Ngabatik: Application Interactive Games to Learn About Design Batik Ngawi Based Android Through The Application of STEAM Learning Model

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Abstract. Batik is one of the cultural heritages that have been established by UNESCO as a Cultural Heritage Humanity's Oral and Non-material (Masterpieces of the Oral and Intangible Heritage of Humanity) since October 2009. Art Batik is the art over the cloths to clothe the beginning only used by the family empires only. The advancement of science in the field of information and communication technology, especially the use of handheld devices Android smartphone has changed the perspective and lifestyle in carrying out daily activities. This impacted on the traditional arts activities. The less the interest of the public to learn or just know about the background of this application that combines the advancement of science in the field of technology to load content such as batik, especially in Ngawi Regency so that people can preserve it.. This application is made into a games interactive education format mockup use software Marvell and is designed to run on devices with operating systems Android and if the teacher want to explain with the students, the teachers can use STEAM learning model.

1. Background

Batik is the art of drawing on cloth for clothes made with resist techniques using wax material. The word batik comes from the Javanese language which means writing. Batik technique has been known since thousands of years ago. There is no clear historical information about the origin of batik. Some suspect that this technique originated from the Sumerians, then developed in Java after being brought by Indian traders. Batik, batic, bathik, battik, batique and batek and batix are other names for batik cloth. Currently batik can be found in many countries such as Indonesia, Malaysia, Thailand, India, Sri Lanka and Iran. Apart from Asia, batik is also very popular in several countries on the African continent. However, batik which is very famous in the world is batik which originated from Indonesia. [1]

Every region in Indonesia has a different style of batik due to the influence of local culture. The batik patterns in Central Java, such as Solo, Yogyakarta and Pekalongan, are mostly floral with tight grooves in dark colors such as black or dark brown, in contrast to the batik patterns in Madura, especially Sumenep, which combine flora and fauna with a predominance of red. [2]

One of the districts that has batik art is Ngawi Regency. Ngawi Regency has started to reactivate the art of batik to preserve the typical motifs passed down from generation to generation from their nearly extinct ancestors. These motifs characterize the natural and socio-cultural conditions that occur in Ngawi
Regency, including bamboo motifs, rice motifs, teak tree motifs, ancient human motifs, kali tumpuk motifs and there are still many motifs that continue to be developed by the community or have not been explored for further exploration. [3]

The public at this time did not really know about batik in Indonesia. Batik is an Indonesian heritage that has been recognized by UNESCO, but there are many limitations in the introduction of batik in Indonesian areas. The introduction of batik motifs at this time can only be seen by visiting museums or by organizing batik galleries. Batik galleries can function as exhibition venues or can function as places to trade batik. However, there are limitations in organizing batik galleries, namely requiring space availability and having to bring in batik cloth, which is often old so it is vulnerable to damage. [4]

Currently, there are several applications about Batik that have been developed commercially or based on academic scientific research such as Final Projects, Thesis, Journals, and so on. In addition to the main features of getting to know the types of batik in Ngawi Regency, there are also several additional features offered to make it easier for users to learn various kinds of batik motifs and how to make them. [5]

Many efforts have been conducted by the government to meet the 21st century. Education One effort was to make changes to the national curriculum, curriculum 2013 (k13) based on learning the 21st century. In 2013, curriculum demands every competence includes three, domain namely, knowledge, attitude, and skill. Curriculum 2013 also realize the balance and continuity between hard and soft skills. Thus, on learning by will appear values expected character.

Values this character emerge if teachers can explore the ability of students to invite them to actively participate in learning, creative, draw innovative, and the trending learning. 21st century learning that prepare with three aspect, there are: (1) skill learned and innovation; (2), information, media and technology and (3) life skills and to have a career.

Skill thought to be controlled by students in education in the 21st century, creative, critical thinking, problem solving and decision-making. In a labored manner or capacity for work on global world and digital are the progress should be able to communicate and collaborate, either by individuals and communities and network of. Students should be able to control tools and technology to work.

STEAM is an approach to learning interdisciplines which blends of science, technology, engineering, art, and mathematics. The fifth fields has been one of education approach comprehensively as a pattern problem solving through 21st century learning experience.

Comprehensively as a pattern of solving problems through the 21st century learning experience. STEAM is one of learning cooperative as part of learning, constructivism where students will build knowledge and concepts itself through project. Given the projects require students to understand the material that is being learned as, sciences use technology developing to help locate concept. And the result is expressed with regard to ethical and aesthetic, as art and showing material forms.

Application of interactive games to learn to make batik have been created quite a lot, but from the many games that already exist, not all of them present a choice of games and learning to draw and information on the types of batik. Most of them only present one option, namely learning to make batik or just getting to know batik in general. Here are some applications that provide learning to write letters by following a pattern, including Ayo Mbatik [6], Educational Game Come on to Make Batik [7], and Learning to Know Interactive Batik [8].

2. Research Methods
The application of the game to introduce the history and types of batik in Ngawi district is named "NgaBatik". This NgaBatik application is a game application to introduce how to make batik and information about the history and types of batik in Ngawi district. In this application there is a menu of materials covering the history of batik, types of batik, how to make batik cloth, and learning quizzes. There is also a batik game as an interactive means of learning to make batik cloth.
2.1. Overview of the System

The working principle of the system in general this application is that users can access games and learning materials about Batik in the system. When the system is running, the user will see the initial appearance of the Ngabatik game, where the user can select several available menus such as entering the game menu, content and Ngabatik game settings. An overview of the application can be seen in Figure 1.

![Figure 1. Overview of the System](image)

2.2. System Design

In designing this Ngabatik game application, the author uses the UML system modeling design or Unified Modeling Language as a medium to convey the design of the learning game system. The UML design that will be used is Use Case and Activity Diagram.

2.2.1. UML Use Case

Each use case has a different workflow. Plot every work use case described as follows:

a. **Use Case Menu Utama**

The initial menu in this Ngabatik game consists of four menus (activity), namely the menu Play where users play several games, namely, Batik, Quiz, and Puzzle Batik motif. Menu Learn in which there is information about the history of batik, motifs, and types of batik. In the Settings menu, users can set the background sound for the application. Then exit to exit the application.

b. **Use Case Play**

On the menu Play, The system will display a batik game menu page which consists of three batik motifs with different difficulty levels. After choosing a batik motif, the user will be faced with three stages of making batik. Starting from drawing patterns, thickening, and coloring fabrics.

c. **Use Case Learn**

Menu Learn consists of several activity namely the History of Batik which presents information from the history of Batik in the archipelago. How to make batik shows the tools and materials as well as the steps in making batik. Types of Batik provide information about the types of batik available. The last one is Getting to Know Batik, which is tracing batik motifs in Ngawi Regency.

Here is a diagram Use Case of the Ngabatik application shown in Figure 2.
2.3. **Activity Diagram**

Activity diagram serves to describe the flow of actor activity in the system being designed, how the flow starts, the branching that occurs and where the flow ends. The activity diagram can also describe parallel processes that might occur in the system as follows:

2.3.1. **Activity diagram**

Activity The main menu will display several menus that can be selected by the user as shown in Figure 3.

![Figure 3. Main menu activity](image)

2.3.2. **Activity diagram menu Play**

Activity Menu diagram Play describes the process of activities that occur in the menu process games, activities carried out by the player, namely selecting the Play menu, then the system will display three game options, namely Batik, Puzzle, and Quiz. For example, if the user enters the Batik menu, the user will get a choice of batik motifs that can be drawn, at this stage if the player has chosen a motif, the activity will continue to the pattern drawing stage. Activity The Cultural Info diagram illustrates the process of viewing the Cultural Info Menu. The diagram can be seen in Figure 4.

![Figure 4. Menu activities Play](image)
2.3.3. Activity diagram Learn

Menu Learn contains the entire material in this application, consisting of four submenus starting from the History of Batik, How to Make Batik, Types of Batik and Getting to Know Batik where users can see the diversity of batik motifs in Ngawi Regency. Activity diagram from the menu Learn as seen in Figure 5.

![Figure 5. Menu activities Learn](image)

2.3.4. Info Menu Activity

The Info page contains developer information for the game Ngabatik. Info menu activity diagram as shown in Figure 6

![Figure 6. Info menu activity](image)

2.3.5. Menu Activity Setting

The Settings page has a button to adjust the volume of the background music. The activity diagram of the Settings menu is shown in Figure 7.

![Figure 7. Menu activity Setting](image)
2.4. System Interface Design

Before making this application, an interface design is made first. Interface design is useful for creating an overview of the application display that will be seen by the user.

The display on the main page of the Ngabatik game application contains several buttons such as buttons Play, Learn, Setting, Exit as well as buttons Credit. The interface of the Ngabatik game main menu page is shown in Figure 8.

![Figure 8. Display Main Application Page](image)

2.5. Testing

In designing the Ngabatik application test, several points need to be tested when the application is released. The following points will be tested.

2.5.1. Material Test

The menu test is a test to see whether the material displayed is in accordance with the history and batik motifs in Ngawi Regency.

2.5.2. Media Test

Tests are carried out to check whether all available buttons on the game function as intended. In addition to the buttons that appear on the game, test the physical buttons on the device Android will also be done to prevent malfunction when these buttons are pressed.

2.5.3. Feasibility Test on Learners and Learning Practitioners

Feasibility testing of students and learning practitioners is carried out to see whether this application is feasible if it is used as a learning medium or not.

3. Results and Discussion

3.1. Functionality Testing Results

Based on the system functionality testing that has been carried out, the results are shown in Table 1.
Table 1. Result Testing Fungsional

| No. | Testing                                      | Status |
|-----|----------------------------------------------|--------|
| 1   | Install the program on Android phone         | OK     |
| 2   | Program execution                            | OK     |
| 3   | Enter the menu view Main                     | OK     |
| 4   | Sign in display OK                           | OK     |
| 5   | Enter on display Batik game                  | OK     |
| 6   | Enter view select Bazzle game level          | OK     |
| 7   | Enter on display Quiz game                  | OK     |
| 8   | Enter the Learn menu option                  | OK     |
| 9   | Enter the menu How to Make Batik             | OK     |
| 10  | View Type information Batik                  | OK     |
| 11  | Enter the Settings menu                      | OK     |
| 12  | View the Info menu                           | OK     |
| 13  | Exit application                             | OK     |

Based on Table 1, it can be concluded that all aspects of functionality are in games Ngabatik has functioned properly and in accordance with the system design.

3.2. System Implementation

Functional testing aims to find out games can run well on the device android.

3.2.1. Main Page Display

The display on the main page of the Ngabatik game application contains several buttons such as the Learning button, Gallery, Virtual Batik, Quiz, practice questions and playing puzzle. In addition, there are also the main characters of the game Ngabatik. The interface of the Ngabatik game main menu page is shown in Figure 9.
3.2.2. Select Games Page

On the Learning menu page, there are several features that can be selected by the user. Figure 10 is a feature select page interface. On this page there are five features such as the History of Batik, Types of Batik, Batik Motifs in Ngawi, Tools and Materials, as well as batik tutorial videos.
3.2.3. Batik Motif Gallery page

In Batik Motif Gallery displays there are 9 batik motifs in Ngawi Regency. Figure 11 The display selects the motive that will be seen its meaning. After the motif is selected, the next step is to read the meaning and also the name of each motif. Figure 12

![Figure 11. Display of Batik Motif Gallery Page](image1)

![Figure 12. Display of Batik Motif Name and the Meaning](image2)
3.2.4. Display of Virtual Batik Design

On the Virtual Batik Page, a blank canvas is provided and later users can use it as a place to draw and color motifs. Batik virtually, the initial display is not full layer, and if the user wants to use the full screen, the canvas will adjust the inch of each user. Figure 12

![Figure 12. Display of Virtual Batik Design](image)

3.2.5. Display of Quizzes and Exercises on Batik

On the Quiz and Exercise page about Batik, there are questions about history, tools, and materials, as well as the types of batik motifs, especially in Ngawi Regency. Quizzes and Question Exercises are made so that users can better understand the material in this application. Figure 13

![Figure 13. Display of Quizzes and Exercises on Batik](image)
3.2.6. *Display of Batik Motif Puzzle*

On the Batik Motif Puzzle page, there are 9 choices of motifs. Figure 14. After the user selects one of the motifs, the pieces of the motif will appear and later the user is asked to combine the pieces into a complete motif. Figure 15.

![Figure 14. Display of Batik Motif Puzzle](image1)

![Figure 15. Display of Batik Motif Puzzle Pieces](image2)
3.2.7. Display Menu Page

On the Menu page, there are options for features, settings, about applications, developer contacts, social media updates, and app rating. Figure 16

![Display Menu Page](image)

**Figure 16.** Display Menu Page

3.3. Hasil Pengujian Tingkat Kepuasan Pengguna

To be able to find out the level of user satisfaction, a trial will be carried out directly by the user. The following are some aspects that are taken into consideration for the level of user satisfaction which can be seen in Table 2.

| Kode | Aspek | Description |
|------|-------|-------------|
| A    | Is the delivery of material in this media packaged in an attractive manner? |
| B    | Is the delivery of material in this media clear? |
| C    | Is hint use delivered clearly? |
| D    | Does this medium encourage your curiosity? |
| E    | Does this media add to your insight about Batik Ngawi? |
Table 3. Assessment Indicator

| Indicator     | Score |
|---------------|-------|
| Disagree      | 1     |
| Disagree less | 2     |
| Enough        | 3     |
| Agree         | 4     |
| Strongly agree| 5     |

Table 4. User Satisfaction Indicator

| Percentage      | Information       |
|-----------------|-------------------|
| 81-100%         | Very satisfied    |
| 61-80%          | Satisfied         |
| 41-60%          | Quite satisfied   |
| 21-40%          | Less satisfied    |
| 0-20%           | Not satisfied     |

Based on measuring the level of user satisfaction using the questionnaire method given to 10 respondents,

The maximum number of assessment indicators = 100. The number of respondents who filled out the questionnaire = 10. The maximum total value = 100 x 10 = 1000

Percentage of Usage (%)

\[
\frac{\text{Total Nilai Responden}}{\text{Total Kepuasan Maksimal}} \times 100 \%
\]

\[
\frac{809}{1000} \times 100 \% = 80.9\%
\]

Based on the results of measuring the level of user satisfaction, it can be concluded that the user is very satisfied with Game Interactive education on learning batik "Ngabatik" with a satisfaction percentage of 80.9%.

4. Conclusion

The Ngabatik game application “Ngawi Batik” has been successfully developed and tested on three devices Android with different results all functions can run properly. The results of user satisfaction using a questionnaire show a user satisfaction level of 80.9% which means the application is very satisfying in the eyes of its users. Suggestions for developing game applications can be developed with the addition of a more complete library feature, including information on batik in Ngawi Regency.

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