application using two languages: Bahasa and English, as a medium of promotion abroad.

REFERENCES

B. Basri and A. Asrul, Mengenal Alat Musik Tradisional Nusantara (Getting to know Indonesian Traditional Musical Instruments). Jakarta: Museum Nasional (Indonesia), 2001.

Tumpi Readhouse, “Gamelan, Seperangkat Instrumen Musik Karawitan (Gamelan, a set of musical instruments),” https://tumpi.id/gamelan-seperangkat-instrumen-musik-karawitan/, 2014. (accessed Oct. 08, 2020).

E. Adams, Fundamentals of Game Design, 3rd ed. USA: New Riders, 2019.

H. Mustafidah, M. G. A. Imani, Sriyanto, and S. Suwarsito, "Development of Natural Science Learning Media in Primary School Using Flash Applications to Increase Student's Achievement," in International Conference on Innovation in Engineering and Vocational Education (ICIEVE 2018), 2018, pp. 1–8.

H. Mustafidah and S. H. Ramadhani, "Adventure Game Application as a Digital Media to Introduce Baturraden Folklore," in The 2nd Annual Applied Science and Engineering Conference (AASEC 2017), 2018, pp. 1–8.

A. K. Pamoedji and R. S. Maryuni, Mudah Membuat Game Augmented Reality (AR) dan Virtual Reality (VR) dengan Unity 3D (Easily Create Augmented Reality (AR) and Virtual Reality (VR) Games with Unity 3D). Jakarta: Elex Media Komputindo, 2017.

P. Hodgson et al., "Immersive Virtual Reality (IVR) in Higher Education: Development and Implementation," in Augmented Reality and Virtual Reality, Switzerland: Springer Nature, 2019, pp. 161–173.

S.-C. Chang, T.-C. Hsu, Y.-N. Chen, and M. S. Jong, "The effects of spherical video-based virtual reality implementation on students' natural science learning effectiveness," Interact. Learn. Environ., vol. 28, no. 7, pp. 915–929, 2020.

S. Chandra Sekaran, H. J. Yap, S. N. Musa, K. E. Liew, C. H. Tan, and A. Aman, "The implementation of virtual reality in digital factory—a comprehensive review," Int. J. Adv. Manuf. Technol., vol. 115, no. 5–6, pp. 1349–1366, 2021.

I. Binanto, Multimedia Digital – Dasar Teori dan Pengembangannya (Digital Multimedia – Basic Theory and Its Development). Yogyakarta: ANDI, 2014.