Game development of "kwace adat bali" for the socialization of balinese traditional dress-up ethics

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Abstract

Many young people have begun to violate the ethics of Balinese traditional dress up by using strict lacy blouse (kebaya), high split sarong (kamen), men sarong (kamen) that not taper on the tip and excessive accessories. Game of "Kwace Adat Bali" is expected as a means of socialization in Balinese traditional dress-up ethics appropriately. In this game, the Balinese traditional dress-up style is classified into three types, namely light traditional clothing (payas alit), middle traditional clothing (payas madya), and great traditional clothing (payas agung). The proposed method is Design Game Based-Learning Instructional Design (DGBL-ID) which is combined with a shuffle random algorithm to shuffle game items. The Game of "Kwace Adat Bali" has tested using alpha testing, beta testing, t-test, and game engagement questionnaire (GEQ). The alpha testing result was 100% game functionality has run suitable for the design. Beta testing shows that overall this game got a value of 77% from 65 respondents. There was a significant difference between user knowledge before and after playing the game of "Kwace Adat Bali" as indicated by t table value of 1.997, t value of 6.5, and the critical value of α = 0.05. The proposed method had an engagement rate of 8.7% higher than just using the DGBL-ID method in developing the game. Therefore, it can be concluded that the game feasible is considered as a new means of socialization in Balinese traditional dress up ethics for the younger generation.

1. Introduction

Along with times, the Balinese tradition dress up style also has changed to be more fashionable. These changes make Balinese traditional clothes tend to deviate from its rule [1]. Some local media told that Balinese traditional clothing to temple is considered outside of the rules. Deviations examples are excessive use of jewelry, a more open clothing model, modified short sleeve kebaya design that is used to pray to the temple, the use of a woman's sarong (kamen) that is higher up to above the knee that tends to impolite, men sarong (kamen) which does not taper on the tip (kancut) that deviates from its philosophical. Millennials also are known as generation Y dominate the deviations of Balinese tradition dress-up ethic.

Based on the problem related to deviation in Balinese tradition dress-up style and game technology utilization is used as means information media, hence this research discusses android based game application as means for socializing Balinese traditional dress-up style that suitable with the norm, politeness and Balinese traditional clothes philosophical. The research design is drag and drop game that is played in Android smartphones that are classified into three, namely payas alit (light traditional clothing), payas madya (middle traditional clothing), and payas agung (great traditional clothing). Game drag and drop is one of the puzzle game models that suitable for game purposes as learning [2]. The proposed method in this research is the DGBL-ID model as an educational game design method that will be combined with a shuffle random algorithm to randomize game items as a game variation.

The research novelty is Balinese traditional clothes classification into three types by considering rule according to social norms that are combined with educational game technology by drag and drop model mobile base that is built using the DGBL-ID model is combined with shuffle random algorithm. No one has researched on the android game to socialization Balinese traditional dress-up ethic that divide into 3 types namely payas alit (light traditional clothing), payas madya (middle traditional clothing), and payas agung (great traditional clothing) using the DGBL-ID model and shuffle random algorithm like author's research topic. This game application is intended for millennials start from students in grade 1 to adults.

Some of the studies that the authors refer to are conducted by Aulia Ahrian Syahidi et al in 2019 about the usage of the game as a media of learning basic programming for vocational high school. The game was chosen because it was considered capable to increase the engagement between students and basic programming so the student could learn through the game. This is evidenced by the results of research which states that the success rate of learning design that reaches 90.9% [3]. Another research using the game as a learning media was conducted by Lailatul Husniah

et al in 2019. They made a game to introduce traditional weapons by MDA Framework in its development. That research was able to improve user ability with an average of 76.67% [4]. Besides being able to be used as an introduction to traditional weapons, the game can also be used as a media to introduce a tourism place. The next research is conducted by Dewa Ngurah Tresna et al in 2017 with the title "The Changes Traditional Dress-Up Style to Temple for Balinese Hinduism Teenager in SMA Negeri 5 Denpasar" discuss causative factor analysis in changes of Balinese traditional dress-up style for men and women and lack of socialization Balinese traditional etiquette [1]. The research in 2017 that is conducted by I Dewa Ayu Sri Suasmini with the title "Kebaya as clothing go to the temple in representation contemporary women in Denpasar" discuss about changes in the design of kebaya women that are more fashionable but tends to forget the ethics of dressing in temples. The research purpose that is conducted by I Dewa Ayu Sri Suasmini is to change dress-up style and contemporary women's lifestyle to keep consider to the aesthetic value as well as ethical values in dressing kebaya. The research that is conducted by eli pujastuti et al in 2018 with the title "Implementation of DGBL-ID for Educational Game Design "Waste Management" discuss about the design android game of sorting kind of waste and recycling waste using DGBL-ID model [5]. The next research about shuffle random algorithm that was conducted by Amelia Yusnita et al in 2019 shows that shuffle random algorithm can be used as a one of variation to shuffle data so users don't remember data sequence in the game [6][7][8]. In this research, developing an android game using DGBL-ID model is combined with a shuffle random algorithm is proposed to solve the problem about the deviation of Balinese traditional clothing outside the rules.

This research urgency is creation an android based game named "Kwace Adat Bali" as means socialize Balinese traditional dress-up style when attending an event in banjar (ngayah), pray to temple, and great traditional clothes (payas agung) is often used for a wedding ceremony by also notice ethics, value, aesthetic value, and philosophical of Balinese tradition clothes. This game is needed so Balinese don't forget Balinese tradition clothes rule and philosophical value. Through interactive media such as a game that can give a deep impression and unforgettable for users [9], therefore in this game is interpolated learning and persuasive influence for Balinese tradition dress-up that suitable with conditions, place, and politeness value.

2. Research Method

Determination of game scope is done through literature review, observation, interview, and games review that is similar to the educational game that will be built. That process result is obtained that educational game that will be built discuss about interactive media for socialization Balinese traditional clothes style which is classified into 3 types, namely payas alit (light traditional clothing), payas madya (middle traditional clothing), and payas agung (great traditional clothing) with considering about ethics value and politeness. The following are the methods used in Kwace Adat Bali game development.

2.1 DGBL-ID Model

The development of Kwace Adat Bali application using DGBL-ID (Digital Game Based Learning - Instructional Design) which consists of the analysis phase, design phase, development phase, quality assurance, and implementation and evaluation [10][11]. Based on DGBL-ID model and methodology, the first step is an analysis phase. The next step is design phase. The third phase is the development phase contains program code and content development [12]. After game is created successfully, then be continued to the next phase namely quality assurance phase to check quality of game. Quality assurance phase is going through four tests namely alpha testing, beta testing, t-test, and GEQ. Alpha testing is used for functional tests and feasibility tests in terms of game development [13][14][15]. After alpha testing is done then be continued with beta testing. Beta testing involve user [16][17][18]. The last phases are implementation and evaluation. Implementation related to distribution proses to user. Evaluation is used to improve game suitable with user requirements and development. The game development phase using DGBL-ID model is shown in Figure 1.

2.2 Shuffle Random

In this research, implementation of difficulty level using shuffle random algorithm. Shuffle random is an algorithm for the randomization of index sequences from record or array. This randomization like card deck shuffle, in which all cards are shuffled therefore the arrangement is random [6][7][8]. Another example, for example, A is an array 5 x 1, A = [1 2 3 4 5] as a result, shuffle random process will shuffle index sequences from array A become either A1 = [5 1 3 2 4] or another array arrangement. In a programming language, shuffle random function not only can shuffle number but also can shuffle array string, mix of string and number. Shuffle random algorithm is used in game design level. This method is used to shuffle availability of sash, sarong, headgear and another item from the database program. Therefore, this game is expected it isn't boring and it becomes one of difficulty variation in game.
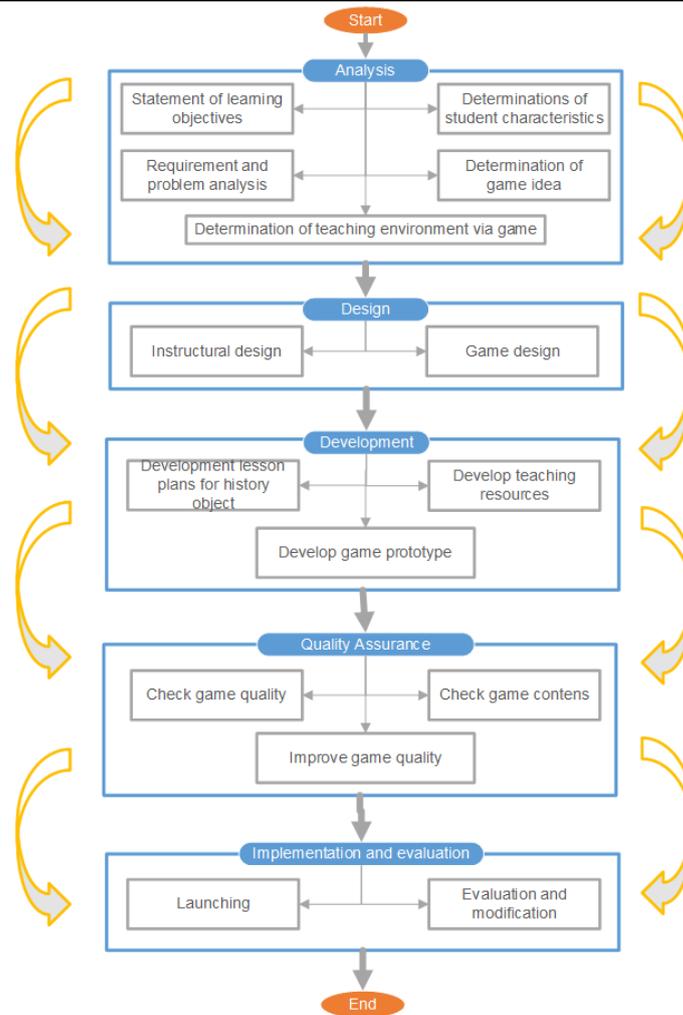
Figure 1. Digital Game Based Learning-Instructional Design Model (DGBL-ID)

2.3 Balinese Traditional Clothes

Following the decision from the unity of interpretation seminar about Hinduism aspects, the clothes that wearable in Balinese traditional are complete clothes known as jangkep clothes. Light Traditional Clothing (Payas Alit) for menswear consists of a shirt, a sash, and sarong. Light Traditional Clothing (Payas Alit) for womenswear consists of lacy blouse (kebaya), a sash, and sarong. Middle Traditional Clothing (Payas Madya) for menswear consists of t-shirt, sarong for the outer layer, sarong for kancut, and a sash. Middle Traditional Clothing (Payas Madya) for womenswear consists of lacy blouse (kebaya), a sash, and sarong. Great Traditional Clothing (Payas Agung) for menswear consists of headgear (destar), dagger, sarong for the outer layer, sarong for kancut, and jewelry. Great Traditional Clothing (Payas Agung) for womenswear consists of headdress (Gelung Agung), a sash for the upper body, a sash for waist, sarong, and ornamental sash.

3. Results and Discussion

In this section, we will describe the process of design, development, and the results of implementing the "Kwace Adat Bali" game using DGBL-ID method.

3.1 Design Results

1. Analysis Phase

    a.   Requirement and problem Analysis

        Along with changing times and the influence of other regional cultures, it also caused changes in the ethics of the use of traditional Balinese clothes, especially for the younger generation. Balinese kebaya which should be polite and closed now has begun to be modified into a modern kebaya with a more open model such as a high hemisphere skirt above the knee, the use of kebaya with low cleavage, excessive use of jewelry, and the

use of recurrent men who do not has a pointed tip (kancut) are some examples of ethical deviations in traditional Balinese clothes. Therefore, media is needed for the socialization of ethics in a good Balinese dress in accordance with the rules targeted at the younger generation. Then the socialization media chosen was a game based on android.

b. Determination of Stude Characteristic

In this research, we choosed students of elementary school to university as a target of socialization ethics in Balinese Clothes through the games.

c. Statement of Learning Objective

The learning will be contained how to use Balinese traditional clothes which are divided into 3 (three) namely payas alit (light traditional clothing), payas madya (middle traditional clothing), and payas agung (great traditional clothing). And the character of clothing will be divided into male and female. Balinese men characters will be named Wayan, and Balinese female characters will be named Ni Luh.

d. Determination of Game Idea

The idea of developing this game is to help male and female characters named Wayan and Ni luh for choosing clothes to be used in accordance with the narration of the story given. In this game the player or user must determine the appropriate custom clothing used by a character when going to the temple, to school, or a large traditional ceremony.

e. Definition of teaching environment via the game

This game was built using the Android platform. The reason for choosing the Android platform is the development of technology as nowadays almost everyone has a cell phone or smartphone with an Android operating system and the Android platform is easier to implement on a smartphone than applied in a Personal Computer.

2. Design Phase

a. Instructional Design

Instructional design divided into general instructional objectives and specific instructional goals, while the details are as follows.

1. The general Instructional Purpose of the game "Kwace Adat Bali" is.
   a. Users can know the types of traditional Balinese clothing.
   b. Users can know the procedures and ethics of traditional Balinese clothes.
   c. Encourage users to care more about traditional Balinese clothes so that Balinese traditional clothes can be used in everyday life.

2. Special Instructional Purposes

The contents used in the game "Kwace Adat Bali" is an introduction to various kinds of Balinese traditional clothes consisting of payas alit (light traditional clothing), payas madya (middle traditional clothing), and payas agung (great traditional clothing). The learning method in this game is story animation based on the case given, game instructions, and information after playing. After the user plays this game the user is expected to be able to explain the correct procedures for using traditional Balinese clothes according to their uses.

b. Game Design

Game design consists of 6 (six) activities, they are story setting - character, combat - scoring system, controller system, interface - detail of level, localization plan, and asset list. The following are an explanation of game design activities.

1. Story setting and characters

In this game contains the diary of Ni Luh and Wayan. The game will ask an user to help Ni Luh and Wayan for choosing appropriate and polite traditional clothing based on the activities carried out. Daily activities carried out by Niluh and Wayan start from going to some places. By helping the main character choose the right traditional clothes, the user gets information about the types of traditional clothes that are appropriate and in accordance with the place, the right kamen is worn and polite, lacy blouse that polite, and information about the ethics of traditional Balinese clothes,

2. Combat and scoring system

The user can start the game by pressing the Play button. Then the main character's diary is show it contains who the main characters and what the activities to be carried out. For complete this game, the user must remember about the time limit. The score in this game is calculated from how fast users complete this game with the right answer for choosing the right kebaya, sarong (kamen), and sash. If user gives a wrong clothes for character the score value will automatically reduce. In addition, in this game the developer uses a random shuffle method also for randomizing kebaya, kamen, and shawl items ti increase difficulty level in the game.

3. Controller system

In this game, only certain objects that can be controlled by the user are clothes and equipment, such as kamen, kebaya, and shawl. For control these objects by dragging and dropping on the main character.

4. Interface and level detail

The screenflow of the game that is used as a reference in designing interfaces and levels is as follows in Figure 2.
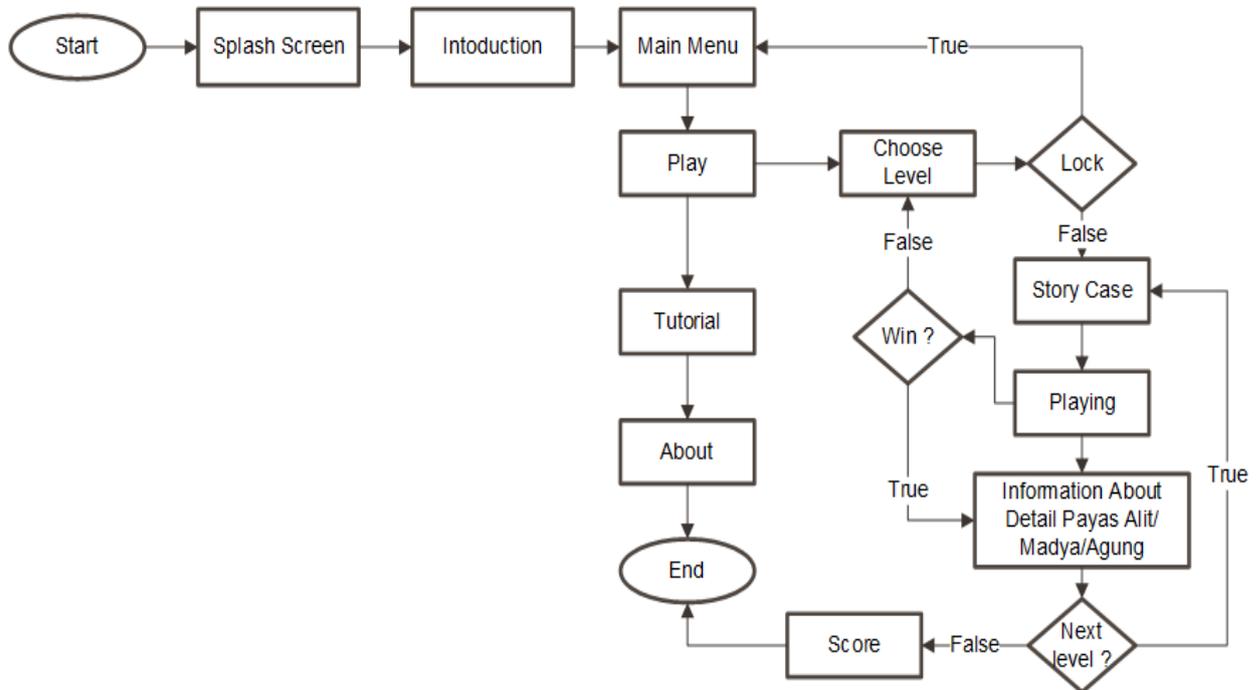

Figure 2. Screenflow Game

The following are some interface designs for the game "Kwace Adat Bali".

a. Main Menu Screen

The main menu is the first screen displayed in a game like in Figure 3(a). Users can select the Play button to start the game, the buttons learn to display the information related to traditional Balinese dress consisting of payas alit (light traditional clothing), payas madya (middle traditional clothing), and payas agung (great traditional clothing) and the button about to get instructions how to play the game. Storyline Screen

b. Level Selection Screen

Figure 3(b) shows the level selection page. The level consists of 8 levels that must be completed by the user. The user does not jump to a higher level before he completes level by level.

c. Clothing Selection Screen

Some assets and objects contained in the game are sarong (kamen), lacy blouse (kebaya), sash, t-shirts, characters, wardrobe, and navigation buttons. Kamen, kebaya, shawl are objects that can be controlled by the player by sliding drag and drop. Character and wardrobe are objects that cannot be controlled by the user. Details of the clothing selection display can be seen in Figure 3(c).

d. The Storyline Screen

Figure 3(d) will feature stories about the daily of Ni Luh and Wayan diaries going to work, going to campus, attending youth events in Banjar, praying to temples, and Tooth Filling event. The main character in the game will wear custom clothes according to the event and place, so that the user helps the main character for choosing the right custom clothing, politely, and ethically.

e. Custom Clothing Information Screen

Figure 3(e) display information about custom clothing. Displays information related to the details of traditional clothing used in accordance with the story given to the character.

5. Localization plans

This game uses an English and the Indonesian language. This game is aimed at the Balinese people in particular and Indonesian people in general.

6. Asset list

Asset list that are used in this game such as main menu, layout about, layout banjar, layout pura, layout office, Ni luh character, Wayan character, button play, button home, score, timer, button next, button exit, property for custom clothes bali (payas alit, payas madya, and payas agung), and art intro screen

(a)   (b)   (c)

(d)   (e)
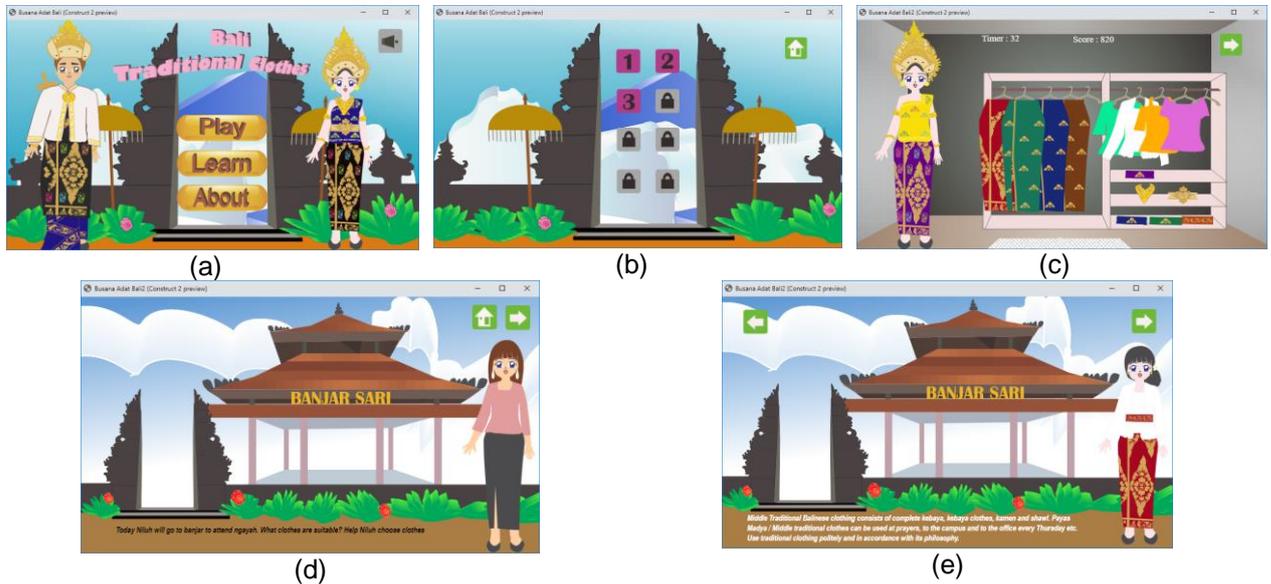
Figure 3. Interface Design

3. Development Phase

This stage is the peak stage in the DGBL-ID model, namely the implementation of the analysis and design that has been done. The development phase consists of 3 (three) stages, i.e

a. Develop a lesson plan for History subject

The users in this game are instructed to help the characters named Ni Luh and Wayan for choosing clothes to be used in accordance with the story of the activities to be carried out. After completion of the game, the user will get information about how the purpose and details of each equipment.

b. Develop teaching resources

The resources making in the game "Kwace Adat Bali" is made using Construct 2. Construct 2 is an application for creating android games that support Artificial Intelligence and game environments.

c. Develop game prototype

After complete to collect all the data, the next step is the development of a prototype game. In Figure 4 the following is a prototype game design that has been made.

Figure 4. Prototype

4. Quality Assurance

a. Check game quality

To find out the quality of the game and the content needs to be tested. Tests carried out are alpha testing, beta testing, t-test and GEQ. Alpha testing is done by the blackbox method [19][20][21][22][23], beta testing, t-test, and GEQ is done by distributing questionnaires to application users [24]. The first test carried out is testing the functionality to find out all parts of the game are functioning properly and in accordance with the design that has been made. The results of blackbox testing is shown in Table 1.

Table 1. Alpha Testing Results

Test Class	Testing Scenario	Expected Result	Testing Results	
The application runs perfectly	Execution of "Kwace Adat Bali" application	Displays the main menu screen	☑ Success	□ Failed
		The sound/music effect is heard well	☑ Success	□ Failed
		Mute and unmute background sound function	☑ Success	□ Failed
		Displays the menu selection screen	☑ Success	□ Failed
Main Menu Selection	Choose the Play Button	Displays the levels available in the game	☑ Success	□ Failed
	Select the Learn Button	Display information related to Balinese traditional clothing	☑ Success	□ Failed
	Select the About Button	Showing tutorials on how to play	☑ Success	□ Failed
Level Selection	Try playing at the first level	Displays all levels available in the game	☑ Success	□ Failed
		The first game all levels are locked except the first level	☑ Success	□ Failed
Start game (Control Game)	Select the Home button	Return to the main menu or the initial display	☑ Success	□ Failed
	Select the Next button	Head to the next level	☑ Success	□ Failed
	Select the Back button	Return to the next level	☑ Success	□ Failed
	Drag and drop objects	Perform the transfer of clothing equipment from the closet to the character	☑ Success	□ Failed
	Randomizing clothes	Clothing accessories are randomized every new level or new player	☑ Success	□ Failed
Game Kwace Adat Bali	Giving a case through a story	A dialogue and storytelling appear about the case that must be solved in the Ni Luh character	☑ Success	□ Failed
		A dialogue and storytelling appeared about the case that had to be solved by Wayan's character	☑ Success	□ Failed
	Choose clothes from the closet	Clothing accessories are always displayed randomly	☑ Success	□ Failed
		Can choose and shift clothing equipment	☑ Success	□ Failed
		Clothing accessories are in accordance with each characters	☑ Success	□ Failed
	Pair the clothes to the character	Can pair clothes to the Ni Luh character	☑ Success	□ Failed
		Can pair clothes to Wayan's character	☑ Success	□ Failed
	Score Settings	The case processing time is always running	☑ Success	□ Failed
		The score is increased if chosen correct clothes	☑ Success	□ Failed
		The score is reduced if chosen wrong clothes	☑ Success	□ Failed
		At the end of the game, the current score and the high score have been reached	☑ Success	□ Failed

Based on alpha (functional) testing, it can be concluded that the development of the game "Kwace Adat Bali" as a means of socializing ethics in traditional Balinese dress is in accordance with the expected results. So the quality of the game is considered sufficient enough to be able to do to the next process.

b. Check Game Content

Check game content is done to find out whether the educational content in the game "Kwace Adat Bali" has an impact on the user. Check game content is done by beta testing, t-test and GEQ. The test was conducted on 65 respondents consisting of 50 millennial respondents with an age range of 20-25 years and 15 respondents consisting of children of elementary school age with an age range of 7-12 years. There were 15 questions asked of respondents. The result is obtained from the questionnaire can be seen in Table 2. Based on the results of the questionnaire, then the percentage of each answer will be searched using Equation 1.

$$Y = \frac{x}{ideal\ score}\ x\ 100\%$$ (1)

Where y is a percentage value, x is the sum of the results of the multiplication value each answer with the number of respondents, and the $ideal\ score$ is the highest likert value multiplication with the number of respondents.

Table 2. Beta Testing Results

No.	Statement	Number of Respondents					Total	Percentage
		1	2	3	4	5	∑(value x	∑respondent)
1.	Appropriate use of colors and background	1	0	16	38	10	251	77%
2.	Matching the text color with the background	0	3	22	30	10	242	74%
3.	Accuracy in writing size	0	7	17	28	13	242	74%
4.	Accuracy in choosing the text type and color	0	7	21	24	13	238	73%
5.	Accuracy in describing the model/subject game	0	7	15	21	22	253	78%
6.	Fit button size	1	2	23	25	14	244	75%
7.	Button color matching	1	3	16	34	11	246	76%
8.	Fit button shape	2	1	16	27	19	255	78%
9.	Accuracy of button functions with desired menu	2	0	11	26	26	269	83%
10.	The appropriate appearance of animation	1	2	17	23	22	258	79%
11.	The suitability of musical illustrations in support of the game "Kwace Adat Bali"	1	3	10	27	24	265	82%
12.	Accuracy in delivering Bali fashion information	2	0	10	31	22	266	82%
13.	The suitability of the information on the traditional clothing equipment used	0	1	26	24	14	246	76%
14.	Ease of application operation	3	0	15	28	19	255	78%
15.	The convenience of using a whole application	0	3	23	26	13	244	75%
	Average							77%

1 = very poor, 2 = poor, 3 = fair, 4 = good, 5 = excellent

Based on the results of the percentages shown in Table 2 the overall average score is 77%. Therefore, it can be concluded that this game can be accepted by the user.

The comparison result between user knowledge before and after playing game of "Kwace Adat Bali" is calculated by t-test [4][25]. The following Table 3 are the results obtained from the questionnaire given.

Table 3. The Comparison Result between User Knowledge Before and After Playing Game

Variable	Total Score	
	Before	After
Average/Mean	66.26	74.46
Deviation Standard	8.96	9.24

The t-test result show that t table value of 1.997, t value of 6.5, and the critical value of α = 0.05, so it was concluded |t value| > t table which means there was a significant difference between user knowledge before and after playing game of "Kwace Adat Bali". The results showed that this game affects and increase the respondent's knowledge about Balinese traditional clothing.

The engagement rate in our research was calculated using Game Engagement Questionnaire (GEQ). A Game Engagement Questionnaire (GEQ) is used for a measure of engagement in playing a game using likert scale [26][27][28]. There two tests to compare the engagement rate between the use of DGBL-ID method and the use of DGBL-ID Method is paired with Shuffle random algorithm using GEQ. The GEQ result is shown in Table 4.

Table 4. The Test Result when DGBL-ID Method is combined with Shuffle Random

Method	Engagement Rate	Deviation Standard
DGBL-ID	3.11	0.590
DGBL-ID+Shuffle Random	3.38	0.598

The GEQ result show that the engagement rate of DGBL-ID method is combined with Shuffle Random algorithm 0.27 higher than the engagement rate of DGBL-ID method. DGBL-ID method is combined with Shuffle Random algorithm can increase the engagement rate of 8.7%.

c. Improve Game Quality

In the DGBL-ID model, the game must be tested before the game launches. Tests have been done by alpha, beta, t-test methods, GEQ and no errors or problems were found related to the content and features contained in the game, so the conclusion was that the game was ready for launch.

5. Implementation and Evaluation

Implementation and evaluation phase basically there are two stages that need to be done, namely the launching and evaluation stage. This launching game is done by packing the application in the form of an *.apk file that is ready to be installed on the user's smartphone. There is no further evaluation and modification process because it stops at the packing process.

4. Conclusion

The proposed method is DGBL-ID method combined with the random shuffle algorithm can be implemented for develop game. Alpha testing result shows that overall the functional game is running well and in accordance with the design. Beta testing result shows that this game can be accepted by the user. T-test shows that there was an enhancement in respondent's knowledge after playing a game. The GEQ result shows the engagement rate of the proposed method that is DGBL-ID method is combined with the Shuffle Random algorithm higher than the engagement rate of DGBL-ID method.

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