Influence of macromedia flash based on computer animation media to improving student learning outcomes in the Haloalkane sub-discussion

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ABSTRACT

During learning students face difficulties in understanding abstract chemistry topics. Currently there is no appropriate media to be applied in the learning process in order to increase students' abilities. Therefore, a study was conducted using macromedia flash based on computer animation to improve learning outcomes in Madrasah Aliyah Negeri (MAN) 2 Medan Model schools in the Haloalkana sub-discussion. This study aims to determine the effect of macromedia flash based on computer animation media on student learning outcomes in the haloalkane sub-discussion and to determine the correlation between the responses given by students to macromedia flash based on computer animation media in the haloalkane sub-discussion. The population of these two samples was taken using random sampling technique, namely class XII IPA 9 as the experimental class and class XII IPA 10 as the control class. The type of this research is quasi-experimental using the pretest and posttest models. Data collection was carried out using multiple choice instruments and response questionnaires. Based on the results of the study, it was found that there was an increase in student learning outcomes between the experimental class and the control class after the implementation of computer animation-based macromedia flash in the Haloalkana sub-discussion at MAN 2 Model Medan and there was a relationship between the responses given by students to computer animation-based macromedia flash media in improvement of learning outcomes.

***Keywords:** Macromedia Flash, Learning Outcomes, Student Response, Haloalkane*

PRELIMINARY

Education takes an important part in shaping the personality and abilities of a nation. Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to develop spiritual strength, self-control, personality, and skills (Fajariyah et al., 2016).

The education system in Indonesia follows the National Education System which will bring progress and development to the nation. Currently the world continues to develop, so the education system needs to adjust the times that continue to develop. For this reason, the education system is required to use and be able to process educational resources efficiently and effectively (Munirah, 2015).

Currently efforts to improve the quality of education face obstacles, where the current final evaluation of national learning is no longer determined by the National Examination but is fully determined by the school. Data obtained from UNESCO states that the quality of educators is an important component in education (Arifa & Prayitno, 2019).

The main task of educators is to condition the environment to support changes in student behavior. Chemistry learning emphasizes on providing hands-on learning experiences through the development of process skills and scientific attitudes. Chemistry learning can be implemented if the teacher-teacher interaction. The use of learning media can help the limitations of educators in delivering lessons in class.

Media serves as a tool to convey information on learning materials and practice questions. The quality of learning is also influenced by differences in student characteristics (Yektyastuti & Ikhsan, 2016).

Learning media has a role in improving the quality of learning, the presence of learning media not only helps teachers in delivering material, but also provides added value in the learning process. The use of learning media in the teaching and learning process can generate student learning motivation and increase the stimulation of student learning activities.

Creative use of media can simplify and improve learning efficiency so that learning objectives can be achieved. The achievement of learning objectives can be influenced by the teacher in choosing learning media that are in accordance with the learning material and in accordance with the characteristics of students.

Chemical understanding is determined by one's ability to relate macroscopic, submicroscopic, and symbolic phenomena. A person has some level of competence to represent macroscopic phenomena. There are five levels of a person's competence in representing this phenomenon (Johnstone, 1993).

Based on the results of observations that have been carried out by researchers at the MAN 2 Model Medan school by using the interview method. The data obtained is the learning process of haloalkane material in this school using PowerPoint media and Problem Based Learning (PBL) learning models. Doing learning by using this media gets a response from students, that it is difficult to understand abstract chemistry. So, it is necessary to find a substitute for learning media. It is intended that students give a positive response by improving learning outcomes. The selection of substitute media must be in accordance with the learning model that will be used.

For this reason, learning media are needed that can help concrete abstract things, clarify message delivery, increase student understanding, encourage active students, and learn independently. The learning media used can be adapted to the environment where students live, making it easier to understand and encouraging students to learn.

The use of appropriate and varied chemistry learning media can overcome the passive attitude of students, and students' motivation will grow quickly. Thus, student learning outcomes will be more embedded in students if students get fun learning by using creative and innovative learning media. Student's difficulties in understanding abstract chemistry. So, we need the right strategies, media, and learning models to present chemistry material to students. Teachers as educators have a big enough role in choosing and using the right method by paying attention to the student's situation and a supportive learning environment, so that student learning outcomes will increase (Ramlah, 2018).

Based on this description, the researchers wanted to conduct a study entitled "The Influence of Macromedia Flash Based on Computer Animation Media on Improving Student Learning Outcomes in Haloalkane Subjects".

RESEARCH METHODS

This research is quasi-experimental research using pretest and posttest research models. This study involved an experimental class and a control class where the sample selection for each class was carried out by random sampling. The first class as an experimental class using macromedia flash learning media based on computer animation. While the second class as a control class using learning media that has been provided by the school. The research design is as in table 1 which will use the T_1 (preliminary test) and T_2 (final test) designs. While X and Y are learning media that will be used in both classes.

Table 1 Research Design

Group	Initial Test	Treatment	Final Test
Experiment	T_1	X	T_2
Control	T_1	Y	T_2

Information:

X = The treatment that will be given to the experimental class is learning using macromedia flash learning media based on computer animation.

Y = The treatment that will be given to the control class is learning using the Think Pair Share model using conventional learning media.

T_1 = Initial Test (Pretest)

T_2 = Final Test (Posttest)

RESULT AND DISCUSSION
Analysis of Research Results Data

After table 2 there is data on learning outcomes obtained in this study after the data was tabulated such as average, standard deviation, and variance of pretest and posttest data from each class, namely experimental class, and control class.

Table 2 Average, Standard Deviation, and Variance of Pretest and Posttest Data

Class	Average Value		Standard Deviation		Variance	
	Pretest	Posttest	Pretest	Posttest	Pretest	Posttest
Experiment	44,97	87,72	4,7	4,6	22,5	21,6
Control	44,00	85,00	4,6	5,2	21,3	26,8

Based on table 2, it can be described the average acquisition of the posttest value of the experimental class and the control class in figure 1.
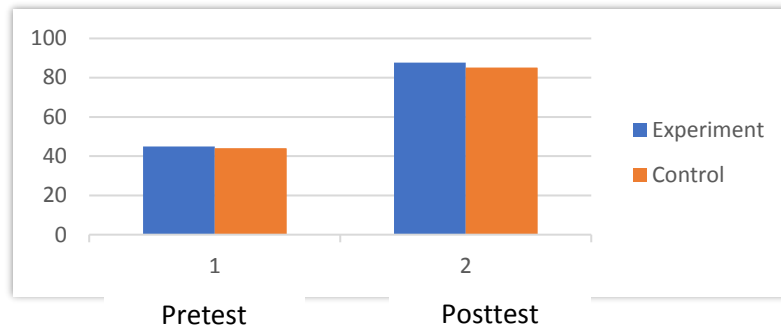
Figure 1 Pretest and Posttest Graph of Control and Experiment Class students

N-GAIN TEST

The results of the calculation of the improvement of learning outcomes can be seen that the average gain value of all students for each class as in table 4.2. Increased learning outcomes for experimental classes by 0.84 (84%) and control classes by 0.79 (79%).

Table 3 Improved Learning Outcomes

Class	Criterion	ΣX	$\%\overline{g}$	Information
Experiment	$\overline{g}$ <0.3 = low	0,84	84	Tall
Control	$0.3 < \overline{g} > 0.7$ medium $\overline{g} > 0.7$ = high	0,79	79	Tall

Based on table 3, it can be concluded that the improvement in learning outcomes in experimental classes and control classes belongs to the high category. The results of the calculations obtained statistical data on the gains of student learning outcomes in experimental classes and control classes summarized in table 4 as follows:

Table 4 Calculation of Student Learning Outcome Gain Data

Data	Statistics	Class	
		Experiment	Control
Gain	Gain Minimum	0.6	0,6
	Maximum Gain	1	1
	Average	0,84	0,79
	Standard Deviation	0,08	0,0940

Based on table 4 the great increase in learning outcomes in experimental classes is higher than the improvement in learning outcomes from the control class. The data on improving learning outcomes in experimental classes and control classes can be seen in figure 2.
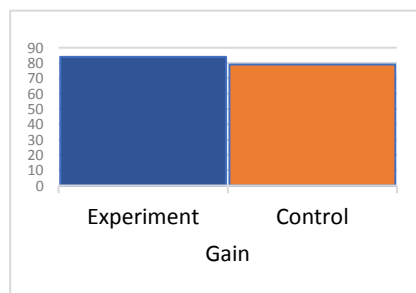

Figure 2 Graph of Improving Student Learning Outcomes

Based on the graph in figure 2, it can be concluded that there is an increase in student learning outcomes in experimental classes and control classes. In experimental classes there was an increase in student learning outcomes by 84%, and in control classes there was an increase in student learning outcomes by 79%.

HYPHOTESIS TEST I

An alternative hypothesis (Ha) to hypothesis I is that the increase in student learning outcomes using computer animation-based flash macromedia media is higher than the improvement in the learning outcomes of students using conventional media. Data on the results of the hypothesis I test calculation can be seen in table 5.

Table 5 Hypothesis Test

Class Data		t_{count}	t_{table}	Information
Experiment	**Control**			
$\bar{g} = 0,84$	$\bar{g} = 0,79$	2.08	2,04	Ha accepted
0,08	0,0940			Ho rejected

The hypothesis testing criteria, namely Ho, are rejected if the t_{count} is above 2.04. So that from this calculation obtained t_{count} for an increase in learning outcomes of 2.08 located in critical areas, then Ha was accepted, and Ho was rejected. Based on the results of the study obtained an increase in student learning outcomes in experimental classes by 84%, and an increase in student learning outcomes in control classes by 79%. The difference from the increase in learning outcomes between the two classes was by 5%.

STUDENT RESPONSE QUESTIONNAIRE CALCULATION

This student response questionnaire aims to find out students' responses to cognitive, affective, and conative dimensions to computer-animated macromedia flash learning media in the haloalkane sub-language in MAN 2 Model Medan. The results of the student response questionnaire can be seen in table 6 as follows:

Table 6 Student Response Experimental Class

Dimension	Indicators	Percentage	Criterion
Cognitive	Understanding The Content of Macromedia Flash Based on Computer Animation	81%	Strong
	Computer Animation Based macromedia flash Display Compatibility	79,5%	Strong
Affective	Motivation	79,5%	Strong
	Attraction	80%	Strong
	Curiosity	78,5%	Strong
Conative	Ask	77%	Strong
	Responding to Questions	77%	Strong

Table 6 shows that the percentage of experimental class students' responses to computer animation-based macromedia flash learning media in the Haloalkane sub-language has strong criteria. So, it can be concluded that students give a positive response to the media used.

HYPOTHESIS TEST II

A simple regression test was used by researchers to determine the linearity of the relationship between student responses and student learning outcomes after being treated using computer animation-based macromedia flash learning media. This test is done to find out whether hypothesis II in this study is accepted or rejected. The criteria of the test using the regression test if the $F_{count} > F_{table}$, then it can be concluded that Ho was rejected, and Ha was accepted. The results of the calculations for the regression test can be seen in table 4.8.

Table 7 Simple Linear Regression Test

Sources of Diversity	Db	JK	KT	F_{count}	$F_{(0.05)(1)(27)}$
Regression	1	53,10344828	53,103448	1,60677	1,21
Remnants	27	892,3448276	33,04980843		
Total	28	945,4482759			

Based on table 7, it is known that $F_{count} = 27$ while $F_{table} = 4.21$, because $F_{count} > F_{table}$ then Ho is rejected, and Ha is accepted. This can be interpreted that there is a significant and linear relationship between computer animation-based macromedia flash learning media and improved learning outcomes in the haloalkane sub-subject.

DISCUSSION OF RESEARCH RESULT

This research has been conducted in class XII IPA 9 and class XII IPA 10 in MAN 2 Model Medan using different learning media, where in class XII IPA 9 which is used as an experimental class using computer animation-based flash macromedia learning media and class XII IPA 10 which is used as a control class using conventional learning media.

Experimental classes use learning media in the form of computer animation-based flash macromedia using the Think Pair Share learning model. Meanwhile, control classes use conventional learning media in the form of power point media by using the Think Pair Share learning model as well. When researchers make observations with chemistry subject teachers in class XII at the school, teachers who teach using PowerPoint media and teach with an explanation system accompanied by a problem. Therefore, for the control class researchers use PowerPoint media.

Learning by using media is one way to make it easier to understand the material being studied. There have been many studies that discuss learning media. First, research in the development of learning module media to improve student learning outcomes. This research aims to change students' attitudes or knowledge after carrying out the learning process using modules that have been developed. As a result of this study, students can improve their learning outcomes when students know and realize how and the right way and strategy for themselves to do learning (Pratiwi et al., 2019).

The second research is to use learning media using computational methods on molecular forms. This research uses NWChem software and Chemsketch as comparison software. The results obtained from this study are the difference in student learning outcomes between classes using NWChem and Chemsketch software (Hasibuan et al., 2020).

The third research is to use learning media based on 3D visualization and animation that utilizes the results of computational calculations using NWChem software. This research makes 2D molecules into 3D molecules. The purpose of this research is to make students understand and understand the material taught. Especially in chemicals that are abstract. When providing learning can not only be through theory, but also the need to visualize abstract concepts that are being studied. This is evidenced by the results of research that states that this developed media can attract the attention of students and make it easier for students to understand the material (Sintiani et al, 2020).

Based on these three studies, author conducted research related to learning media by utilizing NWChem software to create a 3-dimensional learning media. The first research proves that with learning media, students can more easily understand the material being taught. The second study can be concluded that learning media using NWChem software will get better results compared to Chemsketch software. While the third research can be by using NWChem software, but in its application, it still uses PowerPoint. Thus, this research was carried out by applying learning media using computer animation-based flash macromedia. Macromedia flash was chosen as the media used for the learning process because the results of animations made in macromedia flash are smoother or not disconnected when moved, this is different from PowerPoints whose animations will be intermittent or slow loading because the stored files have a relatively large capacity.

Data normality testing was conducted using the Chi-Square Test, based on the calculation of the Chi-Square Test, it was found that the posttest scores of the two classes had normal distribution data ($X^2_{count} < X^2_{table}$) at a significant level of 0.05 with the number of students for the experimental class as many as 29 students and for the control class as many as 28 students. After the normality test calculation was completed, the researcher also conducted homogeneity testing and hypothesis testing. Homogeneity testing obtained F 1.06 for pretest, and 1.24 for posttest with F_{tabel} of 1.93. Based on the criteria of the homogeneity test, if $F_{count} < F_{table}$, then the data is declared homogeneous. Hypothesis testing first looks for the t_{table} value obtained from the t_{tabel} distribution data obtained by t_{table} of 1.93. While based on calculations obtained $_{calculations}$ of 2.08. Thus, the criteria for testing the t count hypothesis are in a critically fulfilled area. Therefore, it can be concluded, that in testing this hypothesis Ho was rejected and Ha accepted which means that there is an influence on student chemistry learning results taught by computer animation-based macromedia flash learning media with students who are taught using conventional learning media.

Although this study managed to improve student learning outcomes, in terms of completeness every student has not been achieved. This is because there are some students whose grades are below 85, or below the minimum completion criteria (KKM). Factors that can affect the non-achievement of

KKM are, the absence of student interest in carrying out the learning process, and the use of methods or media during learning (Fuad & Zuraini, 2016). But posttest grades cannot be used as a basis to see the completeness of student learning. This is because, there are supporting aspects to achieve student completion such as daily grades, student liveliness, and changes in behavior after the learning process. This statement needs to be underlined because, individuals who have certain personality attributes can become better people (Herlina & Zulrahmat, 2016).

Researchers also gave a response questionnaire to students to see how students responded after being given learning treatment using computer animation-based macromedia flash learning media. As a result of this student response questionnaire, researchers obtained data of 80.25% for cognitive aspects, 79.75% for affective aspects, and 77.75% for conative aspects. After the calculations were carried out on the student's response questionnaire, researchers conducted a correlation test between computer animation-based macromedia flash learning media and improved student learning outcomes. The correlation test in this study was 1.16, because the $r_{count} > r_{table}$ then Ha was accepted, and Ho was rejected. So, it can be concluded that there is a relationship between the media used against the learning outcomes of students who use computer animation-based macromedia flash learning media.

Based on the explanation above, some of the factors that support the success of this study for experimental classes are the selection of media used in learning. Thus, it can be concluded that there is a significant influence on the learning outcomes of students who are taught using macromedia flash learning media based on computer animation in the haloalkane sub-language in class XII MAN 2 Model Medan, as well as other factors.

CONCLUSION

Conclusions that can be drawn after conducting research and data processing are : there is an influence of student learning outcomes by using macromedia flash based on computer animation media in the haloalkane sub-subject. There is a correlation between the response given by students and learning outcomes using macromedia flash based on computer animation media in the haloalkane sub-subject.

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