

The Impact of Predict-Observe-Explain Learning Model Assisted by Environmental Media on the Scientific Attitudes of Fifth Grade Elementary School Students

Ni Putu Ita Sintarini^{1*}, Ni Wayan Suniasih² 

^{1,2} Pendidikan Guru Sekolah Dasar, Universitas Pendidikan Ganesha, Singaraja, Indonesia

ARTICLE INFO

Article history:

Received March 20, 2024

Accepted July 14, 2024

Available online July 25, 2024

Kata Kunci:

Predict-Observe-Explain, Media Lingkungan Sekitar, Sikap Ilmiah, IPAS

Keywords:

Predict-Observe-Explain, Environmental Media, Scientific Attitude, IPAS.



This is an open access article under the [CC BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.

Copyright © 2024 by Author.

Published by Universitas Pendidikan Ganesha.

ABSTRAK

Saat berdiskusi siswa masih belum aktif. Hal ini terlihat melalui ketidakberanian siswa untuk mengemukakan ide-ide mereka dan kurangnya rasa ingin tahu terhadap materi Pelajaran. Berdasarkan hal tersebut penelitian ini bertujuan menganalisis pengaruh model pembelajaran POE berbantuan media lingkungan sekitar terhadap sikap ilmiah IPAS siswa kelas V. Penelitian ini menggunakan desain penelitian eksperimen semu dengan rancangan desain penelitian non-equivalent control group desain. Populasi penelitian ini adalah seluruh siswa kelas V sebanyak 426 siswa. Teknik penentuan sampel yang digunakan adalah cluster random sampling yang memperoleh kelas VB sebanyak 28 siswa sebagai kelas eksperimen dan kelas VA sebanyak 29 siswa sebagai kelas kontrol. Metode dan instrument pengumpulan data menggunakan lembar kuesioner. Data sikap ilmiah yang diperoleh dari hasil pengumpulan data dianalisis dengan teknik statistika deskriptif dan analisis statistik inferensial dengan uji-t polled varians. Hasil uji hipotesis menunjukkan bahwa H_0 ditolak dan H_1 diterima. Dengan demikian dapat disimpulkan bahwa model pembelajaran POE berbantuan media lingkungan sekitar berpengaruh terhadap sikap ilmiah IPAS siswa kelas V Sekolah Dasar. Implikasi penelitian ini yakni dapat digunakan sebagai dasar pengembangan penelitian yang berkaitan dengan penggunaan model pembelajaran POE pada mata pelajaran IPAS di Sekolah Dasar.

ABSTRACT

When discussing, students are still not active. This can be seen through students' lack of courage to express their ideas and lack of curiosity about the lesson material. Based on this, this research aims to analyze the influence of the POE learning model assisted by environmental media on the science and science attitudes of class V students. This research uses a quasi-experimental research design with a non-equivalent control group research design. The population of this study was all 426 class V students. The sampling technique used was cluster random sampling which obtained 28 students from the VB class as the experimental class and 29 students from the VA class as the control class. Data collection methods and instruments use questionnaire sheets. Scientific attitude data obtained from the results of data collection were analyzed using descriptive statistical techniques and inferential statistical analysis using the polled variance t-test. The results of the hypothesis test show that H_0 is rejected and H_1 is accepted. Thus, it can be concluded that the POE learning model assisted by environmental media has an influence on the science and science attitudes of fifth grade elementary school students. The implication of this research is that it can be used as a basis for developing research related to the use of the POE learning model in science and science subjects in elementary schools.

1. INTRODUCTION

Science learning aims to foster students' curiosity so that they can understand how the universe works and interacts with the life around them, study the phenomena around them, and understand ideas and apply them in everyday life (Budiwati et al., 2023; Sugih et al., 2023). The optimal science learning process at the elementary school level can actually provide opportunities for students to actively participate in the learning process through real learning activities, so that it can encourage the development of students' scientific attitudes. Scientific attitudes in science learning are students' attitudes

or behaviors towards a particular stimulus that is always oriented towards science and scientific methods, which include aspects of scientific attitudes such as curiosity, responsibility, critical thinking, perseverance/carefulness, cooperation, honesty, and discipline (Alfatonah et al., 2023; Wati et al., 2022).

However, in reality, students' scientific attitudes are still not optimal. Based on the results of interviews with homeroom teachers of grade V at SDN Gugus I Kuta Utara, in the learning process related to the science learning material, it was found that the teacher explained that during the learning process, students often lost interest in listening to the teacher's explanation. The teacher stated that the material given emphasized more on the knowledge aspect than on experimental activities, thus limiting students' freedom in honing their ability to interact with their surroundings. In fact, when teachers use interesting learning media, students will find it easier to understand the material presented and can help develop aspects of their scientific attitudes. This problem was also found in previous studies which revealed that students tend to be passive in science learning if the learning given is only theory and memorization (Haqiqi, 2018; Yunarti, 2021).

Based on initial observations made during the learning process, during discussions students were still not active. This can be seen through students' lack of courage to express their ideas and lack of curiosity about the subject matter. The lack of student enthusiasm can also be seen in their minimal response to the teacher's explanation of the subject matter. This attitude certainly shows that students' scientific attitudes are not yet optimal. In this context, students tend to be passive and less motivated to seek or find new things related to the topic being studied, either through reading books or seeking learning resources or other learning media in the learning process. The importance of a scientific attitude that is embedded and developed in students, students are expected to be able to act and solve problems in their environment with their own abilities (Sari & Lahade, 2022; Ulfa, 2018). Considering the importance of scientific attitudes for students, especially in terms of curiosity, respect for data, critical thinking, discovery and creativity, open thinking and cooperation, perseverance, and sensitivity to the surrounding environment (Awansyah, 2022; Rahmah et al., 2019).

The existence of a gap between expectations and reality that is not in line, then it is necessary to find a solution by using more innovative learning models, choosing the right learning model will make students happier in the learning process so that it will encourage or increase student activity in following the learning process so that the learning that is carried out runs effectively. One of the learning models that can be used is the POE (Predict-Observe-Explain) learning model (Fitrianiingsih et al., 2021; Novanto et al., 2021). POE is one of the models that can help activate students in the learning process because in this model students not only listen but also observe the events that occur. POE is a learning model that focuses students on predicting, observing, explaining (Budi et al., 2021; Salsabila et al., 2022). The stages of the POE (Predict-Observe-Explain) Learning Model are student predictions from the results of the guess (predict), conducting observations with practical work (observe), providing reasons for the predictions that students make, then students will explain according to what is observed (explain) (Lubis & Sormin, 2019; Rahmawati et al., 2019).

In order for learning to be more effective and efficient, it can be combined with learning media, namely environmental media. The environment is the most effective and efficient learning resource and does not require a lot of large costs in increasing student learning motivation (Adeulliah et al., 2023; Muhsam, 2023). The environment can be utilized by teachers because schools are free to determine the learning resources needed by students. The natural, social, and cultural environment around the school is a very strong resource for student learning media. By utilizing the surrounding environment, it will be able to increase students' enthusiasm for learning and support the achievement of learning objectives optimally. Previous research concluded that the stages of the POE (Predict-Observe-Explain) Learning Model can improve students' critical thinking skills (Islamiyah et al., 2019; Nurfiyani et al., 2019). This is in accordance with the research results which state that the application of the POE (Predict-Observe-Explain) Model can improve students' critical thinking skills in the biology subject of photosynthesis material (Rahmatullah et al., 2020; Ulpa et al., 2019).

The novelty of this study lies in the combination of the use of the POE (Predict-Observe-Explain) Learning Model with environmental media as an approach to improving students' scientific attitudes in science learning at the elementary school level. Although the POE Model has been proven effective in improving critical thinking skills in several subjects, this study makes a new contribution by exploring how the use of the surrounding environment as a learning medium can strengthen the model, especially in the context of improving students' scientific attitudes. This approach offers an innovative and contextual alternative, which not only activates students in the learning process, but also utilizes the learning resources available around them, so that it can encourage active involvement and a deeper understanding of the subject matter. This study is expected to provide new insights for teachers and schools in designing more varied and interesting learning strategies, according to the needs of students and their

environmental conditions. Based on this description, a study was conducted that aims to analyze the Effect of the POE Learning Model Assisted by Environmental Media on the Scientific Attitude of Science in Grade V Students. With this research, it is hoped that it will be an example for teachers and schools in carrying out variations in learning, so that students do not get bored in learning.

2. METHOD

This study uses a quantitative research type. In this study, an experimental design was used, namely a quasi-experimental design with the design form used being a non-equivalent Post-test Only control group design. In the non-equivalent control group design, the experimental group and control group used have been formed without any intervention from the researcher and individual randomization is not carried out because it is impossible to randomize classes that have been structured by the school. To conduct research using a quasi-experimental non-equivalent control group design, preparation, implementation and final stages are carried out.

In the preparation stage, the activities that have been carried out are conducting interviews with the principal and homeroom teacher of class V in Gugus I Kuta Utara before conducting the research, consulting the research instrument with the homeroom teacher of class V and the supervising lecturer, conducting a trial of the research instrument, determining the research sample, conducting a lottery to determine the experimental class group and the control group, posttest data analysis in the form of a questionnaire is carried out using the t-test. In the implementation stage, the activities that will be carried out are determining the research sample from the available population, the samples that have been taken are then determined into two groups that will be used as the experimental class and the control class, determining the group that will be used as the experimental group and the control group, providing treatment to the experimental group in the form of a POE learning model assisted by environmental media and in the control class learning is carried out using learning that is usually carried out by teachers in class, treatment will be given 6 times in the experimental class and 6 times in the control class by adjusting the lesson hours, providing a posttest at the end of the experiment, both for the experimental group and the control class group. In the final stage, the activities carried out are analyzing research data and conducting hypothesis tests.

The population in this study was all fifth-grade students at SDN Gugus I Kuta Utara in the 2023/2024 academic year consisting of 7 schools with 15 classes and a total of 426 students. The sampling technique used in this study was Cluster Random Sampling. Cluster Random Sampling. Based on the results of the lottery, it was found that 28 students of class VB SDN 7 Dalung were the experimental class and 29 students of class VA SDN 3 Dalung were the control class. The data collection method and instrument used was a questionnaire/questionnaire on scientific attitudes in science. The instrument grid is a matrix format that contains information that is used as a guideline in formulating questions or statements derived from the variables to be observed. In this study, the data to be analyzed is data regarding scientific attitudes. The instrument grid in this study can be seen in [Table 1](#).

Table 1. The Scientific Attitude Instrument Grid

Dimensions	Indicator
Attitude of curiosity	Demonstrate enthusiasm for observation activities regarding human respiration, digestion, and growth and puberty. Asking various questions about information obtained from the human respiratory, digestive and growth and puberty systems. Find out the instructions or steps of the human respiratory process.
Attitude of respect towards data/facts	Telling what happened factually about the results of observations of the human respiratory process. Distinguish between facts and opinions related to the human respiratory system. Make decisions based on the facts contained in the information about the human respiratory, digestive and growth and puberty processes.
Attitude of discovery and creativity	Showing the results of work on observing the respiratory system that is different from other friends Suggesting new activities related to the human respiratory and digestive systems
Open-minded and cooperative attitude	Respecting other people's opinions about respiratory material, the human digestive system and puberty

Dimensions	Indicator
Sensitive attitude towards the surrounding environment	Actively participate in groups in writing the results of observations about the human respiratory process and digestive system.
	Environmental Attention regarding the human respiratory process and digestive system
	Participation in social activities in the school environment regarding human respiration material

Instrument feasibility testing needs to be done before giving a test that will be used to measure the scientific attitudes of fifth grade students in Science Lessons. The instruments tested were in the form of questionnaires. Testing of the instrument includes instrument validity testing and reliability testing. In this study, the analysis techniques used were descriptive statistical analysis techniques and inferential statistics. Descriptive statistical analysis techniques in this study were used to describe data on students' scientific attitudes in Science that were learned through the POE learning model assisted by environmental media. Analysis techniques with quantitative data can use descriptive statistical techniques by determining the average value (mean), standard deviation and variance. Inferential Statistics are used to determine the extent of the similarity between the results obtained from a sample and the results obtained from the results of the population as a whole. The inferential analysis technique used was the t-test. Before being used as a data analysis, a prerequisite analysis test was carried out. The initial step taken was to carry out a normality test for data distribution and a homogeneity test for variance. Hypothesis testing was carried out after the data was said to be normally distributed and the data in the group was homogeneous. The statistical analysis used to test the hypothesis of this study is the mean difference test (t-test). With the criteria if the t-count price $>$ t-table, then H_0 is rejected and H_1 is accepted. This means that there is an influence and vice versa. This means that there is no influence. The test was carried out with a significance level of 5% with degrees of freedom $dk = () - 2.n_1 + n_2$

3. RESULT AND DISCUSSION

Result

The data description in this study discusses the data that has been obtained during the research activities. The object of this study is the scientific attitude of science in grade V students at SDN Gugus I Kuta Utara. The data that has been collected is analyzed in accordance with the data analysis techniques that have been previously determined. The data analyzed in this study are the scientific attitude data of the experimental group that is taught using the POE model assisted by environmental media and the scientific attitude data of the control group that is not taught using the POE model assisted by environmental media.

The experimental group used in this study was class VB SD Negeri 7 Dalung totalling 28 people. The treatment was given 6 times in the experimental group by implementing the POE learning model assisted by the surrounding environment, then at the end of the study a statement was given in the form of a questionnaire totalling 27 items. Based on the data in Table 4.1, it can be seen that the highest score in the experimental group was 123 and the lowest score was 84. The average score of the experimental group was 103.18. The magnitude of the standard deviation is 10.60, with a variance of 112.30. The category of high and low scores of students' scientific attitudes is based on the PAN (Benchmark Norm) Scale Five according to the ideal score. The ideal score criteria use Mean and Standard Deviation as a comparison to determine the score. Based on the results of the calculation of Mean and Standard Deviation, the analysis of the results of descriptive statistics, a table of score data is presented based on the PAN of scientific attitudes of science in the experimental group as seen in Table 2.

Table 2. The Score Data Based on PAN Scientific Attitude of Science in Experimental Group

Five Scale Interval	Category	Frequency	Presentation
119-135	Very high	2	7%
108-118	Tall	9	32%
98-107	Currently	7	25%
87-97	Low	7	25%
87-84	Very Low	3	11%
		28	100%

The control group used in this study was class VA of SD Negeri 3 Dalung totalling 29 people. The treatment in the control group applied learning implemented by the teacher without using the POE Learning model, then statements were given using a questionnaire. Based on data [Table 2](#), it can be seen that the highest score in the control group is 106 and the lowest score is 75. The average score of the control group is 92.62. The magnitude of the standard deviation is 13.38, with a variance of 179.02. The category of high and low scores of students' scientific attitudes is based on the PAN (Benchmark Norm) Scale Five according to the ideal score. The ideal score criteria use Mean and Standard Deviation as a comparison to determine the score. Based on the results of the calculation of Mean and Standard Deviation, the analysis of the results of descriptive statistics, a frequency distribution table of the scientific attitude scores of the IPAS in the control group is presented as shown in [Table 3](#).

Table 3. The Frequency Distribution of Scientific Attitude Data on Science in the Control Group

Five Scale Interval	Category	Frequency	Presentation
105-135	Very high	2	7%
97-104	Tall	8	28%
88-96	Currently	11	38%
80-87	Low	5	17%
80-75	Very Low	3	10%
		29	100%

Before the hypothesis test is conducted, an assumption test is conducted in accordance with the inferential statistics used, such as hypothesis testing using the pooled variance t-test. The assumption test consists of a normality test of data distribution using the Kolmogorov Smirnov technique and a homogeneity test of variance using the Fisher test. The following describes the results of the normality and homogeneity of variance tests on the data from the collection of scientific attitudes of grade V students in the experimental group and the control group. The normality test of data distribution used in this study used the Kolmogorov-Smirnov technique, with test criteria at a significance level of 5%. Based on the table above, it is known that the scientific attitude score data for the experimental group and the control group are normally distributed. This is because the Kolmogorov-Smirnov calculated score < Kolmogorov-Smirnov table score at a significance level of 5%. The homogeneity test is conducted to show that the two sample groups that have been taken from one population have the same variance. To test the homogeneity of the variance of the two groups, namely the experimental group and the control group, the F test is used. From the calculation results obtained from the F_{count} results, the experimental and control group data scores are 1.60. Meanwhile, the F_{table} of both groups with a significance level of 5% is 4.02. This means that the variance of the data on the scientific attitudes of the experimental group and the control group can be stated as homogeneous.

After conducting normality and homogeneity tests, it was stated that the data were normally distributed and homogeneous. Furthermore, parametric statistical analysis was conducted. The statistical analysis to test the hypothesis in this study was to use the t-test of the pooled variance formula. The recapitulation of the t-test results of the IPAS scientific attitude data scores in the experimental and control groups is presented in [Table 4](#).

Table 4. T-Test Recapitulation

No	Sample Group	dk	\bar{X}	S^2	t-count	t-table	Status
1	Experiment	28	103.18	112.36	3.3	1.673	Ho was rejected
2	Control	29	92.62	179.02			

Based on [Table 4](#) it can be seen that $t_{count} = 2.43$ with a significance level of 5%, then $t_{table} = 1.673$ is obtained. This shows that $t_{count} > t_{table}$, namely $3.3 > 1.673$, then H_0 is rejected and H_1 is accepted. This means that there is a significant difference in the scientific attitude of science between the group of students who are taught using the POE learning model assisted by environmental media and the group of students who are not taught using the learning model using the POE learning model assisted by environmental media in grade V students of SDN Gugus I Kuta Utara in the 2023/2024 Academic Year.

Discussion

The importance of scientific attitudes for students, then this aspect is very interesting to be studied in more depth. So, it is necessary to find a solution by using more innovative learning models, choosing the right learning model will make students happier in the learning process so that it will

encourage or increase student activity in following the learning process so that the learning carried out runs effectively. One of the learning models that can be used is the POE (Predict-Observe-Explain) learning model (Alfiyanti et al., 2020; Rima Rikmasari et al., 2022). POE is one of the models that can help activate students in the learning process because in this model students not only listen but also observe the events that occur. POE is a learning model that focuses students on predicting, observing, explaining (Jasdilla et al., 2019; Latifah et al., 2019).

In order for learning to be more effective and efficient, it can be combined with learning media, namely environmental media. The environment can be utilized by teachers because schools are free to determine the learning resources needed by students. The natural, social, and cultural environment around the school is a very strong resource for student learning materials (Amaliah et al., 2023; Nurika et al., 2022). In addition to the use of environmental media in the classroom, learning outside the classroom and utilizing the surrounding environment will be able to arouse students' enthusiasm for learning and support the achievement of learning objectives optimally. Utilizing the environment as a learning medium enables a more practical, relevant and interactive learning approach, thereby increasing the effectiveness of the learning process (Amelia et al., 2023; Kuendo & Rampe, 2023). The results of the scientific attitude data scores of students in the experimental group were higher than the scientific attitude data scores of students in the control group. The difference can be seen from the average scientific attitude score of students who were given the POE learning model treatment assisted by environmental media which was higher than the average scientific attitude score of students who were not taught the POE learning model assisted by environmental media.

The differences that emerged in the experimental class and the control class were caused by the application of the POE learning model assisted by environmental media used in learning in the experimental class. The application of the POE learning model assisted by environmental media encourages students to be actively involved in the learning process and learn independently, students connect what they know with the material studied with real life (Amirullah et al., 2019; Marcelina et al., 2022). During learning activities, students are invited to predict problems taken from student experience, or books that guide an event or phenomenon that will be discussed (predict). After that, students are invited to observe by conducting observations or experiments to prove the predictions that have been made, then record the results of the observations (observe). Then students are invited to convey the results of the observations that have been discussed, namely at the (explain) stage. Students are also required to actively ask questions and convey their opinions regarding the answers given by the group in front of the class (Islamiyah et al., 2019; Muhsam, 2023).

The advantages of the POE model are that it stimulates students to be more creative, especially in making predictions, from the predictions made by students, teachers become aware of the initial concepts that students have. Arousing students' curiosity to conduct investigations, proving the results of their predictions, can reduce verbalism by conducting experiments. The learning process becomes more interesting, because students not only listen but also observe the events that occur. By observing directly, students will have the opportunity to compare between theory (assumptions) and reality (Adeulliah et al., 2023; Rima Rikmasari et al., 2022). Thus, students will be more convinced of the truth of the learning material. Meanwhile, the learning outcomes in the control group still use the learning model commonly used by teachers or models other than POE, learning activities in the control group tend to be less effective. When learning activities take place and students are not interested in participating. In the control class, learning activities only depend on the handbooks owned by students and teachers. When learning activities take place, students listen more to the teacher's instructions and work on practice questions. In this case, the teacher does more activities than students when learning is done in class.

Previous research stated that there was a significant difference in students' science knowledge competencies between the group taught using the POE model assisted by environmental media and the group taught using conventional learning on student learning outcomes (Kuendo & Rampe, 2023; Rima Rikmasari et al., 2022). Other research also states that the POE learning model assisted by environmental media has a significant influence on scientific attitudes in students (Rahmatullah et al., 2020; Ulpa et al., 2019).

Based on the research results and discussions that have been described, it can be concluded that the POE learning model assisted by environmental media has an effect on the scientific attitudes of class V students of SDN Gugus I Kuta Utara in the 2023/2024 Academic Year. This research is different from previous research, this research has a novelty, namely collaborating the POE learning model with environmental media. This makes learning more structured and enjoyable for students. Although this research has been successfully carried out, there are several limitations experienced by researchers. These limitations are the testing of effectiveness only on aspects of students' scientific attitudes in IPAS,

and the scope of the research which still uses 1 cluster. It is hoped that further research can test the effectiveness in other aspects and broader research subjects.

The implication of this research is that the POE learning model assisted by environmental media can be an option and used by teachers in learning activities, especially in science subjects. This is because the POE learning model can train students to be independent and involve students to be active in discussing and daring to ask questions as an effort to optimize students' scientific attitudes.

4. CONCLUSION

From the results of the research that has been conducted, the conclusion of this study is that there is a significant influence of the application of the POE learning model assisted by environmental media on the scientific attitude of science in grade V students of SDN Gugus 1, North Kuta District, 2023/2024 academic year. The results of this study can be used as a basis for developing research related to the use of the POE learning model in science subjects in Elementary Schools. Therefore, teachers must choose the right and varied learning models in teaching.

5. REFERENCES

- Adeulliah, N., Murniviyanti, L., & Heldayani, E. (2023). Pengaruh Model Pembelajaran POE (Predict-Observe-Explain) terhadap Hasil Belajar IPA Siswa Kelas V SD. *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, 9(5), 871–879. <https://doi.org/10.36989/didaktik.v9i5.1990>.
- Alfatolah, I. N. A., Kisda, Y. V., Septarina, A., Ravika, A., & Jadidah, I. T. (2023). Kesulitan Belajar Peserta Didik pada Mata Pelajaran IPAS Kurikulum Merdeka Kelas IV. *Jurnal Basicedu*, 7(6), 3397–3405. <https://doi.org/10.31004/basicedu.v7i6.6372>.
- Alfiyanti, I. F., Jatmiko, B., & Wasis. (2020). The Effectiveness of Predict Observe Explain (POE) Model with PhET to Improve Critical Thinking Skills of Senior High School Students. *Studies in Learning and Teaching*, 1(2), 76–85. <https://doi.org/10.46627/silet.v1i2.34>.
- Amaliah, L., Ayatusa'adah, A., & Lestariningsih, N. (2023). Penerapan Model Predict Observe Explain (POE) Terhadap Keterampilan Berpikir Kritis Peserta Didik Pada Materi Pencemaran Lingkungan Kelas VII. *Jurnal Penelitian Sains Dan Pendidikan (JPSP)*, 3(2), 150–157. <https://doi.org/10.23971/jpsp.v3i2.6473>.
- Amelia, E., Sa'adah, S., & Listiawati, M. (2023). Respon Siswa terhadap Model Pembelajaran Predict Observe Explain (POE) dengan Panduan Praktikum pada Materi Perubahan Lingkungan. *Jurnal Edukasi*, 1(2), 195–202. <https://doi.org/10.60132/edu.v1i2.138>.
- Amirullah, G., Suciati, R., Susilo, S., & Handayani, D. (2019). Pengaruh Strategi Predict Observe Explain (POE) Terhadap Kemampuan Berpikir Kritis Siswa. *BIODIK*, 5(2), 173–180. <https://doi.org/10.22437/bio.v5i2.7165>.
- Awansyah, P. (2022). Penerapan Metode Eksperimen untuk Meningkatkan Sikap Ilmiah dan Prestasi Belajar Siswa. *Diadik: Jurnal Ilmiah Teknologi Pendidikan*, 12(1), 121–230. <https://doi.org/10.33369/diadik.v12i1.21390>.
- Budi, B., Novanto, Y. S., & Anitra, R. (2021). Respon Siswa terhadap Model Pembelajaran POE dalam Pembelajaran IPA di SD. *ORBITA: Jurnal Pendidikan Dan Ilmu Fisika*, 7(2), 278. <https://doi.org/10.31764/orbita.v7i2.5508>.
- Budiwati, R., Budiarti, A., Muckromin, A., Hidayati, Y. M., & Desstya, A. (2023). Analisis Buku IPAS Kelas IV Kurikulum Merdeka Ditinjau dari Miskonsepsi. *Jurnal Basicedu*, 7(1), 523–534. <https://doi.org/10.31004/basicedu.v7i1.4566>.
- Fitrianingsih, E., Mulyani, H., & Lepiyanto, A. (2021). Pengaruh Model Pembelajaran POE (Predict-Observe-Explain) terhadap Keterampilan Berpikir Kritis di SMAN Rawajitu Selatan. *BIOEDUKASI (Jurnal Pendidikan Biologi)*, 12(2), 147. <https://doi.org/10.24127/bioedukasi.v12i2.4440>.
- Haqiqi, A. K. (2018). Analisis Faktor Penyebab Kesulitan Belajar IPA Siswa SMP Kota Semarang. *Edu Sains: Jurnal Pendidikan Sains & Matematika*, 6(1), 37. <https://doi.org/10.23971/eds.v6i1.838>.
- Islamiyah, B. M. W., Al Idrus, S. W., & Anwar, Y. A. S. (2019). Pengaruh Model Pembelajaran Predict, Observe and Explain (POE) Terhadap Kemampuan Berpikir Kritis Siswa. *Chemistry Education Practice*, 2(2), 14. <https://doi.org/10.29303/cep.v2i2.1294>.
- Jasdilla, L., Fitria, Y., & Sopandi, W. (2019). Predict Observe Explain (POE) strategy toward mental model of primary students. *Journal of Physics: Conference Series*, 1157, 022043. <https://doi.org/10.1088/1742-6596/1157/2/022043>.
- Kuendo, W. A. C., & Rampe, M. J. (2023). Penerapan Model Pembelajaran POE dan Learning Cycle 5E terhadap Hasil Belajar IPA Siswa Materi Interaksi Makhluk Hidup dengan Lingkungan. *SCIENING* :

- Science Learning Journal*, 4(1), 101–106. <https://doi.org/10.53682/slj.v4i1.6806>.
- Latifah, S., Irwandani, I., Saregar, A., Diani, R., Fiani, O., Widayanti, W., & Deta, U. A. (2019). How the Predict-Observe-Explain (POE) learning strategy remediates students' misconception on Temperature and Heat materials? *Journal of Physics: Conference Series*, 1171, 012051. <https://doi.org/10.1088/1742-6596/1171/1/012051>.
- Lubis, F. A., & Sormin, A. S. (2019). Pengembangan Modul Berorientasi Predict, Observe, Explain (POE) pada Materi Virus terhadap Kognitif Siswa. *Jurnal Biolokus*, 2(2), 186. <https://doi.org/10.30821/biolokus.v2i2.535>.
- Marcelina, S., Miranda, Y., Sinaga, S., & Hartanto, T. J. (2022). Implementasi Model Pembelajaran Predict-Observe-Explain Berbasis Masalah Terhadap Keterampilan Proses Sains dan Pemahaman Konsep pada Topik Pencemaran Lingkungan. *Jurnal Pendidikan Sains Indonesia*, 10(4), 705–716. <https://doi.org/10.24815/jpsi.v10i4.25846>.
- Muhsam, J. (2023). Pengaruh Model Pembelajaran Predict Observe Explain (POE) Berbasis Media Konkret Terhadap Hasil Belajar IPA Siswa Kelas IV MIs Al-Fitrah Kota Kupang. *ANTHOR: Education and Learning Journal*, 2(2), 224–231. <https://doi.org/10.31004/anthor.v2i2.77>.
- Novanto, Y. S., Anitra, R., & Wulandari, F. (2021). Pengaruh Model Pembelajaran POE terhadap Kemampuan Pemahaman Konsep IPA Siswa SD. *ORBITA: Jurnal Kajian, Inovasi Dan Aplikasi Pendidikan Fisika*, 7(1), 205. <https://doi.org/10.31764/orbita.v7i1.4665>.
- Nurfiyani, I. O., Suharsono, S., & Faisal Mustofa, R. (2019). Pengaruh Model Pembelajaran POE (Predict-Observe-Explain) terhadap Hasil Belajar dan Kemampuan Berpikir Kritis Peserta Didik pada Konsep Keanekaragaman Hayati. *BIOSFER: Jurnal Biologi Dan Pendidikan Biologi*. <https://doi.org/10.23969/biosfer.v4i2.1928>.
- Nurika, M. M., Vitasari, M., & Taufik, A. N. (2022). Pengembangan Lembar Kerja Peserta Didik Berbasis POE dalam Melatih Keterampilan Proses Sains pada Tema Pelestarian Lingkungan di SMP Kelas VII. *PENDIPA Journal of Science Education*, 6(3), 739–745. <https://doi.org/10.33369/pendipa.6.3.739-745>.
- Rahmah, Y., Azmin, N., & Nasir, M. (2019). Penerapan Model Pembelajaran 5E untuk Meningkatkan Keterampilan Proses Sains dan Sikap Ilmiah Siswa Kelas VIII SMP Negeri 6 Kota Bima. *Oryza (Jurnal Pendidikan Biologi)*, 8(2), 40–46. <https://doi.org/10.33627/oz.v8i2.296>.
- Rahmatullah, M. J., Artayasa, I. P., & Raksun, A. (2020). Perbandingan Kemampuan Berpikir Kritis dan Hasil Belajar IPA Menggunakan Model Pembelajaran Predict Observe Explain (POE) Dan Student Team Achicvment Division (STAD). *Jurnal Pijar Mipa*, 15(4), 416–423. <https://doi.org/10.29303/jpm.v15i4.2092>.
- Rahmawati, A., Anggraini, D., & Masykur, R. (2019). Pengembangan Modul Berbasis POE (Predict Observe Explain) Pada Materi Trigonometri. *Kreano, Jurnal Matematika Kreatif-Inovatif*, 10(2), 193–201. <https://doi.org/10.15294/kreano.v10i2.20337>.
- Rima Rikmasari, Kori Sundari, & Halimah Nuraini. (2022). Model Pembelajaran Predict Observe Explain (POE) Terhadap Hasil Belajar IPA Siswa Sekolah Dasar. *Jurnal Cakrawala Pendas*, 8(4), 1634–1645. <https://doi.org/10.31949/jcp.v8i4.3187>.
- Salsabila, S., Marina, N., Marhamah, M., & Lubis, M. A. (2022). Implementasi Model Pembelajaran POE di Sekolah Dasar. *Dirasatul Ibtidaiyah*, 2(1), 27–42. <https://doi.org/10.24952/ibtidaiyah.v2i1.5615>.
- Sari, F. F. K., & Lahade, S. M. (2022). Pengaruh Model Pembelajaran Inkuiri Terhadap Sikap Ilmiah Rasa Ingin Tahu Peserta Didik Sekolah Dasar pada Pembelajaran IPA. *Jurnal Basicedu*, 6(1), 797–802. <https://doi.org/10.31004/basicedu.v6i1.1973>.
- Sugih, S. N., Maula, L. H., & Nurmeta, I. K. (2023). Implementasi Kurikulum Merdeka dalam Pembelajaran IPAS di Sekolah Dasar. *Jurnal Pendidikan Dasar Flobamorata*, 4(2), 599–603. <https://doi.org/10.51494/jpdf.v4i2.952>.
- Ulfa, S. W. (2018). Mentradisikan Sikap Ilmiah dalam Pembelajaran Biologi. *Jurnal Biolokus*, 1(1), 1. <https://doi.org/10.30821/biolokus.v1i1.314>.
- Ulpa, S. U., Hidayat, S., & Nuraini, N. (2019). Pemberdayaan Kemampuan Berpikir Kritis Siswa Kelas VIII Melalui Model Pembelajaran Predict Observe and Explain (POE). *Didaktika Biologi: Jurnal Penelitian Pendidikan Biologi*, 3(1), 43–48. <https://doi.org/10.32502/dikbio.v3i1.1187>.
- Wati, W., Erna, E., Harahap, R. D., & Safitri, I. (2022). Analisis Karakter Siswa pada Mata Pelajaran IPA di Sekolah Dasar. *Jurnal Basicedu*, 6(4), 5994–6004.
- Yunarti, N. (2021). Analisa Kesulitan Dalam Pembelajaran IPA Pada Siswa SMP Negeri 1 Rambang. *Jurnal Educatio FKIP UNMA*, 7(4), 1745–1749. <https://doi.org/10.31949/educatio.v7i4.1570>.