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The Effect Of Inquiry And Advance Organizer Learning Models On Science Process Skills of Respiratory System at MAN Rantauprapat

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Abstract : *This study aimed to find out the effect of inquiry and advance organizer learning models on students' science process skills of respiratory system at MAN Rantauprapat. The population of this study were the entire students of grade XI-IPA MAN Rantauprapat consisting of 4 classes (XI_1 about 32 students, XI_2 about 35 students, XI_3 about 35 students and XI_4 about 35 students). The samples of the study were grade XI_2 treated by using inquiry, grade XI_3 treated by using advance organizer and grade XI_4 treated by using conventional learning model. The data collecting instruments of students' science process skills were essay tests. The technique of data analysis which was used namely an analysis of covariate (ANCOVA) with $\alpha = 0.05$. The results of this study were: (1) The results of an analysis of covariate (ANCOVA) showed that those learning models had a significant effect to students' science process ($F = 362,48$; $P = 0,000$). The average of students' science process skills treated by inquiry has given an effect of 2,11% higher than treated by advance organizer and of 35,80% higher than treated by conventional learning model. Class which was taught using advance organizer has given an effect of 34,06% higher than conventional learning model. It could be concluded that there was a significant effect of inquiry and advance organizer learning models on students' science process skills of respiratory system at MAN Rantauprapat.*

Keywords *–high-ordered thinking skills, science process skilss, advance organizer, inquiry, respiratory system*

I. INTRODUCTION

The result of the global review by PISA in 2012, Indonesia ranks only 64th out of 65 countries and TIMSS 2011 Indonesia ranks 40th out of 42 countries for science, an evaluation number demanding Indonesia to continue improving the education system to be able to equal and compete with other developed and developing countries. To achieve these objectives, education in Indonesia should be systematically implemented in accordance with the 2013 curriculum which places the role of students more dominant in learning and puts the basic attention on the individual as a whole [1].

The results of Rokhmatika, et al [2] low learning outcomes in the form of students' science process skills caused by less active learning involving students, the material is delivered informatively so as to cause information easily forget. Learning activities are not yet optimal in improving the skills of science processes and the utilization of existing potential [3]. The results of the research by the Organization for Economic Co-operation Development indicate that Indonesia has the ability of science at rank 60 with a value of 383 (OECD, 2012).

Based on observations made in MAN Rantauprapat special in class XI when learning Respiratory System materials that the learning model used by teachers have not been able to make students interested in following the learning. The Resource Systems learning course focuses only on the teacher as the sole source of information. The cause of low interest of students when learning the biology of the respiratory system material because of the applied learning model does not involve the students actively giving less experience of student learning directly [4].

Expected teachers should always involve students directly in learning. Good teachers are not only able of mastering the subject matter that will be taught but also required to have good teaching skills and should be able to create an atmosphere of learning that makes students interested, and motivated so that students are active during the learning process takes place [5].

Biology learning in MAN Rantaup has been mentioned more by mentioning, recalling or memorizing all that has been learned, meaning that learning has not yet led to an increase in the skills of the science process. Students should be able to observe, interpret, classify, compare, organize all existing facts and data, and assess the outcomes of peers during the learning process; as well as planning the experiment by doing it yourself [6].

By implementing learning using learning model in accordance with the ability of students will provide maximum learning results. According to Barthlow [7] that inquiry can develop scientific process skills as well as to increase knowledge, understanding facts and concepts so as to shape a positive attitude towards science.

There are several prerequisites teachers must understand in improving process skills in biology learning. Skill observation process development requires the support of observation objects, tools, materials and learning instruments such as worksheets equipped with observation sheets. To develop the skills of classifying objects, it is necessary to support a spreadsheet format containing aspects of observation in the form of a matrix.

II. METHOD

This research will be conducted at MAN Rantauprapat which is located at Jalan Islamic Center Rantauparapat Zip Code 21414. Implementation of the research done on the even semester of academic year 2016/2017. The study was conducted on March 27 to June 17, 2017. The population in this study were all students of class XI IPA MAN Rantauprapat which amounted to 137 students consisting of 4 classes (XI1 amounted to 32 students, XI2 amounted to 35 students, XI3 amounted to 35 students and XI4 is 35). While the sample in this study are some members of the population amounted to 105 students. The sampling technique used is random sampling because the population is considered homogeneous. Class XI IPA2 amounting to 35 students used as experiment class A with inquiry model treatment, class XI IPA3 amounting to 35 is used as experiment class B with treatment of advance organizer learning model, while class XI IPA4 amount 35 students are used as control class with treatment of conventional learning model and class XI IPA1 totaling 32 students are used as an instrument test class. The research design used was Pretest-Posttest Control Group Design. The procedure and the implementation of the treatment consists of pre experiment, experiment, and post experiment. To get the data needed in this study, then the data collection techniques in the form of observation skill in the process of science-shaped essays of 20 questions from each treatment.

The test to measure the skills of the science process used is a written test in the form of a description of 15 questions each question is given a score of 1-4, based on 8 indicators of science process skill aspects consisting of: observing, grouping, interpreting, forecasting, asking questions, apply concepts and communicate. In doing the data grouping and calculating the data centering measure used descriptive statistics while in testing hypothesis used inferential statistic SPSS 21.0 for windows with anacova analysis technique at significant level ($\alpha = 0,05$) where pretest as covarian. Furthermore, in the follow-up test is done when H0 is rejected. Earlier anacova analysis techniques were used first as a preliminary analysis requirement and normality test as well as data homogeneity.

III. RESULT AND DISCUSSION

The pretest result shows that the students' science process skill in Inkuiri class obtained the highest score of 56,67 and the lowest score 28,33 with standard deviation value 39,95 ± 5,8. In the advanced organizer class obtained the highest value of 55 and the lowest value 30 with the standard deviation value 39.38 ± 5.7. In the conventional class obtained the highest value of 51.67 and the lowest value 30 with the standard deviation value 40.14 ± 4.02. Postes results show that students' science process skills in the classroom with Inquiry learning model obtained the highest value of 93.33 and the lowest 65 standard deviation value 81.67 ± 4.72. In the class with advanced organizer learning model obtained the highest value of 86.67 and the lowest value 61.67 standard deviation value 79.76 ± 5.22. In the class with conventional learning model obtained the highest value of 68.33 and the lowest value 45 with the standard deviation value 52.28 ± 4.35. Data on the difference between pretest and postte value of high students' thinking ability in class with Inquiry learning model with advance organizer learning model and conventional learning model. Presented in Table 1 below:

Table 1. Differences in Pretest Value and Postes Science Process Skill

Learning Model	Pretes	Postes	Difference
Inkuiri	39,95	81,48	41,53
Advance Organizer	39,38	79,76	40,38
Conventional	40,14	52,29	12,15

In this normality test the data is normally distributed or can not be seen from the significant obtained. Provided if sig> 0,05 the data normally distributed. Summary of test results of skill test science normality of kolmogorov smirnof test are presented in Table 2:

Table 2. Data Normality of Process Skills of Science

No	Learning Model	Value count		Sig	Explanation
		Pretes	Postes		
1	Inkuiri	0,800	0,512	0,05	Signifikan
2	Advance Organizer	0,479	0,233	0,05	Signifikan
3	Conventional	0,189	0,225	0,05	Signifikan

Based on Table 2. It is concluded that the students' pretest data in the Inquiry class has the distribution of normal distributed data because the Sig value is 0.8> 0.05; In advance class organizer the distribution of normal distributed data with value of Sig 0,479> 0,05; and in the conventional class obtained the distribution of normal distributed data value of Sig 0,189> 0,05.

Whereas data of student postes on Inquiry class have distribution data which normally distributed because sig value 0,512> 0,05; In advance class organizer the distribution of normal distributed data with sig value 0,233> 0,05); and in conventional class the distribution of normal distribution data with value of Sig 0,225> 0,05)

Homogeneity Test

The homogeneity test of variance was conducted to find out whether the sample variance came from a homogeneous population or not. The sample variance comes from a homogeneous population if sig> 0.05. The homogeneity test was conducted using Levene's test homogeneity test. Summary of group homogeneity testing

Table 3. Overview of Lavene Test Homogeneity Test

Sample Group	KBTT	Sig	Explanation
Students with Learning Model treatment Inkuirti, Advance Organizer and conventional	0,829	0,05	Homogen

Hypothesis testing

The Influence of the Learning Model on the Skills of the Science Process

The results of covariate analysis (Anakova) showed that the learning model significantly influenced the science process skill (F = 362,48; P = 0,000). Based on the test with P <0.05 then Ho is rejected which states there is no significant effect of the application of inquiry learning model, advanced organizer learning model and conventional learning model to the material science process skills of Respiratory System of the students of class XI MAN Rantauparapat; and accept Ha which states that there is a significant influence on the application of inquiry learning model, advanced organizer learning model and conventional learning model to the material science process skill of Respiratory System of XI MAN Rantauparapat students. Obtaining the value of the students' science process skills after the treatment of various learning models, namely inquiry learning model, advanced organizer and conventional presented in the form of graph in Figure 1.

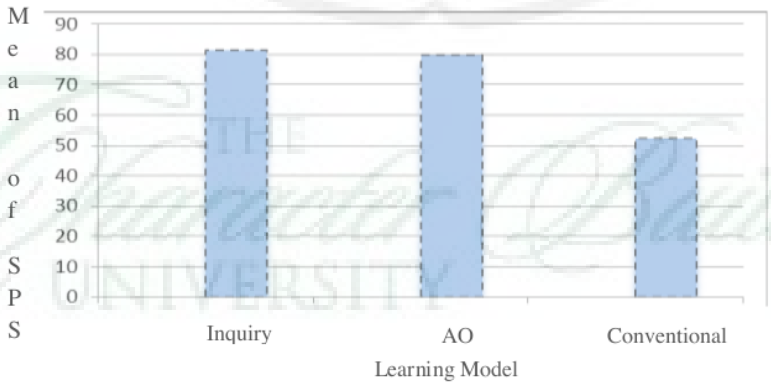

Figure 1. Average Postes Value Based on Influence of Learning Model on Skill of Science Process of Respiratory System Material in Class XI MAN Rantauparapat (F = 362,48; P = 0,00).

Based on the average of science process skill that is learned by inquiry model gives an effect of 2.11% higher than the class that is learned with advance organizer learning model and 35.8% higher than the class that is taught by conventional model. Classes that were taught with advanced organizer learning model gave an effect of 34.06% higher than the class that was taught by conventional learning model.

Advanced Test Using Tuckey's test

The results of Tuckey's test on Post Hoc sho[35]e difference of science process skill and high-order thinking ability of students who are taught by Inquiry learning model, advanced organizer learning model and with conventional learning model with provision if Sig. <0.05 then therein lies the difference. Based on Appendix 15 further tests for students' science process skills that the value of Sig. which is less than 0.05 lies in conventional inquiry - conventional and advanced organizer model (0,000 <0.05) while the inqui[5] self-organizer (0.296> 0.05) is not significantly different. Further test results Tuckey, s showed that the science process skills of students who were taught by inquiry learning model 81,47 did not differ significantly compared to the students 'science process skill which was taught by advanced organizer learning model 79,76 but significantly different from the students' science process skill which was learned by conventional learning model 52.47.

Table 5 Summary of Tuckey's Test

Achievement	Learning Model		Advanced Test Results		Explanation
Science Process Skill	Inkuiri	Advance Organizer	0,296	81,47	Not Sign.
		Conventional	0,000		Sign.
	Advance Organizer	Inquiry	0,296	79,76	Not Sign.
		Conventional	0,000		Sign.
	Conventional	Inquiry	0,000	52,28	Sign.
		Advance Organizer	0,000		Sign.

Discussion

Influence of Learning Model to Skills of the Science Proce[4]

Based on the results of the research above shows that there is a significant influence on the application of inquiry learning model, advance organizer and conventional to the skills of Respiratory Material Science process in class XI MAN Rantauprapat. Overall the average students 'science process skills taught by inquiry learning models are higher than the average students' science process sk[9]s taught by advanced organizer and conventional learning models. This suggests that the inquiry self-help model is more effective in improving students' science process skills.

The results of this finding show that to teach the Respiratory System materials better use inquiry model rather than using the adva[3]d organizer and conventional learning model. This is in line with the sanjaya (2008) expression that the learning model is a series of learning activities that emphasize the critical and analytical thinking process to seek and find the answer to a question in question. The above conclusions also support the results of the Gormally, et al. (2009), Minner (2009), Marheni, et al (2014), Wilson, et al. (2010) and Hilman (2014), Ergul, et al. (2011) concluded [7]t learning using inquiry models can improve the skills of the science proc[26]and student learning outcomes. In line with the results of research that has been done Nurroyani, et al, (2015) that there is influence of inquiry learning model to the realm of knowledge and skills.

The results of Tuckey's test show that[31] students' science process skill which is taught by inquiry learning model is significantly higher than the science process skill in the class which is taught by advanced organizer and conventional learning model. This proves that the selection of learning model is a matter of great concern, because a lesson material that dibelajarkan with the right model of learning can achieve the goal of learning optimally.

Aunurrahman [8] revealed that the use of the right learning model can make it easier for students to understand the lesson so as to enable students to achieve better learning outcomes. It is also proven by Kemdikbud [9] that to bring students to a more real and meaningful experience for learners is needed the right learning [24]el.

The influence of inquiry learning model on science process skill is seen from the stud[23] activity during the learning process, where in the laboratory practicum activity occurs psychomotor activity, students are enthusiastic to be able to find and find solution of solution in group by some scientific procedure done. In the

learning group students interact with their peers to perform a series of activities so that students become actively think scientifically, communicate, hypothetical, seek solutions to problem solving in accordance with scientific procedures, process data and conclude it. This is in line with the opinion of Barthlow (2011) that inquiry can develop the skills of the process of science as well as improve knowledge, understanding facts and concepts so as to form a positive attitude to science.

Sanjaya explains that the inquiry learning model is supported by four main characteristics of students are: (1) intuitively students always want to know; (2) in the conversation students always want to talk and communicate their ideas; (3) in building (construction) students always want to make something; and (4) students want to express their abilities [10]. Furthermore, Suyanti (2008) explains the principles contained in the application of inquiry learning model that is: (1) oriented to intellectual development, in this case the development of thinking ability and oriented to the learning process; (2) the principle of interaction, in this case the learning process is the interaction between students and teachers; (3) the principle of asking, in this case the teacher acts as a questioner because the ability of students to ask is basically already part of the thinking process; (4) principles of learning to think, in this case the process of developing the full potential of the brain; and (5) the principle of openness, in this case the students are given the freedom to try something in accordance with the development of logical ability and reason.

IV. CONCLUSION

Based on the results of the research, the conclusion can be stated that the influence of the use of inquiry learning model gives the effect of science process skill as much as 2.11% higher than the class which is taught with advance organizer learning model and 35,8% higher than the class that is learned by conventional models. Classes that are taught by advance organizer learning model give an effect of 34.06% higher than the class that is taught by conventional learning model.

REFERENCES

[1] Mulyasa, E. (2013). *Kurikulum Berbasis Kompetensi: Konsep, Karakteristik, dan Implementasi*. Bandung: Rosda Karya.
[2] Rokhmatika, S. Harlita. dan Adi, B. P. (2012). Pengaruh Model Inkuiri Terbimbing dipadu Kooperatif Jigsaw terhadap Keterampilan Proses Sains ditinjau dari Kemampuan Akademik. *Jurnal Pendidikan Biologi UNS*. 4 (2): 72-83.
[3] Edi I, Djemari, M dan Supamo. (2014). Pengembangan Tes Kemampuan Berpikir Tingkat Tinggi Fisika (PhysTHOTS) Peserta Didik SMA. *Jurnal Penelitian dan Evaluasi Pendidikan*, 14 (1): 1-12
[4] Maulidiyah, K., Raharjo,W dan Budijastuti, W. 2012. Pengembangan Lembar Kegiatan Siswa Berbahasa Inggris dengan Pendekatan Keterampilan Proses pada Materi Sistem Pernapasan. *Jurnal* Pendidikan Unesa IPA, 1 (1): 25-28
[5] Hanim, N., Abdullah dan Khairil. (2015). Penerapan Model Pembelajaran Inkuiri Terbimbing Berbasis Praktikum pada Materi Sistem Ekskresi Untuk Meningkatkan Hasil Belajar Kognitif Peserta didik. *Jurnal EduBio Tropika*, 3 (1): 1-50.
[6] Saputra, A., Widoretno,S dan Santosa, S. (2012). Peningkatan Keterampilan Proses Sains dan Hasil Belajar Siswa melalui Penerapan Strategi *Guided Inquiry* di SMP. *Junral Bio-Pedagogi*. 1 (1): 36-45.
[7] Barthlow, M.J. (2011). The Effectiveness of Process Oriented Guided Inquiry Learning to Reduce Alternate Conceptions in Secondary Chemistry. *Disertasi Liberty University*
[8] Kemendikbud. (2013). *Pedoman Kegiatan Pendampingan Inplementasi Kurikulum 2013 Oleh Guru Inti*. Jakarta: Pusbang Tendik Badan Pengembangan Sumber Daya Manusia Pendidikan dan Kebudayaan dan Penjaminan Mutu Pendidikan
[9] Nurroyani, I.S., Dwiastuti dan Karyanto, P. (2015). Pengaruh Model Inkuiri Terbimbing terhadap Hasil Belajar Biologi Siswa. *Jurnal Pendidikan Biologi*, 7 (2): 94-101.
[10] Sanjaya, W. (2008). *Perencanaan dan Desain Sistem Pembelajaran*. Jakarta: Kencana Prenada Media Group
[11] Sugiyono. (2013). *Metode Penelitian Pendidikan*. Bandung: Alfabeta

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