



The Effect of Cooperative Learning Model Type Group Investigation on Student Learning Outcomes in Magnitude and Measurement Subjects

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ABSTRACT

This study aims to determine the effect of cooperative learning model type group investigation on student learning outcomes in magnitude and measurement subjects in Class X SMA Parulian I Medan. The population in this study were all students of class X SMA Parulian I Medan which consisted of 4 parallel classes. The research sample was taken in 2 classes using cluster random sampling consisting of an experimental class of 30 students and a control class of 30 students. The instrument used was a multiple-choice test which consisted of 21 questions. Hypothesis testing using an Independent sample t-test from the results of the pre-test and post-test experimental class and control class. The results of the pretest research obtained the average value of the experimental class at 43.65 and the average value of the control class at 40.57. Based on the normality test $L_{table} > L_{count}$ and homogeneity test $F_{count} < F_{table}$, this shows that the two classes are normally distributed and homogeneous. Based on the initial ability test $t_{count} < t_{table}$ indicates that the two classes have the same abilities. Then a different treatment was carried out on the results of the post-test, the average value of the experimental class was 77.30 and the average value of the control class was 72.70, based on the t-test (one party) obtained $t_{count} 2.30 > t_{table} 1.671$, so there was a significant influence of the model cooperative learning type investigative group on learning outcomes.

Keywords: student learning outcomes, cooperative investigation group type

INTRODUCTION

Education is a place to create intelligent and skilled human beings in their fields. Education plays an important role in the intellectual life of the nation, therefore every individual involved in education is required to participate optimally to improve the quality of education. The quality of education needs to be considered to achieve educational goals, while the quality itself can be seen from the success achieved by a student during teaching and learning activities. The important thing in the learning process is the activity of instilling the meaning of learning in students so that their learning outcomes are useful for their lives now and in the future. One of the determining factors is how the teaching and learning

process can run as expected. Meaningful learning is a teaching and learning process that is expected for students where students can be directly involved in the learning process and find knowledge directly.

Learning should provide an interesting atmosphere to achieve maximum results. With an attractive atmosphere, students can effectively and actively participate in the learning process (Ma'ruf & Syaifin, 2021). Several lessons of learning materials provided by the teacher often receive less attention and are not liked by some students, namely mathematics, chemistry, and physics are one of them. Physics is still considered something scary, difficult, and uninteresting so students are less motivated in studying physics (Ali, 2021). Physics lessons, besides containing formulas, physics material is also calculated. The students argue that understanding the physics material taught by the teacher in class takes quite a long time. On the other hand, these students feel that they do not match the method used by the teacher, sometimes making students confused and having difficulty understanding the physics material. In the problem-solving exercises too, only a small part can do well, most don't even know what to do, and even if they are given instructions they are still unable to solve the questions.

Teaching is not just a process of delivering teaching materials but an interaction that is built between teachers and students so that stimulus and response occur. Teaching is an activity to organize or manage the environment as well as possible and connect it with children, so that teaching and learning occur. The learning process for each subject must be appropriate, varied meet the standards must be interactive, inspiring, fun, challenging, and motivating to participate actively.

According to Mas'ut (2015), a good learning process can be identified by the design and implementation of better learning activities, including study rooms, student management, and learning management. The creation of maximum learning activities is not only supported by a good learning process but also must be supported by teacher competence. According to Puspitasari (2018) that the quality of the learning process is expressed in the form of fulfilling and achieving standards in learning. These standards will guide all activities in the learning process, starting from planning, implementation, and monitoring/evaluation. For this learning effort to be effective, it should be carried out systematically (with directed and regular steps) and systematically (unanimously by considering all its aspects).

According to Ihsan (2017), "Learning is an activity where there is a process from not knowing to knowing, not understanding to understanding, unable to be able to achieve optimal results". According to Aunurrahman (2016), learning is a process carried out by individuals to obtain a new behavior change as a whole, as a result of the individual's own experience in interaction with his environment. In this regard, the process of learning, learning, and change is evidence of the processed results. The activities of daily human life are rarely separated from learning activities, both when someone carries out their activities, or in a certain group.

Problem of Research

The field of study of physics as part of Natural Sciences is an interesting subject-object and requires more understanding than memorization. However, the reality of physics is often seen as an abstract science by students with theories and difficult questions. The low student learning outcomes, especially in Physics subjects, are caused by students' lack of interest in learning, students are less active because the results of learning conditions are still teacher center and do not touch the realm of the dimensions of the students themselves (Siregar & Harahap, 2016).

The learning process that occurs in schools is the most important thing in the educational process. The measuring point of educational success with the achievement of educational goals can be observed based on the high and low student learning outcomes achieved. The low student learning outcomes are caused by the low understanding of students' concepts caused by the curriculum, learning, and assessment in Indonesia which still prioritizes the content dimension and forgets the context dimension and the science process Arifin (2017). Improving student learning outcomes is largely determined by the extent to which the student understands a concept and can apply it in everyday life.

During the observation at school, the researcher observed what students' weaknesses were in understanding a physics problem at the high school level. The students are that physics is very difficult. So learning is more active in teachers, where teachers are active in teaching and learning activities and cooperation between students is still lacking. The teacher's lack of knowledge about learning models causes teachers to only use one type of learning model.

In addition, the learning model used is also less varied, only using lecture and discussion methods. This can cause the learning to run poorly because students feel uncomfortable, feel bored, and take a long time to learn physics which ultimately causes low physics learning outcomes obtained. student.

The learning process is not just an understanding of a collection of facts, concepts, or principles, but is the knowledge that can be applied in their environment. Adelina (2017). Designing a learning process that is creative and effective in supporting understanding and increasing the active role of students in the learning process is still very difficult. Student learning motivation is directly proportional to student learning outcomes. High student learning motivation will produce high learning outcomes so the application of an effective learning model pays attention to learning motivation to achieve high learning outcomes (Arifin, 2017).

Student learning activities are considered very important because they can affect their learning achievement or learning outcomes. According to Astuti and Haryono (2017), interesting learning conditions increase students' interest in participating in the learning process, one of the improvement efforts to make learning preferred by students is to apply a learning model that provides space for student learning activities, one of which is the Group Investigation (GI) cooperative learning model.

The learning process becomes more varied with the application of the cooperative learning model. The learning strategy of collaborating with several students as members of a

heterogeneous group with different cognitive abilities is cooperative learning (Laila, et al., 2017). The cooperative learning Model is a group learning model that has many varied types, one of which is the type group investigation cooperative learning model.

Studying in groups can increase collaboration among students so it is hoped that learning will be successful (Rahayu, et al., 2017). With the experience and knowledge they have, students can answer the tests given so student learning outcomes will increase. This model requires students to have good skills in communication and group process skills. The group investigation learning model can be used by teachers to develop the creativity of students, both individually and in groups. The group investigation learning model is also designed to help create a sense of responsibility when students participate in the learning process.

Student learning activities, both individually and in groups, are better and "alive" this can be seen from the way they respond to questions or comment on the exposure of other group discussions (Masitoh, 2016). To obtain high learning outcomes, every student tries to learn well (Badu, 2016). Students can work together and actively learn for group success, and to increase group success, and improve the ability to express opinions (Hadinata, et al., 2017). In investigative activities, students are involved in determining the topic and how to obtain data, and students are involved in planning so that students have the opportunity to learn from beginning to end. Students gain knowledge from the process of solving problems so students are expected to be able to solve existing problems. Student learning outcomes are expected to increase with guidance from the teacher (Helek, et al., 2016). The direct involvement of students in investigating problems is an important factor that influences student learning outcomes in physics.

The Group Investigation type of cooperative learning model was chosen because it can provide opportunities for students to participate in solving problems studied between individuals in their groups to obtain an agreement in solving problems given by the teacher (Artini, et al., 2016). According to Rusman (2014) said, "The implementation of the group investigation model is very dependent on initial training in mastering communication and social skills". This is relevant to several studies on the use of cooperative learning models of the group investigation type, Fahmi & Hidayati (2016) state, there is a very significant difference in the physics learning achievement of class X students in the even semester of SMA Negeri 1 Sedayu in the 2015/2016 academic year between learning using the Group learning model. Investigation with conventional learning models. Kurniawan et al (2015) stated that the application of the GI (Group Investigation) learning model can improve student activity and learning achievement in the material solubility and solubility product for class XI MIA 4 SMA Negeri Kebakkramat 2014/2015 academic year. Supporting research conducted by Ariadi (2014) also states that there are differences in science learning outcomes between groups of students who learn to use the group investigation type cooperative learning model and students who learn to follow conventional learning models. Relevant research that has been carried out by previous research, the author can conclude that the type group investigation cooperative learning model can improve student learning outcomes and student achievement.

Research Focus

Based on the problems that have been described, the limitations in this study are based more on the use of learning models as a support for teachers and students so that physics learning is carried out well in schools. This research focus on "The Effect of Cooperative Learning Model Type Group Investigation on Student Learning Outcomes in Magnitude and Measurement Subjects in Class X Semester I SMA Parulian I MEDAN". The limitation of the material in this research is the material of magnitude and measurement.

The broader concept includes all types of group work including forms that are more teacher-led or teacher-directed. In general cooperative learning is considered to be more teacher-directed, in which the teacher assigns tasks and questions and provides materials and information designed to help students solve problems.

The investigative group model is designed to represent real reality. Each model directs us in designing learning to assist students in achieving learning objectives. The model function as a guide for teaching planning for teachers in carrying out learning activities (Mariyaningsih and Hidayati, 2018).

The role of the teacher in the classroom implementation of the investigative group model, the teacher acts as a resource person and facilitator. The teacher goes around among the groups and sees that they can manage their work, and helps with any difficulties they face in group interactions, including problems in performance on specific tasks related to learning.

A learning model that places students into heterogeneous groups seen from differences in abilities and different backgrounds both in terms of gender, ethnicity, and religion to investigate a topic given by the teacher.

Based on previous studies, the Investigative Group Model has a good significant effect. The research of Wijayanti et al (2015) found that "student learning outcomes while using the GI type cooperative learning model have increased, at the first meeting 48.14% and the second meeting 92.59%". And in the research of Solomon Leonardus Simanjuntak and Nurdin Siregar (2014) found that "student learning activities while using the group investigation (GI) learning model have increased, at the first meeting 51%, the second meeting 62% and at the third meeting 75%". There are positive results from previous research on learning using the investigative group learning model, this study applies the learning model using the investigation group to see its effect on student learning outcomes.

METHODOLOGY OF RESEARCH

General Background of Research

This research was conducted in class X SMA Parulian I Medan, North Sumatra. This research was conducted in the first semester of the 2021/2022 Academic Year. This research is a quasi-experimental type of research, namely grouping the research sample into two groups, each as an experimental class, a cooperative learning model is set for the group investigation type and the control class is a direct learning model.

This study aims to find information about the effect of student learning outcomes who are taught using the group investigation type cooperative learning model on the magnitude and measurement subjects.

Subject of Research

The population in this study were all students of class X semester I SMA Parulian I Medan. Which consists of four classes totaling 120 people. The research sample was selected partly from the population of two classes using a cluster random sampling technique, namely class X-MIA 3 as an experimental class taught by the group investigation learning model and class X-MIA 4 as a control class taught by a direct learning model. Both classes consist of 30 students each.

Instrument and Procedures

The instrument used in this study was a learning outcome test consisting of 21 questions. The question of student learning outcomes was validated using a validity test by 2 experts, namely one lecturer and one physics teacher. The arrangement of this research instrument follows the cognitive realm of Bloom's taxonomy revision by Anderson.

In this research, there is an experimental class and a control class. In the control class, a direct learning model will only be carried out, while the experimental class is set with an Investigation Group type of cooperative learning model. Before being given a lesson, students are asked to do a pre-test after that at the end of the lesson students are given a post-test question. The difference in learning outcomes between the experimental and control classes is used as an indicator of student learning success using the investigative group type cooperative learning model in learning at school.

Data Analysis

The research data were analyzed in stages according to the analysis function, namely as a hypothesis tester. Normality tests and homogeneity tests of the data to be analyzed were carried out as a requirement for hypothesis testing. Hypothesis testing using an Independent sample t-test from the results of the pre-test and post-test experimental class and control class. After the pre-test data was obtained, the data were analyzed using the normality test, namely the Liliefors test, and the homogeneity test. After that, a two-tail t-test was conducted to determine the student's initial abilities in the two sample groups. Furthermore, the researcher taught the subject matter using the investigation group learning model in the experimental class and learning without the investigation group in the control class. The difference in the final results can be seen by post-test using one tail t-test to determine the effect of learning using the investigative group model on student learning outcomes.

RESULTS AND DISCUSSION

Based on the data analysis that has been done, it was found that the average pretest score for the experimental class was 43.65 while for the control class it was 40.57. The difference in pretest scores in the two classes can be seen in table 1 below.

Table 1. Average results of pre-test and post-test experimental class and control class

Class	<i>Pre-test</i>	<i>Post-test</i>
Experiment	43.65	77.30
Control	40.57	72.70

Based on the research data in Table 1, the average pre-test score of students in the experimental class before being given treatment was 43.65. And the average pre-test in the control class was 40.57. With a standard deviation of 7.51 and 9.03. The mean pre-test scores of students in the experimental class and the control class were not much different. This is because the experimental and control classes have not been given treatment.

Then after being given treatment, the experimental class used the investigative group learning model and the control class used the direct model. The average post-test score of students in the experimental class after being treated using the investigative group model was 77.30, while in the control class, it was 72.70. With a standard deviation of 8.81 and 6.49. This shows that the average post-test score for the experimental class is higher than the average pre-test score for the control class. In both classes, there is an increase in student learning outcomes, but the average value of student learning outcomes in the experimental class has reached the minimum completeness criteria. While the average value of student learning outcomes in the control class has increased but has not reached the minimum completeness criteria for all students.

The results showed that there was a significant effect of the investigative group type cooperative learning model on student learning outcomes in class X semester I SMA Parulian I Medan better by using the investigative group type cooperative learning model. In the cooperative learning model of the investigative group type, the teacher divides groups with 5-6 heterogeneous students, the teacher gives topics to students to identify and students are allowed to present the results of their discussions. At the end of the lesson, several questions are given to see the final ability of students in the material that has been delivered.

The study conducted a pretest, so the average value of the experimental class was 43.65, standard deviation = of 7.51, and the average value of the control class was 40.57, with a standard deviation = of 9.03. Based on the results of the normality test $L_{count} = 0.134$ and $L_{table} = 0.161$ (Stable Account), based on the homogeneity test $F_{count} = 1.45$ and $F_{table} = 1.860$ ($F_{count} < F_{table}$). Based on the data above, the two classes are normally distributed and homogeneous.

Furthermore, the results of the initial ability test (two-party t-test) obtained $t_{count} = 1.44$ and $t_{table} = 2.002$ ($t_{count} > t_{table}$) this shows the initial ability of students is the same. Then different treatments were carried out and then post-tested the average value of the

experimental class was 77.30, with a standard deviation = of 8.81 and the average value of the control class was 72.70, standard deviation = of 6.49. Based on the results of the normality test $L_{\text{count}} = 0.118$ and $L_{\text{table}} = 0.161$ (Stable Account), based on the homogeneity test $F_{\text{count}} = 1.85$ and $F_{\text{table}} = 1.860$ ($F_{\text{count}} < F_{\text{table}}$).

Based on the data above the final ability test (one-sided t-test) obtained $t_{\text{count}} = 2.30$ and $t_{\text{table}} = 1.671$ ($t_{\text{count}} > t_{\text{table}}$) this shows that there is a significant effect of the investigative group type cooperative learning model on student learning outcomes. This is consistent with research conducted by Malisa & Barutu (2019) which states that the group investigative type cooperative learning model has a positive and significant influence on learning outcomes. Research conducted by Widiawati (2018)) concluded that the results of student physics learning with the application of the group investigation cooperative learning model were better than the results of student physics learning with the application of conventional learning and had a positive influence on learning outcomes in both the cognitive, psychomotor and affective domains. In addition, Rahmatullah et al (2017) in their research also concluded that the group investigation type of cooperative learning model affected students' physics learning activities and outcomes.

The group investigation type of cooperative learning model makes students more active and able to work together with other students. The results of the posttest experimental class taught using the group investigation type cooperative model showed an increase in student learning outcomes. The increase in student learning outcomes in the experimental class is because in the GI-type cooperative model students are allowed to share ideas, and interact with each other so In investigative activities, students are involved in determining topics and how to obtain data, and students are involved in planning so that students have the opportunity to learn from beginning to end. Students gain knowledge from the process of solving problems so students are expected to be able to solve problems that exist in the learning process. The direct involvement of students in investigating problems is an important factor that influences student learning outcomes (Taher, et al., 2019) that it is easier to understand the learning material being taught and foster good cooperation.

CONCLUSIONS

Based on data analysis and proof of the hypothesis, it can be concluded that there is a significant effect of learning using the group investigation model on student learning outcomes. In the cooperative learning model of the group investigation type, the teacher divides groups with 5-6 heterogeneous students, the teacher gives topics to students to identify and students are allowed to present the results of their discussions. At the end of the lesson, several questions are given to see the final ability of students in the material that has been delivered.

Students are directly involved from lesson planning (determining topics and methods of investigation) to the end of learning (presenting reports). The involvement of students' exchange of ideas is prioritized. The democratic nature of cooperatives (decisions developed or reinforced by group experience in the context of the problem under investigation).

Teachers and students have the same status in solving problems with different roles. What distinguishes group investigation from other types of cooperative learning is that group investigation involves students' ability to learn through investigation or investigation. The teacher's role in the GI model implementation class, the teacher acts as a resource person and facilitator.

So that there is a significant effect of the cooperative learning model of the investigation group type on student learning outcomes on the magnitude and measurement subjects in class X semester I SMA Parulian I Medan.

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