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THE INFLUENCE OF STAD TYPE COOPERATIVE LEARNING MODEL ON IMPROVING PHYSICS LEARNING PROCESS AND LEARNING OUTCOMES

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Abstract: Efforts on improving student's process and learning outcomes using STAD type cooperative learning model involve the following stages: (1) teaching: presenting the lesson; (2) discussion: students work in their groups guided by activity sheets to complete the subject matter; (3) test: students take the quiz individually; and (4) group reward: the data collected in this study consist of activity observation data, questionnaire, and learning outcomes test. This study revealed that the student's activities were categorized as very active in cycle 1, very active in cycle 2, and very active in cycle 3. The teacher's activities were in the very active category during the three cycles. The average cognitive aspect of students was 76, with classical completeness of 74% in cycle 1. The average cognitive aspect of students was 75, with classical completeness of 83% in cycle 2. Meanwhile, the average score of cognitive aspect was 82 with classical completeness of 91 % in cycle 3. ANOVA analysis on the treatment of each cycle showed a significant influence with a value of 0.01 below 0.05. Based on this data, applying the STAD type cooperative learning model can improve first-year students' learning process and outcomes in Physics lessons at State Vocational High School 1 Narmada.

Keywords: *Cooperative learning, STAD, learning process, learning outcome*

INTRODUCTION

The 2013 curriculum is a learning curriculum directed to developing the ability to know, understand, perform things, live together, and self-actualize. Learning activities need to be student-centered, develop student creativity, create fun and challenging conditions, contain values, ethics, aesthetics, logic, and kinesthetics, and provide diverse learning experiences [1]. In the 2013 curriculum, students are declared to have achieved learning completeness if they have been able to acquire at least 75% of the entire material (especially for subjects that have a higher level of difficulties such as Mathematics and Natural Sciences) individually [2-4]. If they reach a higher than 85% score of all students, they have achieved learning classical completeness of 75% (Department of National Education, 2003). The Indonesian state does not differentiate the application of this curriculum [5]. The difference in the curriculum is the individual's ability to absorb concepts from learning materials.

Observation and study during the implementation of learning assignments at State Vocational High School 1 Narmada revealed that learning completeness for science subjects (Physics) in the first year was not optimal with the Minimum Completeness Criteria (MCC) determined by the school of 70 (still below the 75% Completeness Standard individually). The description of this situation can be seen in table 1.

Learning completeness of first-year students at State Vocational High School 1 Narmada students in science lessons was still not optimal. Learning outcomes are influenced by several factors both within themselves and in student's learning environment. Since State Vocational High School 1 Narmada was a relatively new school in Narmada District, prospective students were not familiar with the school's existence. Facilities and learning resources that support the achievement of student learning completeness were still limited. In addition, the methods used by teachers in learning were still dominated by classical teaching and lecture methods without being interspersed with the methods that challenge students to attempt. The main phenomenon that we faced in this class was that students were less participatory, less involved, and did not have the initiative and contribution both intellectually and emotionally, thus teaching tends to be rigid and teacher-centered.

The paradigm shift in education word from teacher-centered learning to more student-centered learning seems to be more effective in optimizing the learning process and improving student learning outcomes. Cooperative learning (one of the learning models that is student-centered) positively impacts students with low learning outcomes. In cooperative learning, the more capable students help the less capable ones [6-8].

Several types of cooperative learning include Student Teams-Achievement Division (STAD), Teams-Games-Tournament (TGT), Jigsaw II, Cooperative Integrated Reading and Composition (CIRC), and Team Accelerated Instruction (TAI). The STAD type cooperative learning model is very suitable for teaching learning objectives formulated with one answer as found in mathematics and science. The model is also suitable to be applied in chemistry learning [9]. The STAD type cooperative learning model can optimize the learning process

and improve student learning outcomes in chemistry subjects [10].

Table 1. The average score of students

Evaluation Type	Average Student Score	Classical Completeness Percentage
Daily tests 1 dan 2	65,6	71,8 %
End-semester exam in the first semester	71,2	78,3 %
Student's final grade in the first semester	69,0	72,8 %

The application of the student-centered STAD type cooperative learning model needs to be conducted at State Vocational High School 1 Narmada to further motivate students in a more active and effective learning process. Student's more active manner will increase their knowledge in learning, and therefore, improve the process and outcomes of science learning.

RESEARCH METHOD

Research Type and Design

The study is classroom action research, which aims to upgrade or improve learning practices in the direction that teachers should conduct in teaching. [11-12]. Classroom action research (CAR) design consists of 3 (three) cycles, with four (4) interrelated and continuous stages: (1) planning, (2) action, (3) observing, and (4) reflecting [13-15]. The design of CAR can be seen in Figure 1 [16].

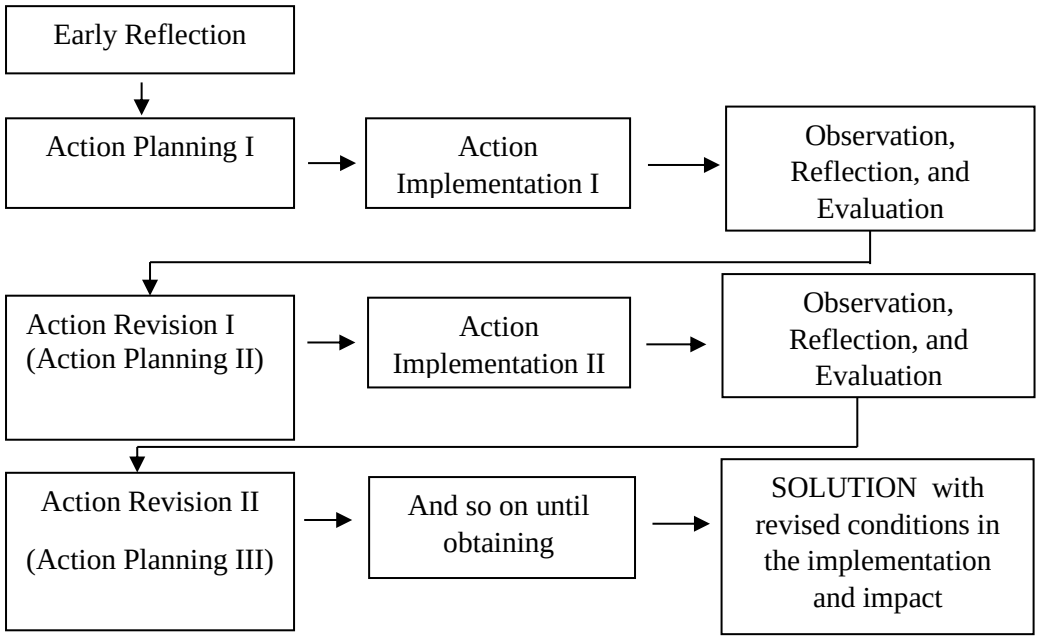

Figure 1. Classroom Action Research Design

Research Instruments and Data Analysis

The research instruments developed for data collection consist of observation sheets, questionnaires, and learning outcomes tests. An observation sheet is used to obtain an overview of the learning process using the STAD (Student Team Achievement Division) cooperative model related to teacher and student activities during the learning process. Students were given a questionnaire accommodating seven attitudes/response indicators compiled and developed by the researcher at the end of each meeting to find out the attitudes and responses (affective) of students participating in learning with the STAD type cooperative learning model. The researcher prepared the instrument for measuring students' cognitive aspect in the form of objective essay questions consisting of 6 questions in cycle 1, 6 questions in cycle 2, and 7 questions in cycle 3. The test was given in the form of a performance test carried out at the end of cycle 3 to determine student's psychomotor skills on the solubility and solubility product concept.

Observation data were analyzed with several steps, including analyzing and summarizing the observation results for each cycle based on the

observation sheet. Observation on activities was also analyzed and summarized.

Indicators of teacher activity involved teacher activity in guiding students, teacher ability to create a conducive classroom atmosphere, and the way teacher provided subject matter to be discussed. In addition, the results of observations about student activities in participating in learning with the STAD type cooperative model were analyzed and summarized. Indicators of student activity include student enthusiasm in participating in teaching and learning activities, student-teacher interaction, student-student interaction, group collaboration, student activity in group discussions, student activity in learning, and student participation in concluding learning outcomes.

Learning outcomes were analyzed using quantitative descriptive. The analysis reflects student's level of understanding in the learning process, which is determined by the percentage of understanding and classical completeness.

RESULT AND DISCUSSION

Student activity profile

Student activity profile in participating in learning activities with the STAD type cooperative learning model in 3 (three) cycles is described in table 2. Based on the observation data, it is clear that the STAD type cooperative learning model positively impacts student learning activities. Students become more active and participative in carrying out learning activities.

Table 2. Profile of student activities in participating in learning

Observed Aspects	Average Score Per Cycle		
	Cycle 1	Cycle 2	Cycle 3
I am very enthusiastic about participating in teaching and learning activities	3,5	3,6	3,6
This lesson provides many opportunities for interaction between students and the teacher	3,3	3,3	3,5
This lesson also provides many opportunities for interaction among the students	3,5	3,4	3,5
This lesson prioritizes optimal group collaboration.	3,3	3,4	3,5
Student activities in a group discussion can excite my learning enthusiasm	3,4	3,2	3,4
Student activity in learning is very high, so the lesson is not tedious	3,0	3,0	3,3
Student participation in concluding learning outcomes is very high	3,3	3,3	3,4
Total	23,3	23,2	24,2
Classification	Very active	Very active	Very active

Teacher activity profile

Teacher activity profile in carrying out learning activities with STAD type cooperative learning model in 3 (three) cycles are represented in table 3. Observation data of teacher activities in conducting learning with STAD type cooperative learning model indicated that teachers are very active in guiding students, creating a conducive learning atmosphere in the classroom, and in providing material to be discussed by students.

Student learning outcome

The learning outcomes of cognitive aspects in the research are obtained directly and instantly (table 5). Thus they describe the level of student comprehension of the topic they have just finished discussing. Tests for measuring the cognitive aspects of students in the first, second, and third cycles were arranged in the form of objective essay tests. It was because objective essay questions are most useful for testing higher levels of cognitive thinking. In particular, teaching objectives at the levels of analysis, synthesis, and evaluation can be measured if students are asked to organize and express their thoughts in a structured framework, describe relationships, and defend opinions in writing [17].

The objective essay test in the first cycle consisted of 6 questions, that in the second cycle consisted of 6 questions, while that in the third cycle consisted of 7 questions so that the total items used to measure student learning outcomes in this study were 19 items. According to the table of learning outcomes, the maximum score obtained by students in the first cycle was 100 (one hundred), and the minimum score was 33.0, with a completeness rate of 74%. It means that it must be continued to the next cycle because it has not reached 85% learning completeness. Hence, further research was applied with the second cycle, after first conducting a revision and reflection on the activities in cycle 1 to minimize the deficiencies in the first cycle. After implementing learning and test in the second cycle, the highest score of 100 and the lowest score of 44,

and the average score of 75 indicated an improvement compared to the results obtained in the first cycle with classical learning completeness of 83%. Despite the increase in learning outcomes in this second cycle of learning, we still have not achieved the work indicator with the completeness of 85%, and therefore, we need to continue to the third cycle of classroom action research [18].

After revising learning tools and actions that were still not effective in cycles 1 and 2, data collection was conducted again in the third cycle, whose learning outcomes were presented in table 3. According to the table of learning outcomes for the third cycle, the highest score was 100. The lowest score was 50. The average score was 82, with classical learning completeness of 91%. Thus the classical comprehension target of 85% has been exceeded. Hence, STAD-type cooperative model can be an adequate learning model in improving student learning outcomes [19-20].

The STAD cooperative model's application improves students' understanding gradually according to the development of learning in each cycle. The increase in concept understanding is supported by the results of the ANOVA analysis, which is below 0.05 with a value of 0.011 (Table 6).

Student Affective Learning Outcomes

Students' affective aspects were assessed by giving a questionnaire containing students' responses (attitudes) to the STAD type cooperative learning process. The questionnaire was compiled and developed by the researcher and accommodated 7 points of student attitude indicators.

Student-centered learning stimulates the students to be more active and motivated in learning. The STAD learning model raises student's motivation into the very active category. In learning, we are expected to pay more attention to the condition of students before starting the lesson [21]. Student learning motivation establishes student attitudes in learning and the desire to improve understanding [22]. The achievements of each student must be rewarded as recompense and awards in the learning process.

Table 3. Profile of teacher activities in conducting learning

Criteria	Average Score		
	Cycle 1	Cycle 2	Cycle 3
Active in guiding students	4	5	5
Able to create a conducive atmosphere	5	5	5
Provide material to be discussed	4	4	5
Total Score	13	14	15
Classification	Very active	Very active	Very active

Table 5. Student Learning Outcomes

Aspect	Score		
	Cycle 1	Cycle 2	Cycle 3
The highest score	100	100	100
The lowest score	33	44	50
Average score	76	75	82
Classical learning completeness	74	83	91
Standard deviation	19	14	12

Table 6. ANOVA Analysis Results

ANOVA

Learning outcomes

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1064.880	1	1064.880	6.665	.011
Within Groups	14379.239	90	159.769		
Total	15444.120	91			

Table 7. Summary of Affective Aspect Data

Observed aspect	Average Score		
	Cycle 1	Cycle 2	Cycle 3
I am very enthusiastic about participating in teaching and learning activities	3,5	3,6	3,6
This lesson provides many opportunities for interaction between students and the teacher	3,3	3,3	3,5
This lesson also provides many opportunities for interaction among the students	3,5	3,4	3,5
This lesson prioritizes optimal group collaboration.	3,3	3,4	3,5
Student activities in a group discussion can excite my learning enthusiasm	3,4	3,2	3,4
Student activity in learning is very high, so the lesson is not tedious	3,0	3,0	3,3
Student participation in concluding learning outcomes is very high	3,3	3,3	3,4
Total Score	23,3	23,2	24,2
Classification	Very active	Very active	Very active

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