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The Influence of The Predict-Observe-Explain (POE) Learning Model on Critical Thinking and Student Learning Outcomes in The Excretion System Material for Grade VIII of SMPN 23 Makassar

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Abstrak

Proses belajar mengajar dihadapkan pada tantangan rendahnya hasil belajar siswa. Faktor penyebabnya antara lain miskonsepsi, kesulitan memahami materi IPA, dan kurangnya penggunaan model pembelajaran yang melibatkan siswa secara aktif. Faktor lainnya seperti keterbatasan waktu, kurangnya stimulasi pemecahan masalah dan faktor internal lainnya juga mempengaruhi kemampuan berpikir kritis dan hasil belajar siswa. Tujuan pada penelitian ini untuk mengetahui : (1) berpikir kritis siswa yang diajar menggunakan model pembelajaran predict-observe-explain (POE) pada materi sistem ekskresi kelas VIII SMPN 23 Makassar, (2) hasil belajar siswa yang diajar menggunakan model pembelajaran predict-observe-explain (POE) pada materi sistem ekskresi kelas VIII SMPN 23 Makassar, (3) berpikir kritis yang diajar tanpa menggunkan model pembelajaran predict-observe-explain (POE) pada materi sistem ekskresi kelas VIII SMPN 23 Makassar, (4) hasil belajar siswa yang diajar tanpa menggunakan model pembelajaran predict-observe-explain (POE) pada materi sistem ekskresi kelas VIII SMPN 23 Makassar, (5) pengaruh model pembelajaran predict-observe-explain (POE) terhadap berpikir kritis siswa pada materi sistem ekskresi kelas VIII SMPN 23 Makassar, (6) pengaruh model pembelajaran predict-observe-explain (POE) terhadap hasil belajar siswa pada materi sistem ekskresi kelas VIII SMPN 23 Makassar. Penelitian ini menggunakan eksperimen semu dengan desain penelitian non-equivalent control group design. Populasi dalam penelitian adalah 291 siswa kelas VIII SMP Negeri 23 Makassar. Ada total 86 orang yang disurvei: 44 berpartisipasi dalam kelompok kontrol dan 42 dalam kelompok kelas eksperimen. Penentuan sampel dilakukan dengan purposive sampling. Instrumen yang digunakan sebagai pengambilan data yaitu berupa lembar observasi, tes kemampuan berpikir kritis dan tes hasil belajar. Analisis data menggunakan analisis deskriptif dan analisis inferensial yang meliputi uji homogenitas, uji hipotesis dan normalitas. Hasil penelitian menunjukkan pada berpikir kritis dan hasil belajar siswa dengan nilai Sign < a= <0,001. sehingga pada penelitian ini terdapat perbedaan signifikan antara berpikir kritis dan hasil belajar siswa yang diajar tanpa menggunakan model pembelajaran predict-observe-explain (POE) dengan menggunakan model pembelajaran predict-observe-explain (POE) pada materi sistem ekskresi kelas VIII SMP Negeri 23 Makassar.

***Kata kunci**: berpikir kritis, hasil belajar, predict-observe-explain, sistem ekskresi, siswa.*

Abstract

The teaching and learning process is faced with the challenge of low student learning outcomes. Contributing factors include misconceptions, difficulties in understanding science material, and a lack of learning models that actively involve students. Other factors such as time constraints, a lack of problem-solving stimulation, and other internal factors also affect students' critical thinking abilities and learning outcomes. The purpose of this study, to know: (1) critical thinking of students taught using the Predict-Observe-Explain (POE) learning model on excretory system material class VIII SMPN 23 Makassar, (2) learning outcomes of student taught using the Predict-Observe-Explain (POE) learning model on excretory system material class VIII SMPN 23 Makassar, (3) critical thinking taught without using the Predict-Observe-Explain (POE) learning model on exretory system material class VIII SMPN 23 Makassar, (4) learning outcomes of students thaught without using the predict-observe-explain (POE) learning model on excretory system material class VIII SMPN 23 Makassar,(5) the effect of Predict-Observe-Explain (POE) learning model on critical thinking of students on excretory system material class VIII SMPN 23 Makassar, (6) the effect of Predict-Observe-Explain (POE) learning model on student learning outcomes on excretory system material class VIII SMPN 23 Makassar.This study used a quasi-experiment with a non-equivalent control

group design research design. The population in the study was two hundred and ninety-one students of class VIII of SMP Negeri 23 Makassar. There were a total of 86 people surveyed: 44 participated in the control group and 42 in the experimental class group. Sample determination was done by purposive sampling. The tools used as data collection are in the form of observation sheets, critical thinking ability tests and learning outcomes tests. Data analysis uses descriptive analysis and inferential analysis which includes homogeneity test, hypothesis testing and normality. The results showed that in critical thinking and student learning outcomes with a Sign value < a < 0.001. So that in this study there is a significant difference between critical thinking and learning outcomes of students taught without using the predict-observe-explain (POE) learning model and using the Predict-Observe-Explain (POE) learning model on excretory system material class VIII SMP Negeri 23 Makassar.

Keywords: critical thinking , excretory system, learning outcomes predict-observe-explain, student.

INTRODUCTION

Education in Indonesia still faces several challenges, such as low quality of education and a frequently changing curriculum. This impacts the educational climate that focuses solely on higher education. According to Abd Rahman et al (2022). Education is the process of creating an environment that supports learning. Meanwhile, Saputri (2019) stated that the demands of 21st century, education require students to have problem-solving skills, critical thinking skills, collaboration skills, communication skills, and creativity and innovation skills. These competencies are often referred to as the 4C competencies. The results of the interviews and observations conducted by the researcher with educators and students in the eighth grade at SMPN 23 Makassar reveal several problems in the learning process. One of the main issues is the dominance of the direct instruction model, which has been found inadequate in achieving test scores that meet the established Minimum Completeness Criteria (Azis, 2020). In the learning process, students tend to be more passive listeners and face difficulties in understanding the material, especially due to the many scientific terms used. This results in minimal interaction between students and educators regarding the material taught. Survey results show that the direct instruction model is the most widely used method, accounting for 78%. Meanwhile, group discussion and question-and-answer methods are used at rates of 12% and 10%, respectively (Waridah & Tirsa, 2022).

The teaching and learning process faces the challenge of low student achievement. Contributing factors include misconceptions, difficulties in understanding science material, and a lack of teaching models that actively involve students (Rivai, 2019). Other factors such as time constraints, lack of problem-solving stimulation, and other internal factors also affect student's critical thinking abilities and learning outcomes. As a result, students face difficulties in achieving adequate science learning outcomes according to the Minimum Completeness Criteria standard (Kurniawati, 2022). The researcher chose SMPN 23 Makassar as the research site because the school has not been able to provide optimal learning outcomes using the direct instruction model and has been unable to improve student's critical thinking abilities. Based on interviews with educators and students, the excretory system is one of the topics that is difficult to understand in science learning. This is evidenced by the categories of material that students find difficult, namely the digestive system 11%, the respiratory system 8.3%, the excretory system 43.1%, the circulatory system 24.8%, animal cells 7.3%, and plant cells 5.5%. Therefore, the researcher uses the POE learning model as a solution that is expected to optimize and improve students' critical thinking skills and learning outcomes.

The Predict-Observe-Explain (POE) model, introduced by White and Gunstone in 1995, is an effective learning method to encourage students to discuss science concepts. Through the POE model, students will predict, observe, and explain the results of their observations,

allowing them to build knowledge independently and constructively (Lestari et al., 2023). The Predict-Observe-Explain (POE) learning model has advantages as a learning model that actively involves students and trains critical thinking skills. In this model, students predict phenomena, observe through practice, and explain the relationship between predictions and experimental results, thus facilitating a more interactive and effective learning experience (Alfiyanti et al., 2020).

Based on the explanation, it is hoped that this POE model can enhance student learning outcomes and develop critical thinking skills. Thus, by implementing this POE Model, it is expected that students of SMPN 23 Makassar in grade VIII can explore knowledge in a more imaginative way and gain self-confidence. The POE model is a learning model that applies a continuous experimental technique that takes into account real-world problems, with students being asked to provide feedback as they engage in the process (Rusnawati, 2022). The second phase will involve observation or direct observation in the classroom. Based on the phenomenon or problems presented, it will then be resolved through investigation to better understand deviations from the initial predictions in the form of explanations (Rasimin, 2019). The POE model is used in the material of the excretory system that will be taught in the eighth grade at SMPN 23 Makassar. In this material, students will be given symptoms or phenomena that appear during the observation that will be conducted. Each student will be provided with paper or teaching materials that will be observed carefully, and then the students will explain the results of the observations after the discussion.

Learning outcomes are the cognitive scores obtained from cognitive learning tests. These results reflect students' understanding of concepts. In the assessment, learning outcomes are evaluated through exam scores, emphasizing that cognitive learning outcomes are key indicators of the quality of education, measured through continuous examinations or assessments (Natasya et al, 2023). Thinking is a collection of activities combined in various events or occurrences. Thus, with the abundance of events, it will make it easier for us to gather various representations. Once these representations are collected, an idea will form (Dewi & Pardede, 2021). Critical thinking skills can be measured through several indicators, namely the ability to formulate problems, manage facts, construct logical arguments, develop problem-solving strategies, and consider decision risks (Nofianti et al., 2022). Based on this, the researcher takes the title The Influence of the Predict-Observe-Explain (POE) Learning Model on Critical Thinking and Student Learning Outcomes in the Excretory System Material for Eighth Grade Students at SMPN 23 Makassar.

METHOD

This research is a quantitative study. This research was conducted at SMP Negeri 23 Makassar, located at Jalan Paccinang Raya No 35, Tello Baru, Panakukang, Makassar, South Sulawesi. The population in this study amounted to 291 students with a sample size of 86 students. The data collection methods were carried out through observation, documentation, and tests. The instruments used for data collection were a questionnaire on critical thinking skills and an achievement test. The researcher used data processing and analysis techniques including validity testing, Shapiro-Wilk normality test, Levene’s homogeneity test, and independent t-test to determine the effect of the Predict-Observe-Explain (POE) learning model on students' critical thinking and learning outcomes.

RESULTS AND DISCUSSION

The results of the analysis of students' critical thinking taught using the Predict-Observe-Explain (POE) learning model on the excretory system material for grade VIII at SMPN 23 Makassar (Experimental class VIII.3). Based on the research conducted at SMPN

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23 Makassar, the results of the pre-test and post-test analysis of the critical thinking of the experimental class students can be seen in Table 1.

Table 1. Results of the Benchmark Assessment Analysis (BAA) in critical thinking ability pre-test and post-test in the experimental class (VIII.3)

Assessment Criteria	Category	Frequency		Percentage (%)	
		Pre-test	Post-test	Pre-test	Post-test
80-100	Very Good	0	1	0	3
61-80	Good	0	40	0	95
41-60	Satisfactory	2	1	5	2
21-40	Poor	40	0	95	0
0-20	Very Poor	0	0	0	0
Total		**42**	**42**	**100**	**100**

Based on the results of descriptive statistical analysis in Table 1, it shows that the critical thinking skills of students before the POE model was applied in the experimental class, 95% of students were categorized as poor, with an average score of 28.51. However, after the POE model was applied, 95% of students were categorized as good, with an average score of 67.86, and 3% of students were categorized as very good.

The results of the research conducted at SMPN 23 Makassar obtained the analysis results of the pre-test and post-test of student learning outcomes in the experimental class taught using the POE model, which can be seen in Table 2.

Table 2. Results of the analysis of student learning outcomes for pre-test and post-test in the experimental class (VIII.3)

Assessment Criteria	Category	Frequency		Percentage (%)	
		Pre-test	Post-test	Pre-test	Post-test
80-100%	Very Good	4	12	10	29
66-79%	Good	3	30	7	71
56-65%	Satisfactory	13	0	31	0
40-55%	Poor	16	0	38	0
<40%	Very Poor	6	0	14	0
Total		42	42	100	100

The results of the descriptive statistical analysis in Table 2 show that the pre-test scores of students in the experimental class were varied, with an average score of 56.90 in the sufficient category. However, in the post-test, the distribution of scores significantly increased, with 71% of students in the good category and 29% of students in the very good category, and no students in the very poor, poor, or sufficient categories. The results of the research conducted at SMPN 23 Makassar showed the analysis results of the pre-test and post-test critical thinking of students in the control class, as can be seen in Table 3.

Table 3. Results of the Benchmark Assessment Analysis (BAA) in critical thinking skills pre-test and post-test in the control class (VIII.2)

Assessment Criteria	Category	Frequency		Percentage (%)	
		Pre-test	Post-test	Pre-test	Post-test
80-100	Very Good	0	1	0	2
61-80	Good	0	3	0	7
41-60	Satisfactory	4	32	9	73
21-40	Poor	40	8	91	18
0-20	Very Poor	0	0	0	0
Total		**44**	**44**	**100**	**100**

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Based on the results of the descriptive statistical analysis in Table 3, it shows that in the pre-test, 91% of the control class students fell into the poor category with an average score of 32.95. However, in the post-test, the distribution of scores increased, with 73% of students in the sufficient category, 7% of students in the good category, and 2% of students in the very good category. The results of the research conducted at SMPN 23 Makassar showed the analysis results of the pre-test and post-test of the learning outcomes of the control class students who were taught without using the POE model, which can be seen in Table 4.

Table 4. Results of the analysis of student mastery from pre-test and post-test learning outcomes in the control class (VIII.2)

Assessment Criteria	Category	Frequency		Percentage (%)	
		Pre-test	Post-test	Pre-test	Post-test
80-100%	Very Good	2	7	5	16
66-79%	Good	5	20	11	45
56-65%	Satisfactory	15	17	34	39
40-55%	Poor	17	0	39	0
<40%	Very Poor	5	0	11	0
Jumlah		**44**	**44**	**100**	**100**

Based on the results of the descriptive statistical analysis in Table 4, it shows that in the pre-test, the control class students had a varied distribution of scores. However, in the post-test, the distribution of scores increased significantly, with no students in the very poor and poor categories, and 45% of students in the good category and 16% in the very good category.

Normality Test

The normality test aims to state whether the data from critical thinking and student learning outcomes for the experimental and control classes are normally distributed with the condition that sign > α. The results of the normality test for critical thinking can be seen in Table 5.

Table 5. Results of the Normality Test for Critical Thinking

Experimental Class		Control Class		Description
Pretest	**Postest**	**Pretest**	**Postest**	Normally Distributed
0,115	0,240	0,085	0,130	

Based on Table 5, the results of the analysis using the Shapiro-Wilk test show that the critical thinking data for the experimental class (VIII.3) taught with the POE model and the control class (VIII.2) taught with the direct learning model are normally distributed. This is indicated by the sign value being greater than the alpha value (0.05) in both classes, both in the pre-test and post-test.

Table 6. Results of the Normality Test for Learning Outcomes

Experimental Class		Control Class		Description
Pretest	**Postest**	**Pretest**	**Posttest**	Normally Distributed
0,182	0,243	0,123	0,184	

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Based on Table 6, the results of the analysis using the Shapiro-Wilk test show that the learning outcomes data for the experimental class (VIII.3) taught with the POE model and the control class (VIII.2) taught with the direct learning model are normally distributed. This is indicated by the sign values that are greater than the alpha value (0.05) in both classes, both in the pre-test and post-test.

Homogeneity Test

The homogeneity of variances test is conducted to determine whether the samples used are taken from a homogeneous population or not. The results of the homogeneity test can be seen in Table 7.

Table 7. Results of Homogeneity Test of Critical Thinking in Experimental and Control Classes

Homogeneity Test	df1	df2	Sig.	Description
Levene's Statistic	1	84	0,832	Homogeneous

Based on Table 7, the results of the homogeneity test analysis show that the significance value (0.832) is greater than the alpha value of 0.05. This means that the variance of the pre-test critical thinking scores for the experimental class and the control class is homogeneous or comes from the same population.

Table 8. Results of Homogeneity Test of Learning Outcomes in Experimental and Control Classes

Homogeneity Test	df1	df2	Sig.	Description
Levene's Statistic	1	84	0,060	Homogeneous

Based on Table 8, the results of the homogeneity test analysis show that the sign value (0.060) is greater than the alpha value of 0.05. This means that the variance of the pre-test scores for the experimental and control classes are homogeneous or come from the same population.

Hypothesis Test

Hypothesis test is conducted to determine whether there is an effect of the POE model on critical thinking and student learning outcomes, using the independent samples t-test for hypothesis test. The results of the hypothesis test in this study can be seen in Table 9.

Table 9 Results of Hypothesis Testing of Critical Thinking in Experimental and Control Classes

	Leven's Test For Equility Of Variances		t-test for Equility of Means		
	F	Sign	T	Df	Sign (2-tailed test)
Equalvariances Assumed	16,704	<,001	-11,907	84	<,001
Equal variances non assumed	-	-	-12,097	59,725	<,001

Based on Table 9, research can have a proven hypothesis if the significant value is less than 0.05 (Sign < 0.05), where H_0 is rejected and H_1 is accepted.

Table 10. Results of Hypothesis Testing of Learning Outcomes in Experimental and Control Classes

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	Leven's Test For Equility Of Variances		t-test for Equility of Means		
	F	Sign	T	Df	Sign (2-tailed test)
Equalvariances Assumed	7,733	0.07	-5,073	84	<,001
Equal variances non assumed	-	-	-5,136	-67,672	<,001

Based on Table 10, the research can have a hypothesis that is proven if the significance value is less than 0.05 (Sign < 0.05), where H_0 is rejected and H_1 is accepted. According to table 4.14, it can be seen that the significance value in the hypothesis test yielded a Sign (2-tailed) value = < 0.001, thus the hypothesis in this research can be considered proven.

This research shows that learning using the POE learning model is effective in improving students' critical thinking skills in the topic of the excretory system for eighth-grade students at SMPN 23 Makassar. This is evidenced by the improvement from the pre-test to the post-test, which increased from 28.51 (poor category) to 67.86 (good category). The number of students in the good category also significantly increased to 95%. Biology learning tends to focus on achieving learning outcomes rather than developing critical thinking skills. The POE learning model is one model that supports constructivism and can stimulate students' thinking processes. With the POE model, students are encouraged to be active, analyze problems, and present arguments related to their findings (Faridloh et al., 2024).

Biology learning in schools should be related to the environment in which students live and learn based on real or contextual problems in everyday life. Learning like this has the potential to provide meaningful experiences to students. The local potential of the region needs to be explored so that it can be utilized as teaching materials and media and learning resources (Haerullah et al., 2025). The POE learning model is an effective alternative in the learning process, as it can enhance students' understanding of scientific concepts. Through the POE model, students can develop scientific attitudes, become more critical, and foster a sense of curiosity. Students are guided to make predictions, conduct observations, and explain the results, allowing them to gain a better conceptual knowledge. This aligns with research (Delita et al., 2021) which shows that the POE model is effective in developing students' conceptual understanding. The POE learning model is effective and efficient in improving the learning outcomes of eighth grade students at SMPN 23 Makassar on the excretory system material. Before using the POE model, the average score of students was 56.90 (adequate category). However, after using the POE model, the average score of students increased to 77.14 (good category), with 29% of students in the very good category and 71% of students in the good category.

The improvement in student learning outcomes is caused by the support of the POE learning model implemented in the classroom. During the learning process, students showed high enthusiasm for this POE learning model, in accordance with research Rikmasari et al., (2022) which states that through this POE learning model it will be more varied, innovative, and able to construct knowledge and implementation insights to enhance student creativity. According to Udayani et al (2016), every learning process maximally utilizes learning models to ensure that student learning outcomes are achieved. Good student learning outcomes require an educator who can apply various innovative and enjoyable models to ensure smooth learning implementation to improve learning outcomes, such as the POE learning model.

One of the efforts to improve the quality of education is through the improvement of the teaching and learning process, which is the core of educational activities. All components of learning in the programmed teaching and learning process will be implemented to determine the extent to which the established goals can be achieved (Yusuf et al., 2021). The learning model is believed to need to be applied in a varied and appropriate learning process that can

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enhance students' problem-solving skills or critical thinking abilities as well as improve students' learning outcomes. The POE learning model has the potential to be a learning model that can elicit students' prior knowledge and actively engage them in the learning process through experiments or practical activities. This learning model becomes more interesting because students not only listen, but also observe events that occur through observation activities or can be said to observe their experiments. By observing directly, students will have the opportunity to compare between theory (hypothesis) and the reality that is observed (Delita et al., 2021).

The direct instruction learning model in this case of direct learning shows that critical thinking skills have increased. However, critical thinking skills are lower compared to those taught using the direct instruction learning model. This is indicated by the pre-test scores of students before being taught using the direct instruction learning model, where 40 students (91%) were in the poor category and 4 students (9%) were in the sufficient category. The average (mean) pre-test score for students' critical thinking was 32.95, which falls into the poor category, while the post-test scores after being taught using the direct instruction learning model showed that 1 student (2%) was in the very good category, 3 students (7%) were in the good category, 32 students (73%) were in the sufficient category, and 8 students (18%) were in the poor category. The average (mean) post-test score for critical thinking was 48.69, which is in the sufficient category.

In the direct instruction learning group, where the teacher explains to the students and provides sample problems. The challenge faced by the teacher in implementing this learning is that the intelligence of the students in the class is relatively varied, so the difficulty level faced by students in solving problems is also diverse (Suryadi, 2022). The difficulty for teachers in teaching students with heterogeneous intelligence can be minimized by having students collaborate in groups consisting of four to five people. They interact cooperatively to solve problems, that is, sharing opinions through questions and answers. In direct instruction learning, the teacher only explains to the students how to solve the problems in the sample questions and then guides the students as they work on their assignments (Kastur et al., 2020).

Effective learning requires an understanding of the characteristics of students and the material to be delivered. Guidance from educators will be necessary to support student creativity. The direct instruction learning model can be used with clear communication of competencies and learning objectives. Educators must convey material information and check students' understanding through assignments and evaluations. This is supported by research (Pakaya et al., 2024) that states the direct instruction learning model can improve student learning outcomes through strict control over learning progress and time utilization.

Based on the research results, the researchers obtained the influence of the Predict-Observe-Explain (POE) learning model, which can be seen from the results of the hypothesis test. The hypothesis in this study was used to see the difference in post-test scores between the experimental class (VIII.3) and the control class (VIII.2). Based on the analysis of the Independent Sample t-test, a significance value (2-tailed) of <0.001 was obtained, which is less than 0.05, thus it can be concluded that H_0 is rejected and H_1 is accepted. This means that there is an influence of the Predict-Observe-Explain (POE) learning model on critical thinking in the excretory system material for class VIII at SMPN 23 Makassar. The implementation of learning using the Predict-Observe-Explain (POE) learning model has received positive results from students, where students are very enthusiastic and active in learning because this learning model provides innovative learning by conducting experiments or demonstrations directly by each student, thus applying this model improves students' learning outcomes and critical thinking skills (Mursid, 2020).

According to Suryadi (2022) the POE learning model is more effective in developing critical thinking skills. This model not only enhances basic scientific skills, critical thinking,

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speaking, and discussing but also helps capture students' attention and motivate them during the learning process. The POE learning model has several advantages, including encouraging students to build self-confidence and responsibility in both individual and group work. This model also facilitates students to express themselves well, make predictions or temporary guesses about occurring phenomena, and explain those predictions. Thus, students can construct and articulate their thoughts accurately and connect their prior knowledge with new information obtained.

Based on the research results, the researchers obtained the influence of the Predict-Observe-Explain (POE) learning model, which can be seen from the hypothesis test results. The hypothesis in this study was used to see the difference in post-test scores between the experimental class (VIII.3) and the control class (VIII.2). Based on the Independent Sample t-test analysis, a sig. (2-tailed) value of <0.001 was obtained, which is less than 0.05, so it can be concluded that H_0 is rejected and H_1 is accepted. This means that there is an influence of the POE learning model on critical thinking skills in the material of the excretory system in class VIII at SMPN 23 Makassar.

The facts in this research field regarding learning outcomes using the POE learning model show that the percentage of post-test results in the very good category is 16%, the good category is 45%, and the sufficient category is 39%. It can be seen from the average results of the learning increase through the post-test, which means that the learning outcomes of students in the experimental class on average show higher effectiveness or better performance compared to the control class. The average post-test scores in the control class indicate low values, in contrast to the experimental class which shows high scores. There is a significant difference because the average learning outcomes and critical thinking skills are better than in the control class. The meaning of the above description proves that the learning model developed in this research is effectively successful in improving student learning outcomes. In line with what was stated by Serina et al (2024) that the application of the POE learning model can enhance student activity, which is evident from the higher post-test results. The difference in student abilities between the experimental class and the control class can be explained by the fact that students using the POE learning model are more active and enthusiastic in learning. This is due to the implementation of group work that allows for input from group mates, solving problems by filling them out first, and then discussing them with group friends. Each group is given questions in the form of Student Work Sheets to discuss the results of the experiments conducted and to work on the questions by evaluating and providing analyzed answers.

A similar point was expressed by Rasimin (2019) who stated that this model helps students in predicting, observing, and explaining concepts, thereby deepening understanding and enhancing long-term memory retention. This research shows an improvement in learning outcomes in classes that implement the POE learning model compared to the control class. The improvement is attributed to several factors, including more active learning, where students play a direct role in the learning process by making predictions, observations, and explaining their findings. This POE model also effectively increases students' interest and motivation in learning, which positively impacts learning outcomes and students' understanding of more concrete and relevant concepts.

CONCLUSION

From the research results, it can be concluded that (1) the critical thinking of students taught using the predict-observe-explain (POE) learning model on the excretory system material in grade VIII at SMPN 23 Makassar is in the good category. (2) The learning outcomes of students taught using the predict-observe-explain (POE) learning model on the excretory system material in grade VIII at SMPN 23 Makassar are in the good category. (3)

The critical thinking of students taught without using the predict-observe-explain (POE) learning model on the excretory system material in grade VIII at SMPN 23 Makassar is in the adequate category. (4) The learning outcomes of students taught without using the predict-observe-explain (POE) learning model on the excretory system material in grade VIII at SMPN 23 Makassar are in the good category. (5) There is a significant effect of the predict-observe-explain (POE) learning model on students' critical thinking in the excretory system material in grade VIII at SMPN 23 Makassar.

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