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# Implementing student teams-achievement division to improve student's activeness and achievements on technical drawing courses

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**Abstract.** The purpose of this research is to find out the process of cooperative learning action type student teams achievement division (STAD) and its effect on the activeness and learning outcomes of students in class X Mechanical Engineering of Vocational High School 2 Depok Sleman. This research is a classroom action research using STAD type cooperative learning model, using a qualitative approach to compare the results of observations of cycle I, cycle II, and cycle III. The results of the study show that the implementation of the STAD type cooperative learning model can increase student activity and learning outcomes in each cycle. There are increasing in learning activeness of students who received the minimum score of good categories and increasing in the number of students who received the minimum completion criteria.

## 1. Introduction

The ASEAN Economic Community (AEC) aims to improve economic stability in the ASEAN region and establish a strong economic region between ASEAN countries. One of the indicators measured to determine the readiness of a country to face the AEC is quality of the human resources (HR) so that it has an impact on the number of labor force entering the workforce. One of the Indonesian government's efforts is through aspects of the world of education with curriculum development that focuses on the competencies and character of students, the 2013 Curriculum.

The implementation of the 2013 curriculum in Vocational High School experienced several obstacles at the planning, implementation and evaluation stages of learning. Observations made at Vocational High School 2 Depok Sleman found obstacles including (1) some students lacking confidence in interacting with teachers, (2) teachers did not manage the class optimally, (3) lack of attention where teacher giving explanation, (4) teacher motivation to students is still lacking, (5) teachers more often use the lecture method and students take notes.

In implementing the 2013 curriculum, the most important thing is the creativity of the teacher in the learning process, one of which is through the learning model. The learning model is a conceptual / operational framework, which describes a systematic procedure in organizing learning experiences to achieve certain learning goals and serves as a guide for students in planning, and implementing learning activities [1]. One learning model that could be used is a cooperative learning model. Cooperative learning models prioritize cooperation in solving problems to apply knowledge and skills in order to achieve learning objectives [1]. Cooperative learning consists of five basic elements: positive interdependence, promotive interaction, individual accountability, teaching of interpersonal



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and social skills, and quality of group processing [2]. It involves students working together to achieve common goals or complete group tasks-goals and tasks that they would be unable to complete by themselves [3].

Cooperative learning models have a variety of models that can be applied to improve student activity and learning outcomes, one of which is the type of Students Teams Achievement Division (STAD) [4]. The STAD learning model is one of cooperative learning that is applied to deal with heterogeneous student abilities [5]. In group learning, students will communicate with fellow peers that students are expected to be able to master subject matter easily because students more easily understand the explanations of their peers than the teacher's explanation because their level of knowledge and thinking are more in line and commensurate [6].

## 2. Methods

This research is a class action research (Classroom Action Research), with a spiral model of Kemmis and Taggart. The study was conducted collaboratively with 1 observer who would observe the learning process in the classroom. The study was conducted at Vocational High School 2 Depok Sleman, which is located in Mrican, Caturtunggal, Depok, Sleman, Yogyakarta. Research time is from April 5 to May 30, 2019. The subjects of this study were students of class X in the Machining Engineering expertise program with a total of 32 heterogeneous students, as seen from academic ability based on pre-test scores.

The study was conducted in three cycles of action. The implementation of learning in each cycle uses the Kemmis & Taggart model, which is in the form of a spiral from one cycle to the next [7]. The design of the Kemmis & Taggart action research model consists of four stages of action research, namely the planning of the action, implementation of the action, observation of the action taken and reflection.

The data obtained in the form of students learning activeness and outcomes. The instrument used were observation sheets to get data on student learning activeness, and test/ evaluation questions to get data on student learning outcomes. Observations were conducted by two observers to obtain data on student learning activities whereas the test was carried out twice, before and after being given treatment, in the form of learning using the STAD model.

The data analysis technique used is qualitative descriptive analysis and descriptive statistics. Descriptive statistical analysis is used to analyze quantitative data, while qualitative descriptive analysis is used to analyze qualitative data. Quantitative data is in the form of the score on the observation sheet and the value of student learning outcomes is in the form of the figures. It is then presented, described and then analyzed qualitatively [8].

In the analysis of student learning activeness, quantitative data were analyzed with the following steps: (1) providing criteria for scoring each aspect of the observed attitude; (2) adding up scores for each aspect of the observed attitude; and (3) Calculate the percentage of attitude scores on each aspect observed with equation 1.

$$\text{Percentage of attitude} = \frac{\text{Total score}}{\text{Maximum number of scores}} \times 100\% \quad (1)$$

To observe the activity of learning students can use the calculation steps as follows: (1) determine the maximum score, which is 4; (2) determine the minimum score, which is 1; (3) determine the number of aspects observed, i.e. 10; (4) calculate the ideal mean (Mi); and (5) calculate the ideal standard deviation (SDi). The calculation uses the equation 2 and 3. The categories for increasing student activity and collaboration are based on the following interval scale

$$\text{Ideal mean} = \frac{\text{maximum score} + \text{minimum score}}{2} \quad (2)$$

$$\text{Ideal standard deviation} = \frac{\text{maximum score} + \text{minimum score}}{6} \quad (3)$$

**Table 1.** Learning activity assessment category

Value Interval	Category
$X > M_i + 1,8 \text{ SD}_i$	Very Good
$M_i + 0,6 \text{ SD}_i < X < M_i + 1,8 \text{ SD}_i$	Good
$M_i - 0,6 \text{ SD}_i < X < M_i + 0,6 \text{ SD}_i$	Enough
$M_i - 1,8 \text{ SD}_i < X < M_i - 0,6 \text{ SD}_i$	Less
$X < M_i - 1,8 \sigma$	Very Less

Analysis of the test results of student learning evaluations is done by quantitative analysis by determining the average test scores. Test scores are based on the number of correct answers at the time of evaluation. The score used is from a scale of zero to a maximum scale of 100. The calculation uses the equation 4, 5 and 6.

$$\text{Student scores} = \frac{\text{number of items correct}}{\text{number of items}} \times 100\% \quad (4)$$

$$\text{Average student scores} = \frac{\text{the total score of all students}}{\text{the number of students}} \quad (5)$$

$$\text{Percentage of students who reach the minimum completion criteria} = \frac{\text{the number of students who reach the minimum mastery criteria}}{\text{the number of students}} \times 100\% \quad (6)$$

Qualitative data in the form of field notes at the time of observation during conducting research, were analyzed using qualitative descriptive analysis. Qualitative data analysis was done by describing the learning process in the classroom. The data generated during the action is presented in the form of a description.

### 3. Result and Discussion

#### 3.1. Learning process

The first stage is opening the lesson with greetings and prayers, followed by the presence of student attendance. Then the teacher gives an introduction and continues with the delivery of subject matter.

The second stage is by directing students to groups with several stages of the process. Student achievement data is sorted from highest to lowest grade then divided into eight discussion groups where each group consists of 4 students. It is aimed at smart students who can help other students in group activities.

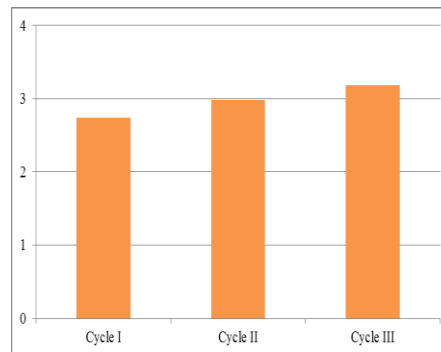
The next stage is giving group assignments that are completed with group discussions, so that positive interactions occur between students with one another. In this stage, the teacher acts as a facilitator, the teacher no longer provides material, but accompanies, and conditions the classroom situation so that the learning process remains conducive. The evaluation phase is carried out with a quiz in the form of a multiple-choice quiz which is carried out at the end of each cycle.

### 3.2. Student activity

Data obtained through observations made three times a meeting. The result is an increasing on student learning activeness in each cycle where could be seen in table 2. In addition, there is also an increasing in student learning activeness that is indicated by higher number of students who are above the good category. It is also indicated by an increase in the average grade scores of each cycle as could be seen in figure 1. Based on the results of the above explanation, it can be concluded that the STAD type of cooperative learning method can increase student learning activeness in technical drawing subjects.

**Table 2.** Student learning activity in each cycle

Cycle I	Cycle II	Cycle III	Category
6	10	14	<i>Very good</i>
17	17	14	<i>Good</i>
5	3	4	<i>Enough</i>
2	2	0	<i>Less</i>
2	0	0	<i>Very Less</i>



**Figure 1.** Improved class average

### 3.3. Student learning outcomes

The initial ability of students before being treated can be seen from the pre-test scores shown in table 3. Based on the table, it can be seen that there are still students who have not met the minimum completion criteria by distributing pre-cycle pre-test scores like in table 4. Based on the table, out of 32 students there were 15 students who had a minimum completion criteria value and 17 students under the minimum completion criteria with an average grade in the pre cycle was 75.125 so that the grade value did not meet the minimum completion criteria.

**Table 3.** Pre-cycle pre-test data intervals

Interval	Freq.	Cumulative Freq.	Relative Freq.(%)
67-69	3	3	9,4%
70-72	5	8	16,6%
73-75	9	17	28,1%
76-78	11	28	34,4%
79-81	3	31	9,4%
82-84	1	32	3,1%
Total	32	32	100%

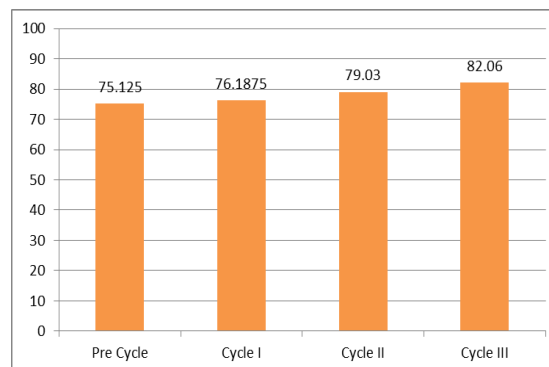
**Table 4.** Pre-test data distribution

Score	Frequency	Percentage	Category
$\geq 76$	15	46,88%	graduated
$< 76$	17	53,13%	not yet passed
Total	32	100%	

**Table 5.** Student learning outcomes for each cycle after being treated

Score	Pre Cycle	Cycle I	Cycle II	Cycle III
$\geq 76$	15	19	27	29
$< 76$	17	13	5	3
Total	32	32	32	32

Data on student learning outcomes after being treated with STAD models obtained from the post-test can be seen in table 5. From the table, it is known that the number of students who received a minimum completion criteria score has increased in each cycle. There is also an increasing in student learning outcomes indicated by the increasing student's number in obtaining the minimum completion criteria. It is also shown by an increase in the average score of each cycle. The increase in the average grade from pre-cycle to cycle III is presented in figure 2.

**Figure 2.** The average score of all students in each cycle

Based on the picture above, it can be seen that there is an increase in the average grade of each cycle. The stability of the average class value in the second cycle is shown by an increase in the average grade of 3.84% in the third cycle which has reached minimum completion criteria.

Based on the description above, it is known that the STAD learning model causes students to go deeper into the learning material, because students find their own learning experiences. STAD learning model is cooperative learning where students learn by using small groups whose members are heterogeneous, so that between smart and less clever students can learn together in one group and interactions occur between one another.

The existence of a group award factor also motivates students to compete to get maximum learning outcomes in each cycle. In working on group assignments students exchange ideas to solve problems, so students can learn together and at the end of learning all students are expected to master the same competencies. This causes students to work on individual quizzes more seriously and enthusiastically, so that student's learning outcomes have increased.

Broadly speaking, the obstacles that occur during the learning process are students still do not understand the syntax and assessment methods of learning methods applied, the attitude of students who are still individual in working on group assignments and there are still few students who ask questions during the learning process. The methods used to overcome these obstacles are explaining again about the syntax and method of assessment of the methods applied at the beginning of learning

and between learning. Besides, optimizing the process of discussion and presentation so that students want to work together with their groups so that students do not study individually is one of the methods. In addition, in order to lure students to ask questions, it is important that the teacher always keeps remind that at the time of learning or at the end of learning, there is a reward for students and groups who are active in the learning process.

#### 4. Conclusion

There was a significant increase in the activeness and learning outcomes of students in class X in the Mechanical Engineering Department of Vocational High School 2 Depok after the implementation of the STAD type cooperative learning model in Technical Drawing subjects.

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