

User Experience Analysis Utilization of Virtual Reality Technology on Application About Ancient Human Life Homo Soloensis

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Abstract. Sangiran Archaeological Museum is an archaeological museum located in Kalijambe, Sragen regency, Central Java, Indonesia. The museum is located in the ancient fossil site of Sangiran, one of the Homo Soloensis fossils found in Ngandong, Blora, Sangiran and Sambung Macan by Ter Haar, Oppenoorth and Von Koeningswald in 1931-1933 in the upper Pleistocene layer. A Virtual Reality Museum Ancient Sangiran Klaster Krikilan (Case Study: The Life of Homo Soloensis) is designed to show the life of early humans in the past. The application is a visual representation of the life of Homo Soloensis between 143,000 and 550,000 years ago. This paper discusses the usability and the user acceptance of the application. As a result, 54.5% participants agree that the application successfully delivered the information while 24.2% disagree.

INTRODUCTION

The application of virtual reality technology in building a virtual museum is a strategic step to introduce cultural heritage without having to visit the museum directly [1]. The virtual museum is built using interactive multimedia and comes with 3D technology in replicating exhibiting objects. The trend of virtual museum development is divided into 2 types, the first is the exhibition object and the room is created 3D model digitally so that it can be explored freely, and it becomes popular [2]. The second trend is a virtual museum created by presenting panoramic images of showrooms in the museum so that it can be seen as real conditions shaped virtual space. The second example of trends is done by Google Art Project that has featured a large collection of famous museums [3]. The development of the virtual museum aims to gain the same experience as when visitors visit the museum [4].

According to [5] there are museums available online and is an extension of the real museum, i.e. museum brochures, museum contents, learning museums and virtual museums. Virtual museums have included all the benefits of all other museum categories even innovative and alternative products. The search for the keyword "virtual museum" on the internet presents a total of 17.4 million links. However, most results have nothing to do with 3D virtual space where users can take virtual tours and explore digital collections and 3D models in an interactive way. It is important to understand what virtual museums should be included and what the benefits and advantages of this app are for museums and visitors [6].

Virtual museums or real museums, communicating specific messages to their visitors through exhibition objects, so the design task also includes the design of exhibition presentations. In general, there are various techniques for navigation and interaction but the most common and appropriate is a technique that allows visitor to navigate or teleport in a virtual museum and allow the visitor to manipulate an exhibit when he is close to an object [6].

In this research, will introduce the history of ancient human culture in antiquity through Sangiran Virtual Museum. One of the exhibition objects that has been found and stored in the Sangiran Museum is the skull of Homo Soloensis. The visitor will be confronted in the form of 3D landscape in a virtual that describes the life of ancient

humans who live by the river to survive. The entire life is presented in a vast exploration space and visitors can walk at any point of space to see the process of Homo Soloensis ancient human activity.

RESEARCH METHOD

This application was developed based on the Software Development Life Cycle (SDLC) in Fig. 1. The concept of Sangiran Virtual Museum in presenting the life of early humans Homo Soloensis is based on literacy. Sangiran virtual museum is created with interactive navigation, which facilitates the user to interact with the object to obtain the desired information. Interactive navigation is designed to provide information on hunting life, making hunting tools and survival efforts of early Homo Soloensis.

FIGURE 1. Software Development Life Cycle (SDLC) Virtual Museum



FIGURE 2. Storyboard development of Museum Virtual

Virtual museum is presented in a first-person mode that can be explored throughout the room, equipped with an illustration and animation of the Homo Soloensis. The design of virtual museum includes intro view, main menu, usage instructions, about apps, and play button as shown in Fig. 2. In Fig. 3. The objects are assembled together including the creation of 3D objects, virtual reality showrooms, and Homo Soloensis's life animation in virtual reality. Testing was conducted to test the application in terms of the functionality and usefulness aspect. In terms of functionality, testing was done on several android devices to define the minimal hardware specification to run the application. Furthermore, the usefulness aspect was investigated by distributing questionnaires on 33 respondents, covering the aspect of ease of use, information delivery, display design and innovation.



FIGURE 3. landscape of ancient human life Homo Soloensi

RESULTS AND DISCUSSION

Museum Virtual Sangiran is created with the Unity 3D. The application presents a new experience for visitors in learning about the discovery of ancient artifacts at Sangiran Museum. Visitors can freely have a tour around the virtual museum and be able to witness the life history of Homo Soloensis. The results of application testing on mobile devices are presented in Table 1.

TABLE 1. Mobile Device Testing

No	Device Name	Specification	Installation	Gyro sensor	Played using VR Glasses
1	Xiaomi Redmi 4A	Processor QuadCore Max 1.4 Ghz, RAM 2 GB, GPU Adreno 308, Layar 5 inch	Succesfull	Succesfull	Succesfull
2	Xiaomi Redmi Note 4	Processor Deca-core 2.1 Ghz, RAM 3 GB, Mali-T880 MP4, Layar 5,5 inch	Succesfull	Succesfull	Succesfull
3	Xiaomi Redmi 4X	Processor OctaCore 1.4 Ghz, RAM 3 GB, GPU Adreno 505, Layar 5 inch	Succesfull	Succesfull	Succesfull
4	Samsung Galaxy J1 Mini Prime	Processor QuadCore 1.5 Ghz, RAM 1 GB, GPU Mali-400MP2, Layar 4 inch	Succesfull	Fail	Fail

Based on Table 1, it can be determined that the application can be run with a minimum specification of Quad Core 1.4 GHz processor, 2 GB RAM and gyroscope sensor. The test results regarding with the application's benefits to users are shown in Fig 4. *Based on Fig. 4, the entire respondents indicated.* The result mentioned for the aspect of delivering information about the life of early humans Homo Soloensis through VR technology as much as agree and strongly agree worth 54.5% and 24.2%. This value is higher than the introduction of conventional display objects that is by the difference in value strongly agree 12.1% and 3% agreed value.

As stated by [6] that in a virtual museum, visitors can fully explore, move, manipulate exhibitions and even create their own virtual experiences in an interactive and flexible way. In this study, the virtual museum about the culture of Homo Soloensis presented in the form of 3 separate clusters that provide illustrations of early human culture ranging from hunting, making tools for hunting and ancient human life in the cave, presented in Figure 3. The virtual museum model presented in this study aims to enhance the visitor's exploration experience. Visitors can

freely see for themselves the process of early human culture by walking in the corner where the illustration of culture is served. It also complements the development of virtual museum models that have been developed by [4] and [6] which only present virtual showroom objects. The uniqueness of a virtual museum created that is equipped animation process of cultural reconstruction in antiquity.

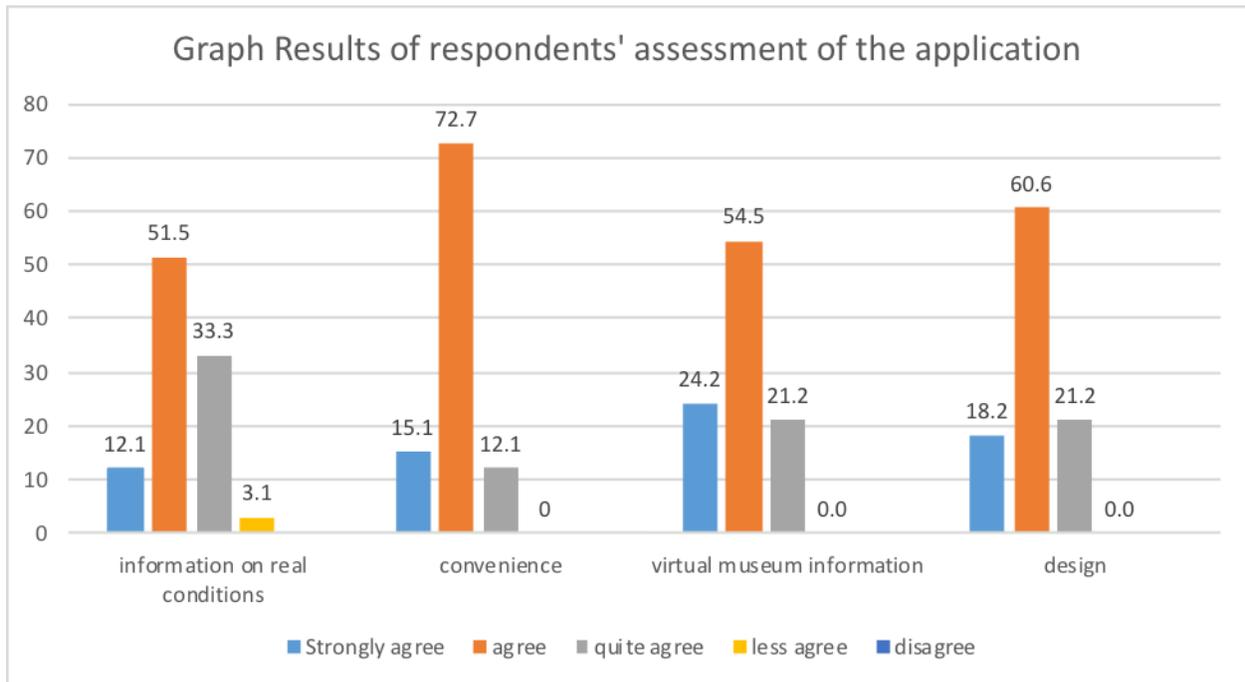


FIGURE 4. The Results of Questionnaire.

CONCLUSION

Homo Soloensis in Museum virtual Sangiran is an android-based application that uses Virtual Reality technology. Control information can be done by visitors through the navigation system. This application describes the condition of the size of the museum and interactive objects, in addition to animation that described the life history of Homo soloensis.

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