

**INTERACTIVE AR-EDUGAME
ON LEARNING INDONESIAN TRADITIONAL WEAPONS**

Papers

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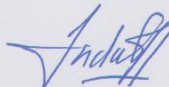
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INTERACTIVE AR-EDUGAME ON LEARNING INDONESIAN TRADITIONAL WEAPONS

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ABSTRACT

Traditional weapons is a product that is closely related to the culture of a society. Besides being used to shelter from enemy attack, the traditional weapon was also used in farming and hunting activities. More than function, traditional weapon has become the identity of a nation that helped enrich the cultural treasures of the archipelago.

Education in Indonesia is guided by a new curriculum called Curriculum 2013. One of the material on curriculum lead students to learn about Indonesian Traditional Weapons, It make students hard to imagine the figure of Indonesian Traditional Weapons. Reflecting on the problems arising from the curriculum of 2013, researchers set up a learning method by combining AR with Educational game in presenting the material of Indonesian culture diversity, especially for the traditional weapons.

This research done by collecting research data in SDIT Muhammadiyah Al-Kautsar Surakarta, and from the internet. The results of the research was an Educational game with the Augmented Reality support to learn about Indonesian Traditional Weapons, that easy to play and learn for children and teacher, namely “GatotVentura”.

Keyword: Augmented Reality, AR, Edugame, Indonesian Traditional Weapons.

INTERACTIVE AR-EDUGAME ON LEARNING INDONESIAN TRADITIONAL WEAPONS

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ABSTRAKSI

Senjata tradisional merupakan sebuah produk yang berkaitan erat dengan budaya suatu masyarakat. Selain digunakan untuk berlandung dari serangan musuh, senjata tradisional juga digunakan dalam pertanian dan kegiatan berburu. Lebih dari fungsinya, senjata tradisional telah menjadi identitas suatu bangsa yang membantu memperkaya khasanah budaya nusantara.

Pendidikan di Indonesia berpedoman pada kurikulum baru yang disebut Kurikulum 2013. Salah satu materi kurikulum mengarahkan siswa untuk belajar tentang Senjata Tradisional Indonesia, Ini membuat siswa sulit untuk membayangkan figur Indonesia Senjata Tradisional. Berkaca pada masalah yang timbul dari kurikulum 2013, peneliti menyiapkan metode pembelajaran dengan menggabungkan *Augmented Reality* dengan permainan edukasi dalam menyajikan materi keanekaragaman budaya Indonesia, terutama untuk senjata tradisional.

Penelitian ini dilakukan dengan mengumpulkan data penelitian di SDIT Muhammadiyah Al-Kautsar Surakarta, dan dari internet. Hasil dari penelitian ini adalah sebuah game edukasi dengan dukungan *Augmented Reality* untuk belajar tentang Senjata Tradisional Indonesia, yang mudah untuk bermain dan belajar untuk anak-anak dan guru, yaitu "Gatot Ventura".

Keyword: Augmented Reality, AR, Edugame, Senjata Tradisional Indonesia.

INTRODUCTION

Lately, everyone is already familiar with the technology of three-dimensional (3D). Now comes a new technology called Augmented Reality (AR). Augmented Reality (AR) is a technology that can describe and incorporate the real world and the virtual world that is made through a computer. The technology of Augmented Reality is slowly but sure has been spread to many aspects of life. This is because the use of AR is very exciting and allows users being easier in doing something, for example in delivering a material like a presentation in learning process or in a game. Therefore, it is considered for education to start using AR as a medium of learning. Today, Education live in a world of media. Where the activities of the learning has been moving toward using an interactive media method. It also should be able to be adapted with the demands of the curriculum, according to the materials, methods, and the levels of learning ability of students to

achieve the learning objectives in school.

Traditional weapons is a product that is closely related to the culture of a society. Besides being used to shelter from enemy attack, the traditional weapon was also used in farming and hunting activities. More than function, traditional weapon has become the identity of a nation that helped enrich the cultural treasures of the archipelago (Ahmadibo, 2012).

Education in Indonesia is guided by a new curriculum called Curriculum 2013. This curriculum have one material that requires students to learn about Indonesian traditional weapons. It makes student hard to imagine the figure of traditional weapons that needed for learning. Reflecting on the problems arising, Researchers set up a learning method by combining AR with Educational game in presenting the material of Indonesian traditional weapons, As a learning and the introduction of Indonesian traditional weapons. students need a media that is more real, because it would

encourage students in understanding the material.

Edugame of augmented reality application is built with the aim to facilitate and attract students to learn about the kind of Indonesian traditional weapons that exist in Indonesia.

PREVIOUS RESEARCH

Research by Norman Kidil, Harry, Winardi, Afan Galih Salman (2012), titled “APLIKASI GAME EDUKASI “MERAH PUTIH” BERTEMA KEBUDAYAAN INDONESIA BERBASIS ANDROID“. As the fast growth of mobile gaming industry now game doesn't works as entertainment only. In this research an educational game “Merah Putih” will be developed on Android platform which giving an information about Indonesian's culture. The method that used is analysis method which include of gathering information, system design, implementation, and testing about information of Indonesia's Culture that shown in this educational game. The result of

this research are there is many information given by this game can be accepted by player and the player think that this game is very useful for studying the culture of Indonesia. Other than that, overall can be expressed that satisfaction level of player against the game is quite high.

Research by Youngo Lee and Jongmyong Choi (2014), titled “TIDELAND ANIMAL AR: SUPERIMPOSING 3D ANIMAL MODELS TO USER DEFINED TARGETS FOR AUGMENTED REALITY GAME “. With the development of computer vision, mobile platform, and information technologies, there have been many mobile augmented reality applications, contents, and services. The technology of augmented reality has been developed to many application areas such as books, games, advertisements, and tour guide systems. However, most vision-based augmented reality applications have to train some physical objects patterns or paper markers before using it. If the physical objects for the applications are destroyed or damaged, users have

to buy new objects or print them out again. To reduce the inconvenience, there has been developed technology that users take pictures of 2D markers what users want and superimpose content on it in real-time. In this paper, we present an application that superimposes 3D animal models living in tideland sequentially whenever users make image targets in real time. We implemented 3D models of 10 animals in tideland, and a mobile application to display the animals on smart phone.

Research by Youngo Lee and Jongmyong Choi (2014), titled “IMPLEMENTATION OF AUGMENTED REALITY SYSTEM FOR SMARTPHONE ADVERTISEMENTS “. The recent development and popularization of personal mobile devices has brought a lot of changes into information search and offering. In particular, the newly emerged augmented reality system made possible an innovative way of information acquisition by providing additional information of the virtual world to the real world. This work used the markerless augmented reality system on

smartphones to design and implement the smartphone application service aimed at efficiently conveying information on advertisements to users. The conventional advertising applications simply introduce and explain goods by inducing consumers to have an interest, whereas the markerless application service developed in this work interacts with the augmented reality system and database management system to quickly provide more accurate and diversified information to users.

Sudarmilah Endah, et al (2013) in her article titled "Tech Review: Game Platform for Upgrading Counting Ability On Preschool Children" said that in computer games are a positive side that can increase the effectiveness of the children in understanding mathematics. The positive side of this is still depends on the software as well as interface design, level of integration with other learning activities, delivery style. This study aims to get a gaming platform comparisons that is suitable to

improve the cognitive abilities of preschoolers. Three gaming platform used is Kodu, Unity3D, and Construct 2. With the research results generated is expected to maximize the child's cognitive abilities.

RESEARCH METHOD

A. Research Flowchart

Making the application of Augmented Reality (AR) through several stages and processes. It used to produce a good research and in accordance with the purpose of research. Here are the stages of research shown in the flowchart figure 1.

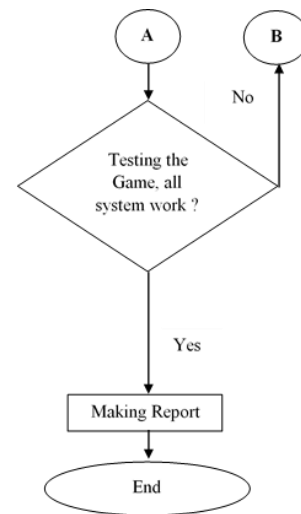
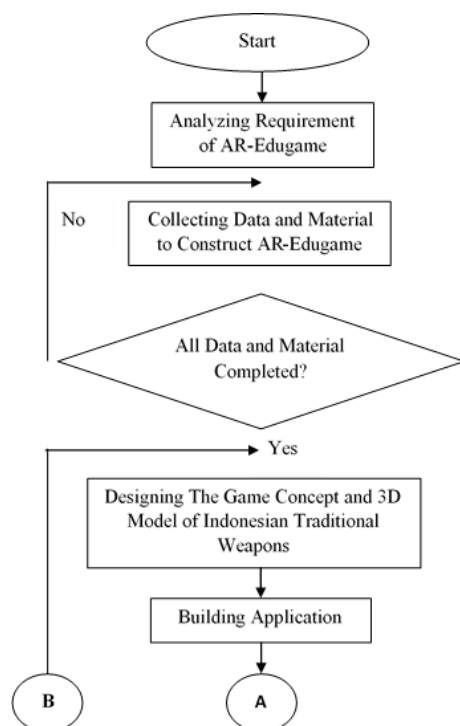


Figure 1 Research Flowchart

B. Application Design

The design of application specifically described in the form of Use Case diagram as in figure 2.

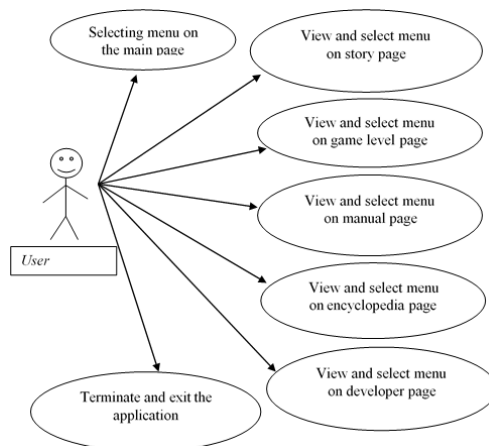


Figure 2 Use Case Diagram

RESULT AND TESTING

A. RESULT

1. Splash Screen Page

Splash screen page is an opening page or the first page that appear when the application is started. This page will automatically closed when it's redirect to the main page. The splash screen page contains the researcher logo as a developer of the application and a short fade animation.

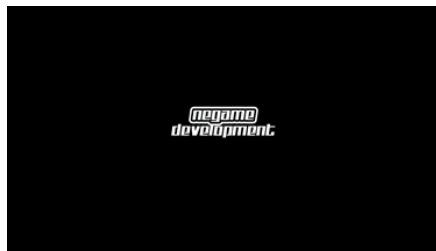


Figure 3 Splash Screen

2. Main Page

The main menu page appear when the splash screen page enclosed. This page contains background music and several menus that can be select by user. User can choose the menu by tap on it. The main page constructed using Unity 3D Canvas and playmaker asset. The menu options that available on the main page was “Mulai” menu, “Tentang” menu, “Ensiklopedi” Menu, Download

marker menu, and the last “Keluar” menu.



Figure 4 Main page

3. “Tentang” Page

“Tentang” Page appear when user tap the “Tentang” menu on main page, this page contains the short description of the application and profile about developer. The “Tentang” page constructed using Unity 3D Canvas and playmaker asset. The menu options that available on this page was “Keluar” menu.

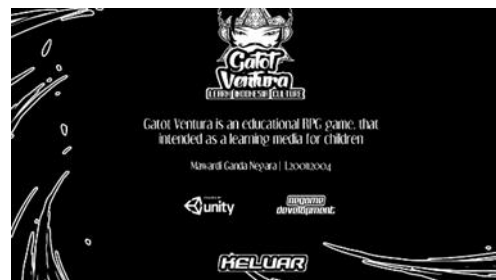


Figure 5 “Tentang” Page

4. “Ensiklopedi” Page

“Ensiklopedi” page appear when user tap the “Ensiklopedi” menu on main page, this page contains short description about the six Indonesian traditional weapons

that used on the application. “Ensiklopedi” page divided into three page, each page contains two type of traditional weapons. The short information about traditional weapons will appears when user tap the 2D-Image model of weapons. The menu options that available on this page was “Kembali” menu and Arrow button

5. Story Page

Story page will appear when user tap the “Mulai” menu on the main page. Story page contains the narration of game, and the main purpose of the game. It tell to user how the game work, and how the game will end. The menu options that available on this page was “Lanjut” menu.

6. Game Level Page

Game Level Page appear when the story page already enclosed. This page contains a lot of game scenes. There are six game levels scene that each levels consist of three sub levels and one Augmented Reality scene. The game scenes constructed from so many platform and sprite of images. In this page user can select the levels, and the other

levels only can be unlock if user already completed the first levels. The menu options that available on this page are “Keluar” menu and “Petunjuk Main” menu.

7. “Petunjuk Main” Page

“Petunjuk Main” page appear when user tap the “Petunjuk Main” menu on game level page, This page contains explanation about the game, the rule of the game, the function of every items, the function of each buttons on the screen, the tutorial how to use Augmented Reality camera. The menu options that available on this page was “Lanjut” menu.

B. TESTING

1. Black Box Test

Application testing is needed to determine which application has been made has been running well in accordance with the expected functions, before the test and assessment done by the respondent. In this test researchers used black-box method to determine whether the application is running in accordance with the expected functions. Therefore, researchers do re-tested so that applications can run properly. Black-box testing is a method of

software testing that examines the functionality of an application without peering into its internal structures or workings. The device used for testing applications was smartphone with android 5.1.1 lollipop, brand Xiaomi Mi3.

2. Reliability and Validity Test

Before testing the validity and reliability, researchers carried out tests using questionnaires. This research was conducted in SDIT Muhammadiyah Al Kautsar Kartasura on May 30, 2015. Here are the results of recapitulation that has been filled by the students of class IV C SDIT Muhammadiyah Al Kautsar Kartasura with the statement criteria: P1: “Aplikasi mudah dioperasikan / dimainkan”, P2: “Tata letak tampilan aplikasi menarik”, P3: “Isi materi mudah dipelajari/dimengerti”, P4: “Aplikasi dapat membantu belajar tentang senjata adat Indonesia”, P5 : “Objek 3D yang dibuat menarik”, P6: “Aplikasi permainan ini dapat meningkatkan keinginan untuk belajar”.

Assessment Explanation :

SS : Sangat Setuju (5)

S : Setuju (4)

N : Netral (3)

TS : Tidak Setuju (2)

STS : Sangat Tidak Setuju (1)

Table 1 Results of the questionnaire

No	Name	Statement					
		P1	P2	P3	P4	P5	P6
1	Olyvia Nurrizma	4	5	5	4	5	4
2	Dhasin Izzan	4	5	5	5	5	5
3	Fahrul	5	5	5	5	5	5
4	Devana Putri Nadya	4	3	4	5	5	4
5	El Yafi	5	5	5	5	5	5
6	Rafih Dihak Ahmad	5	4	5	5	4	5
7	Hafizh Rasendriya	5	4	4	5	5	4
8	Alya L. R	4	5	4	5	5	4
9	Syahrindra Lingga Hanu	3	5	5	4	4	3
10	Annisa Angelika Nugraha	3	5	4	5	4	5
11	Syahra Refizka N	4	5	5	4	5	4
12	Farah Adaya S	4	5	5	5	5	5
13	Damar Arrya Akbar	4	5	5	5	5	5
14	Muhammad Hanif Aqila	5	5	5	4	5	5
15	Sakti Indra Heradewa	5	5	5	5	5	1
16	Alfin	5	5	5	5	5	1
17	Nayla Asri Y. P. A	4	3	3	5	3	3
18	M. Hafidz Pradana	3	4	2	1	5	4
19	Melly ana P. N	5	4	3	4	3	4
20	M. Revan Atha Subandi	5	4	5	5	5	5

Table 2 Result of Validity Test

Corelation Between	Corelation Value	rTable value	Conclusion
P1 with Total	0,477	0,444	Valid
P2 with Total	0,542	0,444	Valid
P3 with Total	0,842	0,444	Valid
P4 with Total	0,619	0,444	Valid
P5 with Total	0,525	0,444	Valid
P6 with Total	0,452	0,444	Valid

Table 3 Result of Realibility Test

Reliability Statistics	
Cronbach's Alpha	N of Items
0.564	6

3. Calculations Percentage of Interpretation

To calculate the Interpretation Percentage, first needs to calculate the total score using the formula $(S) = \sum (\sum p \times BP)$, where p = Number of respondents answer and BP = Weight ratings. Thus obtained the score (S) statement:

$$P1 \text{ Score (S)} = \{(9 \times 5) + (8 \times 4) + (3 \times 3)\} = 86$$

$$P2 \text{ Score (S)} = \{(13 \times 5) + (5 \times 4) + (2 \times 3)\} = 91$$

$$P3 \text{ Score (S)} = \{(13 \times 5) + (4 \times 4) + (2 \times 3) + (1 \times 2)\} = 89$$

$$P4 \text{ Score (S)} = \{(14 \times 5) + (5 \times 4) + (1 \times 1)\} = 91$$

$$P5 \text{ Score (S)} = \{(15 \times 5) + (3 \times 4) + (2 \times 3)\} = 93$$

$$P6 \text{ Score (S)} = \{(9 \times 5) + (7 \times 4) + (2 \times 3) + (2 \times 1)\} = 81$$

Calculations percentage of Interpretation (P) statement of students questionnaire using formula $(P) = \text{Score} / \text{Smax} \times 100\%$. So from the calculation which obtained the results Interpretation percentage (P) Statement:

$$\text{Interpretation percentage P1 (P)} = 86/100 \times 100\% = 86\%$$

$$\text{Interpretation percentage P2 (P)} = 91/100 \times 100\% = 91\%$$

$$\text{Interpretation percentage P3 (P)} = 89/100 \times 100\% = 89\%$$

$$\text{Interpretation percentage P4 (P)} = 91/100 \times 100\% = 91\%$$

$$\text{Interpretation percentage P5 (P)} = 93/100 \times 100\% = 93\%$$

$$\text{Interpretation percentage P6 (P)} = 81/100 \times 100\% = 81\%$$

Result percentage of students statement

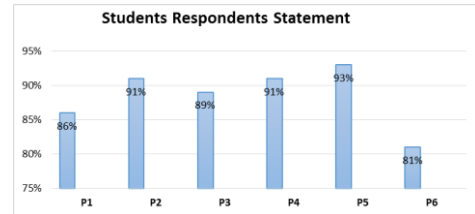


Figure 6 Results Percentage of Students Statement

Explanation :

1. From the statement “Aplikasi mudah dioperasikan /dimainkan” resulted Interpretation percentage of 86%, according to the scale intervals stated very high that the application is easy to operate according to the respondents.
2. From the statement “Tata letak tampilan aplikasi menarik” resulted Interpretation percentage of 91%, according to the scale intervals stated very high that the application have a good interface according to the respondents.
3. From the statement “Isi materi mudah dipelajari/dimengerti” resulted Interpretation percentage of 89%, according to the scale intervals stated very high that the application have a

material that easily to learn according to the respondents.

4. From the statement “Isi materi mudah dipelajari/dimengerti resulted Interpretation percentage of 91%, according to the scale intervals stated very hight that the application can help on learning Indonesian Traditional weapons according to the respondents.
5. From the statement “Object 3D yang dibuat menarik” mentions that 15 respondents stated strongly agree (SS), 3 respondents agreed (S), 2 respondent said netral (N). The statement resulted Interpretation percentage of 93%, according to the scale intervals stated very hight that the application 3D-Object can help user to identify the Traditional Weapons according to the respondents.

6. From the statement “Aplikasi permainan ini dapat meningkatkan keinginan utuk belajar” resulted Interpretation percentage of 81%, according to the scale intervals stated very hight that the application can help user to increase willing when study according to the respondents.

CONCLUSION

1. Design and manufacture of Augmented Reality Applications Educational Games For Learning Indonesian Traditional Weapons have been successfully created.
2. Application of Augmented Reality (AR) edugame can help students learn to understand Indonesian Traditional weapons, with a pleasant atmosphere.

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