Flash Animation-Based Learning Media to Improve Learning Outcome of the Electronics Subjects

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Abstract: This research analyzed the benefit of flash animation-based learning media on improving the learning outcome of the Electronics subjects in study program physics education, University of Muhammadiyah Prof Dr HAMKA Indonesia. The study focused on the transistor chapter of the Electronics subjects.. This research used quantitative method in the form of quasi experiment with Nonequivalent Control Group Design. The research result showed: (1). Control class and experiment class were balance because there were no significant difference on the average learning outcome in both class which was observed before the learning process (13 ≈ 12.95). (2). There were improvements in both classes observed after the learning process. (3). Learning outcome in the class that used animation as learning media was higher than the class that did not use animation as media (21.55 >17.35). (4). The gain in learning outcome in the class that used animation as learning media was 0,71 which was included as the category high. The gain in the class that did not use animation media was 0.19 which was included as the category low.

Keywords: animation learning media, animation teaching material, animation transistor.

1. Introduction

Learning media is something that needs to be noted in teaching and learning process. Especially in the Electronics subjects that needs imagination because of the characteristic of electronics which is invisible. This is in accordance with with the field data from the research done by Winarno (2013) that stated the use of interactive learning media in the subject of electronics can facilitate teachers in explaining the learning materials to the students.

The initial interview done to the lecturers of electronics in study program physics education in University of Muhammadiyah Prof Dr HAMKA Jakarta, showed the high level of difficulty on delivering the electronics subjects because of the characteristics of electronics which is actually invisible to be seen directly by naked eyes. Electronics system contain many physical characteristics that can only be felt its symptoms so that students should picture i with imagination. Moreover associated with electric current, electron movement, electrical field and various basic symptoms when happen in this electronics incident. The result of initial interview with the lecturers of basic electronics stated that almost 40% of students have not achieved maximum target in the learning process of electronics.

This is compounded with the students' low interest in reading to the exact lesson, based on the previous research done by Restina (2011) that the students' interest in reading towards the lecture materials presented in writing is still low. This condition effect on the low learning outcome of the students. Only around 60% of the students were able to achieve satisfactory grade with reference to the results of the assignments given by lecturers after students were given the task to read the teaching materials.

The formulation of the problem in this research include: (1). Are there any difference in the learning outcome of the students within the class that used the learning media Flash Animation before the treatment was done?, (2). Are there any differences on the learning outcome of students in the class that did not use the learning media Flash Animation before and after the treatment was given?, (3). Are there any differences in the learning outcome of the students in the class that used flash animation-based learning media before and after treatment

was given?, (4). Are there any differences in the students' learning outcome between the class that used and did not use flash animation-based learning media after treatment was given?, and (5). Are there any differences in the gain of students' learning outcome between the class that used and did not use flash animation-based learning media?

Kozma (1991:2) elaborated the most obvious characteristic of learning media is technology, mechanical aspect and electronic that determines function, form, and other physical characteristics. Burden and Byrd (1999:137) defined learning media as the conveyor of learning information. Sadiman, et al. (2008:7) defined learning media as the distributor of learning message. Agina (2003:1-4) explained that the use of animation in the learning activity can improve the quality of learning process and outcome. Hegarty (2004:343) explained that the development of animation technology has been able to provide visual displays that are stronger than various phenomena and abstract information so that it can act to improve the quality of learning process and outcome. Bogiages dan Hitt (2008:43) explained that the improvement of understanding skill in a group and interest in learning are also an added value for the utilization of animation in learning. Harrison dan Hummell (2010:21-22) explained that animation is able to enrich experience and students' competence on various teaching materials.

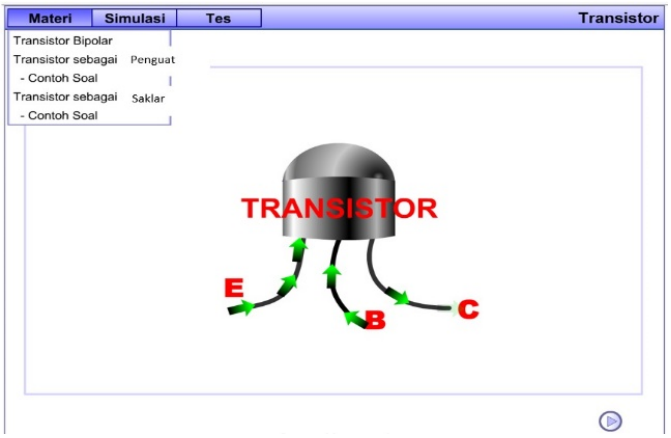
The use of animation in learning, other than it had been known to have many benefits, but on the other side it is still considered to have several flaws. Highlighted about the avalability of supporting factors such as room and tools used to display animation in learning activity. Agina (2003:4) criticized the factor of supporting tools quality such as software capability, memory capability on supporting media such as laptop, computer, LCD and the aspects of the adjustment to the curriculum. Lowe (2004:558-559) observed from the aspects of the process of preparing the material which could potentially lead to inefficiencies. Sadiman, et al. (2008:69) criticized on the production cost which is relatively expensive so that it is very difficult to achieve all learning objectives.

The Electronics subjects in study program Physics Education in the Faculty of Pedagogy and Education, University of Muhammadiyah Prof Dr HAMKA is a compulsory subject. This Electronics subjects has a study load of 2 credits in the odd semester. One of the topics in the subject of electronics is about Transistor. Transistor as an electronic component semiconductor has a dynamic characteristic, on one condition it can become a conductor (conductor of electricity) and in other condition it can become isolator. Because of this dynamic characteristic, the electronic symptoms that happen in this component also vary. This varied symptom needs visualization and simulation so that it is easy to be understood by the students.

2. Flash Animation-Based Learning Media for the Topic of Transistor

Initial Display of Main Menus

The applied flash animation-based learning media for the topic of transistor consists of three main menus which are: Material, Simulation and Test. Whereas for the Material menus itself contains 5 displays which are: Bi-Polar Transistor, Transistor as amplifier, Sample problem for transistor as amplifier, Transistor as switch and the display of Sample problem for transistor as switch.



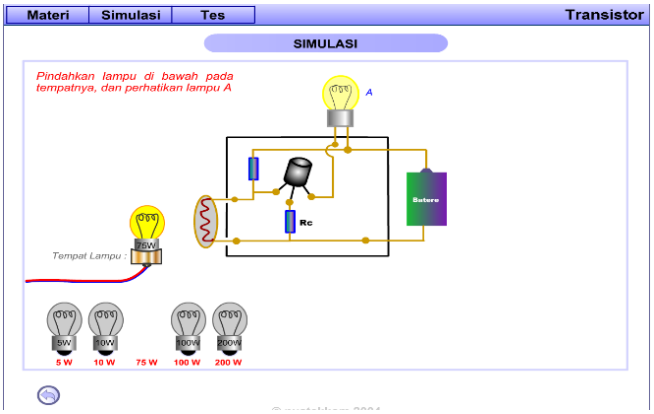
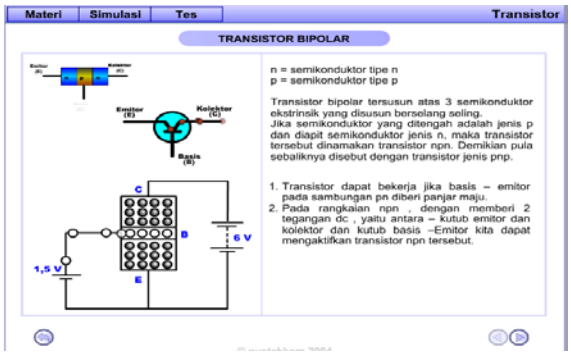
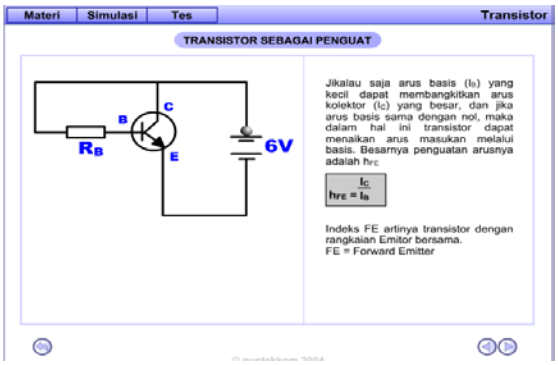


Figure 1. Example of the display for 3 main menus of learning media with the topic transistor

Contents Display of the "Material" Menus

The contents of the Material menus in the applied flash-based learning media explain about: (1). The characteristics of bi-polar transistor as contained in the Material menu bi-polar transistor, (2). Direction of the electric current on the foot of transistor and the formula of the amplification of the electric current in the circuit of Forward Emitor as contained in the menu transistor as amplifier, (3). Sample problem of the amplification of electric current as contained in the Material menu sample problem of transistor as amplifier, (4). Theory, concept and how the transistor works as switch as contained in the Material menu Transistor as switch, and (5). Sample problem on how to place resistor (load) in the transistor circuit as a switch as contained in the Material menu sample problem of transistor as switch.





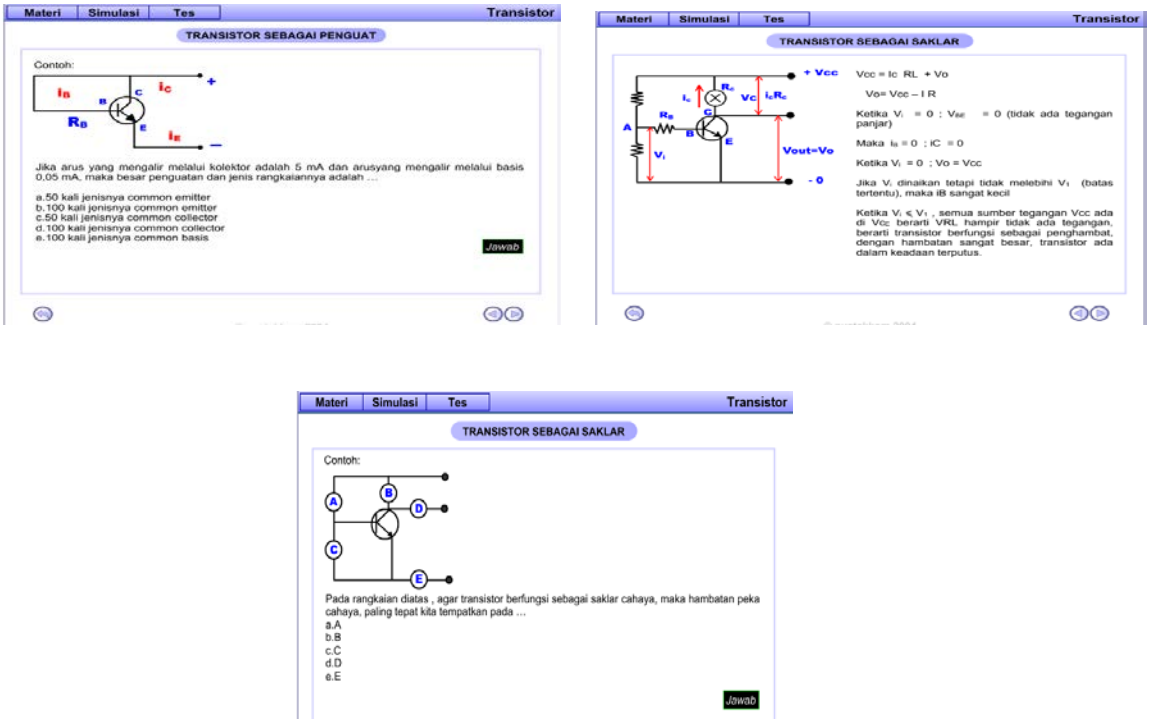


Figure 2. Contents of the Material menus on the subject transistor based on flash animation

3. Research Method

This research was done in Study Program Physics Education, Facullty of Pedagogy and Education, University of Muhammadiyah Prof Dr HAMKA. The population in this research is all students from semester IV (80 Students). The research was conducted in the first semester of 2014. Precisely in September until December 2014. The sample of this research was taken from two classes with the details of one class as an experiment class consisting of 20 students and one class as the control class consisting of 20 students. The research method used was quantitative method in the form of quasi experimental design. The form of quasi experimental design used was Nonequivalent Control Group Design.

Experiment class is the class that received the implementation of flash animation-based learning media. Pre-test was done before the implementation of the learning media to figure out the initial capability possessed by the students in experiment class about the topic. Post-test was done to figure out the capability possessed by the students in control class about the topic after receiving the implementation of flash-based learning media.

Control class is the class that did not receive the implementation of flash-based learning media. Pre-test was done before the conventional lesson started to figure out the initial capability possessed by the students in control class about the topic. Post-test was done to figure out the capability possessed by the students in control class about the topic after receiving conventional lesson.

The learning media used in this research was flash animation-based learning media that discussed the topic of Transistor in the course of electronics semester IV.

The data analyzed in this research consisted of main data in the form of students' test result data, and supporting data in the form of interview result on the response of teachers and students towards the use of learning media. The data analysis technique used was difference test using Non-parametric statistical test of Mann Whitney and Wilcoxon test.

4. Result and Discussion.

Control Class

The result of Pre-test in control class showed the initial capability possessed by the students had an average grade of 13 with the standard deviation of 2.27. The lowest grade of the pre-test from 20 students in control class was 10 of 25, achieved by one student. The highest pre-test score achieved by the students in control class was 18 of 25, achieved by one student. The grade of pre-test that were mostly achieved by the students in control class was 11 of 25, achieved by 7 students.

The result of post-test in control class showed the final capability of students after receiving the implementation of conventional lesson had the average grade of 17.35 with the standard deviation of 1.84. The lowest grade of the students in control class was 14 of 25, achieved by one student. The highest post-test grade in the control class was 20 of 25, achieved by three students. The most achieved grade score in control class was 18 of 25, achieved by 4 students. After conventional lesson, an improvement of leearning outcome was achieved but relatively small which was an increase in average of 4.35. If meticulously detailed, there was a decrease in learning outcome of one student with the point of decrement of -1. An improvement of learning outcome happened to 19 students, with the biggest increase happened to 3 students with the increment point of +6.

Experiment Class

The result of Pre-test in control class showed the initial capability possessed by the students had an average grade of 12.95 with the standard deviation of 2.13. The lowest pre-test grade from 20 students in the experiment class was 9 of 25, achieved by one student. The highest pre-test score achieved by the students in experiment class was 17 of 25, achieved by one student. The most pre-test grade score achieved by the students in experiment class was 11 of 25, achieved by 5 students.

The result of post-test in experiment class showed the final capability of students after receiving the implementation of flash animation-based learning media had a quite high average of 21.55 with the standard deviation of 2.04. The lowest grade of the students in experiment class based on the post-test result was 17of 25, achieved by one student. The highest post-test grade in experiment class was 24 of 25, achieved by two students. The most achieved grade score in experiment class from the post-test result was 23 of 25, achieved by 7 students. After the lesson using flash-based animation media, a relatively high increase in learning outcome was achieved, which was an average increase of 8.60. If meticulously detailed, there were no students that experienced a decrease in learning outcome. The increase in learning outcome happened to all students. The biggest increase happened to 5 students, with the increment point of +10.

Table 1: Comparison of the results of the Pre-Test and Post-Test.

VARIABLE CLASS	PRE-TEST			POST-TEST			NORMALITY GAIN
	Mean	Low Score	High Score	Mean	Low Score	High Score	
Control	13	10	18	17.35	14	20	0.19
Experiment	12.95	9	17	21.55	17	24	0.71

Discussion

The average grade of the pre-test in control class and experiment class was almost the same (13 ≈ 12,95). This showed that the potential ability between control class and experiment class was equal. The lowest pre-test score in control class was better from experiment class (10 > 9).

Likewise, the highest pre-test score in control class was better than experiment class (18 >17). This showed that even if the average score was equal, but the control class even owned a little bit of potential advantage than experiment class.

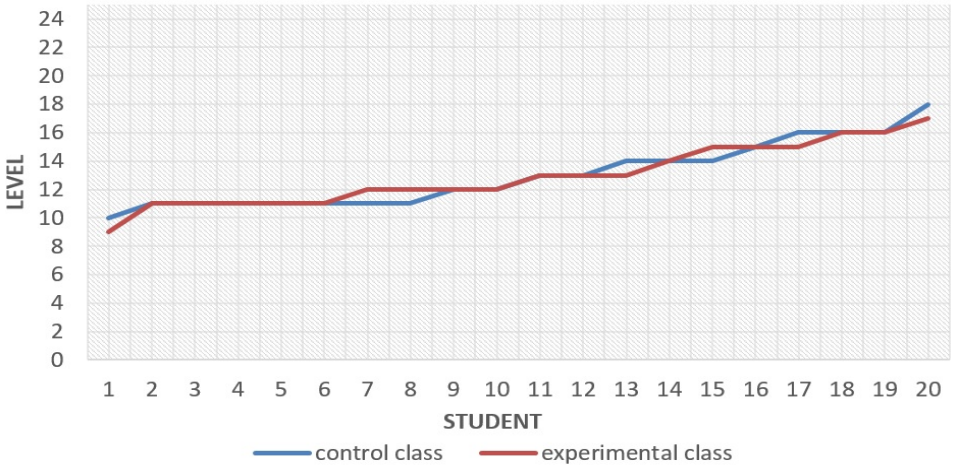


Figure 3. Pre-Test Result.

The lowest post-test score in experiment class was higher than the control class (17 > 14). Likewise, the highest post-test score in experiment class was higher than control class (24 > 20). The change of learning outcome in experiment class was also better than the control class (+10 > +6), this showed decisively that in the class that using flash animation-based learning media, a far better learning outcome was achieved compared to the learning outcome of the class that did not use flash animation-based learning media.

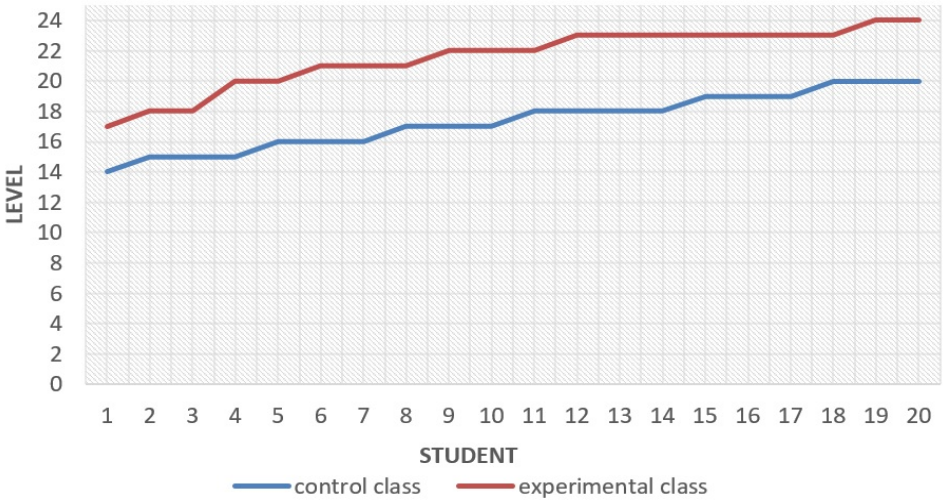


Figure 4. Post-Test Result

The calculation of the gain in learning outcome of the experiment class and control class both had an increase in learning outcome. However, the experiment class had a higher gain, which was 0.71 (high category), compared to control class that only experienced a gain of 0.19 (low category).

The hypothesis test showed that: (1). There were no significant differences of the pre-test result in the class that used as well as did not use flash animation learning media, this showed that the sample taken had equal potential. (2). There was a difference (improvement) of learning outcome in the class that did not use flash animation media (control class) but relatively small (average of 4.35 points). (3).There was a significant difference (improvement) of learning outcome in the class that used flash animation-based learning media (average of 8.6 points).

(4).There was a significant difference between the increase of learning outcome in the class that used flash animation-based learning media and the class that did not use flash animation-based learning media (8.6 compared with 4.35). (5).There was a significant difference on the gain of students' learning outcome between the class that used flash animation-based learning media and the class that did not use flash animation-based learning media (0.713 compared with 0.19).

5. Conclusion.

The conclusion that could be drawn from the result of the research done were: (1).The two classes that were the research sample were equal because they have the potential and basic capability that are relatively similar before the learning process was done. This can be seen from the average score of pre-test in the experiment class as well as in control class (the class that used as well as did not use flash animation-based learning media) that were almost the same ($12.95 \approx 13$). (2).There was an increase in the learning outcome of the class that did not use flash animation media, observed from the comparison of the average score from pre-test and post-test in control class, but the increment was relatively small, which was 4.35. (3).There was a significant increase of learning outcome (pre-test compared with post-test) on the class that used flash animation-based learning media (experiment class) with the average increase of 8.6. (4).There was a significant difference between the learning outcome (post-test) of the class that used flash animation media with the learning outcome (post-test) of the class that did not use flash animation media. The learning outcome (post-test) of the class that used flash animation media was better compared to the learning outcome of the class that did not use flash animation media (21.55 >17.35). (5).There was a significant difference between the gain of learning outcome of the class that did not use flash animation media and the gain of learning outcome of the class that used flash animation media. On the class that used flash animation-based learning media, the gain of learning outcome was higher compared to the class that did not use flash animation-based learning media (0,71 >0,19). The gain of learning outcome of the class that used animation media was higher than 0.7 which was included in the high category. Whereas the gain of learning outcome of the class that did not use animation media was less than 0.3 which was included in the low category.

The results of this study also indicated that the subjects in the animation got the highest posttest scores. In the future need to be multiplied animation-based learning material in various subjects. Animation-based learning material is believed to enhance the students' understanding, which in turn can improve learning outcomes. Subjects' learning outcomes may have been influenced by the knowledge domain. Therefore, further research within different disciplines is also recommended.

Acknowledgements

We would like to say thank you to the Research Institute of the University of Muhammadiyah Prof. Dr. HAMKA and Huazhong University of Science and Technologi, an which has supported this research activity. Also my appreciation should go to the committee of ICCE 2015 that have given the chance to disseminate the result of this research in the conference forum. Also to all people who have the commitment on the development of ICT-based learning media for the advancement of education and human civilization in general.

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