

The Influence of two Stay Two Stray Learning Model Nuanced by Scientific Literacy on Students' Learning Competence in SMPN 4 KERINCI

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Abstract – This research is a quasi-experimental research conducted by using Control Group Posttest-Only Design as its research design. The population of the research is all students of class VII in SMPN 4 Kerinci in the academic year of 2017/2018. Purposive sampling was used to determine samples where class VII.1 was chosen as an experimental class and class VII.3 as a control class. Data of the research were students' competence including cognitive, affective, and psychomotor. The instruments of assessment include tests for cognitive competence and observation sheet for affective and psychomotor competence. The data of cognitive competence were analyzed by using the t-test, while affective and psychomotor competences were analyzed by using Mann Whitney U test. The result of the research shows that the students' natural science learning outcomes were increased and there are significant differences in students' cognitive, affective, and psychomotor competence by using Two Stay Two Stray learning model nuance by scientific literacy with Direct Instruction (DI) model. The students' cognitive, affective and psychomotor competences on the Two Stay Two Stray model nuance by scientific literacy are better than Direct Instruction (DI) model.

Keywords – Two Stay Two Stray Model; Scientific Literacy; Students' Learning Competence.

I. INTRODUCTION

The education of science in learning processes is a process of students' activities which are related to existing prior knowledge with new knowledge acquired or discovered during the learning process. Science education can shape students' scientific attitudes such as flexibility, honesty, openness, diligence, logic, being critical, having high curiosities and caring about the environment.

Natural Science is a science that provides a variety of learning experiences to comprehend the concepts and science processes. Natural Science is one of the important fields of study because the Natural Science that is indispensable to other fields of science. Natural Science learning requires students to understand the concepts and comprehend its application for life. It is also intended for the formation of positive attitudes, because of the beauty and

regularity of behavior which explains the natural events and the application of Natural Science in technology.

Based on the results of an interview on July 22nd, 2017 with teachers of Natural Science course in SMPN 4 Kerinci, it is known that the students' scores were still low in the learning process. The low scores of the students made the students' learning outcomes were also low. Due to the low scores and the students' learning outcomes, teachers used only one type of assessment, it was only a cognitive assessment aspect while there were 3 (three) types of assessment for students used by teachers, namely cognitive, affective, and psychomotor aspects. Assessment of the cognitive aspect alone cannot increase the scores and learning outcomes of students so that the scores and students' learning outcomes are not appropriate as expected. Lufri (2007) says that "the more active the students develop cognitive, affective, psychomotor abilities through interacting with teachers, peers, lesson materials,

instructional media, and the environment, the richer and more meaningful their learning experiences”.

The learning processes that take place in SMPN 4 Kerinci were also still less effective. The teachers still often use a conventional model which is Direct Instruction (DI) learning model or direct learning model to deliver learning materials because it seems the most appropriate and does not take long. The use of this conventional model is less supportive for the students to apply science skills they have because less actively involved in the learning process. The learning process should have an interaction between teacher and students, students and students, and students with the environment, so it can achieve the learning objectives that have been determined. Lufri (2006) also says that “This interaction needs to be designed in such a way as achieving the optimum result in accordance with the learning objectives.

The results of the interview between researcher and some students showed that it has been difficult to understand the lesson which has taught without using any object either directly or the media, teacher has been more often using the conventional model, so students have felt tired during the learning process because the teacher does not attract students' attention and does not emphasize the importance of students' role in the classroom to achieve the learning objectives that are implemented. Teachers should be more creative in using learning models that have been developed by the experts so that learning can run effectively and students can learn actively. Therefore, a pleasant atmosphere in the learning process can be created and not monotonous, and the students are able to apply their science skills in daily life.

The results of the students' learning experiences in Indonesia are clear that the results of the scientific literacy test with PISA questions show unsatisfactory results. The results obtained by most of the Indonesian students are much lower than other participants from other countries. Well or not the science education in a country is seen from the level of the scientific literacy or the ability to apply science in daily life. Nurhayati, et al. (2017) states that “Scientific literacy is someone's ability to comprehend science, communicate with science (written or oral) and apply science in solving problems to have better attitudes and awareness of oneself and the environment in making decisions based on scientific thinking. Because of the importance of scientific literacy to be mastered because of its wide application and it almost includes all fields, so the member countries of Organization Economic Cooperation

Development (OECD) hold the Program for International Student Assessment (PISA). This method is done to determine whether a country already has students with a quality of good scientific literacy as well as testing the quality of education of participant countries. Chabalengula, et al. (2008) says that through science, communities can learn not only how to make decisions about the use of science and technology, but also to assess the application and effect of those findings. Alchin (2014) also states that information on science education has a wider place for scientific literacy that can be the first benchmark on science that is relevant to science education. Holbrook and Miila (2009) assert that science literacy in education is to develop creative abilities, to utilize knowledge and skills corresponding to scientific evidence and scientific processes, especially with its relevance to daily life, not only solving issues of personal problem challenge but also the meaningful scientific issues and making responsible socio-scientific decisions.

Students' literacy skills are not only enhanced by students' learning motivation but also teachers need to consider the learning model to be used. The learning model which is applied by the teacher should be related to the learning model used by the students in order to be actively involved in the learning process. This is done by applying the Two Stay Two Stray (TSTS) model. Warsono and Hariyanto (2012) state that “The Two Stay Two Stray learning model encourages students to think creatively and analytically in groups. The facilitator organizes the class in such a way so there is enough room for groups of students that contain 4 (four) people.” The Two Stay Two Stray learning model involves the students' active role in learning so students can think critically and analytically to look for and find answers from a problem in question.

Arif, et al. (2016) say that the TSTS model is a learning model involving students' interactions within intra-group and inter-group in a classroom. Dewi, et al. (2016) also say that the TSTS model is a technique that provides an opportunity for groups to share results and information with other groups, this is done through mutual visits and visiting the other groups to share information. The TSTS model teaches students that sharing activities familiarize students with respect to each other's opinions, so students can learn to express their opinions to others. Sulisworo and Fadiyah (2014) assert that the recognition of other students' opinions can increase self-confidence and motivate students to express their ideas or opinions. Students feel their presence is trusted and respected because each member has a very important role in the division of group tasks. This situation

occurs interactively because groups cannot solve tasks without good cooperation between groups.

II. RESEARCH METHOD

The type of this research is a quasi-experimental research (apparent experiment) with the design of Group Control Posttest-Only Design. Experimental class was given treatments by using TSTS model of scientific literacy nuance, while control class was only given the conventional learning model that is Direct Instruction (DI) model. A final test was given in both sample classes to see the learning competency in the final meeting.

Table 1. Research Design of Control Group Posttest-Only Design

Class	Treatment	Result
Control	-	T
Experiment	X	T

(Source: Lufri, 2017)

Information:

X = Learning with TSTS Model Nuance by Scientific Literacy.

T = Final Test

The population of this research is all students of class VII in SMPN 4 Kerinci in year 2017/2018. Sampling was done by purposive sampling technique. Samples were taken with consideration of the proximity of the mean (average score) and the number of students.

1. Cognitive Competence

Learning outcomes instrument used in this research is a final test. First, try out a test. The trial test was done to determine the validity, level of difficulty, discrimination power, and reliability. Data of the learning outcomes were analyzed by using the t-test. Before undertaking the t-test, the normality and homogeneity tests were conducted (Sudjana, 2002).

2. Affective and Psychomotor Competences

The data analysis technique of affective and psychomotor was obtained from the result data of filling observation sheet of students' learning activity, which was analyzed by Mann Whitney U test (Siregar, 2013).

III. RESULTS AND DISCUSSION

A. Research Results

1. Data Description

a. Description of Cognitive Competence Data

Data of cognitive domain learning competence in this research were obtained through the final test of a written test in the form of multiple-choice questions. The final tests were given to the experimental class and control class held at the end of the meeting. The data of students' cognitive competence are presented in Table 2.

Table 2. The Students' Learning Results in Experimental and Control Class on Cognitive Domain

Class	N	$\bar{X}$
Experimental	30	87,23
Control	30	81,43

It can be seen in Table 2 that the average of students' Natural Science learning competence in the experimental class is higher than the control class that is 87,23 and 81,43.

b. Data Description of Affective Competence

The research data on the affective domain were obtained through observations done by the observer by using the format of affective assessment when the learning process was taking place. The research data of affective competence domain were presented in Table 3.

Table 3. Comparison of Affective Competence Sample Classes

Class	N	Score	Predicate
Experiment	30	75,07	Good
Control	30	65,73	Good

Table 3 shows that the mean score of affective competence in the experimental class which is given treatments of the TSTS model nuance scientific literacy is higher than the average score of affective competence in the control class of DI model.

c. Data Description of Psychomotor Competence

The research data on psychomotor competence was obtained by the observer through observations. Psychomotor competence research data are presented in Table 4.

Table 4. Comparison of Psychomotor Competence in Sample Classes

Class	N	Score	Predicate
Experiment	30	81,77	Very Good
Control	30	80,07	Very Good

Table 4 shows that the mean score of psychomotor competence in the experimental class which is given treatment of TSTS model nuance scientific literacy is higher than the average score of psychomotor competence in control class of DI model treatment.

2. Results of Data Analysis

Based on the requirements of the analysis, it was obtained the data are normally distributed and have a homogeneous variant, so it is eligible to continue the hypothesis test. The t-test is used as hypothesis test for cognitive competence, while hypothesis tests for affective and psychomotor competence used Mann Whitney U test.

a. Hypothesis Test of Cognitive Competence

The results of the normality test of cognitive competence in the sample classes are shown in Table 5.

Table 5. The Normality Test Results of Cognitive Competence

Class	N	α	S	L_{calc}	L_{table}	Information
Experiment	30	0,05	6,9	0,944	0,161	Normal
Control	30	0,05	5,2	0,996	0,161	Normal

Table 5 shows that the data in the sample classes have $L_{calc} > L_{table}$. It means that the data are normally distributed.

The result of homogeneity tests for two sample classes can be seen in Table 6.

Table 6. The Homogeneous Test Result in Sample Classes

Class	N	$\bar{X}$	S	S^2	F_{calc}	F_{table}	Information
Experiment	30	87	6,9	47,61	1,76	1,85	Homogen
Control	30	81	5,2	27,04			

The normality and homogeneity tests for the final test shows that both samples are normally distributed and have homogeneous variants. Therefore, testing the hypothesis which is used is t-test. The results of the hypothesis test can be seen in Table 7.

Table 7. The Results of Hypothesis Test in Sample Classes

Class	t_{calc}	t_{table}	Conclusion
Experiment	4,60	1,697	Hypothesis accepted
Control			

Table 7 shows the t-test on the cognitive competence domain i.e. $t_{calc} > t_{table}$, that is $4.60 > 1.697$, it means that the hypothesis is accepted and the TSTS learning model nuance science literacy can improve the cognitive competence of students.

b. Hypothesis Test of Affective Competence

Testing the hypothesis which is used is Mann Whitney U test. The results of Mann Whitney U tested can be seen in Table 8.

Table 8. The Calculation Results of Mann Whitney U test for Affective Competence.

Class	Z_{calc}	Z_{table}	Conclusion
Experiment	6,29	1,96	Hypothesis accepted
Control			

The test results of Mann Whitney U test Z count = 6.29 and Z table = 1.96. So that, it is obtained $Z_{calc} > Z_{table}$, thus it can be said that hypothesis accepted. Students' affective competence on learning with TSTS model nuance science literacy has increased.

c. Test of Psychomotor Hypothesis

Testing hypothesis used is Mann Whitney U test. Mann Whitney U tested results can be seen in Table 9.

Table 9. The Calculation Results of Mann Whitney U test for Psychomotor Competence.

Class	Z_{calc}	Z_{table}	Conclusion
Experiment	1,97	1,96	Hypothesis accepted
Control			

Mann Whitney U tested results were obtained $Z_{calc} = 1.97$ and $Z_{table} = 1.96$. The result obtained by $Z_{calc} > Z_{table}$, thus it can be said that hypothesis accepted. The students' psychomotor competence on learning by using TSTS model which is nuance by scientific literacy has increased.

B. Discussion

1. Cognitive Competence of Students

Students' cognitive competence is observed appropriately with the formulation which is contained in basic competence 3.7 and 3.8 that is analyzing the interactions among living creatures with their environment, population dynamics due to such interactions, and the occurrence of environmental population and impacts upon the ecosystem. The written test is given for testing the cognitive competence which consists of 20 (twenty) questions about the interaction materials of living things with their environment and 30 (thirty) questions about materials of environmental pollution. The results of data analysis found that the average scores of students' cognitive competence on learning with TSTS model nuance scientific literacy are higher than in learning with DI model.

TSTS learning model was done by dividing 4 (four) students in each one group. This is for students' role in 2 (two) as the guests and 2 (two) as the hosts. Besides this TSTS learning model can improve cooperation and students' motivation in learning. TSTS learning model that is used is added with the nuance of scientific literacy so those students are able to recognize natural phenomena factually. The nuance of scientific literacy on TSTS model has inserted into LKPD that those students do by using scientific literacy aids to answer the problems given in the LKPD. It is also explained by OECD (2003) that "natural scientific literacy is defined as the capacity to use scientific knowledge, to identify questions and to draw conclusions based on facts to understand the universe and make decisions of the changes that occur because of human activity. Widyatiningtyas (2008) also suggested that scientific literacy can be interpreted as an understanding of science and its application for the needs of society.

The experimental class which is used this TSTS model nuance by scientific literacy can increase individual responsibility for the group. It can be seen from the seriousness of students in answering questions contained in LKPD. Every student tried to master the learning materials because they will convey the ideas that are gained by their group of friends and the guests that come to their group.

2. Affective Competence of Students

The data analysis results of affective competence were known that the average score of students' affective competence on learning by using TSTS model nuance by scientific literacy is higher than by using DI model. The experimental class that used the TSTS learning model

nuance by scientific literacy found a change of interest and positive attitudes that happened to the students from filling rubric which is filled by the observer every time learning took place.

The attitude of the student's responsibilities is seen when the students complete the tasks contained within the LKPD on time. Every student socializes each other seriously and diligently in the discussion. Harahap and Edy (2017) also assert that the use of this TSTS model will lead students to be more active in processing information in discussions, questioning, seeking answers, explaining and facilitating. Students also carry out what the teacher instructs when learning to take place. The responsible and curiosity attitude of students encourage students to ask the teacher if they do not understand the subject matter without having to be provoked/stimulated by the teacher. While presenting the results of the discussion, in which each group moves forward to the class in turns to present their workgroup, curiosity and responsibility can be still observed in each student. Groups who come to the front of the class feel responsible for defending their group's opinions by providing scientific and clear reasons for other groups. A group that does not appear, also have a great curiosity by asking questions of the group that appears. Harahap and Edy (2017) also explain that the TSTS learning model can help to improve the ability to receive and processing information from students because this TSTS learning model allows students to share information with other groups. Teachers play a role to provide mastery of the concept of subject matter that aims to avoid the occurrence of misconception of students.

3. Psychomotor Competence of Students

Psychomotor competence was observed by two observers using observation sheets of practices and non-practices activity assessment. Implementation of practices with TSTS model nuance by scientific literacy and DI model follow the steps of practices according to LKPD instruction. When the practices take place, students record the results of the practices so those students are satisfied with the results obtained during the practices. At the end of the practices the students clean and tidy up the lab table together.

The non-practices activity, the first psychomotor aspect is presenting, is a form of communicative activity in the presence of many people for the purpose of making opinions or information to others. The indicators used for this aspect are the students engaging in group discussions and giving ideas, the students engage in the discussion but not giving

the idea, the students just listen to their friends while discussing so those students are not involved in the discussion. TSTS model nuanced by scientific literacy is generally involved in discussions and ideas. Ismawati and N. Hindarto (2011) argue that overall psychomotor learning outcomes have increased significantly. This is because, in the group activities, students are required to play an active role and communicate with each other both orally and written and want to dig information both in discussion and literature study and able to share with other students in decision-making to get results. Harahap and Edy (2017) also express the opinion that TSTS learning can help students receive and improve the ability to obtain information, allow students to share information with other groups and can develop students' personal and social attitudes. However, in the DI model, not all students give ideas in the discussion, highly skilled students who are more dominant in group discussions.

IV. CONCLUSION

The conclusions of this research which has done are that the learning model of Two Stay Two Stray (TSTS) Nuanced by Scientific Literacy Model is better known in improving students' learning competence in 3 (three) aspects, such as cognitive, affective, and psychomotor aspects compared with Direct Instruction (DI).

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