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Collaboration and Student Motivation Achievement In Physics Learning

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ABSTRACT

Teaching and learning activities that tend to be monotonous and passive lead to low student interest and student achievement. Therefore, this study aims to determine fellow collaboration and achievement of student motivation in learning physics. This research is applied with a learning model in six phases that can increase collaboration, motivation and student achievement, namely choosing topics, cooperative planning, implementation, analysis and synthesis, presentation, evaluation. This type of research is a quasi experiment. The instrument used was a student's conceptual knowledge test in the form of a description of 8 items and student activity sheets namely experimental activities. The results showed that collaboration with good students will affect the achievement of student motivation in learning physics.

Keywords: collaboration, achievement, motivation

INTRODUCTION

Physics as an exact science requires critical thinking skills such as identifying, analyzing, concluding and making decisions in mastering concepts through natural phenomena and unique phenomena that are studied specifically (Wuri & Mulyaningsih, 2014). Physics learning cannot be done by directly studying the product, but a learning activity that involves students in a problem solving process or an experiment is needed to produce a product (Erlinda, 2016).

Researchers conducted an interview with one of the physics teachers, it was found that physics learning outcomes were still low due to several factors, namely from the instructor, students, and facilities and infrastructure. Indicators that show that student learning outcomes are low seen from the average value of students who have not met the value of the Minimum Mastery Criteria (MMC). There are still quite a lot of students getting an average score in physics under MMC while the minimum completeness criteria to be achieved is 70. Based on the observation sheet given by researchers to students, physics is a difficult and boring subject.

The low learning outcomes achieved by students are due to the learning models used by teachers less varied (Suryadana et al., 2012). The learning process applied by the teacher tends to be less meaningful and monotonous because students only listen to the teacher's explanation and are not actively involved to explore knowledge. Teacher-centered learning makes students tend to be passive, so teachers have difficulty conditioning learning that requires students to be more active, because students are only able to master the material limited to what is

e-ISSN:
Vol. 1 Issue 1, 2019

conveyed by the teacher, discussion activities undertaken by students while learning are also not fully implemented optimally.

Students often lack the ability to visualize and interpret abstract physical concepts in meaningful ways (Balta, 2015). Students need to be involved to be more active during the learning process, so that in overcoming problems, students must be trained to conduct experiments. The experiments were carried out in addition to aiming at training students in finding and understanding concepts, also aimed at forming teamwork so as to increase student motivation in active learning activities.

Team intervention has utilized a number of training methods to target these rules for team performance (ie, preparation, execution, reflection) and team management dimensions of maintenance (ie, interpersonal dynamics). These intervention strategies generally fall into one of four categories. First, the most basic approach to training and teamwork development involves providing didactic education to team members in class type settings, such as giving lectures on the importance of providing social support in teams or promoting ways to manage interpersonal conflict among teammates. This type of training was found to be useful for increasing team effectiveness (for example, the Group Investigitation model) (Cheater, Hearnshaw, Baker & Keane, 2005).

Assessment of learning outcomes conducted by teachers so far only use cognitive assessments of learning outcomes in general and still use Bloom's cognitive theory. The 2013 curriculum specifically divides the assessment of learning outcomes into factual, conceptual, procedural and metacognitive knowledge with indicators of each knowledge based on Anderson and Krathwohl's revision.

As revealed by Sagala (2012) in his book states "the core of learning is the interrelationship and the process of disclosing knowledge by teachers and students that produce learning outcomes". So, it is necessary to have a learning model that is oriented towards learning experimental and discussion activities that can create student involvement in the learning process to foster interest and understanding of students' physics concepts (Aksoy, 2013).

One learning model to enable students through group learning in class and conducting discussions, exchanging opinions and interrogation is a cooperative learning model type Group Investigation (Akçay, 2012). Group Investigation type cooperative learning model is a learning model where students actively discuss in heterogeneous groups, exchange opinions and conduct activities (Hossain, 2013). The Group Investigation type Cooperative Learning Model has a constructivist theory base proposed by Piaget and Vygotsky. Constructivists are teaching and learning perspectives in which a learner builds meaning from experiences and interactions with others, this is the role of the teacher. There are six steps to this model, namely topic selection, cooperative planning, implementation, analysis and synthesis, final product presentation (Arends, 2012).

Several studies on the Group Investigation cooperative learning model have been carried out and it is proven that Group Investigation is able to assist teachers in explaining material. The results of these studies suggest that the Group Investigation type cooperative model is able to encourage students to hone their ability to learn independently (individually or in groups) and can

e-ISSN:
Vol. 1 Issue 1, 2019

increase the activities of each group effectively so as to be able to measure learning outcomes in the domain of cognitive, affective, and psychomotor , which means it can make students become more creative.

Student Learning Outcomes using the Group Investigation type Cooperative learning model is supported by several previous studies such as that conducted by Simanjuntak & Mariati (2014), showing that the existence of a Group Investigation cooperative learning model assisted by computer media can improve student learning outcomes and can increase student activity students in learning.

In addition, research conducted by Cahyaningrum, Retno & Muhardjito (2016) shows that the application of the Group Investigation cooperative learning model is able to improve student physics learning achievement as evidenced by student cognitive learning achievement and percentage of students completeness learning physics that goes beyond the mastery indicators.

Effective teaching methods such as discussion and cooperative learning can be alternatives to improve student achievement. Unlike cooperative learning methods, lectures and demonstration techniques do prevent students from working with peers to maximize learning outcomes (Sausa, 2006; Johnson & Johnson 2009). Social competencies such as being respectful, obedient, completing tasks, and being tolerant are better promoted by cooperative learning (Tavakoli, 2014). Cooperative learning is oriented towards increasing student academic achievement through the creation of a learning environment that is fun (Joshi and Bhatnagar, 2015). Group investigation is one of the cooperative learning models that offers students the opportunity to create their own methods to learn and display their knowledge and understanding (Mitchell, et al., 2008).

METHODS

The study was conducted at 18 Medan High School, Jl. Wahidin No. 55 C, Pandau Hulu I, Medan Kota. The sample of this research is students of class X MIA-3 as many as 30 students. This type of research is a quasi experiment or quasi-experimental design with a group pretest-posttest design can be seen in Table 1.

Table 1. *Group Pretest-Posttest Design*

Class	Pretest	Treatment	Postest
Experiment	O_1	X	O_2

The researcher gives a pre test to the class first. The instrument used in this study was a conceptual knowledge test in the form of an essay of 8 items. The pre-test data of students' conceptual knowledge obtained will then be compared with the student's final grade or post test score.

Researchers then conduct learning using the Cooperative learning model Group Investigation type. The Group Investigation type Cooperative learning model has six phases that can enhance peer collaboration and student motivation to choose topics, cooperative planning, implementation, analysis and synthesis, presentation, evaluation. Then, the collaboration and student motivation to analyze the data from the post test and pre test students and student activities.

e-ISSN:
Vol. 1 Issue 1, 2019

RESULT & DISCUSSION

The average value of student activity at the first meeting which is 68.06 is quite active. At the second meeting there was an increase in student involvement in learning 77,92 classified as active. At the third meeting the average value of student activity increased by 85.97 classified as very active.

Table 2. Student Learning Activities

Rated aspect	Cycle I	Cycle II	Cycle III
Learning activity	68,06%	77,92%	85,97%

Table 3. Student Conceptual Knowledge

	Principles and generalizations	Theory, model and structure	Classification and category
Pre test	38%	31%	36%
Post test	76%	66%	66%

It appears that there is an increase in students' conceptual knowledge in the experimental class before being given treatment and after being given the treatment of cooperative learning model Group Investigation. An illustration of the level of mastery of students' conceptual knowledge based on their dimensions, can be seen in Table 3.

The results of the analysis of students' conceptual knowledge in the experimental class show that the percentage of the highest knowledge indicator is the principle indicator and generalization. This is because the problem of conceptual knowledge is classified and indicators of principles and generalizations are easy to solve because principles and generalizations form the basis for theory, models, and structures.

While the percentage of achievement of each indicator that lies in the theory, model and structure indicators as well as the classification and categories are the same where the percentage of achievement in the experimental class is 66%. Knowledge of theories, models and structures including knowledge of various paradigms, epistemologies, theories, models used to describe, understand, explain, and predict phenomena. But the level of mastery of students' conceptual knowledge on the three indicators is the same, which is classified as moderate.

the learning activities are carried out, then a post test with the same number of questions is then given. And obtained an average post test score of 72.42 with a standard deviation of 11.29. Then it can be concluded that there is a significant effect on students' conceptual knowledge if given treatment using the Cooperative learning model of the Group Investigation type in physics learning. This research is also supported by the results of the research of Harahap and Derlina (2017), which states there are significant differences in student learning outcomes in both classes, namely the 74.7 experimental class and 63.53 control class. The results of Irwan and Ridwan's research (2015) also state that there is a difference in student learning outcomes in the experimental class that is 70.25 because in the experimental class students are active in contributing their ideas

e-ISSN:
Vol. 1 Issue 1, 2019

about the material and helping each other in the learning process so that only a few students who are still confused in giving their ideas of mind and in solving problem problems, the ability to cooperate successfully in increasing student understanding.

The ability of students to work together in conducting experiments can improve students' conceptual knowledge. Doing experiments will really help students in understanding the subject matter so that it will be quickly remembered and also long remembered. This is supported by Harahap and Turnip (2014) in their research stating that through the use of the Group Investigation type cooperative learning model increased student learning outcomes coupled with high student collaboration skills in conducting experiments.

In this study conducted with three meeting cycles. The average value of student activity at the first meeting was 68.06 (quite active). At the second meeting there was an increase in student involvement in learning even though it was still dominated by students who were less active, this can be seen from the average value of students who were actively involved in learning that is 77.92 (active). But at the third meeting the average value of student activity increased by 85.97 (very active) meaning that more students understood the Cooperative Model Group Investigation type and also understood the learning objectives. Research conducted by Yuandini, Feggi and Sahyar (2017), shows that the knowledge of student group concepts learned using Group Investigation type cooperative learning models assisted with flash media is different from the concept knowledge of student groups who are taught using conventional learning models, as well as increasing scientific attitudes and activeness the student. That is, the Group Investigation learning model influences scientific concepts and attitudes in experimenting.

Hughes (2011) states that with Cooperative learning the type of Group Investigation makes students more active and supportive in communication in learning. When students build knowledge about physical concepts, they need opportunities to think, discuss, develop, listen, write and read. For the success of a learning that uses groups such as cooperative learning models of the type of investigation the group needs the ability to work together in groups (teamwork skills) among students. Teamwork is a set of skills that individuals use to drive group success.

The results of this study are also in accordance with previous studies by Husna, Alkhafi, & Hotman (2016), this study shows that the learning outcomes of students' conceptual knowledge due to the influence of the cooperative learning model group investigation type are better than the learning outcomes of conceptual knowledge using conventional learning. This learning model oriented on experimental activities is applied in this study and the researcher finds several advantages and disadvantages. The advantages include: causing active students with group learning activities by involving their minds in finding and conducting experiments; encouraging to take the initiative; creative; and active because of a growing sense of inquiry and a sense of wanting to succeed; raises self-confidence for students; increase motivation to learn; provide meaningful learning experiences and enhance collaboration between students and teachers. This inner satisfaction encourages wanting to do more discoveries, especially linking it to

e-ISSN:
Vol. 1 Issue 1, 2019

daily life, so that interest in learning increases. The obstacle faced by researchers is the lack of practical tools to make the division of groups a little so that it is more difficult to control students who are less active. But overall students are active in the activities carried out.

The implementation of the physics learning model of the Cooperative Group Investigation type can run well seen from the average value of the post-test which is better than the average value of the pre-test. And the category of mastery of conceptual knowledge gained is in the medium category. But there are still many things that must be addressed, both in terms of planning, equipment, and in terms of implementation.

CONCLUSION

Based on the results of research and analysis of the data obtained it can be concluded as follows. Group Investigation type Cooperative learning model can increase collaboration among students in learning physics. Cooperative learning model Group Investigation type can increase student motivation in learning physics.

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Vol. 1 Issue 1, 2019

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