Interactive Media For Introducing The Indonesian Archipelago Mask Through "ARTopeng" Application Using Computer Based Augmented Reality Technology

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Abstract—**The Indonesian Archipelago mask is one of Indonesian cultures and local wisdom. Indonesia has approximately 85 masks which spread all over country. The aim of this research paper is to develop "ARTopeng" application using Augmented Reality as the desktop based interactive media for introducing the Indonesian masks. The method used in developing this "ARTopeng" application is Prototyping. In the first stage, needs analysis and literature study were conducted. The second stage is done by designing the application using use-case. The third stage is the implementation and functionality testing by media expert. The fourth stage is the software testing stage to examine the quality and feasibility of "ARTopeng" application as the instructional media in the context of functionality, usability, portability, efficiency, maintainability, and reliability (ISO 9126-1). This research paper has some conclusions: 1) "ARTopeng" application prototype development have passed several software engineering processes from design up to testing which are according with the specification; 2) The result of "ARTopeng" application quality analysis as the media for introducing the Indonesian Archipelago mask is functionality 82,5%, reliability 86,7%, portability 85%, maintainability 80%, efficiency 75% and usability 85,78%.**

Keywords—**Indonesian Archipelago, Mask, Augmented Reality, ISO 9126**

I. Introduction

Indonesia has a wide range of cultural treasures that are not even owned by other countries. The vice of Minister of Education and Culture, Wiendu Nuryanti (Laksono , 2014) said that Indonesia is a superpower country in the field of culture. Culture in Indonesia means national identity. Lots of Indonesian culture contain high cultural value and it has been recognized by the world such as batik, angklung, wayang kulit, keris and others.

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One of Indonesia's cultural richness is the art of mask (seni topeng). Indonesia has about 85 types of masks that are exist in various parts of the country (Kolin , 1992). However , the wave of globalization make local cultures that comfortly exist become eroded bit by bit, so does the mask art. Especially among the younger generation, while the youth are those who have a big role and a great responsibility to maintain and preserve the existence of cultural heritage that has existed since a long time ago.

The emergence of advanced and sophisticated computer technology called 'Augmented Reality' will be able to combine the virtual world and the real world in real time became one of the media for the developers to distribute their ability to build innovative applications that are beneficial to the preservation of local wisdom , particularly the art of mask.

II. Theoritical Background

A. *Indonesian Mask Archipelago*

In Kamus Umum Bahasa Indonesia, written that topeng is a mask made of wood (paper, etc) in the form of people, animals and so on (Poerwadarminta, 1997: 1087) . Bhineka Indonesian society has a variety of dances and theaters that show the cast wearing a mask . Dayak communities in Borneo inherit Hudoq mask . Trunyan community on the shores of Lake Batur, Bangli, until now also consider the masked pantomime called Barong Berutuk is sacred. (Suartaya; 2011).


Bali Mask   Cirebon Mask   Malang Mask   Solo Mask

Picture 1. Types of Indonesian Archipelago Mask

B. *Augmented Reality*

Azuma (1997) defines Augmented Reality as a combination of real and virtual things in the real environment which works interactively in real time and involves an integration of objects in 3 dimension, that is integrating virtual objects in the real world.

Augmented Reality Technology, also known as AR, will break the limit between real world and computer output, so that we can see, hear, feel, and smell as shown in Picture 2.
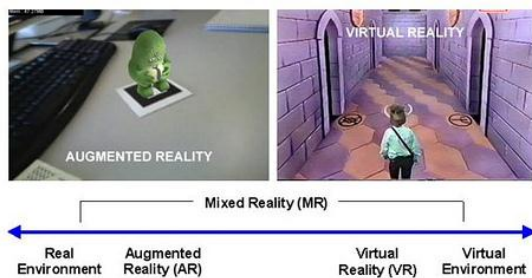
Picture 2. Augmented Reality and Virtual Reality

Lazuardy (2012), Head of IT Division AR&Co Indonesia said that Augmented Reality technology creates new kind of interaction between human and computer.

C. *ISO 9126-1 Quality Factor*

ISO 9126 Quality Factor Model is the international standard for evaluating software. ISO 9126 quality factor model indentifies six points of main quality. These ISO characteristics would be used as a variable for software testing. The variable is based on the most relevant characteristics towards the software to produce a good quality test, that is having a high probability of finding the fault (Myers, 2004). Six point of main qualities in this research are fungsionality, reliability, efficiency, portability and maintainability.

III. **Method**

This research used Research and Development method. Sugiyono (2009) in his book states that Research and Development is a method of research which is used to produce certain product and to test the effectiveness of the product. The development of ARTopeng use Linier Sequensial Model (Waterfall Model).
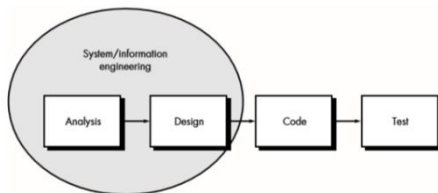
Picture 3. Waterfall Model (Pressman, 2010)

The development of ARTopeng using Augmented Reality was conducted in Informatics Engineering Department's laboratory of Yogyakarta State University, on July 2014 until August 2014. Whereas, the trial to users was in Vocational High School of Wonosari, Gunungkidul, Yogyakarta.

According to Simamora (2005:27), so the calculation is :
Note :
m   = The highest scores on the scale
n   = The lowest scores on the scale
b   = sum of class or category has created
Authors interpret the measurement results through semantic differential scale with five scale., m = 7, n=1, into five catagory (b=5), so the calculation is :
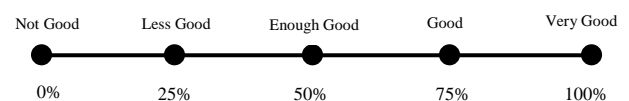
$$RS = (m-n)/b$$
$$= (7-1)/5$$
$$= 1,2$$

So, the standard for 5 categories which are formed with pole 7 as the positive pole is as follows :

Table 1. Table of Scores Range

Scores Range	Categories
1 – 2,2	Not Good
2,2 – 3,4	Less Good
3,4 – 4,6	Enough Good
4,6 – 5,8	Good
5,8 – 7,0	Very Good

Then, can be made presentation in continuum interval categories as follows:

Picture 4. Interval line for percentage categories

IV. **Discussion**

In this paper, the product is an application "AR-Topeng" for the Indonesian archipelago mask. The demonstration and explanation the work of system is as follows :
a.   What ARTopeng need to work
1.   Marker
In an application "AR-Topeng", we need some property like as marker.

Picture 5. Marker of Cirebon and Yogyakarta Mask

2.   Head Bundle
Beside we need marker, the property we need in an application is head bundle. The head bundle created by carton paper that covered by flannel. This is the head bundle :
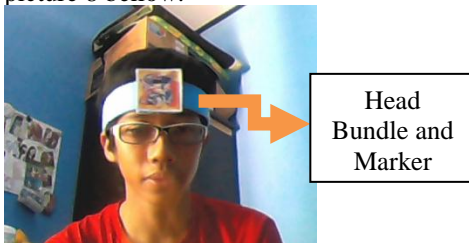

Picture 6. Marker and Head Bundle

b. How ARTopeng works
 1. Click shortcut of ARTopeng in desktop.

Picture 7. ARTopeng shortcut

  2. First page of application is webcam
  3. After webcam is active, user use the head bundle with the marker in his/her head as shown in picture 8 bellow:

Picture 8. User wearing the head bundle with marker

  4. After wear the head bundle, user turn his/her face in front of the computer webcam. Then the mask will automatically appear on the user's face. Like in the picture bellow:
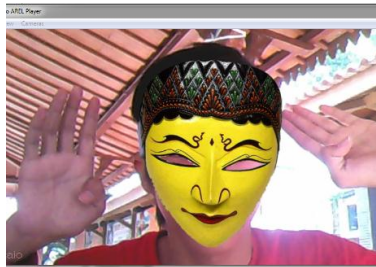
Picture 9. The mask that had been shown appropriate the marker

Picture 10. User before use the head bundle

Picture 11. User after use the head bundle

  5. Along with the appearance of the mask, there will be a sound that explain about the mask that has been displayed. By doing so, we will be able to determine the shape and the type of custom mask in certain area. We can also find the explanation about that mask, the how history is, when to wear the mask, how to use it and so forth.

A. *Alpha Testing*

Alpha Testing was executed to get the result of quality analysis from the software developed. The result of this test is in the form of questionnaire study result by media expert in the terms of functionality, reliability, portability, maintainability, and efficiency (ISO 9126).

This is the table of media testing result which was perfomed in the terms of functionality, reliability, portability, maintainability, and efficiency.

Table 2. Media Expert Testing Result

Num	Testing Aspect	Num of answer	Media Expert 1	Media Expert 2	Total	%	Category
1	Functionality	1	4	5	9	82,5%	Good
		2	4	4	8		
		3	3	5	8		
		4	4	4	8		
2	Reliability	5	4	4	8	86,7%	Very Good
		6	4	5	8		
		7	4	5	9		
3	Portability	8	4	5	9	85%	Very Good
		9	4	4	8		
4	Maintainability	10	4	4	8	80%	Good
		11	4	4	8		
5	Efficiency	12	4	4	8	75%	Good
		13	4	3	7		
	Average Presentage					81,83%	Good

Based on the test result by media expert, the quality software from the functionality terms is 82,5%, from the reliability is 86,7%, from the portability is 85%, from the maintainability is 80%, and from the efficiency is 75%. Overall percentage software quality is **81,83%** and categorized as "**Good**".

The next test is to get material validation from the material expert. Material validation carried by two material experts. The result is presented in table 3.

Table 3. Material Resting result

No.	Mask Type	Material Expert 1	Material Expert 2
1.	Yogyakarta	Valid	Valid
2.	Cirebon	Valid	Valid
3.	Bali	Valid	Valid
4.	Surakarta	Valid	Valid
	Presentase	100%	100%

B. *Beta Testing*

Beta testing was conducted to know the feasibility of this application in usability terms. Usability testing was taken from Usability Questionnaire by Jr. Lewis. Software demo can

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successfully be approved using the questionnaire consisting of 19 question items with 60 respondents.

Here is the result of the calculation of average data from questionnaire. Total answers collected is 6845. Divided by 60 respondents, average answers for each respondent is 114,1 with 19 question items. To explain the average for each item is

X = 114,1/19

   = 6,004

Average result is X = 6,004, which is categorized as "Very Good". Then interval category percentage was made by calculating the data percentage. The datawas tabulated by calculating the total score criterion (if each item gained the highest score) = 7 x 19 x 60 = 7980. With the highest score in each point = 7, total point = 19, total respondent = 60, whereas score results of collecting data = 6845 Therefore, the usability level of "ARTopeng" based onthe sample from 60 respondent is (6845 : 7980) x 100% = 85,78 % from represented criteria.

v. **Result**

From those discussion, it can be concluded that: The development of this book media has been through a series of engineer software from designing to product testing, had been in accordance with specification; The result of quality analysis for AR-Topeng for introduction the Indonesian Archipelago mask for validation is 100% validated, for functionality is 82,5%, for reliability is 86,7%, for portability is 85%, for maintainability is 80%, and for efficiency is 75%. On the whole, the quality percentage is 81,85% and can be classified as "Good"; the results of the feasibility test by usersresulted in usability value of 85,78%, so it can be concluded that AR-Topeng using Augmented Reality Technology was highly proper as introduction media the Indonesian Archipelago mask.

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