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The Effect of Cooperative Learning Model Type Group Investigation Assisted Flash Media, Scientific Attitude on Students' Conceptual Knowledge

Feggi Yuandini* Sahyar
Post Graduate, State University of Medan, Medan, Indonesia

Abstract
This research aimed to find out whether the conceptual knowledge of students on cooperative learning model type Group Investigation assisted flash media better than conventional learning; to find out whether the conceptual knowledge of students who have above average scientific attitudes is better than students who have below average scientific attitudes; to find out whether there was an interaction between cooperative learning model type Group Investigation with students' scientific attitude in improving students' conceptual knowledge. This research was quasi experiment research. The population was all students of class XI-IPA SMA Negeri 1 Hamparan Perak Academic Year 2016/2017. The sample selection was done by using random class technique of two classes. The first class was the class XI-IPA 1 as an experimental class taught with cooperative learning model type Group Investigation assisted flash media and the second class was class XI-IPA 2 taught by conventional learning. The instruments consisted of a conceptualized science test and a validated scientific attitude questionnaire. The data in this research were analyzed by using two-way ANOVA. The results showed that the conceptual knowledge of students who were taught using cooperative learning model type Group Investigation assisted flash media better than conventional learning. The students' conceptual knowledge with above average scientific attitudes shows better results than students with below average scientific attitudes. There was an interaction between cooperative learning model type Group Investigation assisted flash media and scientific attitude on students' conceptual knowledge. This interaction showed the dominant students' conceptual knowledge on cooperative learning model type Group Investigation assisted flash media in group of students who have above average scientific attitude.
Keywords: Group Investigation, Macromedia Flash, Scientific Attitudes, Conceptual Knowledge

1. Introduction

The nature of physics concepts are abstract, some are concrete. Abstract physics concept is difficult to visualize, so can make the students difficult in studying physics concepts (Swandi, 2014). The most important thing in studying physics is to interpret every concept contained in the material physics. While most students are only adept in solving problems from the math aspect only. Students often lack the ability to visualize and interpret abstract physical concepts in meaningful ways (Balta, 2015).

Understanding the concept of physics is supported by the students' scientific attitude. Barnes and Dolby (Patil, 2001) suggest a scientific attitude can be regarded as a complex thing that is the values and norms inherent in the people of science. Kaur (Kaur, 2013) defines scientific attitude as the most important outcome of the teaching of science. Scientific attitude is an attitude that must exist in a scientist or academician when faced with scientific problems. This scientific attitude needs to be familiarized in various scientific forums, for example in discussions, seminars, workshops, and the writing of scientific papers. Indicators of scientific attitude that observed were curiosity, respect for evidence, critical reflection, creativity and inventiveness, open minded, cooperation with others, willingness to tolerate uncertainty, sensitivity to environment. This scientific attitude will increase students' conceptual knowledge.

Conceptual knowledge is a complex and organized knowledge of some factual knowledge. Conceptual knowledge implies the relationship between factual knowledge in the form of basic elements with larger scientific structures that allow for new knowledge (Anderson, 2001). Conceptual knowledge includes three types: knowledge of classification and category, knowledge of principles and generalizations, and knowledge of models, theories, and structures. Classification and category are the foundations in principle and generalization. Principles and generalizations form the basis for theory, model, and structure.

Assessment of learning outcomes undertaken by teachers so far only use the assessment of cognitive learning outcomes in general and still use Bloom's cognitive theory. The 2013 curriculum specifically divides assessment of learning outcomes into factual, conceptual, procedural and metacognitive knowledge with indicators of each knowledge based on the revisions of Anderson and Krathwohl. The assessment of learning outcomes by teachers on knowledge competence includes the level of ability to know, understand, apply, analyze, and evaluate factual, conceptual, procedural, and metacognitive knowledge (Bello, 2011).

Based on the interviews with physics teachers in SMA Negeri 1 Hamparan Perak and observations found problems related to the process of learning in the classroom that is still using conventional learning where

students tend to be passive. Then the lack of conceptual knowledge of students in physics lessons. Teachers also still use the assessment in general.

In response to the above problems, it was necessary to have a learning model that oriented learning on experiment activities and discussions that can create student involvement in the learning process to foster interest and understanding of student physics concept (Aksoy, 2013). Students who learn by active learning methods, not only learn better, but also take more pleasure in the learning experience (Bello, 2011). One of the learning models to enable students through group learning in class and conduct discussions, exchanging opinions and questioning is a cooperative learning model type Group Investigation (Akçay, 2012).

Cooperative learning model type Group Investigation is a learning model where students are active in discussions in heterogeneous groups, exchanging opinions and practicing activities (Hossain, 2013). Cooperative learning model type Group Investigation has constructivist theory base proposed by Piaget and Vygotsky. Constructivist is a perspective of teaching and learning in which a learner constructs meaning from experience and interaction with others and the teacher's role is to provide meaningful experiences for students. There is six steps of this model that are topic selection, cooperative planning, implementation, analysis and synthesis, presentation of final product, and (Arend, 2012).

The principle of reaction in cooperative learning model type Group Investigation is the teacher's role in group investigation is one of counselor, consultant, and friendly critic. Teachers must guide and reflect the group experience over three levels: the problem-solving or task level, the group management level, and the level of individual meaning. Intervention by the instructor should be minimal unless the group bogs down seriously. The support system for group investigation should be extensive and responsive to the needs of the students. The school needs to be equipped with a first-class library that provides information and opinion through a wide variety of media; it should also be able to provide access to outside resources as well. Children should be encouraged to investigate and to contact resource people beyond the school walls. One reason cooperative inquiry of this sort has been relatively rare is that the support systems were not adequate to maintain the level of inquiry. Instructional effects of this model are constructionist view of knowledge, disciplined inquiry, effective group process and governance, interpersonal warmth and affiliation. While, the nurturant effects of this model are respect of dignity of all and commitment to pluralism, independence as a learner and commitment to social inquiry (Joyce, 2009).

Point of cooperative learning with learning methods where students struggle together in small groups to gain common knowledge. In this way, students are responsible not only for their own learning, but students are also responsible for others (Lavasani et all, 2011). In accordance with the results of research conducted by MacLeod (2013) and Önder & Silay (2016) that this learning model can train students in developing the students' understanding of physics concepts.

2. Method

The research was conducted in SMA Negeri 1 Hamparan Perak in the Academic Year 2016/2017. The population of this research were all students in grade XI IPA in SMA Negeri 1 Hamparan Perak that consist of 4 classes.

The sample in this research were taken with random class. The sample were XI IPA 1 as an experimental class that used cooperative learning model type Group Investigation assisted flash media and XI IPA 2 as a control class that used conventional learning.

Samples taken as many as 2 classes, consisting of experimental classes taught by Group Investigation model assisted flash media and control classes taught by using conventional learning. Both class consist of 30 students in Physics subject. This type of research is quasi experiment using pre-test and post-test that aims to see the effect of the Group Investigation model on conceptual knowledge that distinguishes above average scientific attitudes and below average scientific attitudes.

Design research with 2x2 factorial design for technical analysis of two way variance (ANOVA). Data collection techniques in this research obtained through a test of conceptual knowledge and a scientific attitude questionnaire. Data collection conducted in two stages, collecting data on students 'scientific attitudes and collecting data on students' conceptual physics knowledge.

Conceptual knowledge test used 20 multiple choice questions using five answer options. The instrument for scientific attitude was in the form of a questionnaire with 20 statements with five possible answers to each question. The scale used is Likert scale. The answer of each instrument item ranges from very positive to very negative.

3. Result

Student's conceptual knowledge on control class and experiment class shown in Table 1 below.

Table 1. Pre-test and Post-test Results of Students' Conceptual Knowledge

	Conceptual Knowledge	
	Control Class	Experiment Class
Pre-test	38.5	41.0
Post-test	62.0	70.0

Based on Table 1, the description of the average pre-test and post-test conceptual knowledge in experiment class and control class as follows: Pre-test on control class and experiment class were 38.5 and 41.0. Post-test on control class and experiment class were 62.0 and 70.0.

3.1. Analysis of Conceptual Knowledge Items on Control and Experimental Class

Post-test questions of conceptual knowledge that have been answered by the students are analyzed per point. This analysis was useful to look at which student conceptual knowledge indicator becomes difficult for students.

Analysis of conceptual knowledge items each post-test item that has been given to the experimental class and control class can be seen in Table 2 below.

Table 2. Average Value of Student Answers to Each Post-test of Conceptual Knowledge in Class Control and Experiment

No	The Dimension of Conceptual Knowledge	Percentage of Achievements	
		Control	Experiment
1	Classification and Category	73.33%	83.33%
2	Principles and Generalizations	63.33%	73.33%
3	Theory, model and structure	56.67%	66.67%

Based on Table 2, the conclusions of this analysis are the percentage of students achieving the average score that correctly answers the conceptual knowledge of the students in the experimental class higher than the control class.

And the highest percentage of achievement for each indicator lies on the first indicator, that is classification and category, where the percentage of achievement in the experimental class is 83.33% and the control class is 73.33%.

This is because the conceptual knowledge issues that are classified and category indicator are easy to solve because the knowledge of classification and category includes class, category, division, and specific arrangement in discipline. Knowledge of classification and category is the basis of principles and generalizations. Principles and generalizations form the basis for theory, model, and structure.

While the lowest percentage of achievement for each indicator lies in the third indicator, that is theory, model and structure, where the percentage of achievement in experiment class is 66.67% and control class is 56.67%. This is because the conceptual knowledge of the theory, model and structure is difficult to solve for students compared to the previous two categories because the knowledge of theory, model and structure includes knowledge of the various paradigms, epistemology, theories, the models used in the disciplines, Disciplines to describe, understand, explain, and predict phenomena.

3.2. Data Analysis of Conceptual Knowledge Based on Level of Scientific Attitude

The results of conceptual physics knowledge on student post-test in control class and experiment class on above average scientific attitudes and below average were shown in Table 3 below.

Table 3. Two-Way ANOVA

Class / Scientific Attitude	Control Class (A_1)	Experiment Class (A_2)	Average value
Above Average (B_1)	63.75	76.92	69.66
Below Average (B_2)	60.00	64.71	62.58
Average value	62.00	70.00	

Before testing the first hypothesis tested the prerequisite is the normality test, homogeneity, and test results of normal and homogeneous data distribution. After the prerequisite test, then continued with two-way ANOVA with SPSS 17.0

Table 3 shows the value of conceptual knowledge of students who were taught by using cooperative learning model type Group Investigation assisted flash media and conventional learning related to students' scientific attitude.

To be more clearly seen as the interaction will be shown in Figure 1.

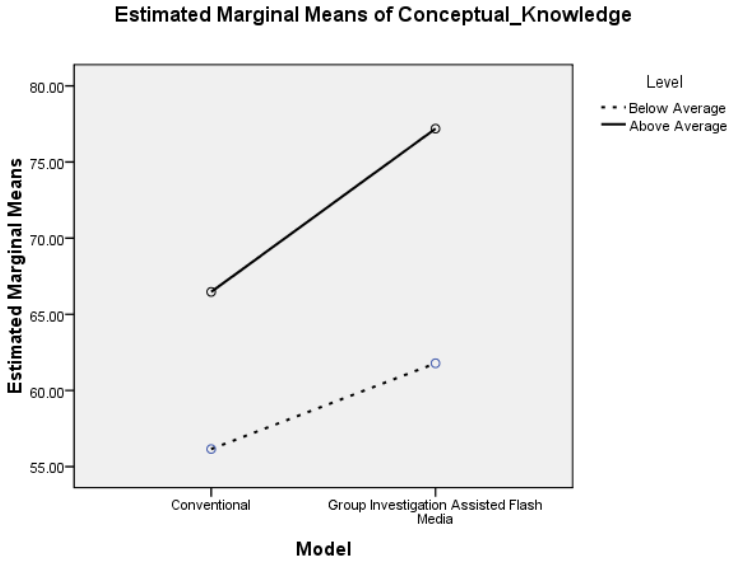

Figure 1. belum ada nama.

The graph shows that in the classroom which is taught by cooperative learning model type Group Investigation assisted flash media with above average scientific attitude have conceptual knowledge value better than below average scientific attitudes. In the control class, the conceptual knowledge of students who have above average scientific attitudes was similar to that of the conceptual knowledge of students who have below average scientific attitudes. The graph showed that cooperative learning model type Group Investigation assisted flash media with above average scientific attitude had a positive influence in improving students' conceptual knowledge.

4. Discussion

The research was conducted in SMA Negeri 1 Hamparan Perak in the Academic Year 2016/2017. The population of this research were all students in grade XI IPA in SMA Negeri 1 Hamparan Perak, that consist of 4 classes

4.1. Student's Conceptual Knowledge by Using Cooperative Learning Model Type Group Investigation Assisted Flash Media better than Conventional Learning

The results obtained in this research indicate that the conceptual knowledge of students with cooperative learning model type Investigation assisted flash media better than conventional learning. This was seen from the sig. value 0.000 < 0.05 and the average value of conceptual knowledge of the experimental class is 70 better than the control class of 62. This was because the stages in the cooperative learning model type Group Investigation assisted flash media can develop students' conceptual knowledge. This was also because the cooperative learning model type Group Investigation had several advantages, among which are able to build students' ability in terms of investigating a concept by doing the lab so that students are expected to understand about the concept. The next advantage is that it can increase the level of participation in group discussions to solve problems encountered while conducting investigations. So students are trained in thinking logically about the concepts learned. This is the underlying reason why students who are taught using Group Investigation cooperative learning models are better than students who are taught by conventional learning.

Group Investigation cooperative learning has been well documented in educational research as a successful pedagogy for improving students' academic performance (Hossain, 2013). The results of Suhendri and Sahyar(2012), Harahap and Turnip (2014), Aristi (2014), Ariadi et al (2014), Astra et al (2014), Ade Mayasari et al (2013). Group Investigation cooperative learning is better at improving learning outcomes. The similarity of this research with previous studies lies in the use of learning model that is cooperative learning model of Group Investigation type. While the difference lies in the use of media. In this research, cooperative learning model of Group Investigation type is added with flash media usage. The next difference lies in the dependent variable. In this research, the dependent variable is conceptual knowledge whereas in previous studies is the result of learning

4.2. Conceptual Knowledge of Student Physics Who Have Scientific Attitudes Above Average is Better Than Students Who Have Scientific Attitudes Below Average

The results obtained in this research indicate that the conceptual knowledge of students in the group of students

who have above average scientific attitudes better than the group of students who have below average scientific attitudes. This is seen from the sig value. Of 0.000 <0.05 and the average value of conceptual knowledge of students in groups of students who have above average scientific attitudes of 69.66 is better than the group of students who have below average scientific attitudes of 62.58.

This is because in the experimental class is taught by cooperative learning model type Investigation Group assisted flash media closely related to scientific attitude, where every stages of cooperative learning model type Investigation Group assisted flash media always associated with scientific attitude. Starting from the beginning in the phase of choosing a topic, by confronting the problem of the topic to be studied, the student is already aroused to know more. Then in the cooperative planning phase, students will do the planning in terms of doing a lab work like a scientist. Furthermore, in the implementation phase, students' enthusiasm to know very much related to what happened from the experimental activities undertaken. Similarly, in the phase of analysis and synthesis, presentation of final results, as well as evaluation. These phases lead to students' curiosity because through these phases students will be able to know the results of the scientific process that has been done.

Based on the results of research Emirianti (2005) and Purwaningsih (2007), scientific attitude gives a positive influence on learning achievement. The success of the Group Investigation model of cooperative learning in improving achievement and learning outcomes is made possible by the emergence of scientific attitudes on students when learning with the model. In other words, cooperative learning model of Group Investigation type can grow scientific attitude.

4.3. Interaction Between Cooperative Learning Model Type Group Investigation Helped Flash Media and Scientific Attitudes in Influencing Conceptual Knowledge

Based on the researcher's observation, the improvement of conceptual knowledge in the experimental class is higher than the control class conceptual knowledge. This is because students in the experimental class are more active in the learning process. In the learning group the students discover the concept of the material studied along with the teacher's guidance and the help of instructional media. Discussion results are then reported in the form of worksheet that have been provided so that students can understand the concept that has been discussed.

The result of interaction test in general (Learning Group Investigation Model * Scientific Attitude) shows the interaction between the learning model used with the scientific attitude variable toward the conceptual knowledge of students (obtained significance of 0.041 <α = 0.05). This explains that the Group Investigation learning model is assisted by flash media and the scientific attitude is influencing the conceptual knowledge of the physics of the students because the learning can encourage the students to have the attitude of a scientist in solving the problem on the subject matter so that the students better understand the concepts of physics thus will be achieved. The results desired by the teacher or student.

5. Conclusion

Based on the results of research conducted by using cooperative learning model type Investigation Group assisted flash media obtained the conclusion that students' conceptual knowledge using cooperative learning model type Group Investigation assisted flash media with average value 70 better than conventional learning with average value 62. The students' conceptual knowledge who have above average scientific attitudes with 69.66 and higher categorization was better than students who have below average scientific attitudes with a value of 62.58 and categorized high. There was an interaction between cooperative learning model type Group Investigation assisted flash media and conventional learning with a scientific attitude to the conceptual knowledge of physics students. In this research, the students' dominant conceptual knowledge on cooperative learning model type Group Investigation assisted flash media in the group of students who have above average scientific attitude

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