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The effectiveness of cooperative learning model with peer assisted tutors method complementation with student activity sheet on the students grade X SMAN 13 Semarang

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Abstract. The purpose of this research is to know the effectiveness of cooperative learning model with peer assisted tutorial method complementation with student activity sheet on work and energy material of student grade X SMAN 13 Semarang. The research design was used post-test only control group design. The sample determination method was used the random Sampling technique, which is to determine the control and the experimental class. Indicators of effectiveness in this study are interest, activities and cognitive learning outcomes of students of experimental class higher than the control class. Based on the data analysis, it is found that in the experimental class, students who are taught by cooperative learning model with peer assisted tutor's method have higher interest, activity and cognitive learning outcomes compared to the control class. For example, in the interest of students on the physics learning, in the experimental class the percentage of students who are very interested and enough interest to learn the physics on work and energy material are 18.9% and 81.1%, respectively, while the control class is 16.2% and 75.65%, respectively. Meanwhile, in the experiment class, there were no students who were not interested in physics learning when applied cooperative learning model with peer-assisted tutors, while in the control class taught by lecture method and information discussion there were 8.1% of students who were less interested in learning. Thus, it can be concluded that the application of cooperative learning model with peer assisted tutorial method complementation student activity sheet on work and energy material is quite effective.

1. Introduction

Learning is a key word and a very important activity in education. Learning is a physics process involving educators and learners to gain a certain knowledge and skill [1]. In practice, the learning process is not an easy thing to do in order to obtain what is the goal of education. Interest in learning is very influential on learning outcomes, because with interest someone will do something he is interested. Conversely, without interest someone will not do something. The low interest in student learning will be very influential on student learning outcomes on physics subjects. Both of these things indicate that the lesson is still less effective or the effectiveness of learning is still low.

The effectiveness of learning is a learning activity that produces positive effects, resulting in the mastery of knowledge, skills and attitudes optimally, can learn easily, fun and can be achieved learning objectives in accordance with expectations [2-3]. Effectiveness shows the achievement of goals or objectives has been established. So the effective learning can be said if the instructional goals that have been determined in learning can be achieved well. One of the learning models that can activate the



student is cooperative learning model. The cooperative learning model goes from the basic of getting better together that emphasizes the provision of wider learning opportunities and a conducive atmosphere for students to acquire, and develop knowledge, attitudes, values, and social skills that are beneficial to their lives in society [4]. Cooperative learning is believed to be a pedagogic practice to improve the learning process, high-order thinking, social behavior, as well as concern for students with different background abilities, adjustments, and needs [5-7]. Through the cooperative learning model, the students not only learn and accept what is presented by the teacher in teaching and learning process, but can also learn from other students, and also have opportunity to learn each other [8].

Many methods can be used in the learning process using this model. One is the peer tutor method. Peer tutor method is a method of learning that is done by empowering students who have a high knowledge capability of the student group itself to become a tutor for his friends [9]. Students who become tutors are assigned to provide learning materials and exercises to their friends (tutee) who have not understood the material / training given by the teacher based on the rules that have been agreed together in the group. Thus will build a cooperative learning group atmosphere is not competitive [10]. The essence of peer tutor learning methods is learning that its implementation by dividing the class in small groups, and learning resources not only teachers but also peers who are clever and fast in mastering a certain material. In this study, students who become tutors should have a higher ability compared with other friends, so that when he gives guidance he was able to master in the material to be delivered [11-12].

To facilitate students in learning by peer tutor method, students' worksheets (student activity sheet) are used. student activity sheet is a teaching material that has been packaged in such a way that students are expected to understand the learning materials independently [13]. In addition, students will also be given a structured direction to understand the learning materials provided as well as tasks related to the material to be discussed the next day. Benefits of student activity sheet were used in learning process, to provide a meaningful learning experience for students. A meaningful learning experience means actively engaging students to discover new concepts or knowledge by relating them to existing knowledge [14].

As a medium of supporting the success of learners, in each meeting will be given LKS containing a summary of material, examples of questions with structured answers, as well as questions that must be solved by students to train their abilities. Asmarani *et al.* [14] said that the use of student activity sheet in learning can improve students' activity, and the purpose of using student activity sheet is to provide meaningful learning for students. The aim of this study is to determine the effectiveness of cooperative learning model with peer assisted tutor's method complementation with student activity sheet on the students' grade X SMAN 13 Semarang to improve the cognitive ability.

2. Methods

This research is a kind of experimental research, with research design posttest only controls design. Physics subject in this research is work and energy concept for grade X SMA. The research was conducted in SMA Negeri 13 Semarang. The independent variable in this research cooperative learning model with student activity sheet assisted peer tutoring method. The dependent variable is the effectiveness of learning. Sources of data in this study are students, teachers, observation results, and documentation. There are two types of data taken i.e. quantitative and qualitative data. The quantitative data in the form of increasing competency student obtained from the value of student learning outcomes on physics subjects. Qualitative data in the form of student activity and teacher performance obtained from observation sheet and student questionnaire. Furthermore, data collection in this study was obtained using test, questionnaire, and observation sheet. Test is used to get the learning result of cognitive aspect of physics subject work and energy of student of class X SMA Negeri 13 Semarang. Questionnaires are used to find out how much students interest in the process. The observation sheet is used by the researcher to see how the students' activity in the learning process.

3. Result and Discussion

Table 1 shows the student interest after in the experiment and control class was applied the cooperative learning model with student activity sheet assisted tutorial peer method. The student interest was obtained using questionnaire and observation sheet.

Table 1. Students' interest on experiment and control class

Criteria	Percentage (%)	
	Control Class	Experiment class
Very Interest	16.20 %	18.90 %
Enough Interest	75.67 %	81.10 %
Less Interest	8.10 %	0.00 %

Based on Table 1, it can be seen that the student interest in learning process was applied the cooperative learning model with student activity sheet assisted tutorial peer method, not much different between experiment and control class on the categories very interest. However, for enough and less interest has a difference between experiment and control class. At experiment class, student with enough interest is 81.1% and there is no interested student after physics learning using cooperative learning model with student activity sheet assisted peer tutoring method, while in the control class still has less student interest on physics learning using discussion method around 8.1%. It's can be said that cooperative learning method with student activity sheet assisted peer tutoring method has been effective to improve student interest. This is similar to previous study [9,15-16] that peer tutor learning can increase the student interest on learning process. The existence of learning opportunities from other students with peer tutor methods at once guided by student activity sheet was resulted that student interest in the experimental class better than in the control class.

Learning effectiveness indicator then seen from student activeness during learning process. The students' activity in the experimental and control class is done during the learning process using the observation sheet. Result of student's activity analysis for control and experiment class as shown in Table 2.

Table 2. Student activity

Criteria	Percentage	
	Control Class	Experiment Class
Very Active	51.35 %	67.60 %
Active	29.73 %	27.00 %
Less Active	18.92 %	5.40 %

From Table 2 it can be seen that the students' activity in experiment class was higher than control class. It is because in the experiment class student was guided to be active with student activity sheet and also peer tutors learning. According to Tutik [17], that one of the benefits of using student activity sheet is to facilitate teachers in classroom management, especially in changing the teacher-centered learning atmosphere to be student-centered learning. It can be said that the role of teaching in learning process is done by a facilitator and peer tutor group discussion.

From the data analysis it can be seen that the interest of study in the experimental class is higher than the control class. This higher interest causes the student's activity in the experimental class to be higher than the control class. Cooperative learning is expected to increase activity in study groups, and encourage students to be more critical thinking, which in turn will affect learning outcomes. The presence of peer tutors and student activity sheet help the child more freely to ask and learn directed in the learning process. Training questions and material summaries contained in student activity sheet, help students to be more focused on learning process by peer tutor methods.

The last effectiveness indicator of learning is the student's cognitive learning outcomes. The students' cognitive learning outcomes were obtained by competency test in the form of multiple choice questions with total item question is ten problems. The capability of students' cognitive learning in the experimental and control class can be seen in Table 3.

Table 3. Student cognitive capability

Criteria	Percentage	
	Control Class	Experiment Class
Done	24.32 %	81.08 %
Not Done	75.68 %	18.62 %

Based on Table 3, it can be seen the student cognitive capability was done on the experiment class while in the control class is not done. Cooperative learning with peer tutor method was applied in the experiment class effective to improve students' cognitive learning outcomes. This can be seen from the percentage of students who can achieve the done criteria in the experiment class more than 75.65%. Furthermore, can be said student at the experimental class also has achieved the expected learning mastery. This is because learning is done more encourages students to learn to work with friends in the process of problem solving, so that learning will be more memorable than the control class that does not use this model and learning method.

This difference in cognitive learning outcomes is due to the differences in student learning interest and activeness between the experimental and control classes. So that when viewed, the experiment class that has a higher interest and activeness, also has a higher cognitive learning mastery compared with the control class. It is similar to Usman [18], that interest in learning has a major effect on learning outcomes, because with one's interest will do something to which he or she is interested. Conversely without interest someone will not do something. For example, a child is interested in art, so he will try to know more about art.

Similarly, in the process of physics learning, a child who has a great interest in the subject of physics, will tend to know more about physics. So children will tend to be more diligent in reading, listening to explanations from teachers and friends in the process of discussion, and not give up when experiencing difficulties. This is what the child experienced during high learning interests, so the knowledge student gained from learning more. High knowledge and understanding, will cause students' cognitive value is also high, and vice versa. This is similar to the previous research, which is the application of peer tutor learning has proven effective in improving student learning outcomes [19]. Also the peer tutor learning is one of the learning methods that can stimulate students to achieve the expected competence [9,20]. In addition, peer tutoring learning is effective for improving learning activities of student [9, 21-22].

4. Conclusion

Study of effect of the learning process by using cooperative learning model peer assisted tutors with student activity sheet to improve the effectiveness of physics learning with topics work and energy at Grade X SMA has been done. It can be seen from the students' interest, student activity, and student cognitive capability in the experimental class is higher than the control class. Based on that we can conclude the cooperative learning model with peer assisted tutors' method complementation with student activity sheet on the students grade X SMAN 13 Semarang is effective to improve the student interest, student activity and student cognitive capability.

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