

# Edugame of Traditional Dance of Indonesia with Augmented Reality

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## Abstract

Traditional dance is one of the results of culture form of dance for generations by people in Indonesia. Currently, we require new innovations to attract people and students, in recognizing the traditional dance of Indonesia. Therefore, the writer made augmented reality edugame to attract interest in learning and developing the traditional dance of Indonesia. The method used was SDLC (System Development Life Cycle) method on waterfall model. Augmented reality application on Edugame to Identify Traditional Dance of Indonesia was able to teach movement and dance information learned by the students described in this paper.

**Keyword:** Augmented Reality, Educational Game, Indonesia, Traditional Dance

## 1. Introduction

Indonesia is a country that has a wide variety of cultures. Arts are also the product of culture. The cultural diversity aims to produce varieties of art, including the art of dance or traditional dance (Hendrianti dan Wariatunnisa, 2010). According to Wahyudi (2015), traditional dance is one of the cultural heritages which must be preserved; however, in the current development, traditional dance actually has been started to be ignored even forgotten by the younger generation (Wahyudi, 2015).

Of all the ways to develop and introduce traditional dance of Indonesia, such as through printed media, mass media and internet, there is another way to it. It is to use mobile technology in the form of AR (Augmented Reality) games. Augmented Reality (AR) is a variation of the Virtual Environment (VE), or Virtual Reality (VR). VE technologies completely immerse a user inside a synthetic environment. While being immersed, the user cannot see the real world around him. In contrast, AR allows the user to see the real world, with virtual objects superimposed upon or composited with the real world (Azuma, 1997: 2). Based on previous research, students only learned arts and culture when there were school exams and they did not actually know about the arts that they learned. Hence, students will be more interested in learning by using teaching methods that will help them learn the arts and culture in Indonesia (Guanawan et al., 2013). AR technology that is capable of combining the virtual world and the real world can be used to introduce the culture of Papua, for example, so that people can learn about culture with a more interactive and interesting without actually going there. The use of Android-based gadget is one of the effective ways to invite the public to learn more about the culture (Satrioadi, 2014).

Based on previous research, it had described that learning in the form of games can trigger students' interest in learning. This application has fundamental differences with previous studies, namely edugame, to learn about traditional dance of Indonesia with android-based

augmented reality by using Blender3D and Unity3D. Blender is open source software to create 3D objects and 3D animation; while, Unity3D is an integrated tool to create games, simulations and architectural buildings (Sudarmilah et al., 2013). The purpose of this application is to make edugame with augmented reality application by using android-based gadget that can facilitate children and communities to be able to learn and to easily see the traditional dance of Indonesia from their gadget.

## **2. Method**

### **2.1 Time and Place**

The time allocation to complete this study was about 6 months, which was conducted on December 2015 until May 2016. The programming was done in the researchers' boarding house or at home.

### **2.2 Tools and Materials Research**

This research required Tools and support for planning and implementing the edugame applications, the tools used were listed as below:

#### **a. Hardware**

- Processor Intel®i3-2328M with Intel® HD graphic 3000M
- Hard disc 500 GB
- RAM 2 GB DDR3 Memory.

#### **b. Software**

- Blender
- Unity3D
- MonoDevelop
- Corel Draw
- Free Audio Editor
- Movie Maker
- Vuforia SDK

### **2.3 Chronology research**

This application design was conducted by using SDLC (System Development Life Cycle) research method with Waterfall model. SDLC (System Development Life Cycle) is a sequence of several gradual processes in designing and developing a system that is also recognized as information system development or application development. In addition, the waterfall model is an approach model to the SDLC method and it works in a linear and sequential method (Dewanto, 2004). This research had several steps, they were:

#### **a. Start**

The research began by making the title “Edugame to Identify Traditional Dance of Indonesia with Android-Based Augmented Reality” for the purpose of creating innovative learning with education game.

#### **b. The Requirement Analysis**

The goal of this step was to define the required process in making the application.

#### **c. The Data Collection**

Data collection included activities to collect the data needed, for example dance video and dance material that would be used in the application.

**d. Design Applications**

Designing the application was done by making the design of the application.

**e. Creation Application**

In this research, the purpose of this step was to make things that would be needed, such as design, objects, characters, programming, and so on.

**f. Application Testing**

Tests were performed when the making of the edugame application was finished.

**2.4 Determination of dance**

This step included determining the dance that would be used and demonstrated in the application edugame representing several islands and provinces in Indonesia. In determining the dance, the researcher browsed through the internet in Youtube and Google search engine.

**2.5 Making Objects**

The objects used for augmented reality applications are a character in 3D (Three Dimensional) to be created and animated according to the actual examples of dance videos. There were five different characters, and they were originating from Sumatra, Java, Kalimantan, Bali and Papua.

**2.6 Storyline**

Storyline or plot is a series of events or events that dial-connect in the story (Indrawaty & Bakhtiar, 2013: 52). The storyline made for the application would be described as below:

**a. Home (main menu)**

In Home menu, there were some features such as background image, audio that went on automatically, and menu buttons on the initial display, such as start button, download button, hint button, key information and exit button. Start button is a button that will start the game by choosing AR level. Download button is the button to download the AR marker dance. Help button shows the function of the buttons on the main menu. Information button displays the researchers' biography and some greetings from the researchers for supervising and supporting the creation of the application. Exit button is the button to close the application.

**b. Main Menu Level Page**

The image of the background page is Indonesia map, has selecting levels button, Home button, Exit button, Quiz button, and the audio is run automatically. The Level button will show the information of the dances and augmented reality dance. The levels are composed of five dances, which are Tor-tor dance, Gambyong dance, Gantar dance, Kecak dance, and Sajojo dance, in which the application provides information and the augmented reality of these dances. Augmented reality can be displayed by using markers; each of the levels has its own marker in accordance to a certain dance show. The Home button is used to return to the main menu. The Exit button is used to close the application and close the dances information. Quiz button is a button to display the quiz page.

**c. AR Dance Page**

This page has Continue button, Back button and Home button. The buttons possess different functions. Continue button is a button to continue with the next level. Back button is a button to return to the menu level, and Home button is a button to go back to the home page (Main Menu).

**d. Quiz Page**

This page contains a background image, audio, a quiz statement, and answer button. Answer button has two options, namely right and wrong. If the statement is answer correctly, then the user will be rewarded with the opportunity to go the next statement. Whereas, if the answer is wrong, the user will be rewarded by one point and the screen will display button to return to the main menu, back to the quiz statement, and return to the menu level.

**2.7 Storyboard**

The storyboard is a sketch drawn up in sequence according to the script; storyboard is used to communicate story ideas to others more easily (Widiastuti et al., 2012:43). The edugame that would be developed had 1-4 storyboard, which were as shown below:

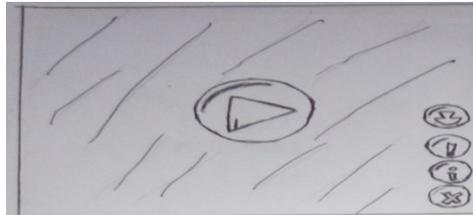


Figure 1. Home Page

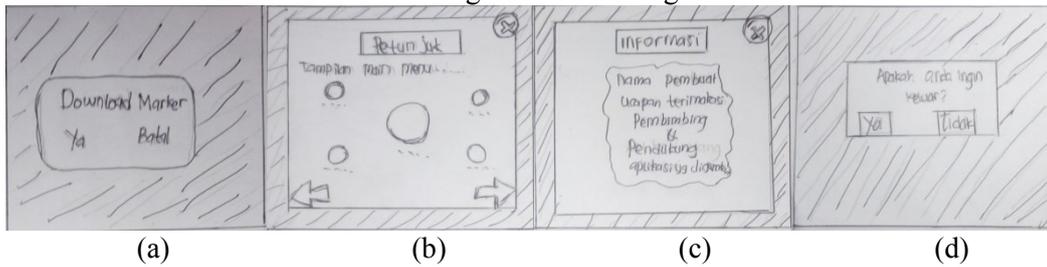


Figure 2. Part of Home page. (a) Download page, (b) View Help Page, (c) View Information Page, and (d) View Exit Page

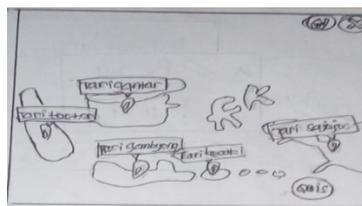


Figure 3. Level page

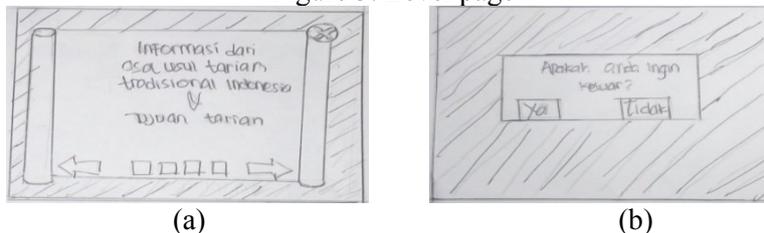


Figure 4. Part of Level Page. (a) View Information Dance Page, and (b) View Exit Page

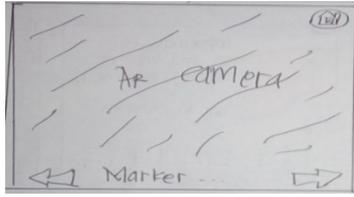


Figure 5. AR Camera Dance Page

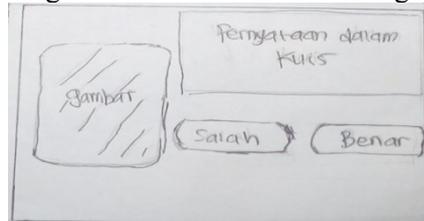
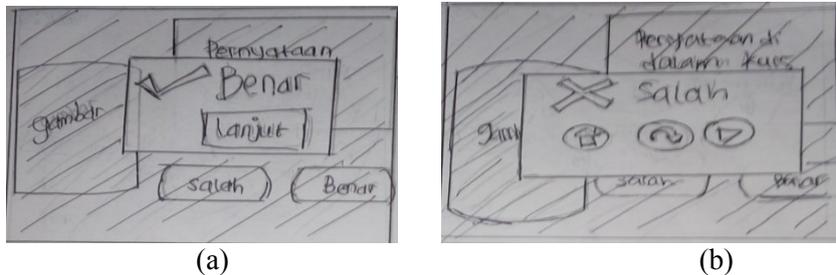


Figure 6. Quiz Page



(a)

(b)

Figure 7. Part of Quiz Page.

(a) View Statement Correct answer, and (b) View Statement Wrong answer

### 3. Results and Discussion

The part below presented the results achieved by the researchers after going through several stages of development applications to learn about Indonesian traditional dances through Android-based augmented reality.

#### 3.1. Application results

##### a. Home page

This application page was the start page when a user opened the application. Here was the initial view of the application.



Figure 8. Home page



Figure 9. Part of home page. (a) Download page, (b) View Help Page, (c) View Information Page, and (d) View Exit Page

**b. Level Menu page**

Level menu page contained dance material that consisted of 5 levels of dance, which were Tor-tor dance, Gambyong dance, Gantar dance, Kecak dance, and Sajojo dance.



Figure 10. Level Menu Page



Figure 11. part of Level Menu Page (a) View Information Dance Page, and (b) View Exit Page

**c. AR dance page**

AR dance page contained 3D animated objects of Augmented Reality that were already animated similar to the original dance.



Figure12. AR dance page  
 AR Tor-Tor dance, (b) AR Gambyong dance, (c) AR Gantar dance, (d) AR Kecak dance,  
 & (e) AR Sajajo dance

**d. Quiz page**

This page displayed and presented a quiz in a statement of the materials that had been obtained from the game.



Figure 13. View Quiz Page

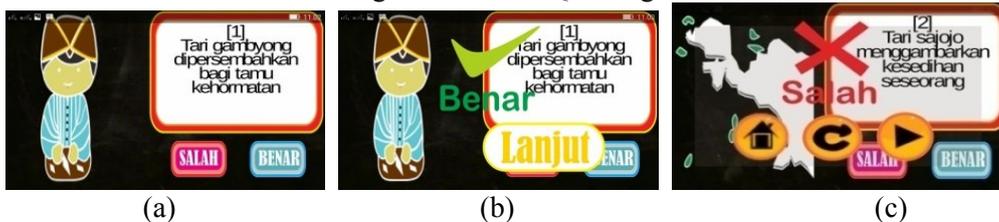


Figure 14. part of Quiz page (a) view Statement, (b) view reward Statement Correct answer,  
 and (b) View reward Statement Wrong answer

**3.2. Research Testing Result**

**a. Testing Black Box**

Black Box is a test to find out whether all the functions of the software has been running smoothly based on the functional requirements that have been previously defined (Rouf, 2012). The following table presented the test results from the Black Box test of edugame application in learning Indonesian traditional dances with android-based augmented reality.

**Table 1.** Results of Testing Black Box Display Applications

Page	Testing Button	Status
Home	Start Button	(√) Succeed ( ) Failed
	Download Button	(√) Succeed ( ) Failed
	Help Button	(√) Succeed ( ) Failed
	Information Button	(√) Succeed ( ) Failed
	Exit Button	(√) Succeed ( ) Failed
Level Page	Level Button (Level 1,2,3,4,5)	(√) Succeed ( ) Failed
	Quis Button	(√) Succeed ( ) Failed
	Home Button	(√) Succeed ( ) Failed
	Exit Button	(√) Succeed ( ) Failed
	AR Dance Page	Back Button
Next Button		(√) Succeed ( ) Failed
Home Button		(√) Succeed ( ) Failed
Quiz Page	True Button	(√) Succeed ( ) Failed
	False Button	(√) Succeed ( ) Failed

**Table 2.** Results of testing on multiple versions of android

No.	Name	Specification	inference
1	Lenovo A7000 +	RAM 2 GB,ROM 16 GB, OS V5.0.2	Application can run smoothly and look good
2	Sony xperia m2	Ram 1 GB, ROM 8 GB, OS V5.0.2	Application can run smoothly and look good
3	Xiaomi Redmi Note 1	RAM 2GB, ROM 8GB, OS V4.4.4	Application can run smoothly and look good
4	Oppo neo 3	RAM 1 GB, ROM 4 GB, OS V4.2.1	Application can run smoothly and look good

**b. Validity and Reliability**

The Validation Test and Reliability was conducted in SDIT Al-Hikam Banyudono Boyolali, on June 7, 2016 by demonstrating the edugame learning about Indonesian traditional dances with android-based augmented reality in front of all the students in the SDIT. The test validation and reliability tests were conducted by using questionnaire that was given to the respondents. Here were the results of the validation test questionnaire data on students:

**Table 3.** Results Validity Questionnaire on Students

Correlation Between Variables	Correlation Score	Score r Table	inference
P1 Between Ptotal	0,571	0.361	Valid
P2 Between Ptotal	0,531	0.361	Valid
P3 Between Ptotal	0,577	0.361	Valid
P4 Between Ptotal	0,483	0.361	Valid
P5 Between Ptotal	0,672	0.361	Valid
P6 Between Ptotal	0,475	0.361	Valid
P7 Between Ptotal	0,422	0.361	Valid
P8 Between Ptotal	0,543	0.361	Valid
P9 Between Ptotal	0,427	0.361	Valid
P10 Between Ptotal	0,528	0.361	Valid

Explanation :

The correlation value could be determined by the questionnaire responds and the data quantifies the number of respondents by using SPSS 20 software. Table r value was determined from the number of respondents (30) with a significant level of 5% obtained by  $df = (N-2)$ , in this case  $N = 30$  and  $df = 28$ , sought from the table that the numbers r 0.361. If the correlation value was greater than r table then the statement was declared as valid instrument and, vice versa, if the value of r table was greater, then the correlation value was declared as invalid.

The results of the questionnaire data reliability test on students using SPSS 20 were presented in the table below:

**Table 4.** Questionnaire Reliability Test Results on Students

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.723	.792	11

Explanation :

Of the reliability test above, it was stated that Cronbach's alpha 0.723 figures showed that it had fairly high reliability because it was larger than r table, which was 0.361.

The validation and reliability testing was performed to measure the validity and reliability of the data. Validation comes from the words that means validity extent of provision and accuracy of a meter in doing measuring function (Azwar, 1988: 3). Meanwhile, reliability comes from the word reliability means the extent to which the results of a measurement can be trusted. A result is deemed as reliable when the implementation of measurements is found several times against the same group of subjects, the obtained measurement results are relatively the same, as long as the aspect that is measured in the subjects themselves has not changed (Matodang, 2009: 93).

**c. Results Percentage of Interpretation**

The results obtained by calculating the percentage of the interpretation of the data questionnaire respondents were the number of respondents according to their level of knowledge and the number of all respondents summed. Then, the entire amount of number was multiplied by 100% or by the formula:

$$P = \frac{a}{b} \times 100\% \tag{1}$$

Explanation:

P = Percentage

a = Sum of respondents according to their level science

b = Sum of all of respondents

The following results of calculation of the percentage of respondents were presented in the table below:

Table 5. Results Percentage of Respondents

Question	Sum of Questions on the questionnaire					Sum of respondents according to their level science (a)	Percentage of Interpretation $P = \frac{a}{b} \times 100\%$
	SS (5)	S (4)	N (3)	TS (2)	STS (1)		
P1	21	5	4	0	0	137	91%
P2	15	13	1	0	1	131	87%
P3	17	10	3	0	0	134	89%
P4	20	8	2	0	0	138	92%
P5	21	7	2	0	0	139	93%
P6	21	5	4	0	0	137	91%
P7	16	11	3	0	0	133	88%
P8	21	5	4	0	0	137	91%
P9	19	10	1	0	0	138	92%
P10	24	6	0	0	0	144	96%

Notes:

Account b = 150

The percentage of students' interpretation of the questionnaire responds was depicted in the diagram below:

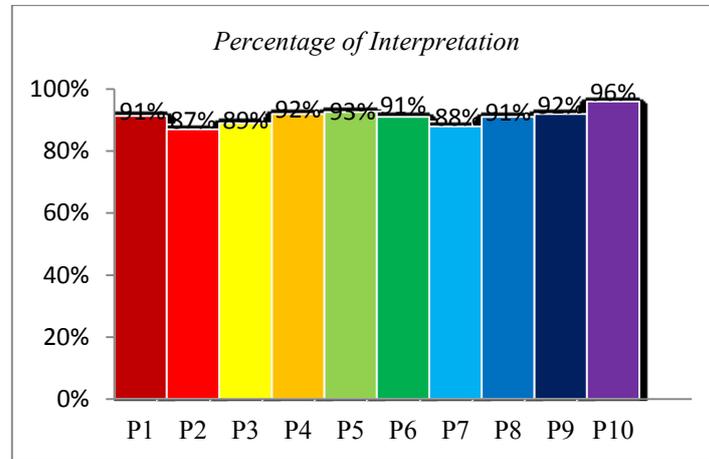


Figure 15. Percentage Graph Interpretation of results of the questionnaire respondents

- P1. Attractive background color display and interesting applications
- P2. The main menu is quite clear and compelling
- P3. Attractive 3D animated objects
- P4. Interesting Reward Sound
- P5. Appealing game background sound

- P6. The language used is easy to understand
- P7. Application is easy to use
- P8. The problem statement which is on the quiz app helps students in understanding the materials
- P9. The contents are easy to understand
- P10. Marker is easily detected by AR camera

The interpretation percentage of the questionnaire was used to measure the merits of this application. In the statements included in the questionnaire, the students could assess and measure whether or not the application was interesting and helped them understand the learning materials. The following description showed the percentage of interpretation:

- a. P1 statement resulted in 91% percentage of interpretation, thus the students stated that the background color displayed interesting application.
- b. P2 statement resulted in 87% percentage of interpretation, thus the students stated that the main menu was quite clear and interesting.
- c. P3 statement resulted in the interpretation percentage of 89%, thus the students stated that the application had interesting 3D animated objects.
- d. P4 statement resulted in 92% percentage of interpretation, thus the students stated that the reward sound was appealing.
- e. P5 statement resulted in 93% percentage of interpretation, thus the students reported that the background sound was interesting.
- f. P6 statement resulted in 91% percentage of interpretation, thus the students expressed that the language used in the application is easily understood.
- g. P7 statement resulted in 88% percentage of interpretation, thus the students said that the application was easy to use.
- h. P8 statement resulted in 91% percentage of interpretation, thus the students expressed about the information contained in the quiz application helped them in understanding the learning material.

- i. P9 statement resulted in 92% percentage of interpretation, thus the students stated that the contents of the material were easy to understand.
- j. Expressions of P10 resulted in 93% percentage of interpretation, thus the students stated that the Marker was easily detected by AR camera.

#### 4. Conclusion

Based on test results and discussion, it could be concluded that the Augmented Reality edugame for learning Indonesian traditional dances could be one of the media that was able to develop the culture of traditional dances from Indonesia. Edugame applications could also be developed to be one alternative to help students to easily understand the materials of learning culture, especially Indonesian traditional dances. The results showed that 87% of the students stated this app helped them to more easily understand the materials for cultural learning, and 96% of students said that the application was able to increase the interest in learning Indonesian cultural heritage.

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