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# Improving Conceptual Understanding of Cell Structure and Function through Predict-Observe-Explain (POE) Model for XI Science Students at SMA N 4 BURU

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**Abstrak**

Penelitian ini bertujuan untuk mengetahui bagaimana pengaruh penggunaan model pembelajaran Predict-Observe-Explain (POE) terhadap pemahaman konsep tentang struktur dan fungsi sel pada siswa kelas XI IPA di SMA N 4 Buru. Penelitian dilakukan dengan metode kuantitatif dan melibatkan 27 siswa sebagai peserta. Hasilnya menunjukkan bahwa penerapan model POE secara signifikan meningkatkan pemahaman siswa tentang materi tersebut, dengan hubungan yang cukup kuat (korelasi 0,632) dan tingkat keberhasilan belajar mencapai 85%. Selain itu, respon siswa terhadap model ini sangat positif, mereka menunjukkan minat dan keterlibatan aktif selama proses belajar. Temuan ini menyarankan bahwa model POE merupakan strategi yang efektif untuk membantu siswa memahami konsep biologi, khususnya tentang struktur dan fungsi sel.
**Kata Kunci:** pemahaman konsep, struktur dan fungsi sel, POE, siswa kelas XI IPA

**Abstract**

*This study aims to determine how the use of Predict-Observe-Explain (POE) learning model affects the understanding of the concept of cell structure and function in class XI IPA students at SMA N 4 Buru. The research was conducted using quantitative methods and involved 27 students as participants. The results showed that the application of the POE model significantly improved students' understanding of the material, with a fairly strong relationship (correlation 0.632) and a learning success rate of 85%. In addition, students' response to this model was very positive, they showed interest and active involvement during the learning process. The findings suggest that the POE model is an effective strategy to help students understand biology concepts, particularly about cell structure and function.*
***Keywords:*** concept understanding, cell structure and function, POE, science XI students

## Introduction

Teaching and learning activities are one of the determining factors in achieving an increase in the quality of education. According to Uno H. B. (2022), it is conveyed that the process of learning is the basis of educational activities, the quality of learning is one of the determinants of the success of a school, so there is a positive correlation to the quality of education as a whole. This states that teaching can be used as an effort to guide and direct learning experiences to students which generally take place in formal situations where the teacher's competence in designing and developing various learning resources is needed during the learning process at school. To strengthen this view, Daryanto also stated that the quality of learning is the level of success. In achieving this goal, the progress of students can be seen from the increase in

knowledge, abilities, and positive behavioral changes through learning activities in the classroom (Prasetyo, 2013: 12). So, it should be a pleasant learning process involving students, so that learning objectives can be achieved and take place well. Biology learning is taught to gain knowledge by collecting data, analyzing, being scientific, thinking rationally so that it is trained in solving the problems it faces. Current biology learning is often only on remembering and understanding low-level thinking, not yet reaching the development of higher-level thinking.

Based on the results of observations and interviews with Mrs. Una Lesnussa, a biology teacher, on September 30, 2020, information was obtained that student learning outcomes were still below standard when viewed from the predetermined Minimum Completion Criteria (KKM) of 70, while the highest score students produced was only 60. From these results, it appears that student learning outcomes are still relatively low. In the learning process carried out so far, students only listen, pay attention, and do the tasks given by the teacher. The interaction that occurs in the learning process is only one-way, namely teacher to student (teacher center).

In order for the learning process to be more optimal, it is necessary to use the right learning model, one of the learning models that can improve learning outcomes is the POE learning model. Warsono and Hariyanto (2012) said that "The POE learning model provides students with the opportunity to reconstruct knowledge, and is skilled in communicating students' thoughts and discussion results". The results of research by Sah Ulya Ulfa, et al (2019) showed "There is an empowerment of critical thinking by using the POE model in learning IPA respiratory system material at SMP Negeri 13 Palembang. Overall, from 6 indicators of critical thinking, the critical thinking ability of students using the POE learning model includes critical indicators, while the ability of students' critical thinking abilities without the POE model is in the non-critical category". Then, Citron (2018) also conducted research on the effect of applying the POE learning model to improve student learning outcomes on vibration and wave material with an N-gain value of 0.65 in the medium category. The average post test value obtained was 81.02 higher than the specified KKM value (75). From the results of research and analysis conducted by Santhiy (2015), it shows that the application of the POE learning model can increase student activity.

Based on the description above, this study aims to determine the effect of using the Predict-Observe-Explain (POE) learning model on improving understanding of the concept of cell structure and function in class XI IPA students at SMA N 4 Buru.

## Method

The type of research used in this study is a quantitative method that aims to determine the effect of POE learning model on the learning outcomes of students in class XI IPA at SMA Negeri 4 Buru. The subjects in this study were all students of class XI IPA at SMA Negeri 4 Buru with a total of 27. The data collection techniques used in this study are: Tests were conducted to determine student learning outcomes by applying the POE learning model. Non-Test Questionnaire or questionnaire is a data collection technique that is done by giving a set of questions or written statements to respondents. The questionnaire was filled in by students, and documentation was used to strengthen observation data. Documentation in the form of an assessment of the student's score list, in the form of photographs or images of the implementation of learning and student activities during the learning process.

Instrument is a data collection tool. The instruments used in this study are: Test questions used after students carry out learning with the POE model on biology learning outcomes. Tests are conducted to determine student learning outcomes. The test in this study was in the form of multiple choice as many as 20 questions. Questionnaire sheet given to students aims to determine students' responses to the implementation of the POE model.

To analyze the data obtained through the questionnaire, then consulted with the Likert Scale as in Table 1 below:

Table 1 Likert Scale

| No | Alternative Answer | Score | Description | |
|---|---|---|---|---|
| 1 | A | 4 | Strongly Agree (SS) | |
| 2 | B | 3 | Agree (S) | |
| 3 | C | 2 | Disagree (KS) | |
| 4 | D | 1 | Disagree (TS) | |

After obtaining the distribution of questionnaire data based on the Likert Scale above, then the data is processed and analyzed to obtain the value of variables X and Y, the formula is used:

On the value of variable X (questionnaire results) the frequency distribution formula is used, namely:

$P$ = f/n× 100%

Description:

P = Percentage number

f = Frequency of the number of student responses per aspect that appears

N = Total number of students

100 = Constant value

To obtain the value of variable Y (learning outcomes) the following formula is used:

Value = (score obtained)/ (number of questions) x100%

Furthermore, the value is presented in the form of a frequency distribution table, so that it can describe the position of a value of all students studied in accordance with the benchmark reference guidelines.

Furthermore, to determine the effect of the application of the POE learning model on student learning outcomes, the data in the table is then re-analyzed using the product moment correlation statistical data analysis technique as follows:

r_xy= (N∑ xy-(∑ x). (∑ y))/(√((N∑ x²-()∑ x²).(N∑ y²-∑ y²))

Description:

R_xy: Correlation Index Number "r" Product Moment

∑ X : The sum of all X scores

∑ Y : Number of Y scores

∑ XY : The sum of the product of the X and Y scores

N : Number of frequencies or number of individuals

After knowing the effect of the POE learning model on student learning outcomes, it is used with the formula:

KD= r²x100%

Where:

KD: Coefficient of Determination

r : Correlation Coefficient

## Result and Discussion

### Student Response to the POE Model

To measure the effect of the POE learning model, a questionnaire was made and distributed to 27 students as respondents. The results showed that the application of the Predict-Observe-Explain (POE) learning model was able to improve the understanding of the concept of cell structure and function of students in class XI IPA at SMA N 4 Buru. Students' response to the application of Predict-Observe-Explain (POE) learning model showed a high level of interest and participation. Based on the data, 85.18% of students stated that they were interested in learning biology using the POE model, while 11.11% of students felt quite interested and 3.71% felt less interested. In addition, most students felt that this model made it easier for them to express new ideas and ideas to teachers and friends, with a percentage reaching 92.59%. This positive response shows that the POE model is able to increase student motivation and activeness in the biology learning process, especially on the material of cell structure and function. These results are in line with previous research which states that the POE model is effective in increasing student involvement in learning.

Based on the data, it is known that out of 27 students taken with excellent qualifications amounted to 16 students (59%), good qualifications amounted to 7 students (26%), and sufficient qualifications amounted to 4 students (15%), while in the qualifications less and failing there are none.

### Student Learning Outcomes

Student learning outcomes are obtained from test scores conducted after carrying out the learning process as follows:

Table 2 Student learning outcomes

| Interval | | Qualification | Frequency | Percentage |
|---|---|---|---|---|
| **Score** | **Letter** | | | |
| 80-100 | A | Excellent | 16 | 59% |
| 66-79 | B | Good | 7 | 26% |
| 56-65 | C | Fair | 4 | 15% |
| 40-55 | D | Deficient | - | - |
| 0-39 | E | Failed | - | - |
| **Jumlah** | | | **27** | **100%** |

Data Source: Student Learning Outcome Score.

Based on the data in Table 2 above, it is known that of the 27 students taken with excellent qualifications amounted to 16 students (59%), good qualifications amounted to 7 students (26%), and sufficient qualifications amounted to 4 students (15%), while in the qualifications less and failing no one.

**Correlation of Variable X and Variable Y**

Based on the data collected and calculated using product moment as follows:

N=27, $\sum X = 2080$, $\sum Y = 2090$, $\sum XY = 161430$, $X^2$= 160390, $Y^2$= 164700.

$$r_{xy} = \frac{n\sum xy - (\sum x).(\sum y)}{\sqrt{\{(n\sum x^2 - (\sum x)^2\}\{(n\sum y^2 - (\sum y)^2\}}}$$

$$r_{xy} = \frac{27\ x\ 161430 - (2080).(2090)}{\sqrt{\{27\ x\ 160390 - (2080)^2\}\{(27\ x\ 164700 - (2090)^2\}}}$$

$$r_{xy} = \frac{4358610 - 4347200}{\sqrt{(4330530 - 4326400)\ (4446900 - 4368100)}}$$

$$r_{xy} = \frac{11410}{\sqrt{(4130\ x\ 78800)}}$$

$$r_{xy} = \frac{11410}{\sqrt{325444000}}$$

$$r_{xy} = \frac{11410}{18.040{,}1665187}$$

$r_{xy}$ = 0,63248103815

$r_{xy}$ = 0,632

Table 3 The results of the correlation analysis between the effect of the POE (Predict Observe Explain) learning model (variable X) on student learning outcomes (variable Y).

| Variabel | Rhitung | Rtabel | | |
|---|---|---|---|---|
| | | Db | 5% | 1% |
| X and Y | 0,632 | N-2<br>27-2=25 | 0,396 | 0505 |

Based on the test results using product moment statistics, it shows that between variable X and variable Y there is an influence of the POE learning model on student learning outcomes with a moderate / sufficient category level of 0.632 which lies in the coefficient interval between 0.40 - 0.69. Therefore, the POE learning model affects student learning outcomes with a contribution rate of 61% and the remaining 39% is influenced by other factors such as student motivation and interest in learning.

**Conclusion**

Based on the results of the research conducted, it can be concluded that the Predict-Observe-Explain (POE) learning model has a positive and significant influence on the learning outcomes of students in class XI IPA at SMA Negeri 4 Buru. The results of the analysis showed a correlation of 0.632 (r=0.632) which is included in the moderate to strong category, and the level of student learning completeness reached 85%. Students' response to the application of this model was very positive, showing increased interest, active involvement, and understanding of concepts through practicum and discussion. Thus, the POE model can be used as an effective alternative to improve the quality of biology learning, especially the material of cell structure and function, and increase student participation and learning motivation

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