

## IMPROVING STUDENTS' LEARNING OUTCOMES THROUGH THE APPLICATION OF AN INTERACTIVE MULTIMEDIA ON HUMAN EXCRETION SYSTEM MATERIAL

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### Abstract

The research aimed to describe the improvement of students learning outcomes through the application of an interactive multimedia on human excretion system material. The research design used in this study was One Group Pretest-Posttest Design. This research was conducted in class VIII A and VIII D at SMPN 6 Gresik by involving 50 students. The method used in this study is the test method. The N-gain score obtained by class VIII A was 16% of students categorized as medium and 84% of students categorized as high, whereas the N-gain results obtained by class VIII D of students who were categorized as moderate by 12% and students categorized as high by 88%. The significance probability obtained by class VIII A and VIII D is 0,000 which indicates a significant increase in pretest and posttest. The average skills assessment obtained by class VIII A was 88.57 for the first meeting and 90 for the second meeting. In class VIII D the first meeting the average assessment of skills was 85.57 and 89.28 in the second meeting. Based on the results of the research, it concluded that the application of interactive multimedia on human excretion system material improved students learning outcomes.

**Keywords:** interactive multimedia, learning outcomes, human excretion system

### INTRODUCTION

Technology was an exploration medium that has an important role in education field. Technology provided a new nuance in the presentation of information, especially information in learning (Rante, 2019). The use of technology in learning can change the learning climate in traditional classrooms to be more interactive (Zuhrieh, 2019). The 2013 Curriculum of Indonesia also required students to play an active role in the learning process, the teacher only acted as a facilitator or guide in learning (Kemendikbud, 2016). Therefore, the learning process needed to be interactive and conducive, so that it needed interesting media so that the learning atmosphere was not boring (Sadiman, 2019).

One of the developments of learning media was multimedia. Multimedia was a combination of text, graphics, sound, animation and video that functions to convey messages to the public (Wahono, 2015). Wibiwanto (2017) also defined multimedia was everything that can be used to channel messages from the sender to the recipient so that it can stimulate thoughts, feelings, interests, and attention. Multimedia also functioned to explain complicated information or material that cannot be seen by naked eye (Pribadi, 2018).

Research conducted by Qosyim and Priyonggo (2017) showed that there was an increase in learning outcomes after the application of interactive learning media using

flash for material movement systems in humans class VIII. These results are evidenced by the results of the average gain obtained is 0.7632 which showed that all students have achieved mastery learning by experiencing an increase in learning outcomes. Research by Rahmawati (2019) showed that the results obtained after the application of interactive multimedia as learning have indicated the differences in the initial test scores and final tests of learning outcomes. This is evidenced by the value of  $t_{count} > t_{table} = 3,484 > 1,708$ .

Mayer's cognitive theory (2017) stated that humans will learn better by using audio, image, animation, video and text integration. The learning process using interactive multimedia is a learning process that uses integration of text, audio, video, images, and animation, so that information received can enter long-term memory (Mayer, 2017). This is also supported by the theory of dual coding (dual coding) by Paivio which stated that by using interactive multimedia showed that visual information and verbal information can be received in the same memory with the long term so that it can improve student learning outcomes (Solso, 2018).

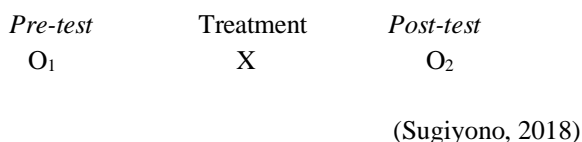
Based on the results of the pre-research questionnaire given to 54 students at SMPN 6 Gresik, it showed that 75% of students found it difficult to study the material of the human excretion system. Then 87% of students wanted interactive multimedia to be applied when learning

science. In addition to distribute questionnaires to students, interviews were conducted with science teachers. According to the science teacher at Gresik 6 Public Middle School, most of the eighth grade students had difficulty in understanding the learning material which memorized a lot and student learning outcomes in the excretion system material were obtained around 72% under KKM.

In this research, researchers applied multimedia developed by Cahyaningtyas (2017) which showed that the media which was developed was adobe flash-based interactive media that was fit to be used as a learning media with a feasibility percentage of 91.11%. This research was different from previous studies. In this study, the subject used was SMP Negeri 6 Gresik and improved learning outcomes included the results of learning knowledge and skills. Based on the facts above, the researcher intended to conduct research with title improving students' learning outcomes through the application of an interactive multimedia on human excretin system.

**METHOD**

The research design was "one group pretest posttest design". In this design a pretest is held at the beginning of the meeting to determine the initial state of the subject before being given treatment or posttest done at the end of the meeting. The design can be described as follows:



Notes:

- O1: *Pre-test* is a test given to student before being treated.
- X: Treatment of the application interactive multimedia on human excretion system material
- O2: *Post-test* is a test given to students after being treated

This research was conducted at SMPN 6 Gresik in the odd semester of the 2019/2020 school year. The sample in this study were students of class VIII A and class VIII D. Each class is 25 students. Data collection techniques using the test method. The test used is in the form of a pretest to find out the initial ability, a posttest to find out the student's final ability and a test of skills in making posters about the excretion system in humans and their application in maintaining personal health.

Analysis of learning outcomes data uses the normality test, homogeneity test, paired t test (paired t test) and N-Gain test. Normalized gain analysis is used to find out how much the increase in results between pretest and posttest using the formula below:

$$G = \frac{<Sf> - <Si>}{<Smaks> - <Si>}$$

(Hake, 2015)

Notes:

- <Sf> = *posttest score*
- <Si> = *pretest score*
- <Smaks> = *maximum score*

After obtaining the normalized gain score then it converted in Table 2:

**Table 1** N-Gain Criteria

Range	Criteria
0,0 < (<g>) ≤ 0,3	Low
0,3 < (<g>) ≤ 0,7	Medium
0,7 < (<g>) ≤ 1,00	High

(Hake, 2002)

The results of learning this skill are obtained from the assessment of product skills with the criteria set in the rubric, then the value is determined by the formula:

$$\text{Student Scores} = \frac{\text{Score Obtained}}{\text{Score Maximum}} \times 100$$

(Riduwan, 2015)

Then student learning outcomes on skills competency can be determined by the following assessment criteria:

**Table 2** Assessment Criteria for Learning Skills

Score	Criteria
85 < Score ≤ 100	Very Good
70 < Score ≤ 85	Good
55 < Score ≤ 70	Enough
0 < Score ≤ 55	Less

(Kemendikbud, 2015)

**RESULT AND DISCUSSION**

The assessment of student learning outcomes is carried out to assess whether the application of interactive multimedia on the material of the human excretion system can improve student learning outcomes. Assessment of student learning outcomes includes the assessment of knowledge and skills. Assessment of the pretest and posttest results was analyzed using the normality test, homogeneity test, normalized gain test, and paired t-test.

**Normality Test**

**Table 3** Normality Test Result

	<i>Pretest</i>	
	VIII A	VIII D
N (Total Students)	25	25
Mean	31,32	30,00
Asymp.Sig. (2 tailed)	0,163	0,107

The significance value obtained during the normality test was 0.163 > 0.05 for class VIII A and 0.107 > 0.05 for class VIII D. This shows that the data were normally distributed (Pallant, 2018).

**Homogeneity Test**

**Table 4** Homogeneity Test Result

Levene Statistic	Df1	Df2	Sig.
0,089	1	48	0,767

Samples are said to be homogeneous if Sig. > 0.05. Based on these data the significance value obtained was

0.767 > 0.05. This shows the data obtained are homogeneous.

**Paired t test**

**Table 5 Paired t test Results of VIII A**

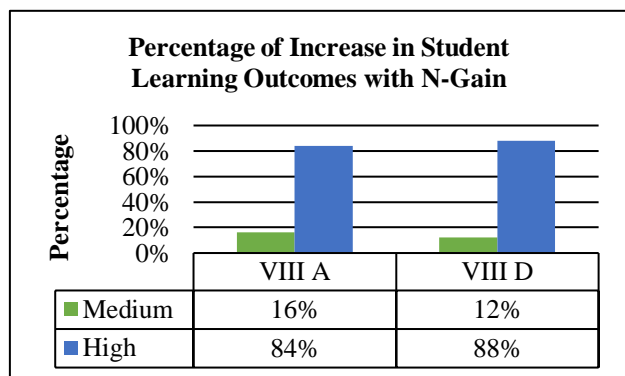
	t	df	Sig.
Pretest dan Posttest	-30,635	24	0,000

**Table 6 Paired t test Results of VIII D**

	t	df	Sig.
Pretest dan Posttest	-23,990	24	0,000

Based on Table 5 and Table 6 it can be seen that the probability value of class VIII A and VIII D is 0,000. This shows that the probability value is 0,000 < 0.05 which means that there is a significant difference between the pretest and posttest results (Pallant, 2010).

Normalized gain analysis is used to find out how much the increase in results between pretest and posttest. The percentage of class VIII A and class VIII D can be seen in the following diagram based on the classification of Hake (2002):



**Figure 1** Percentage Diagram of Improvement of Student Learning Outcomes with Grade VIII A and VIII D N-Gain

Based on the diagram of the percentage increase in student learning outcomes with N-gain class VIII A and class VIII D it can be seen that from 25 students of class VIII A there are 16% of students categorized as medium and 84% of students categorized as high. In class VIII D the N-Gain results were 12% in the moderate category and 88% in the high category students. Learning outcomes in the dimension of knowledge can be increased because previously students have not gotten the excretory system material, but after the application of interactive multimedia on the material excretion system students become more understanding and learning outcomes increase.

Learning outcomes in the dimension of knowledge can be increased because previously students have not gotten the excretory system material, but after the application of interactive multimedia on the material excretion system students become more understanding and learning outcomes increase. Salim and Tiawa (2015) stated that learning by using *flash* animation was very helpful for students in understanding science material and getting effective learning outcomes. *Flash* animations

were able to show different views of the learning process in the classroom, were able to analyze existing science concepts and can provide ideas that connect students with a basic understanding of new knowledge. The use of interactive multimedia based on *Adobe Flash* also helps students learn the subject matter independently. This was in accordance with the theory of constructivism which stated that through learning using interactive multimedia, the teacher acted as a facilitator, helping students to find facts, concepts or principles for themselves (Wijayanti, 2015).

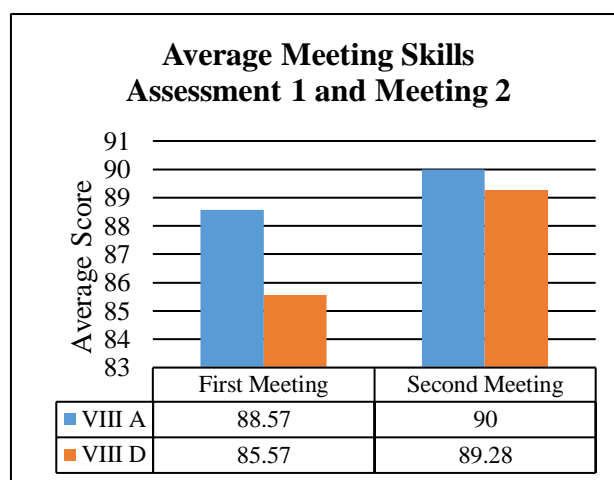
Improved learning outcomes were also in accordance with the cognitive theory of multimedia learning proposed by Mayer (2017) which stated that humans will learn better by using the integration of audio, images, animation, video and text. The learning process using interactive multimedia was a learning process that used integration of text, audio, video, images, and animation, so that the information received can enter long-term memory.

Improved learning outcomes are also following Jean as 16% and grade VIII D as many as 12% of students are of medium category. This is because students do not understand the language used in interactive multimedia and at the first meeting some students did not use headsets/headphones, so some of these students did not hear the audio from the explanation of the material.

The results obtained in this study are following the hypothesis that has been formulated, namely through the application of interactive multimedia on the material of the human excretion system, there is a significant difference in the average learning outcomes of grade VIII A and VIII D students at SMP Negeri 6 Gresik.

**Skills Learning Outcomes**

Assessment of learning outcomes on the dimensions of skills is the assessment of student skills in making work about the excretion system in humans and its application in maintaining personal health in the form of posters. The average diagram of the assessment skills of meeting 1 and meeting 2 as follows:



**Figure 2** Average Chart of Assessment Skills for Meeting 1 and Meeting 2

Based on the average skills assessment diagram (Figure 2) it can be seen in class VIII A the average skills

assessment is 88.57 for the first meeting and 89.28 for the second meeting. In class VIII D the first meeting averaged 85.57 and 90 for the second meeting. In this skill assessment, all students of grades VIII A and VIII D are complete (Appendix 2.9 and Appendix 2.10), because the value obtained  $\geq 75$  is the Minimum Mastery Criteria (KKM) value at SMPN 6 Gresik. The completed score is supported by the contents of interactive multimedia which can increase student knowledge and is used in making posters. Through media in the form of interactive multimedia, students can obtain knowledge, skills, and attitudes, so that with the appropriate media can improve student learning outcomes in the dimensions of skills (Arsyad, 2016).

The results of learning dimensions of knowledge and skills dimensions with the application of interactive multimedia on the material of the human excretion system in SMPN 6 Gresik have increased. This is evidenced by the N-Gain score obtained by students of class VIII A and VIII D in the high and medium category and the results of the significance probability value obtained for class VIII A and VIII D of 0,000 which indicates a significant increase in pretest and posttest. This is in accordance with research conducted by Qosyim and Priyonggo (2017) which shows that the application of interactive learning media using flash for motion system material in classroom humans can improve learning outcomes with an average N-Gain yield of 0.7632 in the high category. In the skill dimension also increased from the first meeting to the second meeting. This is relevant to Rahayu's research (2019) which states that using instructional media can increase student motivation and learning outcomes on the dimensions of knowledge and skills.

## CONCLUSIONS

Based on the results of the study it can be concluded that the interactive multimedia of the human excretion system can improve learning outcomes for class VIII SMP Negeri 6 Gresik.

## SUGGESTION

For further researchers, researchers are expected to consider the availability of infrastructure that supports research so that research does not experience obstacles.

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