Activity and Progress of Learning with Two Stay Two Stray (TS-TS) Cooperative Model on Harmonic Vibration

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ABSTRACT

Two stay two stray cooperative model (TS-TS) has been applied to know the activity and progress of student learning outcomes in Yapis Manokwari Senior High School. The type of research used is quantitative with quasi-experimental method. Time series design research was used, in this case, the group used for research cannot be selected at random. The sampling technique used is purposive sampling. This technique selects samples with certain criteria which in this research is class X IPA as many as 12 students. The data collected were pre-test, post-test and learning activity for three lessons with harmonic vibration material. The results of pre-test and post-test data collection has tested the hypothesis using Paired Sample T-Test with , obtained = 5.920 > = 1.796, then rejected . This shows that after applied TS-TS learning model there is a significant difference in student learning outcomes before asked the model and afterwards. The N-Gain test also shows an increase of the post-test average of each learning. Students' activity on each learning has increased by 40.7%, 48.8% and 63.2%, respectively. Physics learning using TS-TS learning model can help learners to understand the physical meanings of physics and solve/analyze the problems given by the teacher and can increase learners' learning activities during the learning process.

Keywords: activity, cooperative model, learning of progres, two stay two stray (TS-TS)

INTRODUCTION

The emphasis on the process of analyzing the problems in physics requires a deeper learning of physics, therefore to learn more than the students must understand the concepts of the previous material. This fact should be followed by appropriate and adequate physics learning (Gunta, 2015). It is not unknown that the subject of physics in Indonesia is a lesson that is considered difficult, heavy and unpopular so that in the end can reduce the interest of learners to learn it (Wulandari, 2016). One of the efforts that can be done for that purpose is to use the right learning model. The basic activities that learners use for learning are speaking, listening, writing, reading, doing experiments, and observing. It is expected that the desire of learners in the class will be maximized to make learners as the center of learning. The teacher's job is to motivate students so that they will carry out a series of learning activities. High

motivation of the students is expected to drive the students' interest in learning so that student learning outcomes can be improved (Palupi, 2014).

Cooperative learning will encourage learners to solve a given problem and be able to discuss such issues with their peers. In other words, teachers can engage high-ability learners to help their peers with low-ability. The cooperative learning can increase activity and learning outcomes (Celikten, 2012). Learners in completing the task group, each member cooperate and help to understand a learning material.

Teaching and learning process is one of the things that are needed and influential in the achievement of learning objectives. Learning activities of learners as a requirement in the learning process is necessary because learning may not take place properly without the activity of learning process. This indicates that an effective learning process is going to have an effective impact on the results of the learning process. In the learning process, learning activities should involve all aspects of students, both in physical and mental. So, changes in behavior can change quickly, precisely, easily and correctly related cognitive, affective and psychomotor aspects (Hanafiah, 2010). In this learning activity, learners must be active in the following the learning processes to develop the potential that exists in them.

Learning activities of learners (Supinah, 2013) can be described as follows:
• Complex thinking: Students use of various complex thinking strategies effectively and translate a task into a working step with clear objectives.
• Processing information: Students use different information-gathering techniques and information resources effectively and interpret and synthesize information.
• Communicate effectively: Students express/convey ideas clearly and effectively communicate ideas with other people/students.
• Working together or collaborating: Students are trying to achieve group goals by using interpersonal skills effectively, strive to maintain group cohesiveness, and demonstrate the ability to play roles in various roles effectively.
• Effective reasoning: Students understand their own paradigms, make effective plans, seek, create and use the required resources, and be very sensitive to feedback.

Yapis Manokwari Senior High School is one of the schools that have been using the Curriculum 2013. Teachers should be experienced by learners to able to know the conditions and situations for the implementation of learning. If the knowledge of these conditions is fulfilled the learning process can run smoothly and optimally. Initial conditions found in Yapis Manokwari Senior High School. Teachers tend to still be the center of learning (teacher center). This kind of learning does not provide an opportunity for learners to express their opinions and ideas which leads learners to be less active in the learning process. The teacher who in this case is a physics teacher should be able to provide a physics learning atmosphere that is fun and not stressful for learners. One way that can be done is to choose the appropriate learning model. Also, the learning model should be able to make learners active in the learning process. The activity of learners is going to affect the learning outcomes of the learners (Tsay, 2006).

The cooperative learning model is a learning model that requires learners to work together in small groups and help each other in learning to achieve learning objectives (Huda, 2011). One of the used cooperative learning models is Two Stay Two Stray (TS-TS) type. The TS-TS type cooperative learning model developed by Spencer Kagan is a learning model that provides an opportunity for group members to share results and information with other group members by visiting each other or visiting groups (Nardi, 2014). The reason to choose this learning model is enabling learners to interact with each other and share their knowledge with other friends. In this type, there is a given role as host and guest. This role is used during group discussions. The existence of the given role to the learners will motivate the learner to understand the material which will be delivered during the inter-group discussion. In the way, learners are required to

be able to understand the material. The expected learning is learning that focuses on the activities of learners which enable learners to be directly involved in learning. Appropriate learning model can motivate learners to increase physics learning activities and results (Dewi, 2016). The TS-TS type cooperative model is more effectively used to improve learning outcomes compared to other models (Wahyuni, 2014; Gumay, 2014; Nurjanah, 2017).

The TS-TS type of cooperative learning model has a founder in the implementation which relate in activities undertaken by learners during the learning process. Each group consists of two people who serve as guests and two people who play the role of the host. The two people in each group are going to visit the other group, ask the material and the host of the other group members to explain the material to the visiting group members (Suprijono, 2009). This model provides an opportunity for learners to discuss each other's problems with peers and share information gained in the group to other groups. The use of TS-TS type cooperative learning model provides a funny learning experience for students because learners can solve problems with friends and convey/communicate the solution with other groups in the role of guest and host (Harahap, 2017).

METHODOLOGY

The research method used in this research is quasi-experimental design as one of the quantitative methods. The quasi-experiments are defined as an experiment that has the treatment and measurement of the effect of the treatment (Riduwan, 2011). In this method, the researcher has a role as a controller in order to completely control the characteristics of the sample to be studied, the characteristics of the sample to be studied and using a design that allows to be used as a controller of the situation.

The quasi-experiments have two forms of design as time series design and nonequivalent control group design (Sugiyono, 2016). The time series design used in this study. In this design, the used groups cannot be randomly selected for the study. Before the treatment, the group was pretested up to three times, to know the stability and clarity of the group's condition before being treated. If the score in each group has the same value at the pretest and then the value is much increased after being given posttests, it will be more reliable if the treatment causes improvement to be done more than one pretest and posttest given (Fraenkel, 2009).

Sampling technique used in this research was purposive sampling. The purposive sampling is a technique of selecting samples with condition sampling. Some of the considered criteria are the number of learners in a class, the inactivity of learners in the classroom and the cognitive learning outcomes of learners on the low level of physics. The sample used in this research is X class IPA Yapis Manokwari Senior High School. This is done because researchers do not use a comparison class. In class X IPA, the number of students was 12. This criterion has been adapted from the TS-TS type cooperative learning model because the learners will be divided into the groups consisting of 4 students.

Data collection techniques consist of observation, documentation, and tests. Learning progress data obtained from learners' learning outcomes during the process of teaching and learning activity that is at the value of pretest and posttest. Data obtained from the observation sheet of learner activity.

Procedures of activities undertaken in analyzing the data activities of learners are as follows:

1. Provide an assessment with a range of 1-5 for each aspect assessed by providing a check mark on the assessment sheet.
2. The assessment sheet using Likert scale with 5 criteria is very good, good, good enough, less, and very less. These criteria have information about the number of learners who made the statement on the observation sheet. After the observer fills in

the observation sheet, then adds a lot of checks to each column on the observation
sheet.

The pretest and posttest data tested the normal and homogeneous model classes as the
basis for determining hypothesis testing, then using N-gain to calculate the improvement that
occurred before the learning and after model learning.

RESULT and DISCUSSION

a) Activity of Learning

Student learning activity in table 1, when applied cooperative learning model type TS-
TS, learning activities get increasing percentage. Student learning activities are observed in two
categories as class and group. The assessment of one class category, the percentage of activity
in the first learning was 40.7%. This value was included in the medium criterion. In the second
study rose to 48.8%. This value included in the criterion of medium. At the last learning was
63.2% of this value included in high criteria. In group appraisal, the percentage of activities
found that during the first and second period of the study included moderate criteria, in which
only a few students provided feedback on the teacher's lessons. However, the three activities of
learners are at a high criterion in learning where learners almost do whole learning activities
well. In the third lesson, learners participated fully in the discussion activities, and conveyed
the results of group discussion to other groups. The Finding are in line with the study (Simone,
2016) which says that learners participate fully in discussion activities, giving roles and
responsibilities convey the results of group discussion to other groups.

Table 1. *Percentage of learning activities in class and group categories*

Unit			%		
			Class		
Class activity	1. Harmonic Vibration Characteristics		40,7		
	2. Period, Frequency, and Vibration Energy		48,8		
	3. Harmonic Vibration Energy		63,2		
			Group		
			1	2	3
Group Activity	1. Harmonic Vibration Characteristics		46,7	46,7	39,0
	2. Period, Frequency, and Vibration Energy		59,0	50,4	53,1
	3. Harmonic Vibration Energy		75,2	77,1	74,2

Based on Figure 1.a, percentage of learning activities of students in the classroom
increased from learning 1, 2, and 3. The result of this percentage was obtained from the
observation on the activity sheet. Based on the percentage criteria of learners' learning activities,
the percentage goes into medium to high criteria. Based on Figure 1b, the results of the activity
assessment of learners in terms of groups indicating that each learning has increased
significantly, and this is in the middle to high level, the average of each learning is 44.1%,
54.0% and 78.8%. The percentage increase for group 1 in learning 1 to 2 was 12.3%, in the 2nd
to 3rd learning was 16.2%. Group 2 in learning 1 to 2 amounted to 3.7%, in learning 2 to 3 of
26.7%. Group 3 in learning 1 to 2 was 14.1%, in learning 2 to 3 of 21.1%.
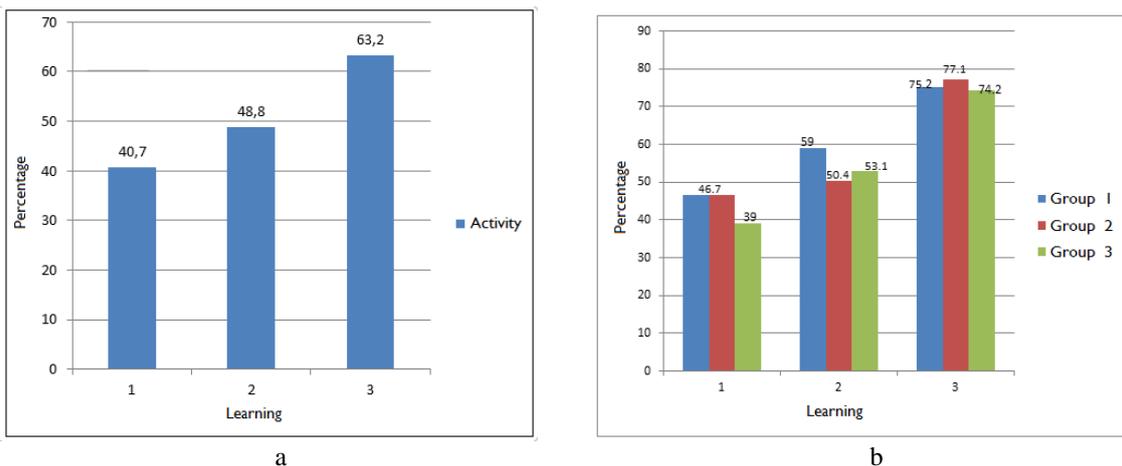
Figure 1. *Graph of percentage of assessment, a) Class activity, and b) Group activity*

b) Progress of TS-TS Cooperative Learning Model

Improved learning outcomes can be seen from the behavior in addition to the mastery of knowledge, thinking skills and motor skills. Results of learning or student achievement can be seen from the mastery of material that has been studied. Tools for measuring results/learning achievements prepared by the teacher named achievement test.

Table 2. *Significance of normality and homogeneity test data, a) kolmogorov-smirnov, b) Levene statistic*

Method	Normality Test (Kolmogorov-Smirnov)		
	Statistic	df	Sig
Pre-test	0,213	12	0,140
Pos-test	0,193	12	0,200

(a)

Homogenity Test (Levene Statistic)			
Statistic	Df1	Df2	Sig
0,033	1	22	0,858

(b)

Table 2 (a) shows that the value of pre-test significance is 0.140 and post-test 0.200, with then significance > 0,05. These results indicate that the data is normally distributed. Table 2 (b) shows that the significance value of the data on the homogeneity test is 0.858, with the value then the significance > 0,05. This means that the data is homogeneous. After it is confirmed to be normally distributed and homogeneous, the data analysis is continued by hypothesis/inference test using Paired Sample t-test.

Table 3. *Cognitive diagnostic tests on the mean pretest and posttest values*

		Paired Samples Test						
		Paired Differences						
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df
					Lower	Upper		
Pair 1	posttest - pretest	22.048	12.901	3.724	13.851	30.246	5.920	11

Table 3 is the result of paired Sample t-test performed at pretest and posttest value with significant level obtained = 5,920, while value = 1,796 so > then rejected. This means that there are significant differences in cognitive learning outcomes before and after using TS-TS type cooperative learning model. This significant difference occurs because of differences in pretest and posttest values of learners, the average posttest score is higher than the pretest value of learners. This means that, the application of TS-TS type cooperative learning model give a good enough impact in helping to improve students learning outcomes. In line with the

results of the study (Selvianti, 2015) indicating that there are significant differences in physics learning outcomes of learners who were taught using cooperative learning model type TS-TS and who were taught using conventional learning model.

The N-Gain test is done by calculating the gain formula on N-Gain equation. The result obtained is as follows:
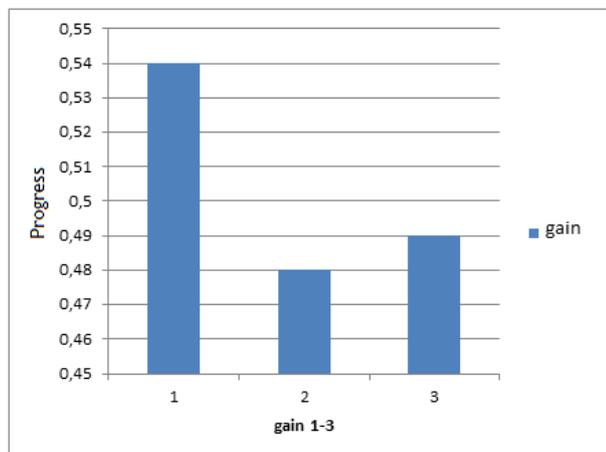
***Figure 2.** Graph of N-gain test*

The N-gain test is performed to see the difference in learners' learning outcomes between before and after learning. Based on Figure 2, the result of g1 is the difference between pretest results 1 and posttest 2, g2 differences in pretest 2 and posttest 2 results, g3 differences in pretest 3 and posttest results 3. The tests show that there is a difference between before and after applying cooperative learning model TS-TS type to outcome learners learn. This is also evidenced by the average posttest score of learners better than the average pretest value of learners. The increase in learning outcomes has previously been proven through research conducted by (Effendi, 2016) showing that TS-TS can improve the results student learning. Along with research results (Lusiana, 2017) that the low motivation and student learning outcomes can be overcome by applying the TS-TS.

CONCLUSION

The use of TS-TS cooperative learning model provides many benefited for students in Yapis Manokwari Senior High School. The result of learning activity is known that students are happier and active in group learning. Student learning activity in one class gives successive percentage of each learning is 40.7%, 48.8%, and 63.2% who experienced an increase in each learning and included in the criteria of medium and high. Student learning activities in the group gave the average percentage of each successive learning was 44.1%, 54.0% and 78.8% in medium and high criteria. Students are free to ask their friends if they feel difficult and they also feel more comfortable. This result is also evidenced by the increase of N-gain in pretest and posttest with moderate criterion that is in the range $0.3 < g\ 0.7$, that the posttest average value is better than the average value of pretest learners. It was concluded that learning with TS-TS cooperative model can improve learning activity and learning achievement.

The obstacles faced by most teachers are only about developing the digital teaching materials when the initial planning takes up much of their time. Moreover, most of the teachers are accustomed to use technology for learning, so they have less chance to experience many

obstacles. On the other hand, a small number of teachers who are unfamiliar with the technology have more chance to encounter many obstacles in developing it.

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