

THE EFFECT OF *STUDENT FACILITATOR AND EXPLAINING (SFAE)* COOPERATIVE LEARNING MODEL ON PHYSICS STUDENT'S ACHIEVEMENT

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ABSTRACT

Low students' physics learning outcomes are an important and major problem in achieving competency. The purpose of this research was to find out whether there was a significant effect of the Student Facilitator And Explaining (SFAE) cooperative learning model on the physics learning outcomes of class XI students of Senior High School. The type of research conducted was Quasi Experimental Research with the Post-test Only Control Group Design research design. In this study, the population was all class XI Mathematics and Natural Sains students at Senior High School who were enrolled in the 2022/2023 academic year. The sample of this study was class XI Mathematics and Natural Sains 1 which was the experimental class and class XI Mathematics and Natural Sains 2 which was the control class. The research instrument consisted of a posttest and an attitude assessment sheet. The data analyzed in this study used descriptive analysis and a two-way similarity test at a significant level of 0.05 for student competencies consisting of knowledge competencies and that is, there is a significant effect of applying the Cooperative learning model of the Student Facilitator And Explaining (SFAE) type.) on the physics learning outcomes of class XI students of Senior High School. This is supported by the results of data analysis on each of the knowledge and attitude competencies. With the two average similarity tests, the value of t count $>$ t table was obtained, for knowledge competencies $2.05 > 2.00$, and for attitude competencies $3.08 > 2.00$.

Keywords : Learning, Physics, Cooperative Learning Model, Student Facilitator And Explaining (SFAE), Learning Outcomes



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I. INTRODUCTION

Education is the most important part for the realization of a competent society. The purpose of education is to shape students so that they can become someone who has broad knowledge, skills and insights as a form of progress in learning so that educational goals can be achieved. Learning is an activity to gain knowledge, experience, improve certain skills, improve character and behavior and instill good character. Within the scope of not knowing a thing or the process of gaining knowledge, according to scientists in general, the relationship between humans and nature is referred to as experience. Experience that often applies so that knowledge is obtained [1]. A nation's life's development and survival are greatly influenced by education. Alongside the fast improvement of science and innovation, training is a need that should be met. A nation's development and survival depend heavily on its education system. Education is a need that must be met alongside the rapid development of science and technology. In the 21st century, educators must equip students with the creative skills necessary to address social issues in their daily lives [2]. Learning and innovation skills (the capacity to learn and innovate) are essential for students in the twenty-first century: 1) problem-solving and critical thinking; 2) collaboration and communication; and 3) creativity and innovation [3]. The modern education revolution is also focusing heavily on creative and critical thinking [4].

Based on the Regulation of the Minister of National Education no. 22 of 2006 there are 5 goals of the physics learning process in high school. First, learning physics is expected to form students' healthy behavior towards physics by realizing the majesty of God Almighty in the creation of the universe. In addition, learning physics can instill real rational attitudes, facts, not closed off, diligent, critical and can help each other. Third, learning physics aims to broaden knowledge in describing problems, associating and communicating through experiments, collecting, processing, and understanding them, and conveying the results of experiments by means of speech or writing. Furthermore, the purpose of learning physics at the senior high school level is to develop reasoning abilities in critical thinking through the use of patterns and foundations of natural physics, providing explanations of various activities from nature and solving problems through qualitative and quantitative methods. The final goal is to be able to master the concepts and principles of physics and have the ability to develop knowledge and self-confidence concepts to become a tool in continuing education to a higher level [5]. The ability to learn and innovate is needed in the field of science, especially in the field of physics. Physics is one part of science is essentially a collection of knowledge, ways of thinking, and investigations that use scientific processes [6].

The cooperative learning model is one of the learning models that fall into the category of constructivism understanding. Philosophically, the notion of learning according to constructivism is an understanding that is built systematically, the results of which are then developed through a background that has boundaries and is not instantaneous. Knowledge is not just a set of facts, concepts, or instructions to be understood and applied. Humans must build that knowledge and make knowledge meaningful through concrete experiences. The cooperative learning model is a learning model that emphasizes the participation and collaboration of students in achieving the goals of the learning process [7]. Resumes from a variety of research findings regarding the implementation of cooperative learning 101 reasons, including the fact that collaborative learning can enhance students' ability to 1) think critically and study science 2) a science learning environment; 3) the way science was viewed; 4) the accomplishments and evaluations of science learning; 5) the capacity to comprehend scientific writing; 6) social skills; 7) Science can be put into practice; 8) upholds both male understudies as well as ladies performed by [8].

The SFAE learning model is a learning model that encourages students in the learning process through presenting ideas or arguments to other students. The SFAE learning process is one type of cooperative learning model that makes students participate actively in the learning process. The learning process through the SFAE model is one type of cooperative learning model in the learning process using small groups through the number of members in each group of 4 to 5 students in a heterogeneous way [9].

In the past, methods for cooperative learning have been implemented in which each student collaborates to resolve a given problem that is still not optimal. Therefore, the modification must be carried out by combining Peer Tutoring with student facilitator and explanation [10]. Study on modified SFAE with peer tutoring, teaching material presented first, explanations given by one student tutor to his colleagues, and a learning evaluation form provided at the conclusion of the quiz [11].

One of the studies regarding the SFAE type learning model was successfully carried out by Armi in the chemistry learning process. Armi stated that the results of studying chemistry in groups of students using the SFAE type learning model had significantly increased students' chemistry learning outcomes in the 2011/2012 Academic Year. In addition, students become more active, creative, and have enthusiasm for the learning process. The results of previous research on the SFAE learning model turned out to be able to support an increase in motivation, student activity, learning outcomes, support an increase in the ability to give opinions, support students' collaboration skills and self-confidence, and also support an increase in the ability to understand students' concepts. Therefore, in this study it is hoped that the SFAE type learning model can support an increase in student learning outcomes.

II. METHOD

A. Research Methods

This research was conducted with the aim of knowing the effect of the cooperative learning model of the SFAE type on the physics learning outcomes of class XI students at Senior High School. The SFAE learning model is the independent variable and the results of learning physics for class XI students as the dependent variable. In accordance with the problems and objectives that have been described, the type of this research includes Quasi Experiment Research (quasi experiment). The characteristic of this experiment is that this experiment has a control group, but cannot have the full function of carrying out external control variables that can affect the performance of the experiment [12].

Table 1. Research Methods

Group	Treatment	Posttest
Experiment	X	O
Control	-	O

Source:[12]

B. Research Design

The design of this study is the Post-test Only Control Group Design. The design of this study was that the class for the experiment or class for the control was chosen not through random. In this design there is a comparison between the class for the experiment and the class for the control. In this research design, the experimental class received treatment but the control class did not receive treatment. In this study the class for the experimental learning process was carried out through the use of a cooperative learning model with the SFAE type, but the class for the control was held through a scientific approach without the help of a model.

III. RESULTS AND DISCUSSION

This study used two sample classes, namely the experimental class and the control class. The class for the experiment was treated through the use of a cooperative learning model with the type of student facilitator and explaining, but for the control class, the treatment was carried out through a scientific learning model for the material used in this study, namely elasticity and static fluid in class XI Senior High School. During the research process, researchers obtained competency data from students, namely knowledge competencies and attitude competencies.

Table 2. Posttest Results and Student Attitude Assessment

Class	Posttest	Attitude
Experiment	80,23	83,57
Control	76,69	77,26

The SFAE type learning model is a cooperative learning process in which students are given demands to be active in the learning process. One of the methods applied is the discussion method so that students are active throughout the learning process. By applying this learning model to the class for experiments, it turns out that it can contribute to the influence of the results of learning Physics on students' competency knowledge and attitudes. In the SFAE learning model stage, students carry out group discussions at each meeting. All students are responsible for a topic problem that has been given at the beginning of the discussion. With the responsibilities proposed to students in the discussion process, students become more active, able to think critically in which students can carry out tasks as well as possible and are able to explain a problem to all students.

The application of the learning model in the classroom for experiments is able to support an increase in the learning outcomes of students' physics in knowledge competencies and attitude competencies. This can be seen through the average learning outcomes of students on the learning outcomes of knowledge and attitudes competencies obtained. Even though there were some students in the experimental class who had not reached the KKM, overall the students' physics scores had increased from before. The results of the study stated that the results of the analysis of the final test data (posttest), attitudes, and activeness during the learning process showed that the average learning outcomes of students in the competence of knowledge and attitudes of students showed where the application of cooperative learning models with the SFAE type on elasticity and static fluid can support an increase in the results of learning Physics for Senior High School class XI Mathematics and Natural Sains. These results can be viewed through the average learning outcomes of students on the learning outcomes of knowledge and attitudes competencies acquired.

Table 3. Test Results of Statistical Analysis of Knowledge Competence in Experiment Class and Control Class

No.	Tested	Test Type	Results	Table	Conclusion
1	Normality	Liliefors	0,11	0,15	Normal Data
2	Homogeneity	F	1,25	1,77	Homogeneous Data

3	Two Means Similarity Test (t)	t	2,05	2,00	Results are not the same (There is an Effect)
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Table 4. Test Results of Statistical Analysis of Attitude Competency of Experimental Class and Control Class

No.	Tested	Test Type	Results	Table	Conclusion
1	Normality	Liliefors	0,09	0,15	Normal Data
2	Homogeneity	F	1,15	1,77	Homogeneous Data
3	Two Means Similarity Test (t)	t	3,08	2,00	Results are not the same (There is an Effect)

Based on the results of research that has been carried out, the application of the cooperative learning model of the SFAE type turns out to be quite effective in the learning process, and students appear to be more active and creative in the learning process. From the results of the data analysis carried out where there were differences in the learning outcomes of students from knowledge competence between students who used cooperative learning models and the SFAE type with students who used a scientific approach. Judging from the average value of class knowledge competence for the experiment, namely 80.23 and 76.69 for the control class. Furthermore, normality and homogeneity tests were carried out through a significant level of 0.05 in both sample classes with the results of the two samples having a normal distribution and having a homogeneous variance and also carrying out a hypothesis test. t table 2.00. Acceptance criteria H_0 if t table $<$ t count $<$ t table then it is in the area of rejection of H_0 . Then H_0 is rejected and H_1 is accepted, meaning that there is an influence of the cooperative learning model of the SFAE type on the physics learning outcomes of class XI students of Senior High School.

This type of SFAE learning model has various advantages, including providing encouragement to grow and develop the potential for critical thinking of students and providing training for the ability of students to become active and creative when dealing with any problems or questions given in the group room. In addition, the SFAE model also supports an increase in students' absorption because the learning process is carried out by means of demonstrations. So that in learning students are trained to play the role of teacher, because students are opened space to carry out the handling of teacher explanations that they have heard. In addition, the advantage is being able to practice consideration, want to do the listening process and give respect to the opinions of others and foster a democratic attitude. The SFAE learning model can also encourage motivation for students to form the best in the process of explaining teaching materials and getting knowledge of students' abilities in conveying ideas or ideas. Another advantage of the SFAE learning model is that it trains the leadership spirit of students and also broadens the horizons of students because of the activity of exchanging ideas and opinions between students. Slavin argues that the SFAE method places more emphasis on students being active in receiving new knowledge through interacting with the environment which is then processed knowledge which makes students understand concepts and students can relate new concepts to other concepts.

After the authors analyzed the data from the posttest results and the results of observations of students' attitudes during the research, the authors obtained the results of data analysis, namely the influence on the attitude competence section was greater than the knowledge competence. This can be seen from the hypothesis testing that was carried out, namely the t -test, the results obtained were t count 2.05 on knowledge competency and t count 3.08 on attitude competency. This means that this model contributes more to improving attitude competence than knowledge. From the results of the author's observations on the advantages of the SFAE learning model, it can be said that the SFAE type learning model emphasizes attitude competence. Where the author observes from one example that students are more active and confident and courageous and reveal that they got it in front of the forum to explain the material and the role of students as teachers.

The capacity to talk, read, and write about science is also included in the definition of scientific communication skills. This ability necessitates a special understanding as well as the capacity to explain and communicate one's knowledge to others[13]. Some students continue to look for information on the internet using blogspot rather than e-books or other trustworthy sources. According to previous research, the *student facilitator and explaining* (SFE) learning model is a learning model that can motivate students in learning so that students are actively involved in learning, increase student confidence, and encourage students to exchange more in-depth information[14]. There is an exchange of information during discussions because students have different sources of reading.

This can be stated where the SFAE type learning model contributes to the attitude competence of students. In the cooperative learning model there is collaboration between students. This also supports the author's

statement, namely the contribution of the cooperative learning model and the SFAE learning model in supporting the improvement of students' attitude competence. Student facilitator and explaining is a model where students show their thoughts or views on other students according to [15]. So that this learning model in addition to supporting the increase in students' knowledge competence, this model can also support an increase in the attitude competence of students.ude, because there is an exchange of information in ongoing learning.

IV. CONCLUSION

Based on calculations using quasi-experiments and the t-test the learning outcomes of students show that the results reject H_0 and accept H_1 . Thus there is an influence from the Cooperative learning model type Student Facilitator And Explaining (SFAE) on student learning outcomes. The application of the *Student Facilitator And Explaining* (SFAE) Cooperative learning model in class XI Senior High School has a significant effect on increasing the results of learning Physics for students in class XI Senior High School which is indicated by increasing learning outcomes and positive attitudes to the learning process.

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