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The Effect Of The Cooperative Learning Learning Model Using Flash Media And Motivation On Student Achievement In Gas Kinetic Theory Material At High School State 2 Medan Y.S. 2021/2022

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ABSTRACT

The aims of this study were: (1) There were differences in physics learning achievements of students who were taught using cooperative learning models using flash animation media compared to cooperative learning without using flash animation media (2). There are differences in learning achievement in groups of students who have high motivation and groups of students who have low motivation (3) Interaction between cooperative learning using flash animation media with motivation in increasing learning achievement. This research is quasi-experimental. The research population was students of class XII Science at High School State 2 Medan Y.S 2021/2022. The sampling technique used a purposive sample consisting of two classes with a total sample of 72 students. The research instruments are learning achievement tests and student learning motivation questionnaires. The test used to obtain data is in the form of multiple choice. The data in the study were analyzed using SPSS 25 with two-way ANOVA. The results of the ANOVA test obtained: 1. The physics learning achievement of students who were taught by the cooperative learning model using flash animation media was higher than the physics learning achievement of students who were taught by the learning model cooperative without using flash animation media. 2. The physics learning achievement of students who have high motivation is higher than the physics learning achievement of students who have low motivation. 3. There is an interaction between cooperative learning models using flash animation media and motivation in improving learning achievement.

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INTRODUCTION

In Law of the Republic of Indonesia number 20 of 2003 concerning the National Education System, Chapter II Article 3, it is formulated that education functions to develop abilities and shape the character and civilization of a dignified nation in order to educate the nation's life, aims to develop the potential of students to become human beings who believe and fear God Almighty, have noble morals, healthy, knowledgeable, capable, creative, independent, and a democratic and responsible citizen.

The achievement of educational goals will be determined by various elements that support it. Makmun (2016: 3-4) stated about the elements contained in the Teaching and Learning Process (PBM), namely: "(1) Students, with all their characteristics who strive to develop themselves as optimally as possible through learning activities, (2) goals, are something that is expected after teaching and learning activities, (3) teachers, always strive to create the right situation (teaching) so that it is possible for the learning process to occur."

The competency ability of Indonesian students based on the results of the Program for International Student Assessment (PISA) research in 2018 was ranked in the bottom 10 out of 65 countries and shows that student weaknesses mainly lie in the broad competence of students. The

same reality also occurs in most high schools in the country, many students have difficulty mastering academic competence. One example is reflected in the average test score of the odd sementer physics subject class XII IPA High School State 2 Medan as shown in table 1.1

Tabel 1. Data on the average value of Odd Semester Physics subjects Class XII IPA Y.S 2017/2018 to with 2019/2020

School Year	Average value	K K M
2017/2018	60	70
2018/2019	63	70
2019/2020	65	70

Source : Date on Administration of High School State 2 Medan

Low learning outcomes of students can be caused by the complexity of the teaching material itself because physics is classified as abstract. In addition, because the presentation of physics is less interesting and boring. This is related to the problem of the quality of physics teaching designs presented by teachers in learning activities, as stated by Gagne in Sanjaya (2017) that: "Teaching or teaching is part of learning, where teachers are more emphasized on how to design or arrange various resources and facilities available to be used or utilized by students in learning something".

Related to the presence of the media, Dimyati (2016) explained that a well-organized media systematically affects educational institutions such as family, religious, school, and scout institutions. The description shows that the presence of media has affected all aspects of life, including the education system, although in different degrees so as to affect the learning outcomes achieved by students.

The media used when explaining the subject matter at HSS 2 Medan generally still uses charts. For practicum, it is also carried out but not often due to limited tools and places. The use of computer media already exists in ICT subjects with computer devices available in laboratories. The use of in focus can be done but this tool is only 1 piece so it is not adequate for teachers to use in teaching.

Flash is one of the media that can be used by teachers in optimizing the teaching and learning process. In addition to saving words, saving time, explanations will be easy for students to understand, interesting, eliminate misunderstandings, and the information conveyed becomes consistent. The application of flash animation in the teaching and learning process in the classroom helps students understand the material because it looks attractive in the form of animation.

Motion animations will arouse student motivation to do activities in class. Learning will certainly be more fun if each teacher can make their own teaching devices using flash. So that students can digest and understand lessons more quickly and most importantly can be applied in everyday life.

In the teaching and learning process, a teacher is required to choose the right, appropriate and efficient learning model to stimulate students to actively and creatively learn and have motivation. The learning process of a topic can be packaged in a form of learning model. According to Joyce and Weil (1996) learning models are grouped into four types, namely social interaction models, information processing models, personality development models, and behavior modification models. The information processing model emphasizes improving students' ability to process information, in the sense of how students capture existing stimuli and store them as information that is meaningful to themselves in short- and long-term memory, as well as the ability to reuse the information for problem-solving purposes. This problem can be fixed with one of them, namely with the cooperative learning model.

Learning achievement is not only due to the intelligence factor of students, but there are other factors that can affect the learning achievement of these students. The factors in question are divided into two, namely internal factors and external factors.

Judging from the reasons for motivation, there are two kinds of motivation, namely extrinsic motivation arises due to external stimulation and intrinsic motivation arises from within the individual, generally because of awareness of the importance of something (Dalyono, : 2015). Students who have high motivation in learning physics will do activities faster than students who are less motivated in learning physics.

In a teaching and learning process, two very important elements are teaching methods and learning media. The choice of one particular teaching method affects the type of learning media to be used. The function of learning media is as a teaching aid that also affects the climate, conditions and learning environment arranged and created by the teacher. The use of learning media can generate new desires and interests, generate motivation and stimulation of learning activities, and bring psychological influences to students. Learning media can also help students improve their understanding of concepts (Azhar Arsyad, 2017).

Computer is a type of media that has the ability to store and manipulate information according to needs. The development of technology at this time has allowed computers to contain diverse information so that computers are not only used as facilities in offices, but also as a learning tool that allows students to be active and creative in teaching and learning activities.

In the world of computer education can be used as a learning medium, namely: 1). Store large amounts of data, 2). Calculate quickly and precisely, 3). Do repetitive work, 4). Display the form of graphs, charts, images guided by numerical data, 5). Work with computers can access data, knowledge, learning materials, 6). Connect with cyberspace so that it can establish direct contact with other countries, 7). Can display data and information that has been recorded in accordance with the wants and needs (Sri, 2016)

Animation is a moving image in the form of a set of objects (images) arranged in an orderly manner following a predetermined flow of movement at each increment of time that occurs. The image or object referred to in the definition above can be an image of humans, animals, or writing. In the process of making it, the animation maker or better known as animator must use logic thinking to determine the flow of motion of an object from the initial state to the final state of the object. Careful planning in the formulation of motion flow based on the right logic will produce interesting animations to watch.

In the field of graphics, visual modeling can be categorized into two groups, namely geometric modeling and appearance modeling. Geometric modeling is a representation of the shape of the object to be displayed while appearance modeling makes a representation of the visual properties or appearance of the object. Examples of visual properties include color and texture. Based on the definition of animation above that an animation is arranged by a set of images displayed sequentially, animation can be said to be a function of time.

There are 2 ways to create animations inside Flah, frame by frame animation and tweening animation. In frame-by-frame animation, images will be created in each frame while in tweening animation, only the initial frame and final frame are made, but Flash will create frames between them (in between). Tween animation is a great way to make motion and changes in movies with relatively small files.

There are several terms in making animation, including:

1. Frames can be likened to movies, where a film is a collection of images that are played sequentially at a certain speed, so that the image looks moving. A keyframe is a frame in

which changes to a key or animation are specified. In tween animation, keyframes are created only at important points in the timeline.

2. Keyframes are marked by a dot within the frame. Keyframes that do not contain images inside the layer are marked by blank dots.
3. Blank Keyframe means that a blank frame is prepared to be filled with a new object, and when drawn an object, the blank keyframe already contains an object. A blank keyframe is denoted by a white rounded dot on the frame.

Flash animation is often used to create a website banner, whether it's a large header banner or a small ad banner that is usually placed in the sidebar. Banners with flash animation look more attractive because there are text, images, or photos that move so that they are more pleasing to the eye.

Cooperative learning has a different structure of tasks and rewards in pursuing student learning. The structure of the assignment requires students to work together in small groups. The award structure recognizes collective and individual efforts. In the application of cooperative learning, two or more individuals depend on each other to achieve one common reward. They will share rewards if they succeed as a group.

The cooperative model used by teachers has the following characteristics (Ibrahim et al., 2016):

1. Students work in groups cooperatively to complete their learning material.
2. Groups are formed from students who have high, medium, and low abilities.
3. Where possible members of the group come from different races, cultures, tribes, genders. Awards are group-oriented rather than individual.

Another goal of the cooperative learning model is the widespread acceptance of different people based on their race, culture, social class, abilities, and disabilities. Cooperative learning provides opportunities for students from different backgrounds and conditions to work interdependently on academic tasks and through a cooperative reward structure will learn to respect each other. The third important goal of cooperative learning is to teach students the skills of cooperation and collaboration. Social skills are important for students, because currently many young people are still lacking in social skills (Isjoni, 2015).

Tabel 2. General steps of the cooperative learning model

No.	Fase	Teacher Behavior
1	Fase I Convey goals and motivate students	• The teacher conveys all the learning objectives to be achieved in the lesson and motivates students to learn.
2	Fase II Present information	• Teachers present information to students by way of demonstrations or through reading materials.
3	Fase III Organizing students into study groups	• The teacher explains to the students how to form study groups and helps each group transition efficiently.
4	Fase IV Guiding working and study groups	• Teachers guide study groups as they work on their assignments
5	Fase V Evaluation	• The teacher evaluates the learning results that have been learned or each group presents the results of their work.
6	Fase VI	• Teachers look for ways to reward both individual

Giving awards	and group efforts and learning outcomes.

Source: Ibrahim, et al(2015)

Motivation can be interpreted as the strength (energy) of a person that can cause the level of persistence and enthusiasm in carrying out an activity, both from within the individual himself (intrinsic motivation) and from outside the individual (extrinsic motivation).

McClelland's theory is known as the Need for Acievement (N.Ach) theory which states that motivation varies, according to the strength of a person's need for achievement. According to McClelland, the characteristics of high achievers have three general characteristics: (1). A preference for tasks with a moderate degree of repertinence, (2) Favoring situations in which performance arises due to one's own efforts, and (3). Want feedback on their successes and failures compared to those with low achievers. Syaodih (in Riduwa., 2005) states the function of motiv'si is:

1. Encouraging children to carry out activities and actions.
2. Can determine the direction of one's actions
3. Motivation is based on selecting the types of actions and activities of the same.

Yusuf (2014) suggests that to increase student motivation, teachers have the following roles:

1. Creating a learning environment that stimulates children to learn.
2. Provide reinforcement for behavior that shows motive.
3. Create a classroom environment that can develop students' curiosity and passion for learning.

With such treatment from teachers, students are expected to be able to arouse their learning motivation and of course the most important hope is that students get optimal learning results according to their abilities. Of course, to achieve these learning achievements will not be separated from the efforts made by teachers in providing motivation or encouragement to students in order to increase their learning motivation.

METHOD

This research was carried out at High School State 2 Medan in class XII IPA Y.S 2021/2022. The population in the study was high school students of class XII science consisting of 2 classes, namely: Class XII Science 1 and Class XII Science 2 with a total of 72 people. The sample in this study was students of class XII IPA, namely class XII IPA 1 and XII IPA 2.

This research is a quasi experiment (pseudo-experiment) by providing treatment in the form of learning. Design experiments with pretest and posttest that look at differences in learning achievement learned with cooperative learning models by utilizing flash animation media and motivation.

Table 3. Pretest and Postest Experiment Design.

Group	Pretest	Learning	Postest
A	√	X1	√
B	√	X2	√

Information:

X1 : Classes that use flash animation media in cooperative learning.

X2 : Classes that do not use flash animation media in cooperative learning.

The variables in this study are:

a. The independent variables are: flash animation media in the cooperative learning learning model and learning motivation.

b. The dependent variable is learning achievement

In this study, there were two classes that received different learning treatment. The first class uses flash animation media in cooperative learning and the second class with cooperative learning without flash animation media. Research data in the form of learning test results using gain scores that are distinguished from students with high motivation, and low motivation.

The material used in the research is Gas Kinetic Theory which is compiled based on teaching materials that follow the syllabus. The research design can be seen in Table 3.2

Table 4. Research Design

Parameters	Experiment (Cooperative learning with animation media	Control (Cooperative learning without animated media
High Motivation	A_1B_1	A_2B_1
Low Motivation	A_1B_2	A_2B_2

Information:

A_1B_1 = Average for experimental classes with highly motivated students.

A_1B_2 = Average for experimental classes with students who have low motivation.

A_2B_1 = Average for control classes with highly motivated students.

A_2B_2 = Average for control classes with low-motivation students.

Data collection techniques are carried out using research instruments, namely, physics learning achievement tests and learning motivation questionnaires. Its use instrument is to measure physics learning achievement which is compiled in the form of objective tests or multiple choice and measure student learning motivation.

An objective test (multiple choice) is a test that in its examination can be carried out objectively. Some of the advantages of objective tests include: (1) contain more positive aspects, for example more representative of the content and area of the material, more objective, can be avoided from the intervention of subjective elements both from students and aspects of the teacher who examines, (2) easier and faster how to check, (3) the examination can be left to others, and (4) in the examination, There is no subjective element that influences.

Motivation questionnaires are given to respondents after learning, to find out student learning motivation can be seen in Table 3.3. The measurement technique for the motivation questionnaire with alternative answers consists of 4 options, each of which scores each option is: strongly agree to be given a score of 4, agree to be given a score of 3, disagree to be given a score of 2, and strongly disagree to be given a score of 1.

Tabel 5. Student learning motivation questionnaire grid.

No	Indicator	Item Number	Sum
1	Effort to learn	1,3,5,10,11,12,23,	8
2	Expectations for success in Learning	2,8,9,20,24	5
3	Want to learn by using flash media	4,6,7,14,15,16,17,18,19	9
4	Want to compete in the field of Physics	13,21,22,25	4
	Total		**25**

To test the validity of the question items, Product Moment Correlation is used. To get the calculated value by using SPSS. Question items are declared valid (valid) if $r_{hitung} > r_{tabel}$ to a significant degree $\alpha = 0{,}05$. Conversely, if the price $r_{hitung} < r_{tabel}$ Then the question is declared invalid so the question must be replaced (Surapranata, 2014).

To determine the coefficient of reliability of the test used Kuder Richardson's formula (K-R 20). Usually (K-R 20) is used for item tests that are systematically made using multiple choice, for example multiple choice five answers, four answers, and so on (Sukardi, 2013). The reliability coefficient of the test can be determined using the Excel program and the value is consulted with the following limits:

1. Interval 0,000 – 0,199 categorized very low
2. Interval 0,200 – 0,399 categorized low
3. Interval 0,400 – 0,599 categorized as medium
4. Interval 0,600 – 0,799 categorized high
5. Interval 0,800 – 1,000 categorized very high

In essence, a good test item is one that is neither too easy nor too difficult. If it is too easy, then the test taker is not motivated to increase the effort to solve it. When tests are designed to measure intelligence, P prices range between very difficult and very simple. For classroom use, most educators usually use moderate tests, that is P beetwen 0,3 until with 0,7 (Surapranata, 2014). To determine the level of difficulty of each test item, the formula is used:

P = $\frac{B_A}{J_A}$ $\frac{B_B}{J_B}$

$\frac{B}{JS}$

Information:
P = Question Number Difficulty Level
B = the number of respondents who answered correctly from the JS
question item = the number of participants (respondents)

To interpret the level of difficulty of the question items, criteria are used:
0,00 – 0,29 Categorized as difficult
0,30 – 0,69 categorized as medium
0,70 – 1,00 categorized easily

The differentiating power of the questions is to determine whether or not a question can distinguish groups in aspects measured according to the differences that exist in the group which is used in distinguishing between high-ability test takers and low-ability test takers (Surapranata, 2014). To determine the distinguishing power of each test item, the proportion of the upper group and the lower group is divided by means of:

1). The data is sorted from highest value to lowest value.
2). Taken 50% from the high value group (upper group) and 50% from the low value group (lower group).
3) Perform calculations by using formulas:

$$D = \frac{B_A}{J_A} - \frac{B_B}{J_B} = P_A\text{-}P_B$$

Information:
D = differentiation power discrimination index
J_A = the number of upper group participants
J_B = the number of participants in the lower goup
B_A = Many of the top groups answered correctly
B_B = The number of the bottom group answered correctly

From the calculation results, it can be seen that the criteria for the distinguishing power of the question are as follows:

D = 0,00-0,20 : Less
D = 0,21-0,40 : Enough
D = 0,41-0,70 : Good
D = 0,71-1,00 : Excellent

Analyzing data is a critical step in research. The pattern of analysis used should be clear and certain. To determine what analysis techniques are needed, depending on the purpose of data analysis to be achieved (Sukardi, 2013). In this research analysis, descriptive and inferential analysis is used. The research data are expressed in terms of mean value, standard deviation, median and mode. For this analysis, it is carried out using the SPSS 25 program. Student achievement is calculated using the g factor (gain score normalized) formula, as follows:

$$G = \frac{skor\ post\ test - skor\ pre\ test}{skor\ maksimum\ ideal - skor\ pre\ test}$$

Information:

G < 0,3 Low category
0,3 ≤ g ≤ 0,7 Medium Category
G > 0,7 High category (Hake dalam septa, 2010)

The normality test is intended to determine whether or not the distribution of research data is normal, meaning whether the distribution in the population is normal. Normality test using SPSS 25 with Kolmogorop Smirnov test. Data is said to be normally distributed if Asymp.sig (2-tailed) > Degree of significance 0,05. Homogeneity aims to find out whether the distribution of data in the population is homogeneous. The homogeneity test is performed by the Levene test using SPSS 25, It is stated that the data is homogeneous if Asymp.sig (2-tailed) > Degree of significance 0,05.

The effect of learning methods on learning achievement of cognitive scales is analyzed with the General Linear Model (GLM). Statistical hypotheses that need to be tested in this study, among others:

1. H_o : $\mu A_1 = \mu$ There is no difference in student achievement learned with the cooperative learning model by utilizing flash animation media.
   H_a : $\mu A_2 \neq \mu A_2$ There are differences in student achievement learned with the cooperative learning model by utilizing flash animation media.
2. H_o : $\mu B_1 = \mu B_2$ There was no difference in the learning achievement of students who had a high motivation group with a low motivation group..
   H_a : $\mu B_1 \neq \mu B_2$ There are differences in the learning achievement of students who have high motivation groups with low motivation groups.
3. H_o :A>< B = 0 There is no interaction between the cooperative learning model and utilizing flash animation media and motivation in improve learning achievement
   H_a :A>< B ≠ 0 There is an interaction between the cooperative learning model and the use of flash animation media and motivation in improving learning achievement

RESULTS AND DISCUSSION

Based on the results of the test instrument validity test, the calculation results are presented in table 6. the following

Table 6. results of the test instrument validity test

No Item	Rhitung	Rtabel	Conclusion
1	.586	>0,304	Valid
2	.374	>0,304	Valid
3	.456	>0,304	Valid
4	-.150	<0,304	Invalid
5	.318	>0,304	Valid
6	.387	>0,304	Valid
7	.662	>0,304	Valid
8	.323	>0,304	Valid
9	.456	>0,304	Valid
10	.157	<0,304	Invalid
11	.326	>0,304	Valid
12	.467	>0,304	Valid
13	.359	>0,304	Valid
14	.544	>0,304	Valid
15	.390	>0,304	Valid
16	.122	<0,304	Invalid
17	.321	>0,304	Valid
18	.586	>0,304	Valid
19	.407	>0,304	Valid
20	.485	>0,304	Valid

Based on the results of the test instrument reliability test, the calculation results are presented in table 7 the following;

Tabel 7. Descriptive Data Statistics of Learning Outcomes

	N	Minimum	Maximum	Mean	Std. Deviation
Pretes Eksperimen	36	10	55	29,34	10.602
Postes Eksperimen	36	60	85	73,16	7.482
Pretes Kontrol	36	10	50	27,24	10.313
Postes Kontrol	36	45	75	65,13	6.095
Valid N (listwise)	36				

Based on the results of the normality test calculation, the above data is seen for the Asymp table. Sig. (2-tailed) both pretes and postes experimental class and control class. To find out normal or unknowable data with criteria if the value of Asymp. Sig. (2-tailed) >α = 0.05 then normal data. Based on the results of calculations it is known that all values of Asymp. Sig. (2-vailed) as a whole > α = 0.05, so it can be concluded that all data are normally distributed.

Test of Homogeneity of Variances

Table 8. Physics_Grades

Levenetatistic	df1	df2	Sig.
.001	1	74	.972

Based on the calculation results, it is known that all Sig. values as a whole > 0.05, so it can be concluded that all data is homogeneous. Testing this hypothesis was carried out with the two-line

ANAVA technique using SPSS 25 which was used was a 2-lane ANOVA, with the test criteria used was F count greater than F table at a significant level α = 0.05 then the proposed hypothesis was accepted.

In the results of SPSS calculations, statistical test outputs for cooperative learning can be obtained by utilizing flash animation media with motivation that shows there is interaction between the cooperative learning model by utilizing flash animation media and motivation in improving learning achievement can be seen in the table.

Table 9. Dependent Learning_Outcome Variables

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	.108[a]	3	.036	2.369	.004
Intercept	13.999	1	13.999	918.252	.000
Interaksi	.108	3	.036	2.369	.004
Error	.595	39	.015		
Total	14.742	43			
Corrected Total	.703	42			

a. R Squared = ,154 (Adjusted R Squared = ,089)

Based on the anova test table above, Fcount is 2.369 with Sig. 0.004. Because the Sig value. <α = 0.05, it turns out that the value of Fcount = 2.369 > Ftable = 1.919 so that hypothesis testing rejects H0. So it can be concluded that there is an interaction between cooperative learning models using flash animation media and motivation in improving learning achievement.

From the calculations it was found that the percent increase in learning outcomes for the experimental class (60.0%) was greater than the percent increase in learning outcomes for the Control class (50.7%) with the difference in improvement between the experimental and control classes being (9.3%). This shows that there is a significant difference in the percentage of Physics learning achievement taught using the cooperative learning model utilizing flash animation media (experiment) and the direct cooperative learning learning model (control). Based on hypothesis testing, the cooperative learning model utilizing flash animation media provides a difference. which is significant where Fcount = 5.570 > Ftable = 1.919 so that the hypothesis testing rejects H_o. In other words, students who are taught using a cooperative learning model using flash animation media will achieve higher physics learning achievements compared to cooperative learning without using flash animation media. The results of the first research show that in general the flash animation media in cooperative learning on Ideal Gas Kinetic Theory material provides benefits to student learning achievement. The influence of the cooperative learning model on increasing student learning achievement can be seen from the achievement of the average post test score in the two sample groups, for the experimental class (73.16) and the control class (65.13). This shows that flash animation media can help students better understand abstract concepts such as the Ideal Gas Kinetic Theory.

The results of the second study indicate that student learning motivation can improve student learning achievement. The research data informs that students who have high motivation have a mean difference of 89.37 and low motivation have a mean difference of 67.00. Based on testing the second hypothesis, it is proven that motivation can significantly influence learning achievement where Fcount = 0.169 with Sig. 0.004. Because the value of Sig. < α = 0.05, it can be concluded that there is a difference in the learning achievement of students who have high motivation and those with low motivation on student learning achievement.

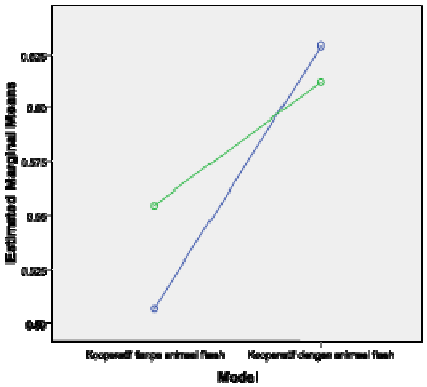

Figure 2. Interaction Line Pattern Between Cooperative Learning Model with Flash Animation and Cooperative Learning Model without Flash Animation on Learning Achievement

From the graph above, this research concludes that there is an interaction between the cooperative learning model utilizing flash animation media and motivation in improving learning achievement, as seen in the graph above. So that the hypothesis proposed H_0 is rejected

CONCLUSION

Based on the results and discussion of the research that has been carried out and described, it can be concluded as follows: (1) The learning achievement of students who are taught by cooperative learning models using flash animation media is higher than the learning achievements of students who are taught by cooperative learning models without utilizing flash animation media. (2) Students who have high learning motivation have higher learning achievement than students who have low learning motivation. (3) There is an interaction between flash animation media in cooperative learning with learning motivation in improving student achievement. From the results of further testing it turns out that students who have high motivation get higher learning achievement if they are taught cooperative learning models by utilizing flash animation media than students who have low motivation.

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