MULTIMEDIA'S EFFECTIVENESS TO IMPROVE STUDENTS LEARNING OUTCOMES IN SOLAR SYSTEMS MATERIALS

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Abstract

This study aims to describe the effectiveness of multimedia in solar system material. This research method uses the ADDIE method with the design of one gruop pretest-posttest. The results of this study were obtained from the results of students learning outcomes test which resulted in multimedia effectiveness with an increase in gain score of 0.76 with high criteria. It was concluded that multimedia in the material of the solar system is effective for improving students learning outcome.

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Keywords: Multimedia, learning outcomes, the solar system

INTRODUCTION

Ministry of Education and Culture in 2013 made curriculum changes, from the Education Unit Level Curriculum (KTSP) in 2006 to the 2013 Curriculum. In the 2013 Curriculum the renewal was in the learning process which emphasized the active participation of students. Based on this, the learning and assessment system must be students-centered or what is called students centered. In this learning process demands that students be active, creative and innovative so that the teacher only acts as a facilitator.

As the era of technology is also experiencing development, it also raises demands and challenges in the learning process. Technological developments make the learning process become increasingly complex because it must balance with the development of science. Increasingly rapid technology can enable the ease of communication without knowing the boundaries of the country that can eventually lead to global competition. So, the world of education should always be conducive and innovative. Therefore, in the process of learning needed good communication in the delivery of the message in the form of learning materials (Herianto, 2017). The message can be conveyed through a learning medium. Learning Media is everything that can deliver messages, can stimulate the mind, feelings, and willingness of students so as to encourage the creation of the learning process in the students. The benefits and functions of multimedia in the learning are to attract attention, improve the quality of learning, reduce verbacteristic and overcome the limitations of space, time and the ability of the senses. Objects that are too large like Earth can be replaced by models (Globes), objects that are too small can be raised for example cell images, as well as movies and video footage, students can observe a process almost similar to the original despite its occurrence Far before and in distant places. 5. Enable students and make it easy to create the same perception. Learning Media in Science learning is a tool that works to convey learning information can make a positive contribution in the learning process that is interactive, effective and foster the curiosity of students to the concepts Demonstrated by the media (Budiyanto, 2018).

According Ministry of Education and Culture (2017), science is knowledge that is composed of natural phenomena that are connected through the process of observation and scientific methods. In the learning process, teachers rarely associate material taught with real-world conditions and rarely encourage students to build relationships between the knowledge they have and their application in everyday life. This can lead to low students learning outcomes (Tumbur, 2015). In the process of science learning teachers need learning media that can improve students learning outcomes and motivate not only verbality which is only expressed by words (Sadiman, 2010).

From the results of interviews, the teacher said that it was quite difficult to teach science materials, especially in abstract material for example the solar system. In this material, students will study the condition of the earth and space. This material is quite abstract because the teacher does not bring real objects to be observed. Most students only try to memorize material rather than understand it so that it is easily forgotten.

According to her there are also more than 50% of students who are unable to reach the maximum / KKM. To overcome this, the teacher will ask students to learn with textbooks, practice tools and powerpoint (PPT). The material in the solar system on the students / BSE science package package is quite short and incomplete. This practice tool which is a learning medium is usually small balls as the planet and one large ball as its center (sun). The equipment still cannot describe the state of the solar system because it is still simple. Besides that, moving these balls as a simulation of rotating planetary movements and evolution is also still manual. Therefore, students must also really pay attention to the teacher who is explaining. If this process is carried out continuously, students will quickly get bored (Slamet, 2016). The difficulty of treatment so that many damaged and improper props are often a problem (Alfini, 2016). Besides that the PPT used is quite simple with a little explanation and less interesting.

Students tend to be interested in learning media that can be placed on computers or smartphones because it is considered practical. Arsyad (in Rusman, 2013) also argues that this based learning can foster students' independence in the learning process so that learning becomes meaningful. In addition, learning to use multimedia has other advantages such as improving the ability of students to operate computers / digital objects, becoming stimulants of students in practical activities and being able to be a solution in dealing with students who find it difficult to accept learning because it is not boring and easy to remember. To overcome the above problems the things that teachers can do to facilitate students in understanding the material is by using other learning media.

The learning media offered is in the form of multimedia. Multimedia is a tool that can convey information in the form of a collection of several media such as text, graphics, sound, animation, etc. (Munir, 2012) in the form of a powerpoint which then the storage format is .ppsm. by using this format, the powerpoint that was created will not be edited by the students again and the hyperlinked file to another folder/document will be opened on other computer/ laptop. Unlike when a powerpoint document is saved in the .ppt / .pptx or application format. In addition, this learning media can be used on smartphones easily by making an application first. This learning media will also contain a collection of several media such as text, graphics, sound, animation, etc. that can be controlled by users. Considering the material of the solar system is quite abstract so if it only contains writing it will actually be boring. In the use of this media will involve more than one five senses so that it will be more strongly embedded in memory (Arsyad, 2013). The teacher can insert questions whose results can be sent directly to him and if permitted, students can see their value directly. Although this media is not too new but this media is considered suitable to be applied to the solar system material system in Sidoarjo 1 because it can contain various kinds of media (text, video, animation etc.) and its users are VII grade students who are generally new to the operation of computers in particular power point. Based on the results of observations, the students in this middle school are used to carrying laptops / smartphones and there is already free wifi at the school, making it very possible if this media can be developed at the school of Sidoarjo 1 Public Middle School.

Learning outcomes are abilities possessed by students after receiving their learning experiences (Sudjana, 2010). According to Benjamin Bloom (in Agung, 2015) learning outcomes are divided into three domains, namely: 1) Cognitive domain, which is related to the intellectual learning outcomes of students; 2) Affective domain, which is related to attitude; 3) Psychomotor domain, which is related to the learning outcomes of students' skills and acting abilities. The material of the solar system in science subjects is material that emphasizes concepts. Therefore in this study the learning outcomes that are suitable for analysis are cognitive learning outcomes (knowledge).

One of the relevant studies is the research of Siti Zubaidah (2016) with the title Development of Learning Multimedia to Increase Learning Outcomes of Cognitive Material of the Respiration System. This study states that the completeness of classical learning of students after learning using multimedia is 91.67%. Besides research from Ida (2015) with the title Development of Audio Visual Learning Media Microsoft Power Point Program in the Subject of Class VIIA Life Organization in SMPN 19 Mataram Academic Year 2012/2013 which states that the completeness of students learning outcomes 100% with the acquisition of an average value of 84, 26%. Based on this explanation, the author intends to conduct research with the title, namely "Development of Multimedia as a Learning Media in the Material of the Solar System to Improve Learning Outcomes of grade 7th Students".

METHOD

This research is using the research design with the development model ADDIE (Analysis, Design, Development, Implementation and Evaluation) in the method of One Group Pretest-Posttest Design that

tested on 25 students SMP Negeri 1 Sidoarjo. The instruments on this method use pretests sheets and posttests that were previously validated first. As for the question on pretests sheet and posttest as many as 12 numbers with multiple choice type. Learning outcomes are determined through improved pretests and posttest. These results were analyzed using the normalized gain analysis. To determine the analyzed values, use the formula:

$$< g >= \frac{(Sf)-(Si)}{100-(Si)} \times 100\%$$

Keterangan :

Sf = skor *posttest*

Si = skor *pretest*

Then the value is normalized by the following criteria.

Tabel 1 Kriteria Nilai *gain*

<g>	Criteria
0,70<g≤1,00	High
0,30<g≤0,70	Medium
0,00<g≤0,30	Low

(Riduwan,2013)

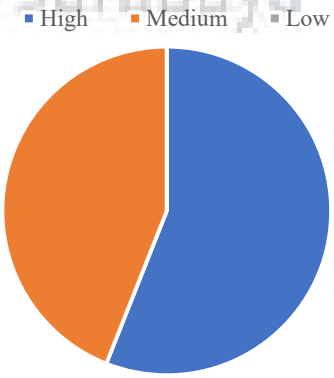
Based on these criteria, multimedia can be declared effective for improving students learning outcomes if students learning outcomes gain a gain score of> 0.3 with moderate or high criteria.

RESULTS AND DISCUSSION

The effectiveness of multimedia is obtained from students learning outcomes based on the value of the pretest and posttest as the learning outcomes of the cognitive domain. Learning outcomes are abilities possessed by students after receiving their learning experience (Sudjana, 2014). Students learning outcomes were assessed by giving pretest and posttest questions with 12 multiple choice questions with different Bloom taxonomy levels. There are differences in the results of the students' pretest and posttest after learning to use multimedia. Multimedia developed is considered more interesting, not boring and fun and helps students understand the material. This is supported by the positive response of students after using multimedia. Interesting things can create a fun and not boring students learning environment so that the material is delivered. Students interest in the multimedia learning process developed was also influenced by the presence of various components in multimedia such as text, images, audio, video and animation. According to theory, 3 levels of experience from Bruner in Arsyad (2009), the learning process can be better if students use all their sense tools. The more sensory devices used in obtaining and managing information, the more likely information in the form of material or concepts is accepted. The results of the pretest and posttest scores can be seen in **Table** 2.

Table 2. Pretest-Posttest Score Analysis

No.	Score		*N-Gain*	Criteria
	Pretest	*Posttest*		
1.	68	95	0,84	High
2.	68	95	0,84	High
3.	53	84	0,66	Medium
4.	37	79	0,67	Medium
5.	73	95	0,81	High
6.	52	100	1,00	High
7.	68	89	0,66	Medium
8.	26	89	0,85	High
9.	32	79	0,69	Medium
10.	63	79	0,43	Medium
11.	58	100	1,00	High
12.	58	79	0,50	Medium
13.	52	84	0,67	Medium
14.	32	95	0,93	High
15.	42	79	0,64	Medium
16.	63	100	1,00	High
17.	58	79	0,50	Medium
18.	47	79	0,60	Medium
19.	52	79	0,56	Medium
20.	37	84	0,75	High
21.	28	89	0,85	High
22.	21	100	1,00	High
23.	16	84	0,81	High
24.	26	79	0,72	High
25.	73	100	1,00	High
Average	48,12	87,46	0,76	High



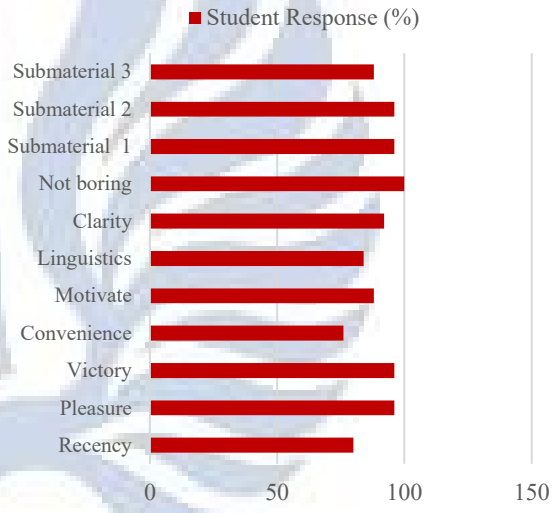
Graph 1 Results of Gain Value Interaction

Based on graph 1 it can be seen that almost half of

the students get an increase in the high category of gain. The use of learning media in the teaching and learning process can generate interest, motivation, and bring psychological influences to students, so that it can help the effectiveness of the learning process (Falahudin, 2014). Based on the gain interpretation criteria proposed by Hake (1999) of the three criteria for N-gain scores the results of the students' pretest and posttest were high with an average of 0.76. Of the 25 students, 11 students had moderate gain criteria and 14 students had high criteria. This shows that all students experience an increase in learning outcomes in knowledge competencies. This increase in learning outcomes is supported by research conducted by Ferit (2017) which in his research shows that multimedia can improve students learning outcomes. Likewise research Siti Zubaidah (2016) development of multimedia learning to improve cognitive learning outcomes of respiration system material. In the cone of experience in Dale (2012), it can be concluded that when the higher the level of abstractness of the message, the senses used will be more limited while the higher the level of concreteness of the message, the more senses are used to receive the message. Learning media that are developed are multimedia with a high level of concreteness of the message so that it can improve students learning outcomes. This is in line with Falahuddin's statement (2012) which states that media not only makes the learning process more efficient, but also helps students receive learning material more comprehensively because the use of media allows students to improve the quality of learning in order to improve their learning outcomes.

The increase in students learning outcomes obtained was able to show that using multimedia students can increase the value of the pretest which was originally low to high posttest values in the material of the solar system. This proves that multimedia developed has effectiveness in improving learning outcomes. Improving students learning outcomes is also supported by students responses. After the questionnaire was given to students with 11 statements. The statement of these statements includes novelty, attractiveness, ease, being able to increase motivation, not being bored and the material of the solar system in multimedia developed. Obtained results that each shows a positive response with a score of> 75% with an average of 90.18% with a very good category shown in Graph 2. Based on the graph it can be seen that the highest statement is at the point stating that multimedia is not boring. This is in line with the statement of Rokhimah Ratnawati (2013) that multimedia makes students not easily bored and easier to understand the material delivered by the teacher so that they can improve learning outcomes.

According to Danu et al (2012), students' positive responses can be used as a benchmark that students feel more comfortable using multimedia in the learning process. Most students 'attention will be focused on the learning process because students' interest in the module and students will not feel bored with the learning process so that students learning outcomes can increase.



Graph 2 Students Response

Based on the graph it can be stated that the multimedia developed has produced a positive students response. Positive responses can influence multimedia effectiveness.

CONCLUSION

Conclusion

Based on the results of the study, it can be concluded that multimedia in the material of the solar system can be said to be effective for improving students learning outcomes by obtaining a gain score of 0.76 with high criteria. Students learning outcomes are also supported by the results of students responses obtained by the average percentage value of 90.18% with very good criteria.

Suggestion

Based on the research that has been carried out, the advice that can be submitted is that:

1. The next researcher considers the condition of the school that allows students to bring laptop/ smartphone.
2. The researcher should check the application on the students laptop/smartphone before using it.

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