The Effectiveness of Application POEW (Predict–Observe–Explain–Write) Learning Models on the Ecosystem Concept

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Abstract. This study aims to determine the effectiveness of the application of the POEW (Predict-Observe-Explain-Write) learning model on the ecosystem concept. The population in this study were all class X MIA at Madrasah Aliyah Al-Holiliyah Cidaun Cianjur and the sample in this study was 24 students in class X MIA 1. The method used in this study was a Pre-Experimental method with a One Group Pretest-posttest Design. The instrument used is an objective test in the form of multiple choice. The Gain Test is used to calculate the increase in learning outcomes, the RTP (Average Level of Mastery) is used to determine the average mastery of student learning outcomes, then the Effectiveness Test is to calculate the percentage of students who score more than the KKM (Minimum Completeness Criteria). The results showed that the average value of the Pre-test was 57.08 while the average value of the Post-test was 81.46. The increase in student learning outcomes has three categories: the high category of 27.2%, the medium category of 62.5% and the low category of 8.3%. The level of mastery of students whose score ≥75 is 22 students (above the KKM) 91.7%. Students who get a score ≤ 75 are 2 students (8.3%). The average level of student mastery with the application of the POEW learning model is 81%. Based on these results indicate that the application of the POEW (Predict–Observe–Explain–Write) learning model is effective on the ecosystem concept.

Keywords: Effectiveness · POEW learning model · ecosystem concept

1 Introduction

Education is a fundamental factor in efforts to improve the quality of life, besides being a determining factor for social and economic development towards better conditions. Education is also seen as the most strategic means to elevate the dignity of a nation.

Given the importance of the role of education in people's lives, the current government pays attention to various aspects of existing education to be developed, with the hope that education in Indonesia will rise from adversity and become the frontline in

nation building. The government's attention is reflected in policies, including the fulfillment of statutory facilities, increasing the education budget, to efforts to improve various applicable regulations to advance national education.

According to the National Education System Law No. 20 of 2003 Chapter 1 Article 1 paragraph 1 emphasizes that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character and the necessary skills for himself, society, nation and state [1].

The achievement of a good quality of education can be influenced by the quality of learning in the classroom. The embodiment of good learning can be seen from student learning activities in participating in learning. Most of the teachers in the learning process play a dominant role, so that the teacher functions as a source of learning and the holder of the highest scientific authority (teacher centered). This view needs to be changed through the application of a variety of learning models that emphasize student activity in learning activities.

The learning process in the classroom is a very important part of education. The success of the learning process cannot be separated from the ability of teachers to develop models, methods, and learning media. Inappropriate learning models can cause the learning process to be not optimal. The learning model should be oriented towards increasing the intensity of student involvement effectively in the learning process. The learning process in various scientific fields is certainly different, in the scientific field of Biology learning is not enough to be carried out by conveying information about concepts and principles, but students must also understand the process of occurrence of scientific phenomena by utilizing sensing as much as possible. This means that when learning science, students must be active in the learning process through observing, experimenting and discussing with friends or with theachers.

Based on the results of observations in schools that will be studied, it shows that the learning system in the classroom uses the same model in each class. This becomes a problem, namely the learning method of students who are less enthusiastic, tends to be passive and also the model provided by the teacher tends to be monotonous, and the model that does not vary causes student learning outcomes to be low and not optimal. The results of interviews with teachers in the field of study at the school that the percentage of students in biology subjects whose scores are below the KKM is around 50–60%. Therefore, it is necessary to make a change in the learning process, namely by involving student activities in the learning process through observation, experimentation and discussion activities or it can be interpreted that learning is carried out through knowledge activities and practical work. In addition to providing the widest opportunity for students to carry out simple exploration, the alternative models offered also consider understanding the concepts that must be mastered by students.

The POEW (Predict-Observe-Explain-Write) learning model is a learning model developed from the POE (Predict-Observe-Explain) and TTW (Think-Talk-Write) learning models which combine the POE model and the inquiry model. The POEW model consists of four stages of core activities: (1) Predict, students make guesses; (2) Observe, students make observations; (3) Explain, students explain in the discussion; (4) Write, students write conclusions in their own language. The POEW learning model can make

students able to make predictions based on their prior knowledge so that students can solve problems given by the teacher as well as problems in everyday life. In addition, students are guided to design experiments based on their own predictions [2].

The POE model is a learning model that begins by exposing students to a problem, then students predict the solution to the problem (Predict), then make observations to prove the prediction (Observe) and explain the results of their observations (Explain). The TTW strategy consists of three phases, namely the Think phase, the Talk phase, and the Write phase. In the Think phase, students are given problems and then students think about possible answers to these problems. Next is the Talk phase, in this phase students work in groups to discuss what they got in the Think phase. The third phase is the Write phase, in this phase students work individually, pouring out the ideas obtained in the Talk phase and writing them in their own language as a result of the discussion so that students better master the concepts being studied [3].

The POEW learning model allows students to be active in the learning process, providing opportunities for students to construct their knowledge, communicate their thoughts and write down the results of their discussions so that students better understand and master the concepts being taught and students' critical thinking skills are improved. Student participation in learning becomes greater because students are involved in making assumptions about problems that can stimulate students' critical thinking skills, conducting experiments to test predictions by observing directly, students can compare theory (allegations) with reality, explain, communicate and interact through group discussion, rewrite their understanding in their own language. Communication (oral and written) in learning is very important, because through communication ideas can be exploited in various perspectives, students' ways of thinking are sharpened [4].

Based on the previous description, the objectives of this research are: a. How is the initial ability of students before being given the POEW (Predict-Observe-Explain-Write) learning model on the Ecosystem concept? b. How are student learning outcomes after being given the POEW (Predict-Observe-Explain-Write) learning model on the Ecosystem concept? c. How effective is the application of the POEW (Predict-Observe-Explain-Write) learning model to the Ecosystem concept?

2   Method

This study uses a quantitative approach, namely research that uses data in the form of numbers as a tool to find information about what you want to know. The research method used is the Pre-Experimental method, which is an experimental research design that only uses the experimental group, without a control (comparison) group and the sample of subjects is selected modestly without using randomization [5] (Table 1).

Information:

Table 1. Research Design

Pre-test	Treatment	Post-test
O_1	X_1	O_2

Table 2. Interpretation of Modified Normalized Gain

Normalized Gain Value	Category
$-1{,}00 \leq g \leq 0{,}00$	Decreased
$G = 0{,}00$	Fixed
$0{,}00 < g < 0{,}30$	Low
$0{,}30 \leq g < 0{,}70$	Medium
$0{,}70 \leq g \leq 1{,}00$	High

O1: Initial test of Ecosystem concept
O2: Final test of Ecosystem concept
X: POEW Learning Model

The population used in this study were all students of class X MIA at MA Al-Holiliyah Cidaun Cianjur. The sampling technique used in this study is purposive sampling, a sampling technique with certain considerations [5]. The sample taken in this study is one of class X of 2 classes in MA Al-Holiliyah Cidaun Cianjur.

The instrument used to measure student learning outcomes is an objective test of 30 multiple choice questions with a score for each question is 1. The research instrument was first tested and met the criteria of validity, reliability, level of difficulty and discriminating power of items.

The data analyzed is the score of student learning outcomes obtained and analyzed by calculating (Table 2):

2.1 Improved Learning Outcomes with the N-gain Formula [6]:

$$N\ Gain = \frac{Posstest\ Score - Pretest\ Score}{Ideal\ Score - Pretest\ Score}$$

2.2 Mastery Level Value

$$Mastery\ level = \frac{number\ of\ correct\ answer}{number\ of\ questions} \times 100\%$$

2.3 Average Mastery Level (RTP)

The effectiveness of the learning model with criteria is said to be effective if 75% of students get a value greater than or equal to the predetermined Minimum Completeness Criteria (KKM), which is 75 [7] (Table 3).

Table 3. Criteria for the average level of mastery

Value Range	Criteria
$90\% \leq RTP \leq 100\%$	Very High
$80\% \leq RTP \leq 90\%$	High
$65\% \leq RTP \leq 80\%$	Moderate
$55\% \leq RTP \leq 65\%$	Low
$0\% \leq RTP \leq 55\%$	Very Low

3   Results and Discussion

The results showed that the average value before learning using the POEW (Predict–Observe–Explain–Write) learning model was 57.08. This can be said to be low and very far from the Minimum Completeness Criteria (KKM) at MA Al-Holiliyah Cidaun Cianjur, which is 75. This is because students have not received the learning materials that will be given in this study.

After learning with the POEW (Predict–Observe–Explain–Observe) learning model, a post-test (final learning outcome test) was carried out. The final learning result (post-test) obtained is 81.46 on a scale of 100. This condition indicates that the learning outcomes of students after getting the application of the POEW model learning have increased.

In other words, the application of the POEW (Predict–Observe–Explain–Write) learning model on the ecosystem concept of class X students at MA Al-Holiliyah Cidaun Cianjur is effective based on the learning outcomes obtained by students. The increase in the value of learning outcomes is due to the influence of several factors including the learning model used during the learning process. This is in accordance with what Arends stated that "The learning model is a pattern that is used as a guide in planning learning in class and tutorials. The learning model refers to the approach that will be used, including learning objectives, stages in learning activities, learning environment, and classroom management" [8]. Through the learning model the teacher can help students get information, ideas, skills, ways of thinking, and expressing ideas. The learning model also serves as a guide for learning designers and teachers in planning teaching and learning activities. With the help of models in biology learning, abstract material can be more easily understood, students learn more passionately, are able to develop critical thinking skills and predict material for students through learning in the environment so that students feel stimulated and enthusiastic in the learning process.

To determine the effectiveness of learning, the following analysis is carried out:

3.1   Normalized Gain Test

Based on Fig. 1, it can be seen that of the 24 students, the high category was achieved by 7 students with a percentage of 29.2%, the medium category was achieved by 15 students with a percentage of 62.5% and the low category was achieved by 2 students with a percentage of 8.3%.
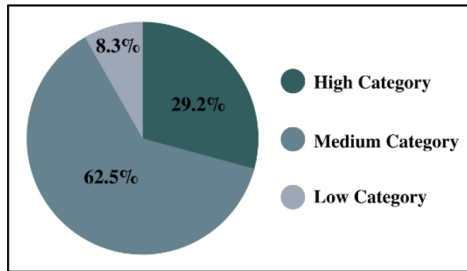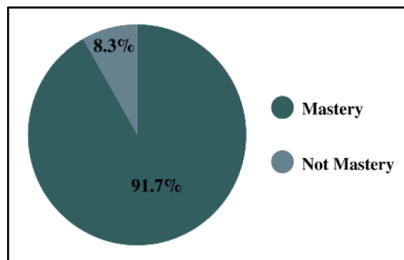
Fig. 1. Improved learning outcomes

Fig. 2. Student mastery level

3.2 Mastery Level Test

The level of student mastery can be seen from 24 students, who have not mastered the material ($\leq 75\%$) are 2 students with a percentage of 8.3%. While the students who managed to master 75% of the material were 22 students with a percentage of 91.7% (Fig. 2).

3.3 Average Mastery Level

The average mastery level of all students is 81% which indicates a high level of mastery.

3.4 Effectiveness of Learning Model

The application of the POEW (Predict–Observe–Explain–Write) learning model is effective in improving student learning outcomes on the concept of ecosystems.

The effectiveness that occurs after using the learning model shows that learning in the class is interesting for students, so students are enthusiastic about learning by themselves, especially when learning is carried out outside the classroom so that students feel happy and stimulated to learn. Effective learning is learning that can produce useful and student-focused learning (Student centered) through the use of appropriate procedures [9]. A teaching and learning process can be said to be successful if the teaching and learning activities can stimulate the learning process. The determination or measure of effective learning lies in the results. Effectiveness can also be viewed as a comparison between the level of achievement that has been obtained and the plan that has been prepared.

The results of previous research on the POEW (Predict–Observe–Explain-Write) learning model on environmental change materials can facilitate students' conceptual changes to become positive which is strengthened by reducing misconceptions reaching 63.30% in class X students of SMAN 1 Banjaran [10]. Another study also concluded that the POEW (Predict–Observe–Explain-Write) learning model improved the learning achievement of students of class VIII MTs Matla'ul Huda Pati in Physics subjects [11]. This is because the POEW (Predict–Observe–Explain-Write) learning model has the following advantages [4]: (1) Students become active and directly involved in learning. (2) Students become more creative, especially when making predictions. (3) Learning is more interesting because students can make direct observations. (4) Can train students to communicate or explain the relationship between predictions and observations to others, so that learning activities will be more meaningful and train students to think critically. (5) Students construct their own knowledge.

The application of the POEW (Predict–Observe–Explain-Write) learning model will be really effective if the disadvantages of this learning model are also considered, so that teachers can anticipate them. The disadvantages of this learning model are [12]: (1) Requires more mature preparation, especially for biology learning requires observations made to prove the predictions put forward by students, because usually more time is needed. (2) More abilities and skills are demanded for teachers to conduct observation activities, and are required to be more professional. (3) Requires good will and motivation from the teacher concerned, so that it is successful in the learning process. (4) To carry out experimental activities requires adequate equipment, materials and places.

4   Conclusion

Based on the results of research and discussion, the following conclusions can be drawn: (1) The initial ability of students before obtaining the application of the POEW (Predict–Observe–Explain–Write) learning model is low. This is evidenced by the average student learning outcomes through the pre-test that is equal to 57.08. The average value is still very far from the average value of the Minimum Completeness Criteria (KKM) that has been set at the MA Al-Holiliyah Cidaun Cianjur school for class X Biology subjects, which is 75. (2) Student learning outcomes after being given learning using the POEW (Predict-Observe-Explain-Write) model as measured by post-test showed improvement and good results. This is indicated by the average value of 81.46. The average value has reached the Minimum Completeness Criteria (KKM) that has been set at the MA Al-Holiliyah Cidaun Cianjur school for class X Biology subjects, which is 75. (3) Student learning outcomes by applying the POEW (Predict-Observe–Explain–Write) model is effective on the concept of Ecosystem in class X at MA Al-Holiliyah Cidaun Cianjur. This is indicated by the average level of mastery of the material, which is 81% which is included in the high category, then the learning mastery obtained is 91.7%, exceeding 75%.

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