



Javanese Batik as the Development of Android-Based Interactive Learning Media

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Abstract. This research aims at producing an android-based as the basis for developing mathematics teaching materials in culture called ethnomathematics. The method used in this research is development research or commonly known as Research and Development using the ADDIE approach (Analysis, Design, Development, Implementation and Evaluation). This research was carried out only at the stage of development, currently the research is still on progressing to the next step which are implementation and evaluation. The research was taken place on Java Island with three major provinces, namely West Java, Central Java, and East Java using a multistage random sampling technique, representative, areas were taken as research sample. The result of this research was the development of an android-based application using ethnomathematical element of Javanese batik. The research stages have been neglected, namely needs analysis and ethnomathematical analysis of batik at the research location, and designing the screen display, material content that needed to be included in the application as the material for the application made. The next step is for the team to implement and evaluate that applications that have been made.

Keywords: Javanese batik · ethnomathematics · interactive learning media · android application

1 Introduction

Batik as the cultural heritage recognized by UNESCO is a pride for Indonesian. The existing culture needs to be preserved and developed in various ways so that it can continue to be passed on to future generations. One way that is quite effective in preserving batik culture is by inserting it into learning at various levels of education from early childhood, elementary school, middle school and college [1].

An appropriate material can be the use of batik as a medium of learning, especially in mathematics. Ethnomathematics is an element of mathematics found in culture [2]. Culture in mathematics cannot be separated from the custom of the people who have long understood mathematics but without realizing it, for example, is the unit of measure for land area in Tasikmalaya, using brick, as well as the habit of people counting good days in marriage, building houses and others. Mathematics is inherent in society, including batik, which is combination of various kinds of flat geometries from mathematics [2].

There have been many studies developing mathematics learning media with an ethnomathematical approach. The use of ethnomathematical-based geometry learning media [3]. Ethnomathematics of the Rajapolah woven craftsman community, Tasikmalaya Regency [4]. Ethnomathematics-based mathematics learning through traditional engklek games [5]. Ngabatik: an android-based ngawi batik motif recognition application [6]. Based previous research, there is a novelty in this research, namely in the form of batik which is the material for batik on the island of java so that the database presented is more extensive. Comparison of one batik motif with other batik will be clearly seen. The geometrical mathematics material presented is easy for students to understand. This research is important considering that there are still not many mathematics learning application that integrated culture with mathematics, so it needs to be developed in order to preserve the nation's culture.

2 Methods

This research activity applies the development method with the ADDIE approach (Analysis, Design, Development, Implementation and Evaluation) [8]. The analysis required is to know about batik found on the island of java in the provinces of West Java, Central Java and East Java (Fig. 1).

The first identification was done by filtering the various existing batik motifs which do not. Furthermore, on each batik motif, a mapping of the similarity of the motif with element of mathematical geometry and various properties of the flat wake operation was carried out in mathematics. In addition, identifying, these elements, the history, meaning, and position of existing batik motifs was also carried out as part of preserving batik culture. The second analysis was to analyze the needs of mathematics learning media in schools in each province. The second stage was to design the display layer on the android application and the third stage was the development stage by inputting data on the design that had been made. This research had only reached the development stage

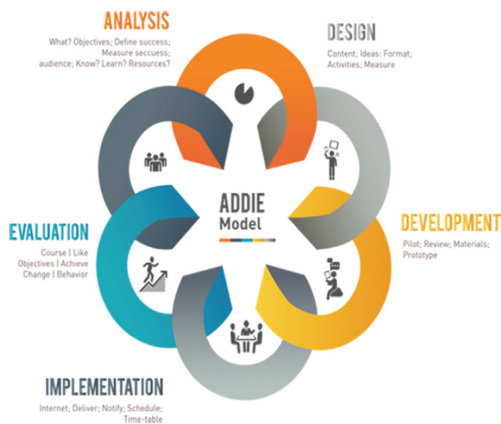


Fig. 1. Model RnD ADDIE. Sumber: <https://kloudlearn.medium.com/overview-of-the-addie-model-in-instructional-design-300cce7fc8ea>

and consulted with expert to carry out expert validation. Validation was carried out by three experts, namely material, ethnomathematics, and design. The next step will be the implementation and evaluation of the result of the learning media development that have been carried out.

3 Result and Discussion

The findings of this research are in the form of identification of students' needs for interesting learning media using local wisdom as its development. Based on data taken from elementary schools in the provinces of West Java, Central Java and East Java, it is seen that there are many teachers and students who do not know what ethnomathematics is and how to apply local culture-based mathematics learning as a medium for developing mathematics learning media in particular. The interest of elementary school teachers at ethnomathematics and how to implement culture as a learning medium through android-based information and communication technology available on smartphones and tablets, hence it is hoped that later this learning media can be useful for students, teachers and parents to provide a learning experience in mathematics through cultural integration packed with technology. These three elements can make it easier for teachers to provide education not only from the cognitive perspective of students, even more than that it can provide character education for students to love their homeland and be proud of Indonesian nation that has a cultural heritage that can be recognized and preserved to the younger generation.

One of the local cultural wisdoms that is full of character education values is the art of batik [9]. Learning activities using batik motifs as a means of learning media have been carried out quite successfully in previous studies. The development of an e-mathematical module that integrates Adi Purwo's Batik motif which aims to develop an appropriate learning media to be used in learning mathematics on geometry transformation material for junior high school students [10]. Various batik motifs are used as a medium for learning mathematics. Pekalongan batik has decorative motifs that are not much different from other batiks that use stylized motifs of plants and animals [11]. Ngawi batik has a variety of motifs, some are natural, historical, regional and others. Each pattern has several motifs, for example, natural style Ngawi batik consists of jamus shoot tea motifs, roses and butterflies, bamboo, teak leaves, melon, and many more [12]. There are also those who make batik applications to recognize batik motifs. The Ngabatik application is a digital batik motif recognition application that requires an internet connection [6]. This is done as an effort to provide something new for the world of education, especially mathematics, that there is an integration of batik art and culture with mathematics which cannot be separated from everyday life. Students begin to understand a mathematical concept in their daily life in the form of cultural activities that involve learning mathematics. The fact that occurs in schools is that most teachers are still unable to relate mathematics subjects to the existing local culture [7]. In this learning media, the ethnomathematical approach that adopted is the concept of geometric transformation found in Besurek Bengkulu Fabric and Ciamis Batik Fabric through triangulation from various sources, namely documents, society, and academics. There is numbers of research related to batik as a learning medium, the focus of the research

results in this research is the creation of an android application that can make it easier for students to learn mathematics, especially on flat geometry material and its properties as an effort to bridge students' mathematical knowledge with batik which is a cultural heritage that has been recognized by UNESCO from Indonesia.

Next, the stages of Flowchart and Pseudocode design are carried out for ethnomathematical applications on Android smartphones as learning media. The desired goal of this stage is to compare data in an easy and variable form so that the relationships that exist in it can be studied and tested to make it easier for programmers to implement onto Android. Based on the design that has been made, further development is carried out using Android Studio. To make it easier to give an overview of the screen display of the android application, it will be seen in some of the images below which are shown in Fig. 2 with explanations.

It is seen in Fig. 2, the Splash Screen page is the initial page that will appear when the application is run. This view consists of an image and a loading run that fills the circle after 3 s. Main Menu Page is a display of the application's main menu. In this view, the main menu opens, go together with back sound music, with several menus having different functions.

Figure 3 shows the regional origin of each batik motif. Batik Material Page When the user clicks the menu button for West Java, Central Java and East Java, the application will display several sub menus of various motifs in those areas. The number of buttons in each region is different, depending on the variety of batik motifs in that region. Then, the back button is used to return to the main menu page.

It can be seen in Fig. 4 and 5 each sub menu of batik motifs, history, ethnomathematical elements and practice questions. Motive Material Page, when the user clicks the Motif button, it will display several sub menu buttons, namely history, ethnomathematics and sample questions. The back button is used to return to the previous menu page. History page, when the user clicks the history sub menu button on the motif menu, it will display information about the history of the formation of batik for that motif. The back button is used to return to the previous menu page. Ethnomathematics page, when the user clicks the ethnomathematics sub menu button on the motif menu, it will display information about the ethnomathematical elements contained in the batik motif.

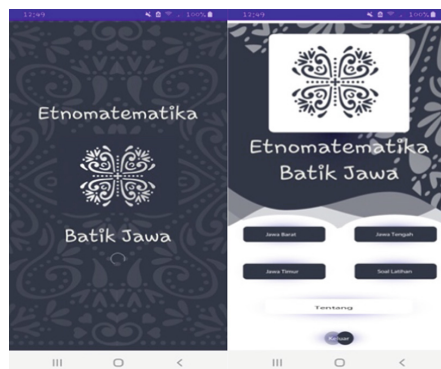


Fig. 2. Splash screen and home

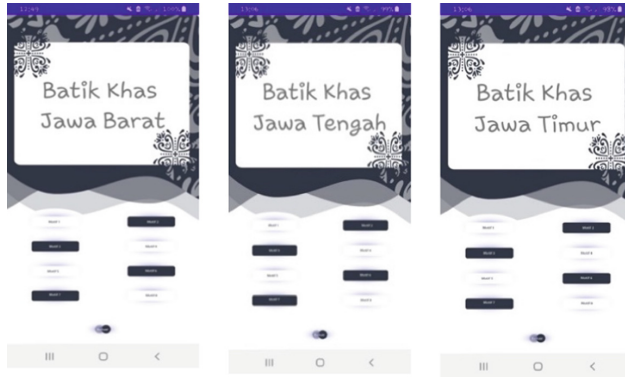


Fig. 3. The display of each batik motif origin

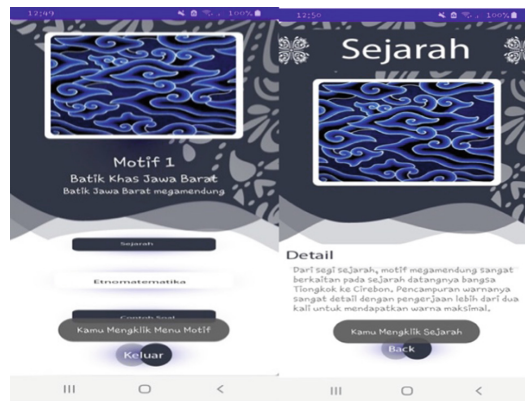


Fig. 4. Screen display of batik motif, history

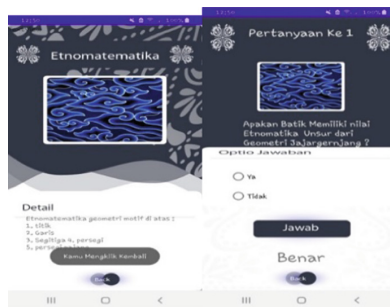


Fig. 5. Screen display of ethnomathematical element, and practice question

The back button is used to return to the previous menu page. Practice Questions page, when the user clicks the practice questions sub menu button on the motif menu, it will



Fig. 6. About application display

display math questions and answer options for the question, then the user can answer the questions on the next button, then the correct/false answers will automatically appear based on the user's answers. The back button is used to return to the previous menu page.

Figure 6 is a display of about application and the name of the author. The about page on the main menu displays an explanation of the application and there is a logo for the application. The back button is used to return to the main menu page.

Above figures are the screen displays of the android application developed by the author. Currently the research is still ongoing with the next plan agenda is validation from material experts, ethnomathematics experts and learning media design experts in the near future. After receiving inputs from the experts as validators, the activities carried out are implementation by conducting limited trials and seeing how the response from users to make improvements back from the results of limited trials. Next, a large-scale trial to test the application product developed is feasible or not to be used as a learning medium by conducting an evaluation.

4 Conclusion

Based on the results and, it can be concluded that this application is still in the development process, so it is not yet certain whether or not this application is used as a learning medium. The next step that the research team took is to carry out expert validation, implementation and evaluation so that it is hoped that the results of this research will be useful for students, teachers and parents as an Android-based mathematics learning medium with an ethnomathematical approach.

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