Designing Android Based Education Game Aksara Jawa Using Shuffle Random Algorithm

Nugroho Dwi Saputro¹, Triana Romadhani², Febrian Murti Dewanto³
¹²³Faculty of Engineering and Informatics, Universitas PGRI Semarang, Jl. Sidodadi-Timur No.24 Semarang, Central Java 50232, Indonesia
nugputra@upgris.ac.id

Abstract. The lack of appropriate supporting media in learning at the age of children makes the young generation now less familiar and still having difficulty learning Javanese script (Aksara Jawa called in indonesian). For this reason, we need appropriate media in the introduction of Javanese script, one of which is through interesting educational games and can provide information about Javanese script. Games are forms of application that can be used as learning media where the process can be done with the concept of learning while playing for children. In this study the algorithm used was the Shuffle Random Algorithm. With this randomization algorithm, it is expected to avoid repetition of the problem so that the learning process can run effectively. Furthermore, this application was tested using the Black Box, White Box and User Acceptance Test. With the Black Box and White Box testing get a percentage of 100% while with the User Acceptance Test this application has an average of 86%, so it can be concluded that this educational game is feasible to be used as a learning medium for Javanese script.

1. Introduction
The majority of Javanese literacy learning is delivered using the lecture method. The use of instructional media is very minimal, there is still a lack of attractive, interactive and modern Javanese language learning media that are able to attract students' interest in learning Javanese script. To motivate students, it is necessary to apply the development of instructional media that can attract interest and foster enthusiasm of students in learning Javanese script or aksara Jawa. With an interesting learning process, material that is considered difficult can be delivered more easily, can be well received by students [1]. With the development of technology, Javanese script or aksara Jawa learning can be applied in the form of educational games. Multiple choice questions can be made randomly, or question can change. The random method is carried out using the Random Shuffle Algorithm which is applied to educational games in Javanese script. There are various shuffling algorithms to provide randomization techniques on the problem so that the questions that come out will be different and can be generated without repetition or duplication. Random shuffle algorithm is randomization of the index order of a record or array [2]. the author will create an Android-based Java alphabet learning application which in a multiple-choice problem applies the random shuffle algorithm. Later this application is intended for students in grades 3 through 6 with learning material that has been adapted to the curriculum.
2. Methods

2.1. Unified Modeling Language

In the development of the system the author uses the prototyping method. This method performs system development using an approach to create programs quickly and gradually so that it can be evaluated directly by the user. This prototyping method has the advantage that the user can find out the suitability of the resulting application without having to wait until the application is implemented. This type of research and development was chosen because it is very appropriate to develop an educational game. The prototyping method has several stages, namely the analysis phase, the system design stage, the prototyping evaluation stage, the implementation phase and the system testing stage [3]. The system design that was built to present the process modeling is to use the Unified Modeling Language (UML). The design stages in the Javanese script educational game design use use case diagrams, sequence diagrams and activity diagrams [4].

Use Case design of the Javanese alphabet educational game illustrates the user interface between the user and the application. Use Case diagram of Javanese alphabet educational game as follows:

![Figure 1. Use case](image)

Class diagrams or class diagrams illustrate the structure of the system in terms of defining the classes created to build the system. Class diagram shows the relationship between classes in the system how they collaborate with each other in achieving goals. In this application the class structure helps in the visualization of a system and is the most widely used diagram type. Class diagram shows the relationship between classes and detailed explanation of each class that contains objects and attributes.

![Figure 2. Class diagram](image)
2.2. Random shuffle algorithm

Random shuffle algorithm is randomization of the index order of a record or array. This randomization is like someone shuffling cards, all cards are shuffled so that the order will be shuffled. Another example for example A is array 5 x 1, A = [1 2 3 4 5] then the random shuffle process will randomize the index array from array A to A1 = [5 1 3 2 4] or become another array arrangement. In the programming language the random shuffle function can not only randomize numbers, but can also randomize string arrays or a mixture of strings and numbers [5].

Another example is if we have 10 numbers in the list, with random techniques, we will get random numbers from these 10 numbers. To get numbers randomly from the list. Shuffle is a method of the Collections class. The shuffle method is used to randomize the contents of a list, so when we call data on a List with a certain No Index, the data that will appear is random. Change the Statement in the getData () method to be like this:

```java
void getData(ArrayList<Integer> data){
    Collections.shuffle(data);
    System.out.println("Got number: "+data.get(0));
}
```

![Figure 3 Code for randoming question](image1)

The user interface in the aksara Java educational game application illustrates the structure, appearance of image placement and placement of buttons that the user uses to interact with the software. Design and build Javanese alphabet educational game using Android Studio for application programming, then use Corel Draw for making background images and icon images.

![Figure 4 User interface Aksara Java application](image2)
3. Results and discussion
3.1. User Acceptance Test
An Android-based Java Script Educational Game with randomized Shuffle Algorithm has gone through the User Acceptance Test process which was conducted on 4 respondents taken from users and principals with 3 testing areas, namely: usefulness, Ease of Use, and format.

3.1.1. Usefulness
The benefits of the educational game of Javanese script are taken in terms of productivity, performance, effectiveness, and usability aspects. From this field, there are two questions, namely in terms of productivity and effectiveness, the percentage value is only 82.9%, which has not reached a score of 85%, because there are still a number of respondents who still feel that the Javanese alphabet education game is not very productive and less effective. In terms of productivity the educational game of Javanese script still cannot replace the conventional Javanese script completely, and for the effectiveness of this game it has not been tested, and must be tested further.

| Respondent | Question & Score |
|------------|------------------|
|            | 1    | 2    | 3    | 4    |
| 1          | 3    | 3    | 3    | 4    |
| 2          | 3    | 3    | 3    | 4    |
| 3          | 3    | 3    | 4    | 4    |
| 4          | 3    | 3    | 3    | 4    |
| Sum        | 12   | 12   | 13   | 16   |
| Percentage | 75%  | 75%  | 81,25% | 100% |

3.1.2. Ease of Use
The use field for User Acceptance Test there are 4 questions that will be answered by 4 respondents with 4 weight choices in each question. The field of use has two analyses whose percentage value has reached 87.5%. Respondents felt that this Javanese alphabet educational game made it easier for users to learn Javanese alphabet, because the Javanese alphabet educational game made users to hear, remember, memorize and write. This educational game also has features to correct answers to wrong questions, there are sound effects and values that have been displayed.

| Respondent | Question & Score |
|------------|------------------|
|            | 1    | 2    | 3    | 4    |
| 1          | 4    | 4    | 4    | 3    |
| 2          | 3    | 4    | 3    | 3    |
| 3          | 3    | 4    | 3    | 3    |
| 4          | 3    | 4    | 4    | 4    |
| Sum        | 13   | 16   | 14   | 13   |
| Percentage | 81,25% | 100% | 87,5% | 81,25% |

3.1.3. Form
The form field for testing Java Javanese educational game contains 2 questions namely about the presentation of output and information content on Javanese literary educational games. Analysis of the User Acceptance Test testing from the form field gets satisfactory results from the two questions given to the six respondents. Based on the User Acceptance Test conducted on 4 respondents taken from Users and Principals it can be concluded that the Javanese script educational game has an average percentage of 87.5%, then the Javanese alphabet educational game is satisfying in the field of expediency, ease of ease and form.
3.2. Black Box Testing

Based on the results of the questionnaire suitability of navigation and content, it can be seen that the assessment of the appearance of each component of the Javanese alphabet educational game in accordance with the function and appearance generated has been adjusted to the user, as well as in terms of content or material that is deemed sufficient, because the educational game is only in use for children 3-6 Elementary School. Testing of Javanese alphabet educational game using the Black Box Testing method, which gets 100% calculation results from three people in accordance with their respective test fields as well as one random user. So, the Javanese alphabet educational game meets the design goals, so this educational game is fit for use.

3.3. White Box Testing

Based on the white box test results from the calculation results of the cyclomatic complexity of the random shuffle algorithm produced is 2. Because the value is less than 10, it means that it is included in an algorithm that is not complex and meets software engineering criteria. Based on these results it can be concluded that this application passed the white box test.

4. Conclusion

Android-based Javanese alphabet educational game application using the Random Shuffle Algorithm as a learning media development is feasible to use. By testing Black Box and White Box, the percentage is 100%. Based on the User Acceptance Test this application has a good average of 86%.

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