

Character-Based 3D Animation Video Development Using Software Blender in Physics Materials for Newton's Law Subjects

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ABSTRACT

This study aims to determine the feasibility of learning media in the form of character-based 3D animation videos in high school physics material on the subject of Newton law. This research is a research and development (R&D) using the ADDIE model. With 5 stages of research, namely Analysis, Design, Development, Implementation, and Evaluation. In the analysis stage, a needs analysis and literature study were carried out. At the design stage, the initial design of the learning media was carried out in the form of storyboard preparation. At the development stage, animation is made on the software blender. At the Evaluation stage, the media was tested on material experts and media experts and then tested on a small and large scale on students. Then in the implementation stage in the form of using a 3d animation video as a medium for learning physics. The data obtained from the results of needs analysis, validation tests and trials in the form of quantitative data were then analyzed descriptively qualitatively and quantitatively. The average value obtained from material experts was 78.03% with good categories, then the value obtained from media experts amounted to 78.32% in the good category, then from the small-scale test obtained a value of 87.80% in the Very Good category and on the large scale test obtained a value of 80.97% in the good category.

Keywords: 3D animation, character

INTRODUCTION

Education has a very important role in building the quality of a nation. Therefore, the Indonesian nation has placed education as the national goal of the Indonesian nation as stated in the fourth paragraph of the 1945 Constitution which states that one of the national goals of the Indonesian nation is to educate the nation's life. Kunandar emphasized that "education is a long-term investment in human resources that has strategic value for the sustainability of human civilization in the world" [1]. Given the importance of the educational process, the quality of education continues to be improved in accordance with the demands of community development. Efforts to improve the quality of education can be seen from the ongoing reforms from various aspects, including policies, systems, management, curriculum, laws, and government regulations.

Teaching and learning process activities in schools should take place in an interesting manner, so that learning does not feel boring and students are enthusiastic about participating in learning. There are many ways that educators can take to increase students' interest in learning material. One of them is by using the media. Gagne and Briggs in [2] state that the media "education is various components in the student environment that can stimulate students to learn". Learning media is one of the most important factors in the success of learning. So that "The use of learning media appropriately can stimulate and involve students to be active, creative, and create fun learning and will ultimately improve the quality of learning" [2]

Gagne in [3] suggests "there are several types of media that can be used in learning, namely: objects to be demonstrated, printed media, still images, moving pictures, sound films and machine learning". One of the media that can be used to increase students' interest in the learning process is audio-visual media. Ega Rima Wati said that "Audio Visual is a medium that displays sound and picture elements. The combination of these two elements makes audio visuals have better capabilities" [4]. Audio visual media is very supportive of learning physics which requires a real picture of events, natural phenomena, or demonstrations of physics experiments. By presenting audio-visual media, it is hoped that it can

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provide an educational effect such as educating students to think critically, providing meaningful experiences, and developing and broadening students' thinking horizons. Audio-visual media can be in the form of video, sound film, and animation.

Education is essentially not only guiding students to be smart, but also helping students to be good. "Realizing that being smart and good are not the same, since the time of the wise community, moral education is the goal of schools. They provide character education which is coupled with intellectual, decency and literacy education, as well as morals and knowledge" [5]. Ramli in [6] states that "character education has the same essence and meaning as moral education and moral education. The goal is to shape the child's personality so that he becomes a good human being and a citizen and a good citizen. Given the importance of the urgency of character education, Character Education is a program contained in the 2013 curriculum content which is currently being implemented in every school. Character values can be developed and instilled in students through the learning process in schools, one of which can be instilled through the use of learning media. Based on the current conditions in the field, it can be seen that there are still very few educators using character education-based learning media.

Theoretical Review

a. 3D Animated Videos

According to Munir in [7] "Animation comes from English, animation from the word to anime, which means animating. Animations are still images that are sequentially compiled and recorded using the camera". Meanwhile, according to Syahfitri in [8] "Animation is an activity of animating, moving stationary objects. A still object is given a boost of strength, enthusiasm and emotions to become alive and moving or just to have the impression of being alive".

Then Djalle Zaharuddin in [9] defines "Animation as the process of creating motion effects or the effects of changing shapes that occur for some time. Animation is also a technique of displaying sequential images in such a way that the audience feels motion illustrations in the displayed image".

Then "3D is a dimension that has space. When referring to a 3D object, it means that the object has volume space. 3D objects also have locations at coordinates X, Y and Z. " this understanding is stated by James Chronister in [10].

b. Character

According to Wyne in [11] "In terminology, the term character comes from the Latin character, which means character, character, psychological traits, character, personality and morals. The term character is also adopted from the Latin language khharz and xharaz means tool for marketing, to engrave, and pointed stak ". Then another opinion about character was conveyed by Takdirotun Musfiroh in [6] "character refers to a series of attitudes, behaviors, motivation (motivation), skills). The character comes from Greek which means to mark or mark and focus how to apply the value of goodness in the form of actions or behavior.

Furthermore, the definition of character according to the Ministry of National Education in [12] "character is a person's character, character, morals, or personality which is formed from the internalization of various virtues which are believed and used as a basis for point of view, thinking, attitude, and act".

From the description of the definition of character put forward by some of the experts above, it can be concluded that, character is the character, character, psychological traits, manners, moral personality and skills that are inherent in a person and become a characteristic that the person has that has been formed within him. that someone

RESEARCH METHOD

The method used in this research is development research method. "Research and development methods or in English, Research and Development is a research method used to produce certain products, and to test the effectiveness of these products. To produce certain products, research is used that is needs analysis and to test the effectiveness of these products "[13].

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This study uses the ADDIE development model with 5 stages of research. According to [8] the ADDIE model has 5 stages, namely: Analysis (analysis), Design (design), Develop (development), Implement (implementation), Evaluate (evaluate). The choice of this model is based on the consideration that this model is easy to understand, then the ADDIE model is developed systematically and rests on the theoretical foundation of the developed learning media design. This model is arranged programmatically with systematic activities in an effort to solve learning problems related to learning media that are in accordance with the needs and characteristics of students.

The first stage carried out is the analysis stage, at this stage in the form of a needs analysis carried out on students. The data from the needs analysis were obtained through a questionnaire filled out by students. The questionnaire contains questions that are asked in order to find out the needs of students for the media to be developed. The questionnaire given is also equipped with a suggestion column for the development of animated video media.

Then the media development planning is carried out in the form of collecting information through library research and needs analysis, then determining the basic competencies and learning materials that will be included in the character-based 3d animation video that will be developed, determining the character values that will be displayed in the animation video, and compiling story board. after creating a storyboard then starting to develop a 3d animated video based on the storyboard, then doing a feasibility test, and doing a trial run.

After the developed media went through several processes, starting from design, development, due diligence by material and media experts, small group trials, and large group trials, the media was revised. After the researcher made several revisions based on the input and suggestions from the respondent, the media was refined. Media that is deemed appropriate can be implemented as learning media.

RESULTS AND DISCUSSION

In this study, a character-based 3d animation video media has been developed that has received good assessment criteria by media experts and material experts so that the media is suitable for use as a learning medium.

Needs Analysis Results.

The results of the needs analysis show that students need character-based 3d animation video media with content in the form of material exposure and examples in everyday life on high school physics material on the subject of Newton law.

Developed Media Outcomes.

After obtaining data through needs analysis, the next step is to develop learning media. Media can be seen on the youtube link <https://youtu.be/xkOow-vPMh4>.

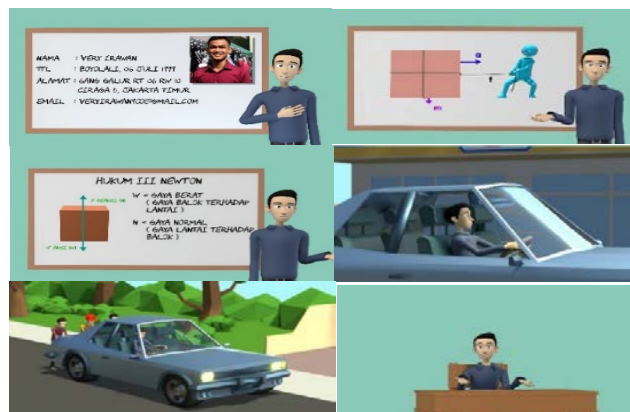


Figure 1. The results of the media that have been developed

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Feasibility Test Results.

Learning media can be said to be suitable for use in the learning process if it has been assessed through the due diligence process by experts then tested on students. In this study, the feasibility of the media was assessed by six experts who were competent in their fields, namely two media experts from lecturers and one media expert from subject teachers then two material experts from lecturers and one material expert from subject teachers. The results of the assessment obtained through material experts and media experts are:

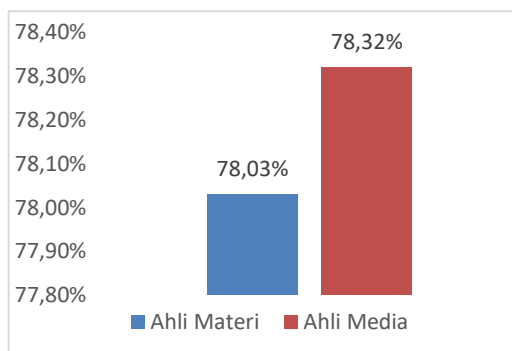


Figure 2. The results of the assessment of media experts and material experts

Figure 2 shows that the percentage of eligibility given by material experts is 78.03% (Good), and the percentage of eligibility given by media experts is 78.32% (Good). Based on these results, it can be concluded that the character-based 3d animation video learning media on the physics subject matter of Newton's law is feasible in terms of material and media. Apart from being tested for its feasibility, learning media was also responded to by students in small-scale and large-scale tests. Small scale test results can be seen in Figure 3.

Small Scale and Large Scale Trial Results.

After going through the feasibility test by the experts, the learning media that had been developed by the researcher were tried out on the students. The following are the results of a small-scale trial:

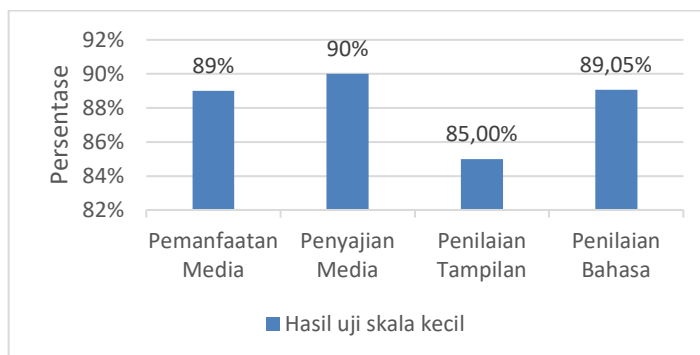


Figure 3. Small Scale Trial Results

These results indicate that the percentage of feasibility in the media utilization aspect is 89.00% (Very Good), the Media Presentation aspect is 90% (Very Good), the display assessment aspect is 85.00% (Good), and at aspects of language assessment of 89.05% (Very Good). If the average of all four aspects is calculated, it will produce a percentage of 87.80% and is included in the Very Good category. The following are the results of a large-scale trial:

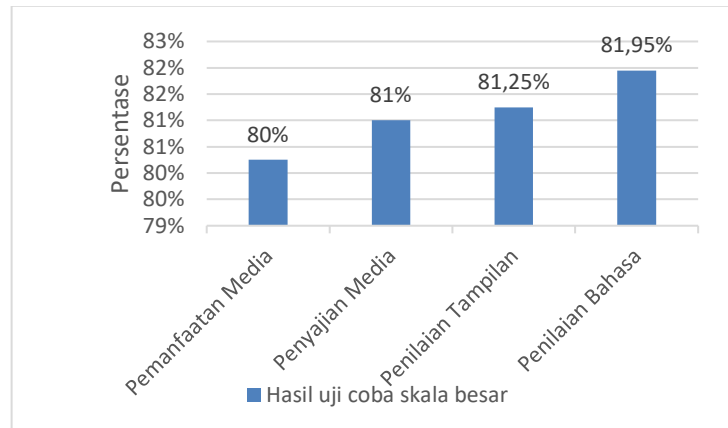


Figure 4. Large Scale Trial Results

These results indicate that the percentage of feasibility in the media utilization aspect is 80.00% (Good), the Media Presentation aspect is 81% (Good), the display assessment aspect is 81.25% (Good), and the assessment aspect language as big as 81.95% (Good). If the average of all four aspects is calculated, it will produce a percentage of 81.05% and is included in the Good category.

The self-assessment of students' attitudes on small and large scale tests.

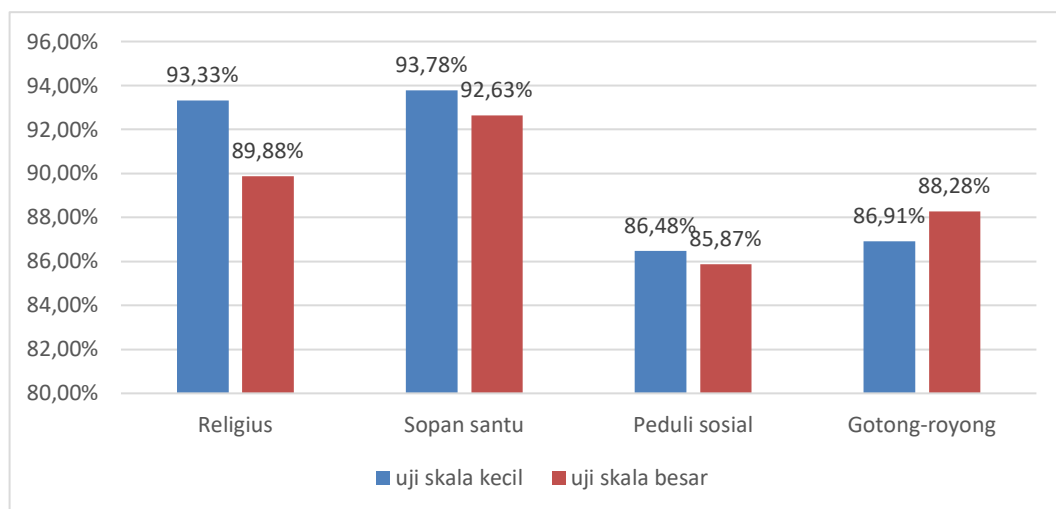


Figure 5. Student Character Assessment in small and large scale tests.

From **Figure 5**. We can conclude that in the aspect of religious value in the small-scale test, the percentage was 93.33% (very often), in the large-scale test the percentage was 89.88% (very often). In the aspect of the value of courtesy in the small-scale test, the percentage was 93.78% (very often), in the large-scale test the percentage was 92.63% (very often). In the aspect of the value of social care, in the small-scale test, the percentage was 86.48% (very often), in the large-scale test, the percentage was 85.87% (often). And on the aspect of the value of Mutual Cooperation in the small-scale test, the percentage was 86.91% (very often), in the large-scale test, the percentage was 88.28% (very often).

CONCLUSIONS

Based on the results of this study, it can be concluded several things regarding the development of learning media developed by researchers, namely:

- a. The final result of this development is a character-based 3d animation video media in high school physics material. The subject of Newton's law with content in the form of material exposure and examples in everyday life of Newton's law material.

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- b. The media developed has also passed the due diligence stage by material experts and media experts. Assessment by material experts obtained a percentage of 78.03% with a good category. Assessment by media experts obtained a percentage of 78.32% with a good category. Based on the material and media expert's assessment, the media developed is suitable for use.
- c. In addition to being assessed by material experts and media experts, the media developed by researchers was also tested on students. Small-scale trials were carried out on 27 students. In a small scale trial, obtained a percentage value of 87.80% with the predicate very good.
- d. Then a large-scale trial was also carried out on a total of 115 students. The results of large-scale trials obtained a percentage of 81.05% in the good category. This means, the media developed by researchers can be said to be suitable for use.

In the self-assessment of attitudes by students on small and large scale tests, they have received a satisfactory assessment. Students practice character values in everyday life. However, the results obtained are not 100% of students who practice these values. So with the development of character-based 3d animation media, it is hoped that students can get value recognition, understand the importance and then can instill the character values contained in the animation video learning media. The character values that appear in the animated video are religious values, courtesy, social care and mutual cooperation.

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