

Enhancing Biology Learning Outcomes through the Implementation of the Predict-Observe-Explain (POE) Instructional Model

Rizki Amalia Nur^{1*}, Nurhidayah², Rika Riyanti³

¹⁻³ Universitas Muslim Maros, Indonesia

* rizkiamalianur@umma.ac.id

Abstract

Learning models play an important role in providing opportunities for students to be actively involved in exploring and applying everyday Biology concepts. One of the effective learning models is Predict-Observe-Explain (POE), which focuses on developing students' life skills. This study aims to evaluate the effectiveness of the POE learning model in improving Biology learning outcomes, especially in the context of the excretory system. This research is a pseudo-experimental study that focuses on the variable of students' Biology learning outcomes, applying the POE learning model. This research methodology uses Pretest-Posttest Group Design. The population of this study was all VIII grade students at MTsS Darul Istiqamah Gowa, with two classes consisting of 22 students each. The analysis results showed that the experimental class, which used the POE learning model, had better learning outcomes than the control class. This improvement can be seen in both classes' minimum, maximum, and average values. Based on the results of this analysis, it can be concluded that there is a significant increase in learning outcomes for students who apply the POE learning strategy compared to students who do not.

Keywords: *Predict-Observe-Explain (POE) learning model, biology, learning outcomes*

Introduction

Biology, as an integral part of Natural Science, has its charm in studying living things' lives. However, the material in Biology is often considered less interesting by students, especially because there is a lot of scientific languages and memorization, which is considered difficult and burdensome. As a result, students' interest and attention to this subject is often lacking. In this context, the teacher's role becomes very important in conveying the material and changing students' perceptions of Biology. With effective classroom management and innovative teaching methods, teachers can help motivate students to learn and make Biology more interesting and easy to understand (Nur, 2018)

Education ideally functions as a means of liberation that allows individuals to actualize their full potential, not as a burden or limitation. However, the main challenge is creating a meaningful learning environment and encouraging this growth. Learning is a transformational process that manifests in individual behaviour and knowledge changes. Using effective and appropriate learning methods is important to maximize learning outcomes. The success of the learning process is not only marked by students' academic

achievement but also by the extent to which the learning method has facilitated conceptual understanding and encouraged their personal growth (Sanjaya. W, 2008).

Implementing appropriate learning methods is an important solution to foster students' interest in the material they find less interesting, such as Biology. Field research conducted at MTsS Darul Istiqamah showed that the monotonous method often used by teachers contributed to a lack of student interest. Observations show that many students seem indifferent and passive during the learning process. In overcoming this problem, researchers need to apply a new approach that has never been applied in the school.

The chosen method is Predict-Observe-Explain (POE). According to Jannah (2017), the POE learning model can help students develop thinking skills, explore understanding, and solve problems through individual predictions. This method is also effective in building students' self-confidence, creativity, and critical thinking. Dewi et al. (2021) also emphasized that the POE learning model effectively promotes students' active involvement in the learning process.

This research has important significance because it focuses on improving the quality and effectiveness of the biology learning process. First, this study aims to improve biology learning by helping students understand complex scientific concepts relevant to everyday life by applying the Predict-Observe-Explain (POE) Learning Model. By using this model, students can learn more interestingly and interactively, which in turn will facilitate a better understanding of the material.

Second, this research can potentially increase student motivation and participation in learning, which is often challenging in traditional learning methods, especially in complex subjects such as biology. Applying the POE model can help foster students' interest and active participation in learning.

Third, this study also hopes to help develop students' critical thinking skills, an important skill needed for their future success, either in their education or careers.

Fourth, this study contributes to the educational research literature by providing empirical evidence on the POE model's effectiveness in learning biology. It will be a valuable source of information for researchers and other educators who wish to apply or study this method.

Method

This research uses a quantitative approach and is a type of quasi-experimental research (quasi-experiment). The selection of this type of research was based on the research focus, which examined the effect of applying the Predict-Observe-Explain (POE) learning model on students' biology learning outcomes. In quasi-experiments, there is no random selection of treatment groups, making them suitable for this study's context.

The research design used was a pretest-posttest design for groups. This design involves measuring learning outcomes before and after implementing the POE learning model. Thus, this study can assess the effectiveness of this method in improving biology learning outcomes. Details of this research design can be seen in the table below:

Table 1. Research Design

Pre Test	Treatment	Post-test
O1	X1	O2
O3	X2	O4

Source: Sugiyono (2014)

This study's population included all class VIII students at MTsS Darul Istiqamah Gowa. The population is divided into two classes, namely class VIII1 and VIII2, with 22 students. Both classes were selected as the sample in this study, making it a study that covered 100% of the target population. This study, therefore, included a total of 44 students of class VIII, intending to obtain an accurate and comprehensive picture of the effectiveness of applying the Predict-Observe-Explain (POE) Learning Model.

This research was carried out in three main stages after the initial exploration stage: preparation, implementation, and evaluation.

The preparatory stage involves gathering information through interviews with Biology teachers at MA Darul Istiqamah Gowa to find out the problems that exist, as well as making observations at the research location. The researcher also determines two classes as research objects and analyzes the curriculum to understand competency standards and basic competencies. It allows researchers to know the material to be taught, in this case, the subject of the excretory system.

The implementation phase consists of five meetings. Class VIII1 was used as an experimental class, where the Predict-Observe-Explain (POE) learning model was applied. In contrast, class VIII2, the control class, was not given special treatment.

Finally, the evaluation stage is carried out during the research process. This activity includes collecting data on students' cognitive learning outcomes through tests, analyzing the data obtained, and preparing results reports. Through these stages, this study aims to understand the effectiveness of applying the POE learning model in improving student learning outcomes in Biology.

Data collection techniques in this study involved giving tests before (pretest) and after (post-test) the application of learning methods. The two tests were given to the experimental and control classes. This test aims to evaluate changes in student learning outcomes before and after applying the Predict-Observe-Explain (POE) learning model. The test sheets provided are designed based on competency standards, basic competencies, and predetermined learning objectives. The test includes 30 multiple-choice questions. Each item is designed to reflect and measure students' understanding of the material being taught. Researchers can identify changes in students' understanding and performance by analyzing student answers on the pretest and post-test tests and applying the POE learning model.

Results

The results of this study, including the final calculations and findings found during the application of the Predict-Observe-Explain (POE) learning model, will be described in the following section. This research is focused on the concept of the excretory system.

1. Pretest data

The results of the initial test or pretest of the control and experimental classes are shown in Table 1. From these data, it appears that the pretest scores of the experimental class are superior to those of the control class.

Table 2. Pretest Results for Experimental and Control Classes

No.	Mark	Experiment Pretest	Pretest Control
1	The number of students	22	22
2	The highest score	72	70
3	Lowest value	40	36
4	Means	63,18	54,91
5	Median	65	55
6	mode	70	70
7	Standard deviation	9.09	12.73
8	Variance	82,72	162,27

The control class recorded the highest score of 70 and the lowest score of 36. The mean (mean) of the control class' pretest score was 54.91, with a median of 55.00 and a mode of 70.00. The standard deviation of the pretest value for the control class was 12.73, and the variance was 162.27. The experimental class showed increased biology learning outcomes after being given questions that included elements of the Predict-Observe-Explain (POE) learning model in the same context, namely the Excretory System. The experimental class's mean value (mean) was 63.18, with the highest value being 72 and the lowest being 40. The experimental class's median and mode pretest values were 65.00 and 70.00, respectively. The standard deviation of the experimental class pretest value was 9.09, and the variance was 82.72.

2. Post-test data

The results of the final test or post-test of the control and experimental classes can be seen in Table 2. From these results, the post-test value of the experimental class appears to be higher than that of the control class.

Table 3. Post-test Class Experiment and Control Results

No.	Mark	Post-test Experiment	Post-test Control
1	The number of students	22	22
2	The highest score	92	80
3	Lowest value	50	40
4	Means	73.00	56.36
5	Median	75.00	55.00
6	mode	88	50
7	Standard deviation	15.81	12.92
8	Variance	150.19	167.10

The control class recorded the highest score of 80 and the lowest score of 40. The control class's average (mean) post-test value was 56.36, with a median of 55.00 and a mode of 50.00. The standard deviation of the post-test value for the control class is 12.92, and the variance is 167.10. In contrast, the experimental class recorded higher post-test results than

the control class. Within this class, the highest score was 92, and the lowest was 50, with a mean (mean) of 73.00, a median of 75.00, and a mode of 88.00. The standard deviation of the experimental class post-test score was 15.81, and the variance was 150.19.

Based on the data presented, it can be concluded that there is an increase in learning outcomes from the pretest to the post-test in both the control and experimental classes. The increase can be seen in the two classes' minimum, maximum, and average scores. However, the experimental class showed a more significant increase, indicating the effectiveness of the Predict-Observe-Explain (POE) learning model.

Discussion

Based on the research results, the use of the Predict-Observe-Explain (POE) learning model has shown a positive impact on improving student learning outcomes in Biology. At the initial stage (pretest), there is a difference between the control and experimental classes, but this difference is not too significant. However, after using the POE model, student learning outcomes in the experimental class experienced a significant increase.

In the experimental class, students achieved the highest score of 92, up from 72 on the pretest, and the average score (mean) increased from 63.18 to 73.00. On the other hand, even though the control class also experienced an increase, the change was not as big as in the experimental class. The highest score in the control class only increased from 70 to 80, and the mean (mean) increased from 54.91 to 56.36. The results of this study indicate that the Predict-Observe-Explain (POE) learning model effectively improves student learning outcomes, especially in Biology subjects. Therefore, this method is worth considering as an approach teachers can use to increase student motivation and learning outcomes.

The results of this study provide important clues regarding the effectiveness of the Predict-Observe-Explain (POE) learning model in improving student learning outcomes, especially in Biology subjects. It shows that innovation in teaching methods can significantly impact student achievement.

Specifically, this study shows how active learning approaches, such as the POE model, can be more interesting and help students understand the subject matter. In this sense, this approach assists students in predicting, observing, and explaining concepts, which promotes deeper understanding and long-term retention.

Another reflection from this study is the importance of teachers in trying and implementing different and innovative teaching methods. It is important because every student learns uniquely, and changing teaching methods can help reach different types of learners.

The implications of the results of this study are quite significant in the context of education and learning, especially in Biology:

1. Improvement of Teaching Methods

This study's results indicate that applying the Predict-Observe-Explain (POE) learning method can improve student learning outcomes. It means educators and educational institutions may consider adopting and implementing this learning model in their curriculum to improve the quality and effectiveness of learning.

2. Encourage Active Learning

The POE learning model encourages students to be active in their learning process, which means students not only receive information but also participate in discovering and understanding knowledge. It can assist in developing critical thinking and problem-solving skills essential for success outside the school setting.

3. Changing Perceptions About Biology Subjects

Biology is often considered a difficult and uninteresting subject for some students. This perception can change by using innovative and interesting methods such as POE. Learning becomes more interesting and interactive, which in turn can increase students' interest and motivation in this subject.

This study's results illustrate an increase in learning outcomes in classes that use the Predict-Observe-Explain (POE) method compared to the control class. It can happen for several reasons. First, the POE method facilitates active learning, where students are directly involved in their learning process by making predictions, making observations, and explaining their findings. This active involvement helps in better understanding and retention of the material. Second, the POE method helps students develop critical and analytical thinking skills, which are important for conceptual understanding. Third, the approach used in the POE method spurs students' interest and motivation to learn, which in turn contributes to improving learning outcomes. Fourth, POE teaches concepts in real and relevant contexts.

Conclusion

The main research finding that is quite surprising is the significant increase in student learning outcomes in the experimental class after the application of the Predict-Observe-Explain (POE) method. Initially, the researcher assumed this method would only deepen students' understanding of concepts. However, the increase in the average score exceeded this estimate, indicating that the POE method not only deepens understanding of concepts, but also positively impacts improving student learning outcomes in general.

The results of this study provide important added value in the field of education, especially in teaching Biology. This study shows that the POE method can help students understand concepts more deeply and has an impact on increasing their average score. Thus, the main contribution of this research lies in implementing POE methods in educational contexts and how these methods can be adapted in various learning settings to improve student learning outcomes.

However, this study has several limitations and opens room for further research. The sample of this study was limited to class VIII students at MTsS Darul Istiqamah Gowa and only focused on one topic, namely the Excretory System. Therefore, further research needs to be conducted in different contexts and topics involving different types of evaluation. In addition, the quasi-experimental design in this study may need to be upgraded to a randomized experimental method to strengthen the validity of the results. Given these limitations, future research could explore integrating the POE model with other learning methods, adapting these methods to students with special learning needs, and their application in non-formal education contexts.

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