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Comparison of Cooperative Learning Model Jigsaw and Think Pair Share (TPS) Toward Competency Learning High School Biology Class X To Content Ecosystem and Environmental Pollution

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***Abstract* – The results of observations that have been made in class X Senior high school Kurnia Jaya pangkalan nyirih shows that the discussion group in applied learning process of teachers has not gone well so the responsibility for students in discussions uneven and cognitive competence of learners is still low. One effort to overcome these problems is to use cooperative learning model, the model of learning jigsaw and Think Pair Share (TPS). This study aims to determine the ratio between the model jigsaw and Think Pair Share (TPS) on the competency study biology.**

This study is a quasi-experimental research (quasi exsperiment). The study population was class X Senior high school Kurnia Jaya pangkalan nyirih Academic Year 2016/2017, sampling was done by using purposive sampling and got class X1, as an experimental class I treatedmodels, jigsaw and class X3 as an experimental class II treated TPS models. Instruments used in the form of an essay test. Data analysis techniques to test the hypotheses is t-test.

Results showed competence comparison study results are significant (sig <0.05) among students who study with the model jigsaw and students learn tomodels. think pair share It can be concluded that there is no difference to the competence of student learning outcomes. The difference is only found in classical completeness between classes using a model jigsaw with a class that uses a model polling stations. The average value of competence cognitive abilities experimental class I is 81.60 with the percentage of students who completed was 85.18% and the percentage of students who have not completed was 14.81%. While the experimental class II average cognitive ability competence is 81.09 with the percentage of students who completed was 69.23% and the percentage of students who have not completed was 30.77%. Affective and psychomotor value in both the experimental class is in the value of both categories.

***Keywords* – Cooperatif; Jigsaw; Think Pair Share; Competency.**

I. INTRODUCTION

Education is one of the manifestations of human culture that is dynamic and full development. Therefore, changes or educational development is something that should happen in line with changing culture of life. Education that can support the future development is education that develops students' potential, so concerned is able to face and solve the problems of life faces. Education must touch the inner potential and the potential competence of learners in the learning process (Trianto, 2009: 1). The process to develop the student's education course must be supported with effective learning.

Learning is a part or element which has a major part to realize the quality of graduate education. In the learning process and the need for a strategic approach to learning models. Cooperative learning is one of the options in improving the learning process to improve and develop the education of students.

Based on observations made in Senior high school Kurnia Jaya, biology learning process has not run as expected, in which the teacher conducted discussion process has not gone well. Equitable distribution of responsibilities and participation of students in the group cannot be achieved because the students are passive surrender all his duties in the active group, and the results of the daily average value of the student has not reached KKM set at 78. Data daily value of these students can be seen in Table 1 below this.

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Table 1. Average daily value of class X on Senior high school Kurnia Jaya Academic Year 2016/2017 biology

No	Classes	Number of Students	Average Daily replay	Completed
1	X1	27	68.24	55.56
2	X2	26	82.32	80.77
3	X3	28	66.08	50
4	X4	26	77.32	65.38

Source: Archives of Biology teacher Kurnia Jaya Senior high school 2016 X class

Discussions that teachers in four classes have an average value that is different, and the class has met the classical completeness, This proves that not all classes managed by using the same method.

Based on interviews with biology teachers Senior high school Kurnia Jaya, obtained information that the leader of the discussion in class X2 was instrumental in organizing the discussions and have a sense of responsibility so that friends within the group actively participate and work together to resolve the problem, this led to success in learning is high. In contrast to the XI, X3 and X4, the leader of the discussion on these three classes cannot control the friends to the class, so that a sense of responsibility, participation and teamwork is very less and led to the success of student learning in class X1, X2, and X3 are low. Slavin (2009: 252) says "it is important to choose a leader of the group discussion. This person should be selected based on the ability of organizational and leadership, and not just based on academic performance alone. This leader must ensure that everyone participates and that the group remains the task ". Slavin explanation states that a leader in the discussion very important role in the success of the group discussions, and proven leader who cannot control in a group discussion in class X1, X2 and X3 lead to failure in group discussions.

Observations made during the students carry out discussion on students' class X1 and X2 can be seen in Table 2 below:

Table 2. Observations discussion class XI and X2

Activity	(%) X1	(%) X2
Students who are active and express their opinions and when discussion	33.33	76.92
Students are passive and resigned themselves to his friend during these discussions	66.67	28.08

Source: school observation

Problems outlined above in mind that the discussion leader cannot control group of their friends, led to the success in the learning process not achieved. This situation requires the variation in the models used for teaching and learning.

Variations learning model is needed to achieve success in the learning process and increase the sense of responsibility and participation of students in class discussions. The learning model *jigsaw* and TPS is one of the cooperative model that is suitable to solve the above problems, both of these models requires students to take responsibility for the group and participate in the process of group discussion. The cooperative model is expected to make students more active in the learning process and improve student learning outcomes.

Based on the description of the issues that have been raised, the researcher has conducted research on "Comparison of Cooperative Learning Model *Jigsaw* and *Think-Pair-Share* (TPS) Toward Competency Learning High School Biology Class X to Content Ecosystem and Environmental Pollution".

II. Review Of Literature

2. Theoretical Basis

2.1 Understanding learning

Learning is a part or element that has a very dominant role to realize the quality of graduates (output) education. Education is a sector that determines the quality of life of a nation. Successful education automatically brings the success of a nation, otherwise a failed education will have implications for the failure of a nation. Learning is to teach students using the principles of education and learning theory is a major determinant of educational success (Sagala, 2009: 63). Learning is a two-way communication process; teaching is done by the teacher as an educator, while learning is done by the student as a student. Students in the learning process are an active subject in the process of thinking, seeking, processing, decomposing, combining, summarizing and adjusting. Meaningful learning according to the needs and interests of students, and as closely as possible related to the reality and its purpose in life.

Based on the description above, learning can be interpreted as a process of student interaction with educators and learning resources in a learning environment. Learning is an aid provided by educators in order to occur the process of acquiring knowledge and knowledge, mastery of skills and character, and the formation of attitudes and beliefs in students. In other words, learning is a process to help students learn well.

2.2 Cooperative Learning

Cooperative learning is a model of learning using a small grouping system, which is between four and six people with different backgrounds of different academic, gender, race or ethnic (heterogeneous) abilities. The scoring system is done so that each group will be rewarded, if the group is able to demonstrate the required performance. Thus, each member of the group will have a positive dependence. Such dependence will then lead to individual responsibility for the group and interpersonal skills of each group member. Sanjaya (2008: 242-243) says that individuals will help each other; they will have motivation for group success, so that

each individual will have equal opportunity to contribute to the success of the group.

Cooperative learning is structured to increase student participation, facilitate students with leadership experience experiences and make decisions in groups, and provide opportunities for students to interact and learn with different background students. So in cooperative learning, students have multiple roles as students or as teachers, by working collaboratively to achieve a common goal, so that students will develop skills related to fellow human beings that will be very beneficial for life outside school (Trianto, 2011: 58).

Cooperative learning strategy has two main components, namely cooperative task (cooperative task) and cooperative incentive structure (cooperative incentive structure). Cooperative duties relate to what causes members to work together in completing group tasks; while the cooperative intensive structure is something that evokes the individual's motivation to work together towards the group's goals (Sanjaya, 2008: 24

Table 3. Steps of Cooperative Learning Model

Stage 1 Convey goals and motivate students	The teacher conveys the lesson objectives to be achieved in this lesson and motivates the student
Stage 2 Submit information	Teachers convey information to students by public or through reading materials
Stage 3 Set students into study groups	The teacher explains to students how to organize study groups and help each group to transition efficiently
Stage 4 Guiding group work and learning	Teachers guide learning groups as they do their work
Stage 5 Evaluation	Teacher Teachers know the learning outcomes about the material they have learned or each group provides the job.
Stage 6 appreciation	Teachers seek ways to appreciate both individual and group effort and learning outcomes

Source : Ibrahim inTrianto (2014:117)

2.3 Jigsaw Cooperative Learning Model and Type TPS Type Learning Model

Jigsaw model cooperative learning model is a cooperative learning model that focuses on the work of groups of children in the form of small groups, as well as the TPS model. The difference between the jigsaw model and the TPS is the activity in the group discussion.

Jigsaw type cooperative learning process group is divided into two groups of origin teams and groups of expert teams. Members of the original team will have different questions, then will meet in a group of experts with the same problem and together, the team of expert teams will return the original team group to great or take turns members.

The activity in the discussion of cooperative learning model of TPS type involves three steps, namely: (1) Thinking means students who think about their own proposals or answers that produce it, (2) in pairs) means students will pair up and experience what they receive, 3) Sharing (sharing) multiple couples to share with the class they have discussed during the discussion.

Both of these models are all intended for active students in the learning process. The jigsaw model has advantages that students have many opportunities to express opinions and process information obtained and can improve communication skills, group members are responsible for the success of the team and the completeness of the material part that is learned and can convey information to other groups (Rusman, 2010: 218) The weakness of jigsaw is (1) Requires more time in learning, (2) Requires ability and skill of teacher, on learning process progress. The advantages of the TPS model are that students have the opportunity to work on their own and work with others. Another advantage of this learning is the optimization of student participants. The classical method that allows only one student to advance and dance for all classes, this learning gives students more opportunities to be identified and show their participation to others (Lie, 2008: 86). The disadvantages are (1) more reporting and necessary groups. (2) Requires the ability and skills of teachers, in the learning process takes place. (3) fewer ideas emerge. (4) if there is a problem in the discussion process there is no mediator.

Table 4. Differences and equations of jigsaw and TPS models.

Jigsaw	Equation	TPS
1. Need more preparation 2. Every student is required to be an expert 3. step in the process of discussion too much 4. Lesson time required more 5. Teori: Aronson, 1979	1. Increase student involvement in discussion 2. Improving student achievement 3. Encourage student cooperation in discussion 4. Improving students' self-confidence 5. Encourage student acceptance with diverse needs 6. Students are more responsible in groups	1. Prepare less 2. steps in the discussion process is not too much 3. Given time in the discussion process 4. Discussion time is only 5-12 minutes 5. Teori: Freed Lymon, 1981

Source (Farley: 2013)

Based on the difference of jigsaw and TPS learning model which has been explained by Farley (2013), it can be concluded that jigsaw learning model is superior compared to TPS learning model. This is because the jigsaw learning model speaks the students to the experts in the material they are studying and returns full with their group friends, unlike the TPS learning model which only answers the problems the teacher gives and the classification with his / her spouse.

Several studies on cooperative learning model of jigsaw and TPS type have been done by Andriani et al (2013) showed that jigsaw model learning achievement better than direct learning and TPS, while in Asfaroh study (2013) also

showed a significant difference of learning result IPA using jigsaw learning model with TPS learning model. However, in another study conducted by Lestari (2013) showed no significant difference between classes using jigsaw learning model with a class using the TPS learning model. While research conducted by Komalasari (2012) states the two kinds of learning strategies that are not significantly different.

2.4 Learning Competencies

According Sagala (2009: 23), competence is a fusion of knowledge (power fikir), attitudes, and physical achievements are manifested in the form of deeds. In relation to competence, Finch and Crunkilton in Mulyasa (2004: 38) also states its nature as a mastery of a task, attitude and appreciation needed to support learning achievement. So competence is a blend of mastery of knowledge, skills, attitudes and attitudes that are reflected in the habit of thinking and acting in their duties.

Competence by Majid (2007: 5) "An intelligent set of intelligent actions that a person must possess as a condition to be able to perform tasks in a particular field of work". In the opinion of majid above, competence is the responsibility as a mastery of a task, skills, attitudes, and appreciation that someone has to be achieved in achieving success.

According to Bloom's terms in Arikunto (2013: 129) "Learning outcomes are divided into three domains, namely cognitive, affective, and psychomotor."

2.5 The cognitive domain

Yamin (2012: 27) reveals the ability of the cognitive domain in the ability to "think", the ability of a more simple ability, namely remembering, to the problem-solving skills that attract students to interact and strategies, previously to solve the problem

According to Yamin (2012: 27), in the cognitive domain there are six levels with different aspects of learning, namely:

1. Level of knowledge or knowledge. This level asks students to recall previously received information, example facts, terminology, and formulas and so on.
2. Level of understanding or understanding. Categories of understanding related to the ability to explain knowledge, information that has been known in words alone. In this case the student is anxious or with a keyword that has been heard in his own words
3. Depth of application or application. It is the ability to use or apply learned information into new situations, and solve problems that arise in everyday life
4. Levels of analysis or analysis. It is a component to remember, separate or differentiate one, concepts, opinions, hypotheses or conclusions, and the configuration of each component to see.
5. Level of synthesis or synthesis. There is a person's ability to link and unite the various elements and elements of existing knowledge to form new patterns more.
6. Level of assessment or evaluation. What is the highest level that students expect to make judgments and judgments using concepts, methods, or by using certain criteria. So evaluation here is more likely to be a regular assessment of an evaluation system.

2.6 Hypothesis

Based on the problems in the background and the theoretical studies that have been described, the research hypotheses that can be formulated in this study are:

1. The competence of students' cognitive domain on learning using Jigsaw model is better than learning to learn cognitive domain of students using TPS learning model.

2.7 Methods

Based on the problems and objectives, this study used a quasi-experimental approach (quasi).research *Quasi-experimental* is a research method that is used to search for a specific effect against the other in a runaway condition. This study aims to investigate the cause and effect relationships by providing one or more experimental groups, and compare the results with one or more of the control group who did not receive treatment (Setyosari, 2010: 156).research *quasi-experimental* Corresponding used in this study because knowing the effect of the comparison study model *Jigsaw* learning model types TPS to the competence of students.

The research design used in this study is the kind of *randomized control-group posttest only design.* In this study, there is the experimental class I and class II experiment. I use the experimental class learning model *jigsaw* and experimental class II uses a learning model TPS. Once treated, the second class are given the test *(posttest)* the same.

Population in this research is all class X Senior high school Kurnia Jaya except for X2 X2 class has been completed in the classical style, the population consists of three classes of class X1, X3, and X4

Samples are some members of the population studied. Samples taken must be representative and represents what will be studied.

Measures of sampling are as follows:

a. Calculating the value of the average grade of the value obtained from the Biology classroom teachers
b. Choosing a sample which has the same characteristics with technique. *purposive sampling* According Lufri (2014: 155), *sampling purposive* is sampling deliberately selected based on the characteristics required in the study
c. Based on the calculated average, taken two classes have of an average nearly the same. Based on the average of the sampled class is class X1 and X3.

III. DISCUSSION AND RESULTS RESEARCH

3.1 Data Description

The data obtained in this study a cognitive competence. Data obtained cognitive competence after learning two basic competences is completed. Data taken from the two models namely learning model jigsaw and learning model TPS.

3.1.1 Cognitive Domains Competency Data Description

Data cognitive competencies in this study was obtained through the final test in the form of a written test in the form of essay given to a student experiment class I and class II experiments were conducted at the end of each meeting the basic competencies. Data research competence cognitive learning students are presented in Table 3.

Table 3 Value average, normality tests, homogeneity test experimental class 1 and class II experiment

Parameter	Class		Ket
	ExI	ExII	
average	82, 97	79.95	$\overline{X}_1 > \overline{X}_2$
Normality Test	P = 0.200	P = 0.200	Distributed Normal
Test Homogeneity	Sig 0.428		Homogeneous

Based on Table 3, it is known that the average competency study biology students in the experimental class I is higher than the experimental class II, where the average value of the experimental class I is 82,97 and experimental class II is 79.95. Normality Test second grade sample normal distribution and homogeneity for both classes of homogeneous samples.

Table 4. Differences between the completeness of students in the experimental class I and class II experiment

Model	Number of students	Students completed	Students are not completely
Jigsaw	27	23 (85.18%)	4 (14.81%)
polling stations	26,	18 (69.23%)	8 (30.77%)

Data showed that the experimental class I, 85.18% of students had completed and 14.81% students declared incomplete. The experimental class II, 69.23% of students declared complete and 30.76% students declared incomplete.

3.2 Testing Requirements Analysis

Test requirements analysis carried out before proceeding to the hypothesis test, the first test is conducted using test for normality *Klomogorov Smirnov* and homogeneity of variance using test *Levene* with *SPSS*. If the data were normally distributed and homogeneous then test the hypothesis using the t test. If it is not normal, it will not proceed with the test of homogeneity of variance and hypothesis testing using *Mann Whitney U*.

3.3 Normality Test

Normality test on the value of cognitive competencies is done by using the test *Kolmogorov-Smirnov* with *SPSS*. The test criteria are accepted H_0 if sig. > Level ($\alpha = 0.05$) and H_0 is rejected if otherwise. Normality test calculation results are shown in Table 5.

Table 5. Results of normality test students' competency

Class	Competency Student	
	Sig	Description
Experiment I	0.200	Normal
Experiment II	0.200	Normal

3.4 Homogeneity test

Homogeneity Test test scores the second end of KD graders experiment experiment I and class II mnggunakantest *Levene* with *SPSS*. The test criteria are accepted H_0 if sig. > Level ($\alpha = 0.05$) and H_0 is rejected if otherwise. Homogeneity test calculation results are shown in Table 6.

Table 6. Test Results Homogeneity Competence Student

Grades	Competence Student	
	Sig	Description
Experiment I	0.428	Homogeneous
Experiment II		

3.5 Data Analysis

Based on the test requirements for data analysis cognitive competencies, data showed normal distribution and have variance homogeneous making it eligible to continue testing the hypothesis. Hypothesis test used for cognitive competencies is t test.

3.5.1 Hypothesis Testing Cognitive Domains Competency

Test this hypothesis is used to determine differences in the cognitive achievement of competence of students in learning by using a model cooperative *jigsaw* and the cooperative model SMT type. Testing this hypothesis using the t test. Results of the calculations are presented in Table 7.

Table 7. Results of t-test calculation

Class	Averag	Sig	α	Conclusion
Experiment I	82.97	0.080	0.05	H_0 accepted H_1 rejected
Experiment II	79.95			

Table 7 shows that the differences in test results cognitive competence students have value Sig> α means that H_0 is received and H_1 rejected. It can be concluded that there is no significant difference between the cognitive competence experimental class I, which uses a model learning *jigsaw* with experimental class II using learning model TPS.

3.6 Discussion

Cooperative learning is a form of learning by students studying and working in groups. Collaborative small group

whose members consist of four to six people with a group structure heterogeneous (Rusman, 2012: 202). The scoring system is made to the group. Each group will receive awards *(reward),*if the group is able to demonstrate achievement of the required.
Each group member will have a positive dependency in the learning process. That kind of dependence which in turn will bring the individual's responsibility to the group and interpersonal skills of each member of the group. Each individual will help each other, they will be motivated for success of the group, so that each individual will have the same opportunity to contribute for the sake of keberhasilam groups. There are many models of cooperative learning model, including cooperative learning model *jigsaw* and learning model SMT type.

3.6.1 Learning Competency Achievement in Cognitive Domains

Based on t test performed on cognitive competence shows that there are no significant differences between classes using model *jigsaw* and class that uses the learning model TPS. This is because both the cooperative learning model is a model *jigsaw* and TPS does not have a very significant difference, except in the process of group discussion.

The process of group discussions have been conducted by students, look every member of the group help each other and give each other motivation for the group's success. This is supported by the opinion of Sanjaya (2008: 242-243) states that each individual will have an equal opportunity to contribute to the success of the group.

Cooperative learning model Jigsaw and TPS also has three stages of learning, where the first stage in the learning model has similarities are equally as thought. But in the second stage there is little difference that is the type of *jigsaw* their home group and expert groups to discuss, while on the type of TPS, students only discuss and pairs *(pair)* with a group of their friends. Basically in this phase there is a resemblance in which each student makes the process of discussion with other group members. Students from the class *of Jigsaw* and TPS will try to gather as much information to complete the tasks assigned by the teacher by working together. Lie said corresponding opinion (2008), that the cooperative learning is learning that promotes cooperation within the group to achieve a common goal.

The final stage in the cooperative learning model *Jigsaw* TPS and also have in common, namely to provide information that is obtained from the discussion and cooperation. In *Jigsaw*, students return to the initial group to deliver results and information obtained from a group of experts, while on the type of TPS students back together with the other members of the group to inform the results of discussions in pairs*(share)*and then present it to the class.

The learning process on the model *jigsaw* and TPS assisted with the book and a summary of the material already available. In addition, students are also given in the form of questions to be answered LDS and discuss in group discussions. Provision about LDS adapted to the learning model used is *a jigsaw* and TPS. Stage learning model *jigsaw* first of each student in the group will be given a different matter and is responsible for answering questions and learn. The second phase of the other group members are getting the same problem met in expert groups and discuss it, then in the third stage each member of the expert group will return to the group and individual teaching berrtugas group of their friends.

TPS cooperative learning process, all students will get the same question from the teacher, then the teacher gives instructions to all the students to think about who has been given *(think).*The teacher will ask students to pair *(pair)* on sebangkunya friends, at this stage students will discuss what has been gained from the stage of thinking. The next stage is to share *(share),* this stage the teacher will ask students to share with the whole class on the topics / materials they have discussed.

Based on the observations of classroom discussion group *the jigsaw* and polling showed that the students are very enthusiastic in doing LDS, help each other and motivate the group of their friends. It is able to improve student learning outcomes, in accordance with the purpose of cooperative learning is to improve student learning outcomes. Muraya and Kimamo (2011) revealed that cooperative learning can improve academic achievement of high school students in the fields of biology compared with normal learning, learning is also no significant difference between boys and girls.

Based on the average value of the class using a model *jigsaw* higher than the class that uses the model TPS. This is in line with research conducted by Lestari and Djumadi (2013) which states that, class *jigsaw* better than the class polling stations but there is no significant difference. In addition KKM grade students in *the jigsaw* that is 85.18% higher than the KKM graders TPS is 69.23%. This is because the learning model *jigsaw* has one advantage over TPS models, is in the process of discussion all students are required to be active in the discussions and in the process of group discussion is not dominated by certain students. some models of cooperative learning can improve the competence of learning outcomes, as has been done by Sumarmin (2017) that cooperative learning model type NHT can improve the competence of learning outcomes.

Another factor that causes the difference in the value of mastery of students in the class *jigsaw* and TPS, which at the time of formation of the group and the students in getting the material. The formation of the group learning model *jigsaw* determined by the teacher (researcher), so the group formed a group that truly heterogeneous because students are not able to determine their own group by close friends, intelligence, and others. In addition to the learning model *jigsaw* students ‘grouped in teams of experts and the home team, so that the material learned in each individual and the group really

understand it. In addition, the stages of cooperation on learning model *Jigsaw* that *expert group* helping students to complete and consolidate all information about the topic they get, so that when the end of the discussion, each member of the group can further deepen the mastery of the concept of matter (Slavin, 2011).

The formation of the group is determined based learning model TPS student's seat, while the pair of seating consists of several pairs capable of the same. As high-ability students sitting with high-ability students, the student capable of being paired with medium-ability students and low-ability students paired with lower-ability students, so that high-ability students who could not help more low-ability students in the learning process. This affects the success of the students in the classical style.

Besides the material obtained type is not as much like alearning model *jigsaw* for students learning based on questions posed by the teacher (researcher). In the learning model of TPS, discussions held by each member of the group was limited in the group by means of pairs, so that the information obtained is also limited and when returned to meet with all members of the group, the information obtained is not as complete as the information obtained in the group of *Jigsaw* (Huda, 2011). This learning process that makes the difference between learning model jigsaw and TPS on the results of class X student Senior high school Kurnia Jaya.

Based on the above analysis, although there are differences as well as the advantages and disadvantages of cooperative learning model *Jigsaw* and TPS, it cannot be separated from the purpose of cooperative learning is positive interdependence, working in groups, individual responsibility, and skills. In addition, the learning situation with a heterogeneous group provides an opportunity for students to interact more widely and gather as much information as in a group are one of the students who are doing well can help other students. Students can also be motivated and learn to be more responsible with the task given to each student to find a topic that was assigned to the group.

IV. CONCLUSION

It can be concluded that cognitive competence between classes using model *jigsaw* with the class using learning model TPS is not a significant difference.

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