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STUDENTS' POST-CLASS ACTIVITY AND LEARNING ACHIEVEMENT USING COOPERATIVE MODEL OF STUDENT TEAMS ACHIEVEMENT DIVISIONS ON OSCILLATION AND WAVE TOPIC

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Abstract

Science learning was still dominated by the lecture model. Consequently, students were less active and difficult in the learning process. The difficulty was caused by the low teacher ability to manage it so that the learning was less effective and interesting. As a result student's interest and learning achievement in learning science was low. Therefore, a learning model is needed to support student mastery. One of them was the cooperative learning model of student teams achievement divisions. This research aimed to describe the activities and student learning outcomes after learning using a cooperative learning model of student teams achievement divisions on Vibration and Wave. This study was a descriptive research with a quantitative approach. It used One-Shot Case Study. The Subjects of this study were students of class VIII of State Junior High School 3 Jombang consisting of 30 students. Student activities were observed by the student activities sheet. Learning outcomes were determined based on mastery of students and mastery of learning indicators on minimal mastery criteria. The results of the research showed that: (1) Student activities at the first and second meetings reached 89,5% with very good criteria, (2) Student learning outcome reached 77% while the learning indicator value got 86,5 with mastery category.

***Keywords**: Cooperative Learning Model; STAD; Learning Outcome; Vibration and Wave.*

Abstrak

Pembelajaran IPA di kelas masih didominasi dengan pembelajaran model ceramah, akibatnya Student kurang aktif dalam proses pembelajaran dan kesulitan di dalam belajar IPA. Kesulitan belajar IPA disebabkan oleh pengelolaan pembelajaran yang kurang efektif dan menarik, sehingga minat belajar dan hasil belajar rendah. Oleh sebab itu, dibutuhkan model pembelajaran yang mampu menunjang penguasaan Student salah satunya model pembelajaran Kooperatif STAD. Tujuan penelitian ini mendeskripsikan aktivitas dan hasil belajar Student setelah menggunakan model pembelajaran kooperatif STAD pada materi Getaran dan Gelombang. Jenis penelitian ini adalah penelitian deskriptif dengan pendekatan penelitian kuantitatif. Rancangan penelitian ini menggunakan One Shot Case Study. Subjek penelitian ini adalah Student kelas VIII SMP Negeri 3 Jombang yang terdiri dari 30 Student. Aktivitas Student diamati menggunakan lembar observasi aktivitas Student. Hasil belajar ditentukan dari kePassedan Student dan kePassedan indikator pembelajaran berdasarkan KKM. Hasil penelitian menunjukkan bahwa: (1) aktivitas Student pada pertemuan pertama dan kedua mencapai 89,5 dengan kriteria baik sekali, (2) hasil belajar Student mencapai 77, sedangkan kePassedan indikator pembelajaran sebesar 86,5 dengan kriteria baik sekali.

***Katakunci**: Model Pembelajaran Kooperatif; STAD; Hasil Belajar; Getaran dan Gelombang.*

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BACKGROUND

Education is a relationship between humans and their surroundings which takes place consciously and planned to develop every potential. Education causes positive changes and developments in either cognitive, affective, and psychomotor aspects continuously to reach life goals. Education could be understood as a set of processes and results. Education as a process is a series of activities that are conducted consciously and continuously. Meanwhile, education as a result refers to the changes and improvements of cognitive, affective, and psychomotor aspects (Ahmadi, 2016).

According to Slameto (2010), education experts have teaching problems that have been an issue until now. Science learning stressed on providing personal experience through observing, questioning, analyzing, and trying activities to improve students' creativity. Science learning difficulty usually occurred because of the learning management ineffectiveness and unattractiveness. This type of learning made class conditions tend to be teacher-centered hence students became less-active and felt the difficulties in learning Science.

Based on the observation on September 8th, 2018, students' scores in Physics showed unsatisfying results with an average score of 69.77. The percentage of students who passed the minimum score was 59.5% and those who had not passed the minimum score was 40.5%. Meanwhile, the Passing Grade (PG) set by the school was 77. It could be caused by the fact that most students disliked Physics. Students who like to read and memorizing learning material tend to be unwilling to understand the formulas and concepts of Physics. Physics concepts require an understanding of Physics formulas. Without the effort of formulas understanding, students could find it difficult to understand the concepts. The lack of interest in Physics learning took effect on students learning achievements.

The questionnaire result filled by 20 students from class VIII-I shows that 18 students (90%) stated that the teacher tends to explain in front of the class most of the time. As much as 11 students (55%) assumed that Oscillation and Wave material was difficult, and 8 students (40%) liked group/discussion learning activity. It shows that Science learning conditions, especially Physics was still conventional. Students' mastery of Physics learning materials was very influenced by students' conceptual understanding of the provided learning substance. The learning process was still dominated by the teacher hence students' access towards independent development through their discovery of the next stage was still limited (Al-Tabany, 2005).

Physics is a subject that needs proper concentration and learning methods to maximize students' learning achievement. Besides the necessity of experiment or demonstration in learning, a supportive environment is also required to improve students' learning process. The physics learning process success could be observed based on learning material understanding level. It could be assumed that the higher the learning material understanding, the higher students' learning achievement. Thus, a proper learning method is needed to enhance students' understanding by applying cooperative learning methods.

Al-Tabany (2015) stated that cooperative learning is one of the learning models that aim to build the spirit of togetherness to maximize learning achievement. This type of learning originates from the concept that finding and understanding concept should become easier if students discuss with each other. One type of cooperative learning model that brings up a supportive learning environment is the cooperative *Student Team Achievement Divisions* (STAD) model.

Meanwhile, Oscillation and Wave learning material should match with the used learning model based on several considerations. First, Oscillation and Wave learning material needs more conceptual analysis and conceptual understanding to encourage students to be more active during the learning process. Second, Oscillation and Wave learning material was thought to be quite difficult hence requires cooperation, critical thinking, and developing students' social skill. One of the ways that could be done to achieve these capabilities is through STAD cooperative learning.

One of several studies about the implementation of STAD cooperative learning that was related to students' learning achievement was conducted by Pertama & Nanga (2014) which shows that the implementation of the STAD cooperative learning model influenced learning achievement on Human Digestion System learning material. The average learning achievement after the study was 76.19 which increased as much as 42% from the learning achievement before the study was conducted.

A study result conducted by Jannah (2016) shows that STAD cooperative learning model on Physics Static Fluids learning material could improve students' learning achievement. The implementation of lesson plan experience improvements in every cycle that was 3.12, 3.37, and 3.67. The completeness of students' classical learning achievements was also improved in each cycle as much as 6.90%, 67.85%, 65%, and 85%. It indicates that Physics learning using the STAD model gave a positive impact because most of the students could finish their studies.

Based on the background, a further study is necessary with the title "Students' Post-Class Activity And Learning Achievement Using Cooperative Model Of Student Teams Achievement Divisions On Oscillation And Wave Topic." The aim of this study are: (1) To describe the learning implementation by the teacher and the students using STAD cooperative learning model in grade eight of SMP Negeri 3 Jombang on Oscillation and Wave learning material, and (2) describe students' learning achievement in grade eight of SMP Negeri 3 Jombang after learning process using STAD cooperative learning model on Oscillation and Wave learning material. The advantage of this study is expected to provide a foundation for both teachers and pre-service teachers as a literature review in conducting researches related to describing science learning achievement in the future.

METHOD

This research is descriptive research using a quantitative approach that aims to describe either the object or research result. This research method could be interpreted as a research method to describe

students' activities and learning achievements using STAD cooperative model on Oscillation and Wave learning material.

Rancangan penelitian yang digunakan dalam penelitian ini adalah *pre-experimental design*, yaitu menggunakan perlakuan tunggal, satu kelompok yang diberi perlakuan dan tidak ada grup kontrol. Setelah perlakuan hasilnya diobservasi (Sugiyono, 2016). Bentuk rancangan penelitian yang digunakan adalah *one-shot case study* yang digambarkan sebagai berikut:

The used research design in this study is the pre-experimental design which uses a single treatment, that is a group was given a treatment and there is no control group. After the treatment was conducted, the result was observed (Sugiyono, 2016). This study used research design in the form of a one-shot case study which could be described as following.

Figure 1**.** Research Design of *One-Shot Case Study*

Notes:
X: Given treatment in the form of STAD cooperative learning model
O: Observation

This research was conducted in SMP Negeri 3 Jombang in the even semester academic year 2018/2019. The population of this research is all eight-graded students in SMP Negeri 3 Jombang, and the used sample for this research was as much as 30 students in Class VIII-I. The used sampling technique is purposive sampling.

The sampling technique in this research use observation, test, and questionnaire method. The observation method was conducted by direct observation using an observation form instrument of the learning implementation. The observation was conducted towards students' activities during the learning process. The test method was conducted to obtain the data of students' learning achievement on the topic Oscillation and Wave using a test instrument in the form of multiple choice. During the research process, the test was given during the posttest. The questionnaire was given to the students to know students' responses towards the STAD learning model.

The data analysis used in this research was quantitative descriptive statistical analysis to know students' activity in attending STAD cooperative learning model. Sugiyono (2016) stated that the score determined based on the evaluated statements with score 1 for "Yes" answer and 0 for "No" answer. Then, the obtained percentage would be categorized using the guidelines in Table 1.

Table 1. Students' Activity Data Interpretation

Activity (%)	Criteria
80 ≤ Students' Activity ≤ 100	Very good
60 ≤ Students' Activity < 80	Good
40 ≤ Students' Activity < 60	Enough
20 ≤ Students' Activity < 40	Deficient
0 ≤ Students' Activity < 20	Very deficient

Source: (Afriani, 2016)

Data analysis was also used on the test instrument, i.e. calculating the average value by referring to the Passing Grade Criteria (PGC). After obtaining the posttest result data, the data was recapitulated for each indicator. The posttest result for each indicator was analyzed to know the completeness of the learning indicator. Before conducting the calculation of learning indicator passing grade (LIPG), question indicator passing grade (QIPG) was calculated.

The obtained learning indicator completeness (LIC) was categorized using the guidance in Table 2.

Table 2. The Criteria of Learning Indicator Passing Grade

Learning Indicator Passing Grade	Criteria
≥ 77	Passed
< 77	Did not pass

(Source: Nilai KKM Mata Pelajaran IPA SMP Negeri 3 Jombang).

RESULTS AND DISCUSSION

Students' Activities Post-Learning using STAD Cooperative Learning Model

This study was conducted on April 4th and 10th, 2019 in SMP Negeri 3 Jombang about the implementation of the STAD Cooperative Learning model on Oscillation and Wave learning material. Observation in this study was conducted to find out students' activities in the learning stages using STAD cooperative learning model. The observation was conducted by two undergraduate students of Faculty of Education Universitas Hasyim Asy'ari as observer 1 and observer 2. The observation results of students' activities are shown in Table 3.

Table 3. Students' Activities Observation Results

No	STAD Cooperative Learning Stages	Students Activities				Averages (%)	Crt
		∑ "Yes" Answers		(%)			
		O1	O2	O1	O2		
I	***Stage I:* Purposes and Motivation Delivery**						
	1. Students answer the teacher's questions.	14	15	97	100	89	BS
	2. Students take notes of the learning material/the theme and the learning purposes	14	15	87	70		
II	***Stage II*: Learning Material Presentation**						
	Observing 3. Students observe a picture of a disturbed pendulum moving up and down.	14	15	97	100	87	BS
	Questioning 4. Students present questions based on their observation of the next learning activity.	9	15	63	63		
	Data Collection 5. Students pay attention to the oscillation and wave learning material explained by the teacher	15	15	100	100		
III	***Stage III:* Group Division**						
	6. Students form a group based on the teacher's clauses.	15	15	100	100	100	BS
	7. Students study the "Oscillation and Wave" worksheet	15	15	100	100		
IV	***Stage IV*: Learning Activities in Team**						
	Associate 8. Students discuss the experiment results and answer in the team.	15	15	97	100	82	BS
	9. Students make a conclusion based on the experiment result.	15	15	97	100		
	Communicate 10. One of the students presents his/her group's discussion result.	12	12	30	30		
	11. Students pay attention to the teacher's explanation.	15	15	100	100		
	***Stage V*: Quiz/test**						
	12. Students do the quiz independently under the teacher's supervision.	15	15	100	100	100	BS
VI	***Stage VI*: Team Achievement Appreciation**						
	13. Students pay attention to the teacher's information.	15	15	100	100	95	BS
	14. Students pay attention to the teacher's information.	5	15	67	100		
	15. Students conclude oscillation and wave definition.	14	15	97	100		

No	STAD Cooperative Learning Stages	Students Activities				Averages (%)	Crt
		∑ "Yes" Answers		(%)			
		O1	O2	O1	O2		
16.	Students listen to the teacher's information.	13	15	93	100		
17.	Students reply greetings.	13	15	93	100		
	Averages					**92%**	**BS**

Notes:
O1 : Observer 1 : Istifadatun Na'imah
O2 : Observer 2 : Zuhrotun Nurani
Krt : Criteria
0 – 19 = Very Deficient
20 – 39 = Deficient
40 – 59 = Enough
60 – 79 = Good
80 – 100 = Very Good

Based on Table 3 about the recapitulation of students' activity observation results, the stages of STAD cooperative learning in the first and second meetings reached 92%. It shows that the learning stages using STAD cooperative learning model conducted by the students were excellently successful. The learning in this study was conducted based on the lesson plan in the first and second meetings. The observation and assessment were conducted by the observers during learning using STAD cooperative learning model. The observed aspects are students' activities including every learning stage using STAD cooperative learning model.

Learning using STAD cooperative learning model on Oscillation and Wave topic in Science subject for eight-grader in SMP Negeri 3 Jombang that could be achieved well consists of STAD cooperative learning model stages including (1) the delivery of learning purpose and motivation, (2) learning material presentation, (3) group division, (4) learning activity in team, (5) quiz, and (6) team achievement appreciation (Arends, 2012). Based on previous research conducted by Jannah (2016), the collected data through observation for students' activity percentage average using STAD cooperative learning model in Physics learning experienced improvement in each cycle.

Students' Learning Achievement Post-Learning using STAD Cooperative Learning Model

Recapitulation data of students' posttest results post-learning using the cooperative learning model are shown in Table 4.

Table 4. Students' Passing Grade Post-Learning using STAD Cooperative Learning Model

Posttest results	Score	Average Score	Notes
Student 1	80		Passed
Student 2	100		Passed
Student 3	80		Passed
Student 4	90		Passed
Student 5	90		Passed
Student 6	70		Did Not Passed
Student 7	80		Passed
Student 8	80		Passed
Student 9	90		Passed
Student 10	90	82	Passed
Student 11	90		Passed
Student 12	80		Passed
Student 13	80		Passed
Student 14	60		Did Not Passed
Student 15	90		Passed
Student 16	70		Did Not Passed
Student 17	90		Passed
Student 18	90		Passed
Student 19	70		Did Not Passed

Posttest results	Score	Average Score	Notes
Student 20	60		Did Not Passed
Student 21	70		Did Not Passed
Student 22	90		Passed
Student 23	80		Passed
Student 24	90		Passed
Student 25	80		Passed
Student 26	80		Passed
Student 27	70		Did Not Passed
Student 28	90		Passed
Student 29	90		Passed
Student 30	90		Passed

Notes

*Passed if the score ≥ 77 (The passing grade of Science subject in SMP Negeri 3 Jombang)

Table 4 shows students' posttest result where there was 23 out of 30 students who reach the passing grade and there were 7 students who had not passed the Passing Grade. Furthermore, the posttest result was analyzed based on the passing grade that applies to the institution. Students' learning achievement is said to pass if their scores reach the PG and students are said classically passed if at least achieved 77 from all of the students. Based on the previous data, 23 students passed. This fulfillment was caused by the activity and the passion of the 23 students.

Based on the students' score data, 7 students did not pass the learning achievement test. Some of the students were failed because they still need more approaches to be able to receive the learning process and the discussion well through the team learning activity. It can be seen based on the table and the attachment that their activities did not follow the whole model stages of the STAD cooperative learning model properly. They only conducted several learning implementation indicators. Thus, it had a bad impact on their learning achievement.

Based on the research result, learning using STAD cooperative learning model has realized the existence of learning achievement passing grade which is 77 with the passing grade itself is 77. It is consistent with a study conducted by Prastiti (2017) that shows most of the student's learning achievement passes well.

Table 5. Learning Indicator Passing Grade

No	Learning Indicators	Question Indicators	*Posttest*		
			QIC	LIC	Crt
1.	Explaining oscillation definition	Students can explain the definition of oscillation.	100	100	T
2.	Identifying oscillation components	Students can determine the composition of oscillation.	67	56	TT
		Students can determine the composition of oscillation.	90		
		Students can determine the amplitude of pendulum's oscillation.	10		
3.	Identifying the effect of pendulum length towards the oscillation period.	Students can determine the effect of pendulum length towards the magnitude of the period.	73	73	TT
4.	Explaining the definition of a wave.	Students can explain the definition of a transversal wave.	100	100	T
5.	Identifying the components of the wave.	Students can identify wave crest and trough.	100	96,5	T
		Students can identify a wavelength.	93		
6.	Identifying the difference between oscillation and propagation direction of transversal and longitudinal wave	Students can differentiate between the oscillation and propagation direction of a transversal and longitudinal wave.	97	93,5	T
		Students can determine the difference between transversal and longitudinal waves.	90		
		Average		**86,5**	**-**

Notes:
* Students are passed if LIC ≥ 77 (Science PG in SMP Negeri 3 Jombang)

Based on Table 5, we can see that 4 learning indicators had been passed. Students were able to explain the definition of oscillation but they had not been able to explain the oscillation component and the effect of pendulum length toward the oscillation period. Students had already been able to explain the definition of a wave, to identify the components of a wave, and to identify the difference between the oscillation direction and propagation direction of a transversal and longitudinal wave.

Two indicators had not been passed. The unfulfillment of question indicators and learning indicators might be caused by the period of learning that was quite short. Hence, there is a question indicator with a score of only 67, and ten of them are categorized not as expected. It might be caused by the fact that the questions included in this indicator are cognitively on level C4. Cognitive level C4 is one of the question-level that requires high order thinking skills. High order thinking skills requires habituation in solving long-term reasoning problems (Yuana, 2018)

CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

Based on the study results, we can conclude that: (1) Eight-graded student's activity in learning using STAD cooperative learning model on Oscillation and Wave learning material on the first and second meetings reached 92, and (2) Students' learning achievement using STAD cooperative learning model on Oscillation and Wave learning material reaches 77 meanwhile the Learning Indicator score reached 86.5 which was categorized passed.

B. Recommendations

Based on the conclusion, the suggestion of this study includes.

1. Maximize students' activities, the teacher is expected to implement the STAD cooperative learning model as a learning model alternative because the result of this study shows very good criteria.
2. The teacher's role is very influential in supporting learning achievement to pass well. The students that have not passed in the post-test might be caused because those students still need more approach through a team learning activity. STAD cooperative learning model requires teacher's special skill hence teachers are expected to be good facilitators, mediators, motivators, and evaluators.
3. Researchers should consider things to minimize research limitations that exist in this study, e.g. in the group division. Students were not used to be in a team prepared by the teacher hence students should be pushed and monitored to join their determined teammates. Thus, teachers are suggested to remind students to stay in their team more often and return to their team in daily activities.

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