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The Influence of Predict Observe Explain (POE) Learning Model on Student Learning Outcomes

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Abstract

This study aims to analyze the influence of Predict Observe Explain (POE) model on student's learning outcomes. This research was conducted using Quasi Experimental design with Pretest-Posttest Control Group Design. Population of this research is all of XI grade students at MA Al Asror Semarang. The sample are XI IPA 1 as control group and XI IPA 2 as experimental group taken by simple random sampling. The result showed that the learning outcomes experiment group is better than control group in term of cognitive, affective, and psychomotor aspects. The result of N-gain t-test shows there is significant difference of posttest-pretest value between experiment and control group. The level of affective and psychomotor aspects of the experimental group is better than the control group. These findings weres supported by the responses of teachers and students who respond well to learning with POE model applied. Based on the findings that the learning of Predict Observe Explain (POE) model was applied have a significant effect on students's learning outcomes.

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INTRODUCTION

The 21st century learning is a transition of learning where the curriculum currently being developed requires schools to change teacher-centered learning approaches to student-centered learning approaches. The 2013 curriculum emphasizes the application of a scientific approach to the learning process. Permendiknas No. 69 of 2013 said that developing learning should be centered on students with active learning patterns (reinforced by learning models of science approaches) and also critical learning. Critical learning emphasizes the activity of analyzing, interpreting, and evaluating things rationally and logically.

Learning biology is closely related to the scientific approach. The scientific approach in learning involves observing, asking, trying, processing, presenting, concluding, and creating. An inquiry-based learning model can improve student achievement and learning outcomes. Students are trained to be able to make a fun experiment (Alameddine & Ahwal, 2016). Predict Observe Explain (POE) model learning have several scientific methods that are part of science learning, namely making hypotheses (predict), conducting experiments (observe), and analyzing and presenting (explain). Inquiry learning and POE model learning reinforce each other, so it is hoped that using this learning in the Excretion System material can make it easier for students to understand concepts.

Based on observations at MA Al Asror, learning biology on excretory system material at the school uses the lecture and group discussion methods. Students still do not understand the material taught without practicum activities that support group discussions. The active role of students in learning biology is less because they are quickly bored and less interested in learning biology whose memorization results as a result of student learning outcomes are less than optimal.

The learning model used by teachers to explore student understanding by asking students to carry out three main tasks, namely predict, observe, and explain is called the POE learning model (White and Gunston, 1992). POE was developed to find the ability to predict students and their reasons for making these predictions regarding the symptoms of something. If the prediction results are following the results of observations, then students are increasingly convinced of the concept. If the student's allegations are incorrect, students can look for explanations about the inaccuracies in their predictions. Students experience a change in concept from an incorrect concept to a true one. Therefore, students can learn from mistakes, and usually learning from mistakes will not be easily forgotten. According to Hsiao *et al*. (2017), POE strategies help students think scientifically, participate in the process of solving scientific problems, initiate scientific dialogues, provide a basis for further scientific exploration and improve student's scientific learning performance. If students use the POE cycle method to solve scientific problems, student learning outcomes will continue to improve during the repeated POE process.

The advantage of the POE model is that students can think creatively to express predictions about a problem that arises in the community and encourage students to prove their predictions with an effort to investigate, so they can answer the problem and support the knowledge they learn. POE model learning can improve student learning activities (Wahyuni, 2013). Juniati (2009) states that the POE model improves student performance and student learning outcomes. The POE model can be chosen as an alternative learning model that can be implemented in schools because the POE learning model can improve students' understanding of concepts. Besides, the POE learning model can be used in other natural science materials to determine the effect of understanding concepts in the learning process (Rosdianto, 2017).

RESEARCH METHOD

This research is a quasi-experimental study with a pretest-posttest control group design. The population used in this study were students of group XI IPA MA Al Asror Semarang in the academic year 2018/2019. The sample consisted of group XI IPA 1 as the control group and group XI IPA 2 as the experimental group, which was determined by a simple random sampling technique. In the experimental group, the Predict Observe Explain (POE) learning model is applied while the control group applies the learning model with lectures and discussions. The POE learning model used by the teacher to explore student

understanding by asking students to carry out three main tasks, namely predict, observe and explain. First students are divided into small groups consisting of 3-4 members. Second, students predict (predict) by answering questions on the Student Worksheet (LKS). Third, students make experimental observations in the laboratory about the structure and function of the organs making up the Excretion System, the process of removing residual substances and the excretion/illness of the human Excretion System by scientific methods. Finally, students discuss the results of predictions and observations and explain the reasons and conclude the results (explain).

The independent variable in this study is the Predict Observe Explain (POE) learning model and the dependent variable is the student learning outcomes on Excretion System material.

Data taken in this study include primary and secondary data. Primary data in the form of students' cognitive learning outcomes consist of pretest and posttest scores measured using a test instrument 26 items multiple-choice items of student Excretion System material. Test questions have been tested for validity, reliability, and the level of difficulty of the questions. Secondary data include affective and psychomotor learning outcomes, student and teacher responses, and the effectiveness of learning. Student affective observation sheets are taken during the learning process by the observer. Psychomotor observation sheets of students were taken during the process of practicum taking place by the observer. Student and teacher responses are taken after learning through a questionnaire. The observation sheet of learning is taken during the learning process.

Data analysis in this study cognitive learning outcomes were done by t-test and N-gain. Descriptive analysis of the percentage is the affective and psychomotor student learning outcomes, student responses and the implementation of learning. Teacher response sheets were analyzed descriptively.

RESULT AND DISCUSSION

Based on research that has been carried out in May-November 2018 at MA Al Asror Semarang on the Excretion System material the following results were obtained.

Student Cognitive Learning Outcomes

Assessment of cognitive learning outcomes of students is done at the beginning and end of learning as a pretest and posttest value. The questions used are 26 multiple-choice questions. Analysis of the pretest and posttest scores in the form of descriptive analysis is presented in Table 1.

Table 1. The Result of Pretest and Posttest in Experimental and Control Group

Descriptive Data	Experimental		Control	
	Pretest	*Posttest*	*Pretest*	*posttest*
Higher Score	62	92	58	77
Lower Score	31	77	31	50
Standard deviation	9,339	3,573	5,827	5,775
Average	43,87	88,70	40,96	65,43
Total	23	23	23	23

Based on Table 1 it can be seen that the posttest means score of the experimental group is higher than the control group. That is because in the experimental group the learning activities of the Excretion System material use the Predict Observe Explain (POE) model. This is in line with Restami et al. (2013) that by using POE learning models students' understanding of concepts is better than using conventional learning models. The Excretion System learning process becomes fun and students prefer to learn with practicum because it is easier to understand abstract material concepts with the five senses so that students' knowledge is more meaningful.

Increasing students' cognitive abilities can be known further from the average N-gain pretest-posttest experimental group and control group, while to ensure the difference in cognitive abilities of the experimental group students with the control group students, it is necessary to further test the t-test on N data -gain pretest-

posttest students of the experimental group and the control group. Before the t-test is performed, a prerequisite test in the form of a normality test is required.

The results of the normality test using SPSS 16 on the pretest-posttest data of the experimental group obtained sig values. α 0,200> sig value. α 0.05 and control group obtained sig. α 0,187> sig value. α 0.05 so that it can be concluded that the pretest and posttest data groupes with POE learning models and groupes with normal lecture and discussion methods. So it can be concluded that the learning model predict observe explain on the Excretion System material can influence the cognitive abilities of students.

The average results of the N-Gain in experiment group is 0,79 and in control group is 0,40. Student cognitive learning outcomes with the treatment of POE learning models on excretory system material in the high category, while the cognitive learning outcomes of students with lecture and discussion methods in the medium category. The difference in the increase in the average N-Gain between students with the treatment of POE learning models with the treatment of lecture and discussion methods by 0.39.

The gain data (pretest-posttest difference) tested the difference between the pretest-posttest difference in the experimental group and the difference in the pretest-posttest control group is presented in Table 3. Based on Table 3 shows that the value of sig. (2-tailed) <α, so H_0 is rejected or accepts H_1. This shows that the average difference in the pretest-posttest scores of students with POE learning models and students with lecture and discussion learning methods are significantly different. Table 3 also shows that the difference in the pretest-posttest scores of the experimental group students is better than the control group. The better pretest-posttest score difference in the experimental group is influenced by the Predict Observe Explain (POE) learning model applied during the Excretion System learning process.

Tabel 3. T-test Result on Gain Data in Experimental and Control Group

Group	Rata-rata	Sig. (2-tailed)	α
Experiment	44,83	0,000	0,05
Control	24,04		

Affective and Psychomotor Learning Outcomes

Based on the completeness of the students 'attitudes, the students' learning achievement results obtained a 100% groupical completeness, so that the use of the POE model in the Excretion System learning material has a good impact on student attitudes during learning. These results can support primary data, namely cognitive learning outcomes of students to be able to determine the effect of POE learning models that are applied in the experimental group. The attitude of students observed in this study included seven aspects of attitude during the learning process (Table 4).

Based on Table 4 aspects of student attitudes have shown a good average of> 70%, although the aspect of activeness of students in asking questions during learning is still lacking at only 54.5%. This shows the use of the POE model in the learning of Excretion System material has a good impact on student attitudes during learning. This is consistent with Anisa's statement (2013) that learning with the POE learning model can provide real new knowledge to students and can increase student participation to be more active and creative so that it can significantly improve learning achievement.

Table 4. Persentage of Student Attitudes on Every Aspect in Learning of Excretion System in Experimental Groupes

No.	Attitude Aspect	Presentase (%)
1.	The activeness of students in asking questions during learning	54,5
2.	Attendance in group	87,5
3.	Complete the task	83
4.	Openness in accommodating other opinions during group discussions	79
5.	Present correctly	73,5
6.	Attitude when working on the Excretion System	77,5
7.	Cooperation in discussion groups	83,5

Data on psychomotor learning outcomes is obtained from observation sheets during the practicum taking place in the experimental group. Based on the results of the analysis showed that the experimental group psychomotor learning outcomes experienced groupical completeness of 100% with an average grade value of 83.04. This shows that the learning of POE models in the experimental group has a positive impact on students' psychomotor in practicing.

The students' skills observed in this study included 14 aspects of skills during the practicum. This is in line with Nurhidaya (2016) that the Predict Observe Explain (POE) model through the experimental method gives a better effect. The high acquisition of the experimental group average value is due to the Predict Observe Explain (POE) model directing students to various process skills activities such as observing, making predictions, using experimental tools/materials, and communicating. This is in line with the opinion of Rahmawati et al. (2014) that practicum activities can make students active and their learning more meaningful because students can experience direct learning. Based on research by Puriyandari et al. (2014) mentioned that the POE learning model can improve student learning achievement which includes the affective domain, cognitive domain, and psychomotor domain. The POE model can provide new knowledge to students significantly and can increase student participation to be more active and creative in learning. The experimental method used in this study using POE learning and training students to search and find various answers to problems (Zulaeha, 2014).

Student and Teacher Response Data

Data on student responses to the learning process of the Excretion System material using the POE learning model was obtained through a questionnaire of student responses given at the end of the learning process as well as categories of student responses to POE learning on the Excretion System in the experimental group. Based on the results of the analysis showed that all students gave responses in the effective category of learning Excretion Systems with the applied POE model. There were no students who gave less effective or ineffective responses. This shows that all students have felt the positive impact of learning that has been applied.

Based on the results of the teacher's response, the teacher gives a positive response to learning because students become more motivated to participate in learning and independent or group learning, so students can understand the material well. The teacher gives advice, the learning time should be well managed so that learning is more efficient and the learning objectives can be achieved and make the instructions in the worksheet more clear so that the desired results can be achieved. One of the advantages of POE learning strategies is that students engage in an invention and encourage students to reason by deduction by drawing a special conclusion (new truth) through the experience of conducting experiments/observations, by conducting deductions students can explain new truths and what happening (Cinici & Demir, 2013).

Implementation of POE Learning Models

The learning outcomes questionnaire in this study was used to measure the level of the syntax of Predict Observe Explain (POE) learning model in the Excretion System material. Data on the implementation of learning is obtained from observations made by observers during two meetings. There are three stages in the syntax of the POE learning model: predicting, observing, and explaining. The results of the learning outcomes can be seen in Table 5 which shows that the learning outcomes using the POE learning model in the Excretion System material are 82.6%. This means that the teacher has done 82.6% of learning activities by the lesson plans that have been designed. The teacher does three syntaxes of learning the POE model namely predict, observe, and explain. According to observer's observations, the teacher has implemented all the syntaxes but is still not perfect in every syntax, so that not yet 100% of the learning syntax that has been designed is implemented well. The implementation of the imperfect syntax can be caused by the teacher's inadequacy in learning activities. This is in line with Ayvacy (2013), the view of a teacher on a problem will be felt by using their 5 sense devices. When the situation is considered, it shows that POE is a good concept of learning and can be useful for teachers in designing teaching based on constructivism theory.

Table 5. Persentage of Observation Results in the Implementation of Predict Observe Explain Learning Model Syntaxs

No.	Observation Aspect	Total Score	Presentase (%)
1.	Preliminary Activities	12	75
2.	Core Activities		
	1. Predict	12	75
	2. Observe	13	81
	3. Explain	15	94
3.	Closing Activities	14	88
	Average		82,6

According to White & Gunston (1992), the POE learning model (Predict, Observe, and Explain) is an effective learning model for generating ideas or ideas by conducting discussions of their ideas. Research conducted by Suyanto *et al.* (2012) stated that POE learning is more effective to improve students' critical and creative thinking skills. The POE model (Predict, Observe, and Explain) is one of the learning models used in the teaching and learning process, by helping students to shape their first-hand knowledge through the senses by seeing, listening, touching, smelling and feeling a problem.

Predict Observe Explain (POE) learning model can develop student's ability to predict (Predict) the reason students provide predictions of a scientific event, then make observations (Observe) and make an explanation (Explain) scientifically (Ayvaci, 2013). The Predict Observe Explain (POE) learning model can be used to explore student's initial knowledge, provide students with opportunities to think about student's thinking abilities, condition students to have discussions, motivate students to explore concepts that they have and awaken students to do an investigation.

CONCLUSION

Based on the results of the study concluded that the learning model Predict Observe Explain (POE) applied at MA Al Asror Semarang has a significant effect on student learning outcomes. Student learning outcomes of the learning process using the Predict Observe Explain (POE) learning model has increased and is higher than the lecture and discussion methods.

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