



PERBANDINGAN MODEL PEMBELAJARAN POE (PREDIKSI-OBSERVASI-EXPLANASI) DENGAN TPS (THINK – PAIR- SHARE) TERHADAP KEMAMPUAN BERPIKIR KRITIS SISWA PADA TOPIK SISTEM PEREDARAN DARAH MANUSIA DI KELAS XI SMA NEGERI 2 BALIGE T.A 2013/2014

THE COMPARISON BETWEEN POE (PREDICT - OBSERVE-EXPLAIN) AND TPS (THINK – PAIR – SHARE) LEARNING MODEL ON STUDENT’S CRITICAL THINKING SKILL ON HUMAN CIRCULATORY SYSTEM IN GRADE XI IA SMA NEGERI 2 BALIGE ACADEMIC YEAR 2013/2014

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ABSTRACT

High school students difficulties to learn physiological processes that need analyzing, reasoning and critical thinking skill. To overcome that problem, is needed to design new instructions to improve biology achievement. Teacher should find out the best way. This study aims to investigate the comparison between POE (Predict-Observe-Explain) and TPS (Think-Pair –Share) learning model on student critical thinking skill by topic human circulatory system. A quasi experimental research with equivalent post test control group design was used in this study. The population of this study was all of grade XI IA students of SMA Negeri 2 Balige. There were two classes chosen as the sample by applying cluster random sampling technique. One class was taught by POE (Predict-Observe-Explain) model while another one class was taught by TPS (Think-Pair –Share) model. Instrument test used was critical thinking test in the essay form (five questions). The research find that the average value of critical thinking posttest in POE group was higher than TPS group ($79.81 \pm 5.71 > 70.6 \pm 7.18$) with t_{obs} higher than t_{table} ($t_{obs} = 5.761 > t_{table} = 1.669$). It means H_a is accepted so there was significant difference of student’s critical thinking skill that taught by POE (Predict – Observe–Explain).

Key Words: *POE (Predict-Observe-Explain) model, TPS (Think-Pair-Share), critical thinking skill*

ABSTRAK

Siswa SMA mengalami kesulitan untuk mempelajari proses fisiologis yang perlu dianalisis, penalaran dan keterampilan berpikir kritis. Untuk mengatasi masalah tersebut, diperlukan Pembelajaran baru untuk meningkatkan prestasi belajar biologi. Guru harus mencari cara terbaik. Penelitian ini bertujuan untuk mengetahui perbandingan antara model pembelajaran POE (Predict-Observe-Explain) dan TPS (Think-Pair -Share) pada keterampilan berpikir kritis siswa pada topik sistem peredaran darah manusia. Penelitian ini merupakan eksperimental kuasi dengan desain kelompok uji post test setar. Populasi penelitian ini adalah seluruh siswa kelas XI IA SMA Negeri 2 Balige. Ada dua kelas yang dipilih sebagai sampel dengan teknik cluster random sampling. Satu kelas diajarkan dengan model pembelajaran POE (*Predict-Observe-Explain*) sementara kelas lainnya diajarkan dengan model pembelajaran TPS (Think-Pair -Share). Uji instrumen yang digunakan adalah tes berpikir kritis dalam bentuk esai dengan lima pertanyaan. Hasil penelitian yang ditemukan bahwa nilai rata - rata posttest berpikir kritis pada kelompok POE lebih tinggi dari kelompok TPS ($79,81 \pm 5,71 > 70,6 \pm 7,18$) dengan bobot lebih tinggi dari t_{tabel} (bobot = $5,761 > t_{tabel} = 1,669$). Dengan demikian, H_a diterima sehingga ada perbedaan signifikan kemampuan berpikir kritis siswa yang diajarkan oleh POE (Predict-Observe-Explanation).



Kata Kunci: POE (Predict-Observe-Explain) model, TPS (Think–Pair–Share), critical thinking skill

INTRODUCTION

Biology as a science provide a variety of learning experiences to understand the concepts and scientific process includes observing, hypothesizing, using of tools and materials well and right, considering the security and safety, asking questions, classifying and interpreting data, communicating findings orally or written, discovering and sifting the relevant factual information to test the ideas or solve daily problems (BSNP, 2006). Biology is science have to learn and practice directly.

Studies of learning biology revealed that in high school had a lot of experience difficulties. The main reasons for learning difficulties were the nature of the topic, teacher's style of teaching, student's style learning and studying habits, student's negative feelings and attitudes towards the topic and a lack of resources. The characteristics of biological science include many abstract concepts, events, topics and facts that students have to learn (Chimer, 2012). The majority of students tend to memorize learning material but they do not understand the concept correctly, not able to apply theory and concept in the solving the problem (Wina, 2006). These case are inconsistent with the educational goals, teaching and learning activities are direct for mental formation that affect cognitive development and helps student aware the thinking process. It includes basic skills, knowledge, attitudes and motivations. Lazarowitz and Penso (1992) reported that high school students difficult to learn physiological processes that need analyzing, reasoning and critical thinking skill. Human circulatory system topic is categorized difficult to comprehend because its complicated characteristics which deal with complex mechanism.

Through the implementation of PPLT (Integrated Field Experience Program) 2012/2013 in SMA Negeri 2 Balige, many student experienced difficulty in learning biology. The result of Mid Semester test revealed that about 40 % of student's score under the CMC (Criteria Minimum Completeness) which is less than 75. Seen from list set value (DKN), that class XI IA, student achievement in human circulatory system topic is about 50 % below the value 75. Another biology teacher, said that is probably caused by some reason, such as the deadline for



complementing all learning material. Those students with low score indicated that they have not mastered the subject. The interview result from several student said that biology lesson disinterest because contain a lot of concepts, various biological events that cannot be seen by the naked eye, some concepts are too abstract and full memorization. Chiepetta and Fillman (1998) state that the learn material through memorization, prevents meaningful learning (Chimer, 2012). Generally, biology lesson still carry out through teacher's lectures or teacher-centered lessons. Even, in SMA Negeri 2 Balige still dominated by teacher-centered learning so that student focus on teacher, does not accustoming to think critically (Tarigan, 2012). Critical thinking skills is one type of thinking skill that will be achieved if students are more involved in the learning process (Permendiknas RI No. 22 Tahun 2006).

According to Wina (2006), one of teacher's mistake in class is does not attempt to find out the student prior knowledge and stimulate student critical thinking skill. The above reasons suggest that biology teachers should enable students to understand the concepts of biology and its applications to daily life. Science education researches have established that student's alternative conceptions in science are very tenacious and traditional instruction is not very effective in promoting conceptual understanding.

To highlight of evidence of above research studies, designing new instructions is needed to improve biology achievement. Effective instructional strategies by promoting the active role of the learner and the facilitative role of the teacher become essential. Teacher should find out the best way to convey the concepts to be taught so that students can remember longer and learn how to relate it to real life. Teacher should choose and use teaching and learning method to improve student learning achievement and critical thinking. This supported by Prain (2009) teacher need to know the prior knowledge and student's understanding of concepts in learning that can do in various ways, such as test, query, and interview. This study follows the principles of constructivist learning. Learning is process to construct knowledge through real experiences from the field. So, teachers should make biology lessons interest and attractive for students to learn more effectively. Teachers might accomplish this by using visual materials, teaching through



practical work, giving examples from student's daily lives, linking the topics to each other (Chimer, 2012).

The POE strategy provides more effective teaching strategy. POE (Predict – Observe – Explain) is learning strategy which developed to find out student's understanding about concept with constructivist approach. Özemer at all (2011) wrote that one of the ways to promote student's attitudes toward science is to use laboratory in science courses. Methods can be used to think about results of experiments for students in laboratory. The POE strategy was firstly developed by White and Gunstone (1992). In the POE strategy, students are asked to do experiments for the prediction, then make the observation and description and then ask to compare their observations with the predictions (cited in White and Gunstone, 1992; Çepni and Çil, 2009; Liew, 2004; Köse et al., 2003).

Furthermore, according to Slavin (2004) cooperative learning very effective in solving the problems encountered in the effort to enable students to learn. According to the Johnson & Johnson model, cooperative learning is instruction that involves students working in teams to accomplish a common goal Cooperative learning can be used in for any type of assignment that can be given to students in lecture classes, laboratories, or project-based courses (Felder and Brent, 2007). Cooper (1995) argues that putting students in group learning situations is the best way to foster critical thinking. Think-Pair-Share is one of cooperative learning strategies students are prompted to think about a topic or problem, record their ideas, pair with a neighbor, and share their ideas.

Previous studies was conducted POE strategy in high school in the subjects of physics states that POE can improve student's mastery of concepts in the material on the pressure and creative thinking skills, including Kusrinaningrum (2012), in her research entitled The Effectiveness of Using POE Strategy (Predict, Observe and Explain) for Increasing the Critical and Creative Thinking Skills for students at SMP N 1 Karangtengah on Pressure Subject of Natural Science Learning concluded that the the learning strategy using POE was effective to increase the critical and creative thinking skills. Wui –Tsai (2005) on their studies “Effect of constructivist-oriented on elementary school student cognitive structures”, applied POE strategy in constructivist-oriented biological learning to enhance students' conceptual



learning and knowledge construction. Manurung (2011) in her research was applying POE models assisted with multimedia to make learning process more interesting, interactive, and facilitate the understanding of the students so that they can think critically and use the scientific method to solve problems. And the result shows the increasing of student learning outcome.

While, Berutu (2011), in her research in comparing between NHT (Numbered head Together) and TPS (Think- Pair-Share) that result of student learning outcomes in TPS (Think- Pair-Share) teaching is better than NHT (Numbered Head Together). Ifamuyiwa, A. S and Sunday K.O (2013) in their research “ Impact of Think-Pair-Share Instructional Strategy on Students’ Achievement in Secondary School Mathematics” showed that there was significant main impact of treatment (Think-Pair-Share) on the student’s achievement. Siahaan, H. L (2013) also examine Pengaruh Model Pembelajaran Think – Pair – Share Terhadap hasil belajar siswa Menggunakan Peta Pikiran Terhadap Siswa Kelas X SMU Pada Pokok Bahasan Struktur Atom revealed that Think – Pair –Share has significant effect on student’s learning achievement.

The purpose of this research is to compare those two learning models, POE and TPS on student learning achievement, activity and critical thinking skill on Human Circulatory System on Grade XI IA SMA Negeri 2 Balige A.Y 2013/2014.

RESEARCH METHOD

This research has been carried out at SMAN 2 Balige in Jalan Kartini Soposurung Balige. The population in this research was the grade eleventh of regular class at SMAN 2 Balige which consists of three classes namely XI IA4, XI IA5 and XI IA6 with total number of students was 184. The sample was selected by random cluster sampling with taking two classes as the sample to represent the entire population in SMAN 2 Balige.

The research instruments test used in this study was critical thinking test in the essay form (five questions)The implementation of POE (*Predict-Observe-Explain*) model have been conducted in experimental design and divided into two groups namely class with use POE (*Predict-Observe-Explain*) model and class with TPS (*Think – Pair – Share*) learning model. Pre test and post test have been



administered to both of classes before and after treatment. Instrument test was tested to 22 students in class XII IA4 SMA Negeri 2 Balige. The test of instrument to find out the validity, reliability, item discriminant, difficulty level. And then validated instrument was given to class XI IA5 and XI IA6. Requirement test for data analysis used normality, homogeneity test, and percentage criteria for critical thinking skill Determining the increasing of student's critical thinking skill by using *t*-test. If $t_{obs} < t_{table}$, H_0 will be accepted and H_a will be rejected. If $t_{obs} > t_{table}$, H_0 will be rejected and H_a will be accepted.

Hypothesis

The nil hypothesis if this study where H_0 . The student's critical thinking skill taught using POE (Predict-Observe-Explain) is not higher than student's critical thinking skill taught using TPS (Think – Pair – Share) in Human Circulatory system topic in grade XI IA SMAN 2 Balige at A.Y 2013/2014

$$\text{Statistically} = H_{01} : \bar{Z}_1 \leq \bar{Z}_2$$

H_a . The student's critical thinking skill taught using POE (Predict-Observe-Explain) is higher than student's critical thinking skill taught using TPS (Think – Pair – Share) in Human Circulatory system topic in grade XI IA SMAN 2 Balige at A.Y 2013/2014

$$\text{Statistically} = H_{01} : \bar{Z}_1 > \bar{Z}_2$$

RESULT AND DISCUSSION

a. Instrument testing

The critical thinking instrument with five valid essay questions which are number 1, 2,3,4,5 were taken as human circulatory achievement test. The result of the instrument reliability analysis showed essay instrument test was calculated by Alpha Formula with high reliable $r = 0.97$) and there are 5 items categorized as moderate questions and 2 questions are difficult. Discrimination Index for essay there are 5 items categorized as poor questions and 2 items as satisfactory questions.

b. Description of Research Data

Student Pre test

Pre test was given to three classes of grade XII IA SMA Negeri 2 Balige. The result of pre test of those classes was calculated using *t* test in order to select

two classes as the object of this research. The classes that have no significant difference in pre test result were chosen as experimental and control class.

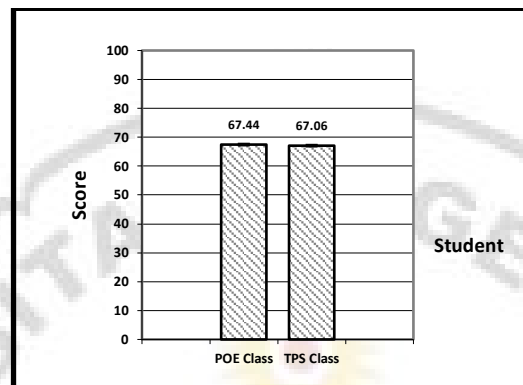


Figure. 1 Student's pre-test data of Class XI IA SMA Negeri 2 Balige in Human Circulatory System

Student Critical Thinking Skill

At the critical thinking data result, the average value of post test in POE Class is 79.81 with standard deviation is 5.71. This value was higher than the average value of post test in TPS class is 70.06 with standard deviation is 7.18 (Figure 3)

The average value of pre-test and post test in POE class showed the difference. Average value of pretest in POE class is 57.00. This value was lower than the posttest value about 79.81. While, the average value of pretest in TPS class is 53.63 and posttest is 70.06. The gain score of pretest between POE classes with TPS class is about 3.37 while, in posttest is 9.75. Data analysis showed that the implementation Predict – Observe – Explain (POE) learning model better than Think – Pair – Share (TPS).

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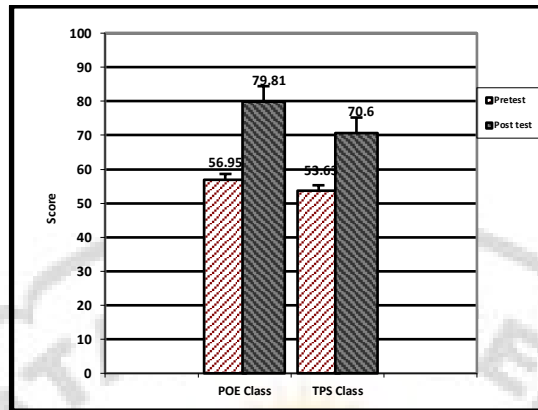


Figure .2 Student’s critical thinking skill of Grade XI IA SMA Negeri 2 Balige on Human Circulatory System Topic before (pre-test) and after (post-test) using Predict – Observe-Explain (POE) and Think – Pair – Share (TPS) learning model.

Figure 2 above showed the percentage of student’s critical thinking skill per indicator before treatment in both of class. Diagram showed that there is no significant difference percentage student’s critical thinking skill at all. But, based on statistically analysis there was significant different that showed student have difference capability in critical thinking. It means that students capability in critical thinking initially was different one each other.

Student’s critical thinking skill in both of class was assessed by essay test with 4 indicator. Those was summarizing the problem question, identifying assumption, determining solution or problem and determining conclusion of the solution which the percentage in both class can be seen on figure 1 for pretest and figure 2 for posttest data.

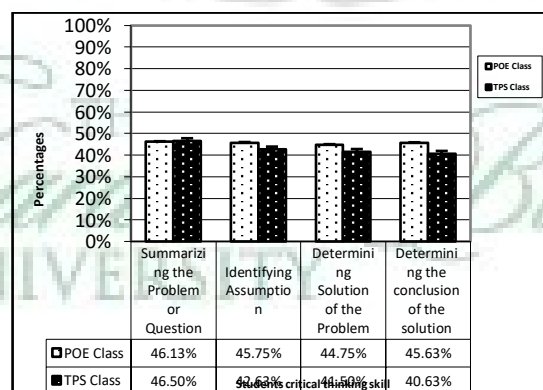


Figure . 3 Data pre-test of Student’s Critical thinking skill of grade XI IA SMA Negeri 2 Balige on Human circulatory System.

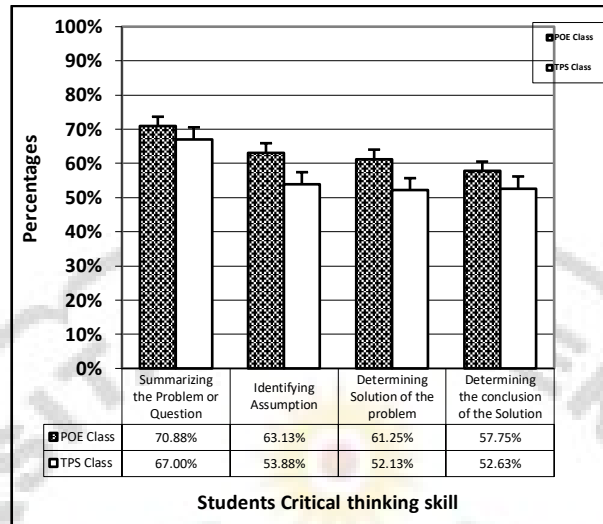


Figure. 4 Student’s Critical thinking skill of grade XI IA SMA Negeri 2 Balige on Human Circulatory System in Class in POE and TPS Learning.

Hypothesis Testing

Hypothesis test was done by using t-test and used to analysed post test and student activity data. For students critical thinking skill data, the average value in POE class 79.81 and the average value in TPS class is 70.6. The combining variance for both post tests II data is 9,16.. The value of $t_{table} = 1.669$ at the level of significance 0.05. Comparison of t_{count} with t_{table} is $5.761 > 1.669$ ($t_{count} > t_{table}$) and it means that H_a was accepted and H_o was rejected. It indicates student critical thinking skill in learning human circulatory system topic which taught

Discussion

Student Critical Thinking Skill

Student’s critical thinking skill in both of class was assessed by essay test with 4 indicators. Those was summarizing the problem question, identifying assumption, determining solution or problem and determining conclusion.

The average value of pre-test and post test in POE class showed the difference. Average value of pretest in POE Class is 57.00 and TPS class is 53.63, that low categorized level. Data posttest of POE value is about 79.81; high-categorized level and TPS class is 70.06 as moderate-categorized level. The differences pretest of POE class with TPS class is about 3.37 point while, the differences posttest of POE class with TPS class is 9.75.



From the data analysis, the percentage of student's critical thinking skill per indicator before treatment in both of class. Diagram showed that there is no significant difference percentage student's critical thinking skill at all. POE class is 45.56% and TPS class is 42.81%. It is categorized as moderate level. But, based on statistically analysis there was significant different that showed student have difference capability in critical thinking. It means that students capability in critical thinking initially was different one each other. The prominent skill in both classes is summarizing the problem or question which can be seen on the diagram that POE and TPS class have almost similar percentages is about 46% that categorized as moderate level. It is categorised as moderate. While, for three other indicator there is differences that below 46%.

After treatment, there was rising of student critical thinking skill for all indicators in both classes. POE class is about 63.25%, moderate-categorized level. While in TPS class is about 56.41%, moderate-categorized level. The summarizing the problem skill in both classes is high-categorized level (67% and 70.88%). Student's understanding of concepts is important to construct critical thinking ability.

From the above analysis and discussion, it indicates that student's critical thinking skill in learning human circulatory system topic which taught by Predict-Observe-Explain (POE) is higher than Think-Pair-Share (TPS) in SMA SMA Negeri 2 Balige academic year 2013/2014.

CONCLUSION

Based on the result of research, it can be concluded as follows: There is a significant difference on student critical thinking between Predict – Observe – Explain (POE) model with using Think – Pair – Share (TPS) on the topic of Human Circulatory System in Grade XII IA SMA Negeri 2 Balige Academic Year 2013/2014

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