The Effect of Multimedia-Based 3D Flipbook Learning Media on Physics Learning Outcomes of 11th Science Grade Students in Work and Energy Subjects

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Abstract
Research on the effect of using multimedia-based 3D flipbook learning media on physics learning outcomes of 11th science grade students in work and energy subjects has been carried out. This research is based on problems in education, especially the use of multimedia learning in the subject of work and energy in physics. Research conducted at SMA PGRI 109 Tangerang using the experimental design method in the form of posttest only with 48 students as samples that divided into 2 groups of classes, experimental class and control class. Based on the results of the analysis on the prerequisite test, using Chi Square test, the estimated results: from the experimental class and the control class, \( X_{\text{count}} < X_{\text{table}} \); with a significant level of \( \alpha = 0.05 \), it means the research class, experimental class, and control class, are normally distributed. For the homogeneity test using the Fisher test obtained \( F_{\text{count}} < F_{\text{table}} \), which is equal to 1.017 < 2.069, then the research class is homogeneous distribution. In the last stage, hypothesis testing was performed by \( t \)-test and the result was \( t_{\text{count}} = 8.621 > t_{\text{table}(0.05)} = 2.014; \) which means \( H_0 \) is rejected. Based on the calculation of the hypothesis test, it can be concluded that there is the effect of the use of multimedia-based 3D flipbook learning media on physics learning outcomes for students of 11th science grade in work and energy subjects.

Keywords: learning media, 3D flipbook, multimedia, learning outcomes, work and energy

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Introduction
One of the main problems in learning in formal education is the less understanding of students that can be seen from the learning outcomes at the end of each semester, due to the learning process which is dominated by traditional learning and approaches that are done deductively to students so the activities in the classroom tend to be boring for students.

Therefore, it is necessary to implement a learning method strategy and develop learning media that can help students to comprehend physics material and can increase activity and creativity as well as students’ physics learning outcomes.

Even though the media development has been done a lot nowadays, but the use of media is less effective. It has minimal use and benefits for learning and influences learning outcomes.

The development of multimedia-based learning has been widely applied in the learning process, one of which is flipbook. Flipbook is a book that can be flipped. This term is taken from a children’s toy that contains a series of different images, if it is opened from one page to another page it
will show that the pictures are as if moving. Basically flipbook is a primitive form of animation, but along with the rapid information technology the idea of flipbook was later adopted and used in making a book (e-book) and electronic magazine (e-magazine) with characteristics that can be opened and flipped resembling a magazine or book in general.

Nowadays software packages and sites also provide digital video file conversion into standard flipbook manufacturing. This e-book format is also known as OPF flipbook, as quoted from the website page, that: "OPF is an electronic book format based on the XML programming language". The OPF format electronic book became known when flipbook was used as a software to present information by displaying books and magazines in 3D format that could be flipped to resemble the original book [1].

As happened at XI IPA SMA PGRI 109 Tangerang in the 2015-2016 school year, the learning outcomes are still below the average. Based on the questionnaire that has been distributed, the reason is that the teacher uses a monotonous method namely lecture and writing on the board, besides the absence of media that can make students feel interested in learning physics, so that there is no enthusiasm for learning and impact on their learning outcomes at each end of the subject, especially in the work and energy. This discussion should be able to use media that is more real or alive than just ordinary textbooks, and should use methods that make students more active in learning.

By using 3D flipbook, it is expected to be able to support the effectiveness of learning activities while at the same time be able to instill physical basic concepts, especially on the work and energy subject. Because this 3D flipbook can involve students directly (active) in teaching and learning activities and provide direct learning experiences to students so they can clearly understand and remember what they see and through media (audio-visual) in learning. This media is also very simple and can be done by all students during learning. So that it can improve student learning outcomes.

Methods

The research method is quantitative research methods. According to Sugiyono, "quantitative research methods are used to examine certain populations or samples, data analysis is quantitative or statistical, with the aim of testing predetermined hypotheses" [2].

Type of research. Experiment research which there is treatment was used in this research. Therefore experiment research used to find a certain treatment in controlled condition. Method of research is the method used for collecting data of research [3]. Experiment method or known as real experiment was used because in this research, the object of research (students) will given the direct treatment without initial action, and consist of 2 classes, experiment and control. Real experiment is the method of research that used to look the output, in this case the obtained output is outcomes learning of students cause there is direct treatment on the used of learning media 3D flipbook in experiment class.

Time and location. This research was done at SMA PGRI 109 Tangerang. The time of the execution in the odd of semester, October -November, school year 2016-2017.

Subject of research. The sample was taken from affordable population of 2 classes. One class was the experiment class and one another was the control class. Class XI MIA-1 was choosen as an experiment class of 24 people. It was given a treatment on the use of 3D flipbook in every study at work and energy subject. While XI MIA-2 was choosen as a control class of 24 people. This class was not given 3D flipbook usage treatment in every study at work and energy subject.

Design of research. The design of real experiment was done the test for once after experiment was finished (posttest) [4]. So, the design was used in quasi experiment of this research were posttest only design, group of experiment and control was given the test after observation treatment. Design of this research was stated on Table 1.

<table>
<thead>
<tr>
<th>Class</th>
<th>Treatment</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experiment</td>
<td>$X_1$</td>
<td>$O_P$</td>
</tr>
<tr>
<td>Control</td>
<td>$X_2$</td>
<td>$O_P$</td>
</tr>
</tbody>
</table>

Instrument and data collection technique. Data type of this research were obtained from formative test of two groups of research, experiment class and control class. The data would be analysed by using t-test. The instrument was in the form of a test of learning outcomes by analyzing student answers to the type of multiple choice questions. Before the research instrument was given to the sample or research subject, the test was tested first at SMAN 3 Tangerang Regency, in the same grade class (other classes), with the aim of obtaining the prerequisites of a test, such as validity and reliability.

Data analysis technique. To analyse the obtained data, the research used several tests such as t-test through the prerequisite test first, Chi Square normality test, and Fisher’s homogeneity test. The hypotheses were, $H_0$ : there was no influence on the use of multimedia based 3D flipbook media learning on student learning outcomes, and $H_1$ : there was
influence on the use of multimedia based 3D flipbook media learning on student learning outcomes.

Results and Discussion

Based on the research data, it appears that the results of the average physics learning of class students taught using 3D flipbook are 76.67, while the average control class student without 3D flipbook has an average of 60.00. This shows that the physics learning outcomes of student using 3D flipbook are higher than those of class students who are taught without using 3D flipbook. The use of 3D flipbook has a positive influence in obtaining optimum learning outcomes.

In addition, after calculating the $t$-test obtained $t_{\text{count}} = 8.621$ and $t_{\text{table}} = 2.014$. So that, $t_{\text{count}} > t_{\text{table}}$. It means that $H - 0$ is rejected at the level of significance $\alpha = 0.05$, it can be concluded that there is an effect of using 3D flipbook on the results of student physics learning on the subject of work and energy.

From the results of this study, then the author gives discussions: (1) the teachers must be more innovative and creative in learning, one of them by using 3D flipbook, so that the learning process becomes more alive, and (2) other researchers should be motivated to complement this research on another subject to improve student physics learning outcomes.

Conclusion

Based on the data and calculation of the hypothesis test, it can be concluded that there is the effect of the use of multimedia-based 3D flipbook learning media on physics learning outcomes for students of 11th science grade in work and energy subjects.

References