3D Interactive Multimedia in English Language Learning

Endah Sudarmilah¹, Yunia Maharani Utami², Irma Yuliana³

¹Informatics Department, Universitas Muhammadiyah Surakarta, Surakarta, Indonesia
²Informatics Engineering Education, Universitas Muhammadiyah Surakarta

¹Endah.Sudarmilah@ums.ac.id, ²yuniamaharaniu@gmail.com, ³Irma.Yuliana@ums.ac.id

Abstract. Language has an important role in communicating. English is the most widely international language used in the world. Based on the results of observations made at Elementary School that the media used during the learning process are worksheets and textbooks, and it has not used learning media yet. This research aims to determine the feasibility of the media and the effect of using interactive learning media toward learning outcomes in English material. The method of this research used “Research and Development” with a development model ADDIE (Analysis-Design-Development-Implementation-Evaluation). This research uses design Matching pretest-posttest control group. The media validation is categorized as feasible with an average value of 79.37%. And the material content validation in the category is very feasible with an average value of 96.97%. The measurement of student learning outcomes is done by providing tests in the form of multiple choices. Based on the average value of learning outcomes control class are smaller than the experimental class that is 67.43 < 82.30. The statistical analysis used in this research is normality test, homogeneity test, hypothesis test, and n-gain test. Assessment of students are categorized as acceptable with an average value of 85%. The results of the data analysis were strengthened using the independent sample t test, with the value obtained sig = 0.451 < α = 0.05 then H0 is rejected and H1 is accepted. The n-gain test results obtained a value of 66.90 for the experimental class and the control class of 32.53. The result of this research is the use of learning media in which it has a greater influence than conventional methods and there are significant differences in the student learning outcomes.

Keywords: English language, learning media, elementary students.

1. Introduction
The rapid development of science and technology in this era are greatly needed in human life, particularly in science such as education. Technology is very influential in improving the quality of learning activity[1]. In the education stage for elementary school, students are more likely to be interested in the material presented in image, video, audio, and games within which there are more colorful display as well as interesting animation[2]–[5]. Inter-activity is the character of interactive learning multimedia program[6]. This inter-activity level determines as to what intense students’ involvement in operating the program [7], [8].

There are recently many school institutions holding foreign language competitions, one of them is English language. The competition can be, for example, speech contest, debate, singing, telling, and poetry. English language is an international one, and thus it’s not surprising if every education institution emphasizing the English language learning [9]. Children find it challenging to learn it as English is not their mother language to use in daily activities, therefore they are not used to either pronounce or listen English letter. Learning media consists of tools physically used to deliver learning
material content, comprising of book, tape recorder, movie, slide (frame image), photograph, chart, television, and computer [10].

Based on the description above, the researcher intended to create learning media based on interactive. There needs to develop an English learning media in the form of interactive one in term of My Uniform School. By the existence of media, it is hoped that it can facilitate the teachers to deliver material as well as improve students’ understanding in English language.

2. Method

This study employed Research and Development (R&D) method [11], [12]. It used Matching pretest posttest control group Design[13]. The model applied is ADDIE (Analysis, Design, Development, Implementation, and Evaluation) research development. There are five stages in ADDIE model: Analysis, Design, Development, Implementation, and Evaluation. The main objective of this development model is to design and develop an effective and efficient product [14]–[17]. ADDIE stages were shown in Figure 1 (a).

Subjects in this study were second grade students at elementary school in Surakarta, comprising of two classes. The study sample used one class that was consisting of 30 students. They were first treated with conventional method (lecture) as control class, and then they were given treatment with learning media as experiment class by using the same class.

The two classes being studied, namely either control class or experiment class was given pretest before learning was started to find out students’ early ability. The material delivery with conventional method was then submitted by lecture, question and answer, assignment, and discussion. While for the experiment class, it was used learning method as the material was submitted. The final learning stage was post-test exercise delivery for either control or experiment class to find out student’s study result.

Analysis stage: the researcher analyzed the problem behind the emergence of interactive multimedia development. Data collection was performed by observing students’ activities, interview with subject teachers and students. Analysis stage was divide into two, they are performance and need analysis.

Design stage was conducted by creating design and making use case as well as diagram activity that will be developed[18], [19]. Use case was shown in Figure 1(b). It is a diagram regarding interaction between user and media. User can operate several things in media, such as game menu, credit, help, setting to adjust volume and full screen, as well as material.

![Figure 1. (a) ADDIE Model (b) Use-Case Diagram](image)

Development, it includes developing learning media based on the already created design. As for the stages carried out by the researchers in developing learning media based on 3D are: 1) developing learning media using Unity 3D application. The media construction based on 3D is seen from material
and design face. 2) Performing validation for learning media by media and material expert team. 3) Improving learning media in accordance to the input provided by media and material expert.

Implementation stage: the media developed was then implemented to second grade students at elementary school in Surakarta by employing pretest posttest in measuring study result of control and experiment class.

Evaluation stage in media developed was performed by considering the students’ study result available in the media. It was then performed comparison toward students’ study result before using media. Initial data collection technique used in this study was observation and interview to the teachers to find out the learning process problem in class. Feasibility test stage [20], [21] and data collection effectiveness was performed by distributing questionnaire and giving pretest posttest problem to each class as well as documentation to strengthen research evidence. Product feasibility test used material, media, and problem validation test. Whereas to find out students’ study result, it was used normality test, homogeneity test, paired t test, independent t test, n-gain test, and independent n-gain test. Feasibility test employed equation 1.

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\text{Feasibility percentage} (\%) = \left( \frac{\text{Score obtained}}{\text{Maximum score}} \right) \times 100\% 
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Validity test: This stage was performed to find out whether pretest posttest problem number used for research can be considered as valid or not. Pretest problem was given before treatment, while posttest problem was given after treatment. Testing on this problem was listed in r table, in which it has 5% level of trust with r product moment was 0.178 taken from value distribution table. r table has 5% significance with number of subject N = 120. The validation result of 30 problems was stated as valid since r count > r table.

Reliability test was used to find out the measurement result accuracy level. The reliable study instrument would be able to result in reliable data. For multiple choice questions, the researchers performed reliability test using kuder-richardson (KR 21). The questions to be stated as valid were acquired from the value testing of instrument reliability by 0.783. Based on the reliability level determination, it could be concluded that exercise question was said as reliable if the criteria result was high. It could be concluded that question item used in this study was included in high level or category.

3. Results And Discussion
3.1. Media Creation Stage
3.1.1. Pre-Production Stage.
   a) Storyboard
   Storyboard is a preliminary design in creating a product. It used to illustrate communication plot for either image or text layout, and thus the functions already made can be described before coding.
   b) Designed Asset
   The object used in developing media was designed by employing CorelDraw and Asset available in Unity 3D, in which every object must represent the plot that had already been created in storyboard.

3.1.2. Production Stage.
   a) Media
   The first stage of media development production process is changing storyboard already designed into digital. The media creation employed Unity 3D engine.
   b) Dubbing and Music
   Dubbing was performed in order to grow media attractiveness. Conducting the music selection that matches with media theme to support the better media. Voice attachment into
the material was used to assist the students in remembering English vocabulary pronunciation easily.

On this stage, the final outcome is the user interface on the 3D interactive multimedia as shown in Figure 2.

![Figure 2. Scene of Education Media](image)

### 3.2. Result

Observation data about learning process in this study was the one obtained based on teachers’ observation result in elementary school in Surakarta observing condition while the learning process taking place. Control class used conventional method in delivering material obtained total pretest score of 53 with total post-test score of 67, while for experiment class, it was obtained pretest score of 50 and post-test score of 82.

The percentage for feasibility test of media expert in the efficiency aspect acquired average value of 79.17%, display aspect obtained average value of 79.17%, technical aspect obtained average value of 80%, and software aspect obtained average value of 79.17%. Total of aspect assessment on media expert feasibility test could conclude that three respondents provided the similar value on learning aspect by 95.83%; whereas for content aspect, respondent 1 and 2 gave the score of 97.73% since they assessed that the video material should provide general vocabularies; respondent 3 gave score of 95.45% since they assessed the time in game should be differentiated and used student animation as the major player in the game. The average value of 95.83% for learning and 96.87% for content aspect. The detail of feasibility result could be seen in Figure 3.

![Figure 3. Feasibility test result (a) Media testing (b) Material testing](image)
The testing toward students was performed in third grader of elementary school in Surakarta having total of 30 students tested. The average of questionnaire assessment result could be seen in Figure 4. Based on the calculation, Figure 3 was the questionnaire result and it provided the system usability scale (SUS) score average of 77.167. SUS score average was 77.16, and it was categorized as Acceptable. This showed that learning media application developed could be well accepted by end users (students) in all aspects.

![Figure 4. SUS Score Result](image)

The average value of N-Gain score experiment class (learning media usage) was 66.90 or 66.90% included into quite effective category. With N-Gain score of 42% for minimum value and 100% for maximum value. While for average N-Gain score for control class (conventional method) was 32.53% included into non-effective category. With N-Gain value, the maximum score was 56.67% and minimum 17.50%. The researchers strengthened by performing N-Gain independent test to examine whether there was difference in average score value of two non-paired group data. It could be found out that the significant value on Levene’s Test for Equality of Variances was 0.084 > 0.05. Therefore, it could be concluded that N-Gain (%) test data variant for experiment group and control group was same or homogenous. From the data result obtained thus independent t-test for N-Gain score focusing on equal variances table assumed. Independent sample test n-gain data found significant value (sig) (2-tailed) of 0.000 < 0.05; hence, it could be concluded that there was significant or pronounced effectiveness difference.

4. Conclusion

The assessment result performed by the material experts obtained the average value of 95.83% for learning aspect and average value of 96.97 for content aspect as well as categorized into very feasible. The study result by media expert obtained average value of 79.16% for efficiency, 79.16% for display, 80% for technical aspect, and 79.16% for software aspect. The questionnaire assessment result filled by 30 students was categorized as acceptable with the value of 85. Question can be said as valid and reliable with high or strong category.

The learning media based on interactive for English lesson has been developed to improve students’ study result. It gained significant value of 0.000 < 0.05 with t-test, which means that there were some differences between two classes. The average value of effectiveness test result using N-Gain test showed that experiment class obtained value of 32.53; therefore it could be concluded that learning media usage was categorized as effective enough while conventional method usage was categorized as not effective.

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