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Comparison of Learning Achievement Chemistry Using Guided Inquiry Learning Model and *POE* on Hydrolysis Salt Material

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Abstract

The research aims to find out the effects of Guided Inquiry and POE models of student achievement on Salt Hydrolysis material. This research using quasi experiment method and done at Kartasura Senior High School on Academic Year 2013 / 2014. The sample was taken using cluster random sampling which consisted of two classes which are XI IPA4 and XI IPA5. Data collected by the methods of testing for cognitive learning achievement (knowledge), while non-test method (questionnaire) for the learning achievement of affective (attitude), and then observation sheets for student achievement psychomotor (skills). The hypothesis test using Mann-Whitney U non parametric analysis. From the data analysis it can be concluded that there is effect of the use of guided inquiry and POE model of the learning achievement of cognitive and psychomotor but not affective, where the use of guided inquiry model is better than POE models.

Keywords: guided inquiry, POE, hydrolysis of salt

Introduction

Education is the most important factor in determining the future life of a nation. UNESCO through the International Commission on Education for the Twenty First Century has recommended the four pillars of education as "learning to do, learning to know, learning to be, and learning to live together". In fact many observers of education gave the assessment that it is entering the 21st century, education in Indonesia still have three big problems; mainly related to the low quality of education . There is some indication that these concerns. For example research TIMMS *(Trends in International Mathematics and Science Study)* said Indonesia was ranked 34 of the 35 countries studied (Toharudin, 2011).

Ministerial Decree No. 4 of 2007 states that good learning is interactive learning, inspiring, fun, challenging, motivating learners to actively participate and provide enough space for creativity and independence according talents, interests and physical and psychological development of learners. To overcome this, the teacher should pay more attention to students by making learning conditions in the classroom more interesting so that the curiosity of

students always appear. Chemistry that is often considered boring must be kept up to date by always innovating in the delivery of appropriate materials and clear.

There are two factors that affect the success of student learning, namely external and internal factors. The learning model chosen is one of the external factors that support the success of student learning. There are several models of learning that is able to actively involve students include: inquiry, discovery, experiments, projects, Problem Based Learning, problem solving (Pertiwi, 2012).

Learning model that is expected to emerge and more emphasis on the involvement of students in full to be able to find the material studied and relate them to life situations is a learning model Inquiry guided and POE. The learning model guided inquiry is a teaching and learning activities to find a concept with teacher guidance through questions directing the way of thinking of students. This model focuses on the processes and skills to carry out research activities include exploration, finding and understanding. Design activities ranging investigation procedure, the conduct of investigations, data collection probe, and the conclusion is directed by the teacher. Inquiry learning is a model that brings students directly into the scientific process in a relatively short time (Trianto, 2009).

The success of the students in addition influenced by external factors also affected by internal factors include scientific attitude and critical thinking skills. In this study, guided inquiry learning model directs students to discover knowledge through scientific work processes. Scientific attitude is the attitude shown by the scientists as they perform a variety of scientific activities related to his profession as a scientist. Scientific attitude in question is the degree of conformity of students' attitudes toward learning process that has the characteristics turned away an honest, thorough or careful, responsibility, discipline, curiosity, respect the opinions of others, convey argument or ideas, collaborate, and critical ,Scientific attitude can also improved its critical power of students. Therefore, in addition to the scientific attitude, other internal factor is the ability to think critically. Someone who has a high critical thinking skills when having difficulties in learning to think how your will solve the problem based on the fact that occurred (Afandi, 2012).

Based on the above, The research aims to find out the effects of Guided Inquiry and POE models of student achievement on Salt Hydrolysis material.

Research methods

1. Place and Time Research

   The study was conducted at SMAN 1 Kartasura in grade XI semester academic year 2013/2014. This study from January to July 2014.

2. Research design

   This research is an experimental research with independent variables guided inquiry learning model and POE, the dependent variable learning achievement of cognitive, affective and psychomotor salt hydrolysis material.

3. Population and Sample

   Population in this research is class student of SMAN 1 Kartasura XI.IPA academic year 2013/2014. While the sample is XI.IPA class 4 and 5 XI.IPA as an experimental class 1 and 2.

4. Sampling Techniques

   In this study, samples taken at random cluster sampling.

5. Data collection

   Collecting data in this study was conducted using multiple choice tests for cognitive and non-test method (questionnaire) for affective and observation sheet for psychomotor aspects.

6. Validation Instrument Research

   Cognitive test instruments tested the validity, reliability, level of difficulty questions, and different power. As for the affective questionnaire was tested for validity and reliability.

7. Data analysis

   Analysis of the data used include equality test, test requirements analysis, and hypothesis testing.

Results and Discussion

Data obtained in this research is student achievement about salt hydrolysis in the cognitive, affective and psychomotor. Data were obtained from two classes of experimental class 1 and 2. The results, processed data and discussion will be presented as follows:

Test data prerequisite for independent sample T-test No 3, namely: equality test, test for normality and homogeneity test. The results of Equality test, test for normality and homogeneity tests can be seen in Table 1, Table 2 and Table 3 below.

Table 1. Test Results Equality (Lavenne)

Test	Sig	Criteria	Decision
Lavene Statistic	0.070	*p> 0.05*	H_0 accepted

Table 2. Normality Test Results (Liliefors)

Aspect	Test	Sig	Criteria	Decision	Conclusion
Cognitive (Knowledge)	Guided inquiry	0,006	*p <0.05*	H_0 is rejected	Abnormal
	POE	0.161	*p> 0.05*	H_0 accepted	Normal
Affective (Attitude)	Guided inquiry	0.200	*p> 0.05*	H_0 accepted	Normal
	POE	0.200	*p> 0.05*	H_0 accepted	Normal
Psychomotor (Skills)	Guided inquiry	0,000	*p <0.05*	H_0 is rejected	Abnormal
	POE	0,001	*p <0.05*	H_0 is rejected	Abnormal

Table 3. Homogeneity Test Results (Lavenne)

Factor	Sig.	Decision H_0	Conclusion
Cognitive	0,025	H_0 is rejected	Not Homogeneous
Affective	0.194	H_0 accepted	Homogeneous
Psychomotor	0.283	H_0 accepted	Homogeneous

From the test results prerequisite in Table 1, 2 and 3, proving that the data is abnormal and is not homogeneous, so test the hypothesis in this study is done by using a statistical test non-parametric *Mann-Whitney U*. The test results influence learning model guided inquiry and models learning POE on learning achievement are presented in Table 4.

Table 4. Non Parametric Test Results Type *Mann-Whitney U*

Test	Sig	Criteria	Decision	Conclusion
Cognitive	0,040	*p <0.05*	H_0 is rejected	There Influence
Affective	0,293	*p> 0.05*	H_0 accepted	No Effect
Psychomotor	0,000	*p> 0.05*	H_0 is rejected	There Influence

In the test this hypothesis H_0 is rejected, which means that there is the influence of the use of guided inquiry and POE model of the learning achievement of cognitive and psychomotor, but does not give effect to the achievement of affective learning, where the use of guided inquiry model is better than POE models.

The amount of the average achievement of students taught by the model of guided inquiry is 83.31. While the magnitude of the average achievement of students taught by the model of POE is 78.63. When measured from the results of tests of balance or *t* test *matching* two parties where students already balanced its initial state, it can be said that the classes were

subjected model of guided inquiry has higher performance than the class that is subject POE models in the study material salt hydrolysis. This is because the model of guided inquiry students are able to learn from his experience in solving problems, finding everything to get new ideas with the guidance of teachers. While in the POE where the syntax models predict, observe and explain the stages carried out less than the guided inquiry should have been able to give a better performance. But the fact that in the process of implementation model of POE is not all guided by the teacher, the student is sometimes too hard to figure out which way the learning process will be taken so that this also affects the achievement of cognitive students. This was confirmed in a study in which the cognitive achievement of students better through the use of guided inquiry learning than conventional (Matthew, 2013).

At this affective aspect concerns the attitudes of students in addressing the problems being faced so affective student achievement is more influenced by internal factors in students such as interest, self-concept, and the curiosity of students to the subject matter .. Though learning model is one external factor that no effect on affective achievement of students. According Suryobroto (2009) the excess of guided inquiry is able to help students develop or augment supplies and mastery of skills and cognitive processes of students.From this description suggests that the use of the learning model which is a factor of the outside or external will have more influence on achievement of cognitive and psychomotor students, because when students are subject to a learning model that is able to change the interest and desire of students to learn and keep learning, then the results obtained from suitability students with learning model that can be seen in the form of a value on a particular subject matter, which is usually presented in the form of scores on the cognitive learning achievement of students. It makes that learning model has more influence on cognitive and psychomotor learning achievement than or affective learning achievement assessment students' attitudes.

While on psychomotor aspects, POE model of guided inquiry and equally a model of student-centered learning. Students are required to construct their own learning sciences that will be obtained. In addition to the implementation students learn the concepts students will also need proof of concepts have been studied. This can be done experimentally. With this experiment psychomotor will be achieved. This was confirmed in a research, said there are significant learning model POE using an experimental model and demonstration of student achievement on the material acid base (Anisa, 2013). In addition Opong, IK (1981) *cit* Adelakun (1993) said that the scientific process involves a few steps or a series of

operations that experienced by scientists during their investigation. They are observation problem, identification, communication, formulating a hypothesis, experiment and classification. Of what is presented is the same thing with the second model of learning is done where students conduct themselves, experience the various stages of the scientific process to get the science like a scientist.

Conclusions and Recommendations

Results of the data analysis and discussion of a number of conclusions that there is the influence of the use of guided inquiry and POE model of the learning achievement of cognitive and psychomotor, but does not give effect to the achievement of affective learning, where the use of guided inquiry model is better than POE models.

Recommendations from this study are, among others, 1) Model guided inquiry and POE is a learning model that had a positive influence on learning achievement, 2) should be given a moderator variables other supporting for example the scientific attitude as it relates to experiment, 3) On learning POE teachers should previously be preparing various needs required that despite the guidance given little students can determine the direction of the desired learning, 4) It should be noted weakness test tools such as observation sheets for psychomotor and questionnaires for affective because it is less able to assess the achievements of psychomotor and affective, it should be complemented with other data collection techniques and 5) Need to do research with other internal factors.

Reference

Adelakun, S.A. (1993). The Relevance of Scientific Skills and Attitudes in the Education of The Visually Impaired. *Department of Integrated Science, Federal College of Education*

Afandi. (2012). Pembelajaran Biologi Menggunakan Pendekatan Metakognitif Melalui Model Reciprocal Learning dan Problem Based Learning Ditinjau dari Kemandirian Belajar dan Kemampuan Berpikir Kritis. *Jurnal Inkuiri*. Volume 1(2), 86-92.

Anisa, D.N . (2013). Pengaruh Model Pembelajaran POE (Prediction, Observation, and Explanation) dan Sikap Ilmiah Terhadap Prestasi Belajar Siswa Pada Materi Asam, Basa dan Garam. *Jurnal Pendidikan Kimia*. Volume 2(2).

Baharudin. (1982). *Peranan Kemampuan Dasar Intelektual Sikap dan Pemahaman Siswa Dalam Fisika Terhadap Kemampuan Siswa SMA di Sulsel Membangun Model Analog dan Model Mental*.

Wu, Y.T. and Tsai, C.C. (2005). Effects of constructivist-oriented instruction on elementary school students'cognitive structures. *Journal of Biological Education*. Volume 39(3).

Lee, W.J. (2011). *The Effects of Guided Inquiry Questions on Students' Critical Thinking Skills and Satisfaction in online argumentation*. Florida State University.

Matthew, M.B and Kenneth O.I. (2013). A Study on the Effects Of Guided Inquiry Teaching Method on Students Achievement. *International Researchers In Logic.* Volume 2(1).

Pertiwi, R.D. (2012). *Pembelajaran Kimia dengan Menggunanakan Metode Contructive Controversy dan Modified Free Inquiry terhadap prestasi belajar dan Keterampilan berpikir tingkat tinggi siswa.* Tesis S2 FKIP UNS Surakarta. (Unpublished).

Suryobroto, S. 2009. *Psikologi Pendidikan*. Jakarta: PT. Raja Grafindo 4 Persada.

Opong, I.K. (1981) Science Education in Primary Schools: Toe product of Science or the way to Science. *Journal of Science Teachers Association of Nigeria,* Vol. 19(2),9-17.

Toharudin, and Uus, R. (2011). Membangun Literasi Sains Peserta Didik. Bandung: Penerbit Buku Pendidikan-Anggota IKAPI.

Trianto. (2009). *Model-model Pembelajaran Inovatif Berorientasi Konstruktivistik*. Jakarta: Prestasi Pustaka Publisher.