



Implementation of Fisher Yates Shuffle Algorithm In Making Learning Animations

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ABSTRACT

English is a foreign language that is difficult for most Indonesian children to learn because the pronunciation is different from the language in which it is written. English is an international language used by various countries in the world. This makes it important to introduce English to children from an early age. The basic English that can be learned by children is the introduction of the pronunciation of the alphabet and numbers and general vocabulary in English. One way of learning that can be adjusted according to the level of children's development so that it is interesting and not easily bored is using learning animations. Animated learning is one of the interactive multimedia-based learning media whose use involves interaction with users so that it can increase the involvement of students in the learning process and can improve the results of learning objectives. The implementation of the fisher yates shuffles algorithm is used to randomize the order of the questions in the quiz practice so that the randomized questions will produce different permutations so that users will get unequal question sequences and it is not easy to remember the quiz answers from the given practice questions. The assessment of the feasibility test for this learning animation will be measured using a questionnaire.

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1. Introduction

Early recognition of English for young children is very important. English is a foreign language that is difficult for most Indonesian children to learn due to the structure of English as opposed to Indonesian and the way it is pronounced is different from the language of writing. As for how to teach English lessons at school still using conventional methods so that it makes children easily feel bored and not interested in learning it. According to Jean Piaget, children aged 7-12 years are at the stage of concrete operational development. At this stage, the child's thinking is holistic and concrete. The learning concept designed by Piaget is Developmentally Appropriate Practices (DAP), namely learning designs that must be adapted to the child's level of development [1]. One way of learning that can be adjusted to the level of children's development to learn the basics of English is by using interactive multimedia learning media or better known as learning animation. Multimedia is a way of delivering information or material that uses various types of learning materials that can form a unit or package [2]. Interactive multimedia is multimedia whose use involves interaction with users so that it can increase the involvement of students in the learning process and can improve the results of learning objectives [3]. Multimedia acts as an introduction or intermediary for messages from teachers to students. Khusna stated that increased motivation and learning completeness can be achieved through the use of multimedia [4]. According to research, Singgih states that the use of interactive multimedia appropriately can increase students' interest in learning in English [5]. The learning animation is designed using Adobe Flash CS3 software with the action script 2.0 programming language. In this learning animation, the fisher yates shuffle algorithm will be implemented. The algorithm is an algorithm to generate random permutations from a finite set [6]. According to Vinay Signh, the Fisher-Yates algorithm was chosen because this algorithm is a better randomization method or it can be said that it is suitable for randomizing numbers with fast execution time to perform randomization [7].



2. Method

This research belongs to the type of descriptive research. The purpose of this study was to analyze changes in student attractiveness in participating in teaching and learning activities using interactive multimedia-based learning with conventional teaching and learning activities. The method used is the multimedia development method which consists of six stages, namely concept, design, material collecting, assembly, testing, and distribution [8]. These six stages cannot change positions. The image of the stages of multimedia development can be described in a diagram like a Figure 1 as follows.

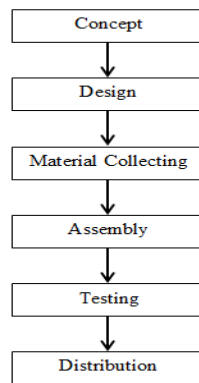


Fig 1. Stages of Multimedia Development

The stages of multimedia development can be described as follows:

1. Concept

At the drafting stage, the appropriate learning animation user target will be determined in advance. The learning animation is suitable for early childhood or elementary school children. This animation has the concept of introducing basic English through seeing while listening. Basic English that was introduced was about the pronunciation of the alphabet and numbers as well as general vocabulary in English. This learning animation has 4 menus, namely the alphabet menu, numbers menu, vocabulary menu, and quiz menu.

2. Design

At this design stage, a flowchart of the learning animation author wants to design will be displayed. The flowchart description that has been designed will be shown in the image below.

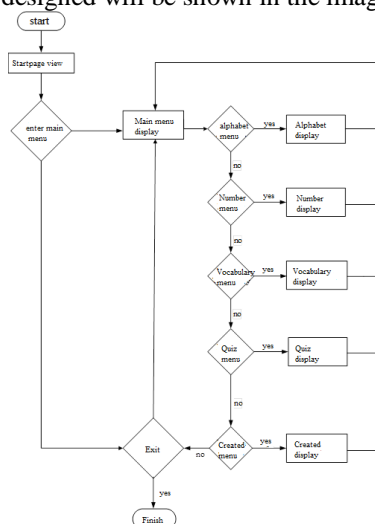


Fig 2. Flowchart of Learning Animation

3. Material Collecting

At the material collection stage, the stage of collecting the materials needed to create this learning animation will be carried out. The materials needed are images in png format, sound in wav format so that it can be imported into adobe flash CS 3 media.

4. Assembly

This stage is the stage for creating a learning animation which is the translation of the design stage into the form of a programming language to produce a learning animation.

5. Testing (Testing)

At this stage, the learning animation has been completed and a black box test will be carried out to check whether the module functions can run properly.

6. Distribution (distribution)

At this stage, the learning animation will be saved on *.exe type media so that it can be run on a computer or laptop directly without having to install Adobe Flash CS3 software first. This stage is also an evaluation stage to analyze the feasibility of the learning animation. The assessment of the feasibility test of this learning animation was carried out by providing a questionnaire. The contents of the questionnaire will be summarized in table 1 as follows.

Table 1.
Contents of the questionnaire

No.	Rated aspect	Indicator
1	Quality of content	Alphabet material is understood easily Number material is understood easily <i>Quiz</i> is interesting <i>Vocabulary</i> is understood easily The colors used are attractive Text on material is clear
2	Media display	Interesting animation Clear animation Clear voice/vocals
3	Engineering quality	Very happy to use animation Animation makes learning enthusiastic

The data that has been obtained from the questionnaire will be analyzed using the Likert scale formula as follows.

$$P = \frac{S}{ideal\ score} \times 100\% \quad (1)$$

Information:

P = percentage value sought

S = total frequency x score

Ideal score = total frequency x highest score

The percentage of results will be categorized in the feasibility percentage table as follows:

Table 2.
Animation Feasibility Test Percentage Scale

Score Percentage (%)	Information
0% - 20%	Very unfeasible
20.01% - 40%	Not feasible
40.01% - 60%	Feasible enough
60.01% - 80%	Feasible
80.01% - 100%	Very feasible

The percentage scale table above is used to determine the feasibility value of the created learning animation. This learning animation is also implemented by using the fisher yates shuffle algorithm which is used to randomize the sequence of practice test questions that are inputted into an array and called by using the ActionScript 2.0 programming language so that the randomized questions will produce different permutations and produce biased results. The randomization steps using the fisher yates shuffle algorithm are as follows:

1. Prepare input (in numeric or character form) as much as N.
2. Take a random number k between 1 and i in the number that are not considered randomized (crossed out).



3. Count from below, cross the number k that has not been crossed out and write that number in another place.
4. Repeat steps 2 and 3 until all numbers are crossed.
5. The sequence of numbers written elsewhere (3rd step) is a random permutation of the initial number.
For example, if there are 5 questions in the order of 1 2 3 4 5. Then the randomization process using the fisher yates shuffle algorithm is presented in Table 3.

Table 3.
Example of Randomization using the Fisher Yates Shuffle Algorithm

Step	Range	Roll	Scrath	Result
			1 2 3 4 5	
1	1-5	4	1 2 3 5	4
2	1-4	3	1 2 5	3 4
3	1-3	1	5 2	1 3 4
4	1-2	2	5	2 1 3 4
				5 2 1 3 4

Based on the table above, the process carried out by the algorithm are entering the question attribute into the scratch (a list of questions that have not been selected), then making a range (the number of questions that have not been selected) then the randomization process is carried out, then forming a roll (for a question selected from all the existing number of questions) and the results of the questions that have been selected are inputted into the results (the results of all questions that have been randomized). The resulted permutations are 5, 2, 1, 3, and 4.

3. Results and Analysis

The learning animation display that has been designed using the Adobe Flash CS3 software is as follows:

1. Home Page Menu



Fig 3. Home Page Menu

The design of this learning animation is colorful. It is designed to attract children's interest. On the home page, there is a welcome button that must be clicked to move to the next page.

2. Main Menu



Fig 4. Main Menu

On the main menu, there are several menu items including alphabet, number, vocabulary, quiz, created, and exit. The alphabet menu will contain alphabet learning in English, the number menu will contain number learning in English, the vocabulary menu will contain vocabularies commonly found in English, the quiz menu will contain practice questions, the created menu contains information on learning animation developers, and exit means getting out of the learning animation.

3. Alphabet Menu

The alphabet learning menu contains 26 upper and lower case alphabets. Children will learn by paying attention and listening. Alphabet letters will make a sound when clicked. The resulted sound is the pronunciation of the letters in English. To return to the main menu then click the menu button which has been provided. The display image of the alphabet menu is shown in Figure 5 below.



Fig 5. Alphabet Learning Menu

4. Number Menu



Fig 6. Number Learning Menu

The number learning menu contains 100 numbers starting from the numbers 1-100. The clicked number will produce the sound of the number pronounced in English. In the number menu, there is an option to return to the main menu or to the next page that contains the previous number continuation.

5. Vocabulary menu



Fig 7. Vocabulary Learning Menu

The vocabulary menu will contain common vocabularies that are often found. As for the vocabulary menu, children are taught to recognize the object displayed and then listen to pronunciation in English. To display the next vocabulary, the next button can be clicked, and to return to the previous page the previous button can be clicked.

6. Quiz menu



Fig 8. Quiz Menu

In the quiz menu, quiz questions will be displayed to train the children's ability in remembering the English learning material that has been given previously. To go to the next question, the next button can be clicked, and to return to the main menu, the menu button can be clicked.

7. Created Menu



Fig 9. Developer Information Menu

On the created menu, it will contain information about the names of the learning animation developers. To return to the main menu, the menu button can be clicked. In the testing phase of the learning animation, testing has been carried out blackbox. The blackbox test results are shown in table 4 below:

Table 4.
Blackbox Testing

Test item	Test details	Expected results	Test result
Home Page Menu	Home Page	Get into the home page display menu	<input checked="" type="checkbox"/> successful <input type="checkbox"/> Not successful
Main Menu	Display Main Menu	If the <i>welcome</i> button is clicked, the main menu will appear	<input checked="" type="checkbox"/> successful <input type="checkbox"/> Not successful
Main Menu	Alphabet Menu	If it is clicked, an alphabet menu will appear	<input checked="" type="checkbox"/> successful <input type="checkbox"/> Not successful
Main Menu	Number Menu	If it is clicked, the number menu will appear	<input checked="" type="checkbox"/> successful <input type="checkbox"/> Not successful
Main Menu	Vocabulary Menu	If it is clicked, the vocabulary menu will appear	<input checked="" type="checkbox"/> successful <input type="checkbox"/> Not successful
Main Menu	Quiz Menu	If it is clicked, a quiz will appear	<input checked="" type="checkbox"/> successful <input type="checkbox"/> Not successful
Main course	Menu Created	If it is clicked, the learning animation development information will appear	<input checked="" type="checkbox"/> successful <input type="checkbox"/> Not successful

At the evaluation stage, all the data obtained are analyzed to determine the feasibility of the learning animation that has been made. The following is a table of the percentage results of the animation feasibility test:

Table 5. Percentage Results of the Animation Feasibility Test

No.	Aspect	Percentage	Category
1	Quality of content	88%	Very feasible
2	Media display	92%	Very feasible
3	Technical quality	96%	Very feasible

In the table above, the feasibility assessment of the learning animation that has been made is categorized as feasible to be used as a learning media for the introduction of basic English for children. This learning animation will be a .exe type so that it can be run on a computer or laptop directly without having to install Adobe Flash CS3 software.

4. Conclusion

Based on the results of research and discussion, the following conclusions can be drawn as follows:

1. This study produces a learning animation developed by using Adobe Flash CS3.
2. This learning animation is designed as attractive as possible to attract children's interest in introducing basic English.
3. This learning animation is expected to provide educational entertainment about the English language.
4. This learning animation is feasible to be used based on the results of the questionnaire data analysis and can be used as a means of supporting learning media.

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