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Using Predict-Observe-Explain (POE) Online Learning Systems During the COVID-19 Pandemic

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Abstract.
Online learning during the COVID-19 pandemic caused students' learning activities to be less visible. This study aimed to analyze students' learning activities through the application of the Predict-Observe-Explain (POE) learning system during classes about electrolyte and nonelectrolyte solution materials. Implementation of online learning was conducted through Zoom Meetings and WhatsApp Groups, as well as using videos. This study used a descriptive method with research subjects, 31 students of grade X, IPA MA Al-Badriyah Sukabumi. Data was collected through observation sheets and student worksheets (LKS). Based on the analysis of the data, the average percentage of student activity during online learning was 97.9%, with a *very good criterion*. Thus, the application of POE learning online can show students learning activities very well.

Keywords: application, online learning, electrolyte, nonelectrolyte

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1. INTRODUCTION

Indonesia is one of the countries in the world that is currently being exposed to the Corona Virus Diseases 2019 (Covid-19) outbreak. With this virus, the government's quick action is to issue a circular that there is a delay for all indoor and outdoor activities to minimize the spread of the covid-19 virus. Because of this, based on the Circular on the Implementation of Educational Policies in the Emergency Period for the Spread of Covid-19, which was issued by the Minister of Education and Culture of the Republic of Indonesia on March 24, 2020, it was decided that the learning process was carried out at home using an online learning system [1].

The online learning system is a learning interaction between teachers and students that is carried out in different places using technology and internet networks, without

going through face-to-face [2]. The results of the study [3] state that distance learning can affect student learning activities in the learning process. In essence, student activities are needed in learning to increase student learning motivation and can arouse students' curiosity about learning materials so that students can carry out interactive learning activities. Student activities are all activities carried out in the classroom during the learning process that produces behavior that affects student learning outcomes. According to Sardiman [4] learning activities include physical and mental activities. In learning activities, these two activities must always be related. In other words, students are required to be active in capturing/actively receiving subject matter during the learning process, actively reading when allowed to read, actively raising hands when the teacher asks questions, actively giving opinions when allowed to express opinions, and actively asking when given the opportunity to ask.

In an online learning system, the skills of a teacher are needed in the proper use of the learning platform. Various platforms can be used to carry out online learning. One of them is the WhatsApp platform and Zoom Meeting. The WhatsApp application is one of the most frequently used applications on smartphones to communicate [5]. WhatsApp is an application that allows the exchange of messages, which is available on various smartphones and can be used to send unlimited messages, images, videos, and audio [6]. Besides being able to be used to communicate, WhatsApp social media can be used to convey knowledge and discuss [7]. It's the same with the Zoom meeting platform. The Zoom Meeting application is an online application, by using the zoom meeting students can easily communicate and discuss via video conference or chat forums in the application [8]. This application can carry out activities together as face-to-face but without direct physical meetings because it can easily use a laptop camera or smartphone webcam [9] The description indicates that WhatsApp and Zoom Meeting can be used in well-designed online learning, so that student activities during the learning process can be seen and students can understand the subject matter and can increase student activity in learning, especially in learning chemistry.

Several concepts of chemistry learning can be found in everyday life, one of which is regarding electrolyte and nonelectrolyte solutions. Based on research results [10] it was stated that in chemistry subjects with electrolyte and nonelectrolyte solution material, the percentage of students who had difficulty and were unable to answer questions from the concept of electrolyte and nonelectrolyte solution material was 34.6%. In general, this material has the characteristics of abstract concepts of concrete examples because it can be related to everyday life so that various explanations and visualizations are needed so that students can observe and analyze phenomena that exist in everyday

life. If the teacher emphasizes more on the concept alone, then not a few students will have difficulty understanding the learning material and do not bring up student activity during learning. To overcome this, it is deemed necessary to make efforts to improve the learning model in online learning so that students can play an active role in a concept that is conveyed so that student learning outcomes are quite good. To overcome this, it is deemed necessary to improve and use learning models in online learning.

The purpose of using the learning model in learning online is to foster student interest and motivation in learning, one of the models that can be used is the Predict-Observe-Explain (POE) learning model. The characteristics of POE learning are constructivism, which can increase students' understanding and activities during learning to become more active by discussing, searching, and finding material concepts independently, and proving the concept into a real concept through experimentation.

Research that supports the application of POE learning to learn is research [11] which suggests that Predict-Observe-Explain (POE) learning is good to use because student learning activities during learning take place very well. The results of research that apply the POE learning model in the online learning system in research [12] states that the POE learning model is effectively applied in online learning, because this model in its learning focuses students on increasing creativity, requiring students to be directly involved in learning so that they can complete and produce products. However, in his research at the observe stage, no practicum or demonstration was carried out, but students observed from various sources the material being studied and the implementation of learning research only used the website, so that student activities could not be seen directly. From research results [13] mentioned that the application of POE combined with practical methods can foster student curiosity and make learning outcomes as expected. Based on this, according to the research results [14] mentions that the use of learning models is one form of online learning innovation so that student activities during learning are quite good.

Based on this description, the researchers tried to apply the WhatsApp and Zoom Meeting platforms in online learning on electrolyte and nonelectrolyte solutions to solve the problem of low student learning activities. The learning in this study is different from what has been done by several previous studies [12, 15] which only used class groups and did not carry out practicum or demonstrations at the observed stage. So, the difference between this research and previous research lies in the research process with the addition of one class group which is used as a whole teacher and student communication and practicum is carried out at the observe stage using observation through the WhatsApp and Zoom Meeting platforms as well as being used as a final

project in the form of a video that must be reviewed by each student so that student activity can be seen during the implementation of the learning process.

2. RESEARCH METHOD

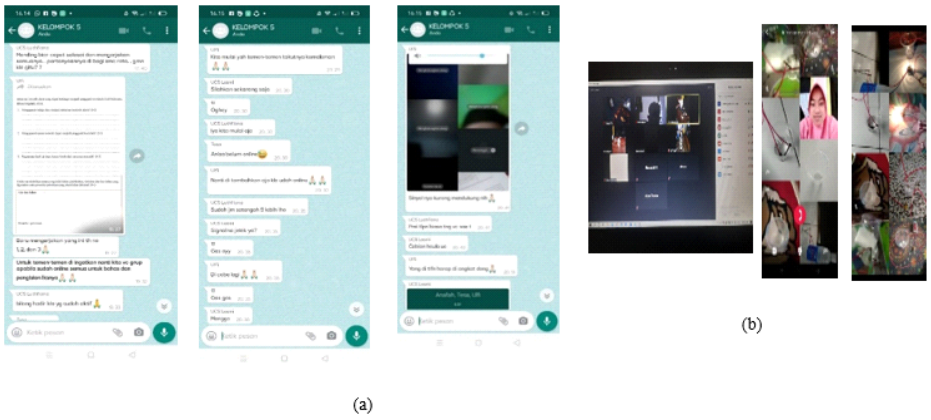
The research method used is the descriptive research method. Descriptive research is research conducted to know the value of independent variables, either one or more variables without making comparisons with other variables [16]. Based on this, it can be concluded that descriptive research is carried out by seeking information related to existing problems, clearly explaining the objectives, planning, and collecting various kinds of data needed. In addition, this study uses a quantitative approach because all forms obtained from research use numbers, starting from data collection, data interpretation, and the final results of data analysis [17].

The implementation of this research in May 2021 by utilizing WhatsApp and Zoom Meeting media with an allocation of 1 x 60 minutes for three meetings. In the learning process, students are observed by observers who refer to the observation sheet using the help of Student Worksheets that are following the stages of the POE model used. Research data obtained from class X IPA MA Al-Badriyah Sukabumi totaled 31 people, consisting of 14 women and 17 men. The learning model used in this research is predict-observe-explain (POE) learning. The learning steps refer to the POE learning stages, namely the predict stage, the observe stage, and the explain stage. The research data obtained from observations during learning conducted by observers with the guideline for assessing the achievement activity “Yes” obtained a score of 1 and the achievement activity “No” obtained a score of 0. Each activity assessed with that score was later converted into percentage form.

3. RESULT AND DISCUSSION

In this study, the application of POE learning was used in electrolyte and nonelectrolyte solutions. Learning is carried out through three stages of POE, namely the predict stage, the observe stage and the explain stage. The implementation of learning is carried out in groups using the WhatsApp application platform and Zoom Meeting. In the Predict stage, students are presented with a phenomenon and asked to provide their predictions for the phenomenon. Prediction questions are made the same for each group. Indicators from the predicting stage of each group were asked to predict the compound being tested based on an image presented accompanied by observations

and descriptions. The compounds tested are compounds that include electrolyte and nonelectrolyte solutions that can be found in everyday life. In addition, each group was asked to predict a series of simple experiments that could be carried out to prove their predictions. The predicted stage is carried out through the WhatsApp Group of each group. In making these predictions, some groups read the phenomenon and did it via WhatsApp Group video calls, while others wrote their predictions directly in the WhatsApp Group. Therefore, in research there is no emphasis on using applications that are considered heavy in the learning process. The process of each group is shown in Figure 2.



(a) (b)

Figure 1: Predict phase documentation (a), Observed phase documentation (b).

In the observer stage, students carry out simple practical activities with electrolyte test equipment. Question indicators in the observing stage lead students to be able to carry out a simple experiment by writing down the objective of the experiment, writing down the theoretical basis, designing experiments by writing down experimental tools and procedures, analyzing and converting the data obtained into electrolyte or nonelectrolyte solutions. The observer stage is carried out to prove the predictions that have been made at the predicted stage. Simple practicum is done by testing the predicted sample. All groups answered correctly the compounds in the prediction stage, namely salt solids, salt solutions, sugar solutions, and isotonic drinks. Each group tested the four compounds with an electrolyte test kit. The implementation of this observing stage uses Zoom Meeting media and WhatsApp Group Video Calls so that student activities can be seen in carrying out the practicum. Previously, the researcher wanted all groups to use the Zoom Meeting media, but not all groups could access the application, so at this stage, the researchers gave the ability to each group by giving two choices between Zoom Meeting or Video Call WhatsApp Group. In line with this, according to [18] states that in online learning educators must look for learning tools or provide

flexibility and convenience to students so that students can follow and play an active role in learning. If the learning tools or media burden students, students do not rule out the possibility that their learning involvement will not be as expected. The poses of each group are shown in Figure 2 (b).

The explain stage guides students to explain their explanations on the worksheets through learning videos that are made as interesting and interesting as each group can. The contents of this video include an explanation of the concepts of electrolyte and nonelectrolyte solutions and the relationship between the results of the practicum and the predictions that have been made. In some of the videos that have been made, there are group videos that still mention the concept in general or only macroscopically, not mentioning the microscopic reasons that cause electrolyte solutions to conduct electric current when testing electrolytes. But overall, each group has made a video well and there are no misconceptions found in the content of the video for each group, it's just that there is an incomplete presentation. The results of the video work are uploaded to the entire WhatsApp Group so that each student can view and provide feedback on other groups' videos. Based on the percentage of research results regarding the student learning process using POE learning presented in Table 1. It was found that at the predicted stage the percentage of implementation was 91.4% with very good criteria, at the observed stage the percentage of implementation was 73.7% with good criteria and at the explain stage it was obtained the percentage of implementation is 84.7% with a very good interpretation.

TABLE 1: Observation of student group learning process using POE learning.

Stage POE	Percentage (%)	Interpretation
Predict	91.4	Very good
Observe	73.7	Good
Explain	84.7	Very good

The highest percentage is in the predict stage because basically students already have prior knowledge of the material. Based on the results of the study, it was stated that students' prior knowledge can be capital in carrying out learning well. While the lowest percentage is in the Observe stage, this happens because students are not used to their practicum using online learning so that the implementation of the practicum does not achieve a perfect score.

The use of the POE learning model by utilizing WhatsApp and Zoom Meeting in the learning of electrolyte and nonelectrolyte materials shows that the use of the learning model with this platform can lead to student learning activities, both individually and in groups. This is by the results of the study Dorwal [18] that student activities are seen

in online learning when using the Zoom Meeting and WhatsApp applications because these applications make it easier for students to communicate and discuss through videos or conversations in the application so that student activities can be observed.

Table 2: View indicator.

Student Performance Activity Indicators	Descriptor	Group Average					The average percentage of implementations	Interpretation
		1	2	3	4	5		
View	Students analyze the phenomena in the Student Worksheet	100	100	100	100	100	100%	Very good
	Students pay attention to the learning videos presented	100	100	100	100	100	100%	Very good
	Students pay attention to their friends who are presenting through the students' final learning videos that are presented	100	100	100	100	100	100%	Very good

The results of observations in this study assessed all student activities on the electrolyte and nonelectrolyte solution material with the POE learning model and using the WhatsApp and Zoom Meeting platforms. Each activity achieved will be assessed with a score which will later be converted into a percentage [17]. Based on the data that has been obtained from the observer which refers to the observation guidelines. Indicators that can show student learning activities include viewing indicators, writing indicators, verbal indicators, motor indicators, mental indicators, and indicators of completing questions [4]. The following will discuss learning activities that appear on each indicator of learning activities in collaboration with research data. Table 2. shows the indicator of viewing as one of the indicators of student activity.

Based on the indicators listed in Table 2 above, the viewing indicator is obtained by observing during the learning process. The indicator sees that with these several descriptors, each group gets a perfect score so that this visual indicator is categorized as very good with a total percentage of 100% for each group. The next indicator to be measured is the writing indicator. Table 3 below shows the learning activity data for writing indicators.

Based on the indicators listed in Table 3 above, for the writing indicator with several descriptors, it was found that each group obtained a perfect score with a percentage of 100% so that this writing indicator was categorized as very good. The next indicator

Table 3: Writing indicators.

Student Performance Activity Indicators	Descriptor	Group Average					The average percentage of implementations	Interpretation
		1	2	3	4	5		
Writing	Students take notes on important things conveyed by the teacher or classmates	100	100	100	100	100	100%	Very good
	Students work on the given Student Worksheet	100	100	100	100	100	100%	Very good

is the verbal indicator. Table 4. Below shows the data from the observations on the oral indicators.

Table 4: Oral indicators.

Student Performance Activity Indicators	Descriptor	Group Average					The average percentage of implementations	Interpretation
		1	2	3	4	5		
Oral	Students discuss with their group mates	100	100	100	100	100	100%	Very good
	Students present the results of their discussions through the final student learning video	100	100	100	100	100	100%	Very good
	Students provide feedback, ask and answer questions during the discussion	100	50	100	50	50	70%	Good

Based on Table 4, it was obtained that almost every group got a perfect score. In the indicator of oral activity with descriptors, students provide responses, ask and answer questions during discussions, and get the lowest score because it does not appear that all groups carry out these indicators. The verbal indicator got the lowest score because according to the results of the study [19] it was stated that oral activities, especially asking and giving responses, would not appear in students who had insecurity and were afraid of being wrong in conveying their arguments. But overall, student activity looks active during learning because POE learning leads students to learn independently.

Furthermore, the indicators observed are motor indicators. The following Table 5 shows the student's motoric indicator data. Based on Table 5, it was found that each student in his group experimented well. The percentage obtained from the motor

indicators is in very good criteria.The next indicator that is observed is the mental indicator by having two descriptors as the observer's assessment. The following Table 6 shows the results of the students' mental indicator data.

Table 5: Motoric indicator.

Student Performance Activity Indicators	Descriptor	Group Average					The average percentage of implementations	Interpretation
		1	2	3	4	5		
Motoric	Student doing experiment	100	100	100	100	100	100%	Very good

Based on Table 6, it can be shown that the mental indicators of each group get a perfect score. This happens because learning is carried out online so that individual students carry out learning using WhatsApp and Zoom Meetings so that there is no learning noise when learning begins. In the online learning room used, each student enters the online room so that each student in his group is actively involved in completing the learning of electrolyte and nonelectrolyte solutions. Therefore, the mental indicators reach a very good category. Furthermore, the indicators that are observed are indicators of completing questions. In Table 6 the following data is presented on the results of observations on indicators of completing questions.

Table 6: Mental indicator.

Student Performance Activity Indicators	Descriptor	Group Average					The average percentage of implementations	Interpretation
		1	2	3	4	5		
Mental	Students are not noisy when learning takes place	100	100	100	100	100	100%	Very good
	Students enter the online learning room	100	100	100	100	100	100%	Very good

Based on Table 7, shows that each student can complete the questions both individually in taking the final test and in groups in completing student worksheets and concluding learning outcomes through learning videos made by each group. Based on the description of all these indicators, the results of the analysis of student activities by referring to the observation sheet conducted by the observers showed that the overall activity of students in learning was 97.7% with very good criteria. The results of the analysis are shown in Table 8.

Table 7: Indicators of completing questions.

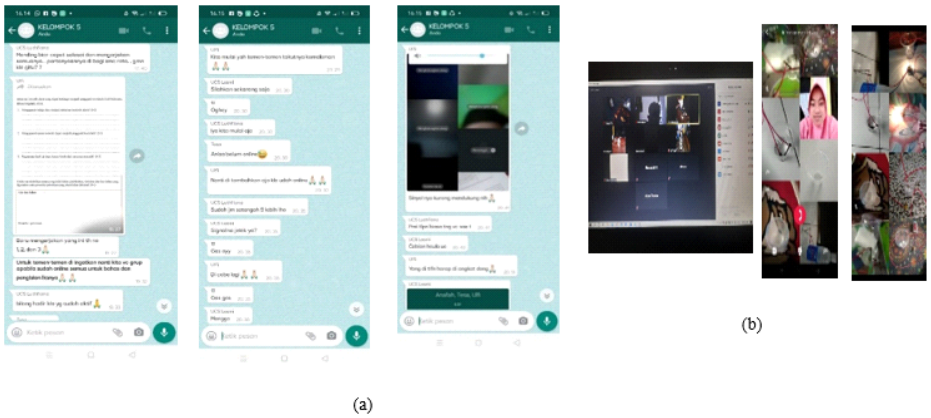
Student Performance Activity Indicators	Descriptor	Group Average					The average percentage of implementations	Interpretation
		1	2	3	4	5		
Completing Questions	Students conclude learning outcomes	100	100	100	100	100	100%	Very good
	Students complete the questions contained in the LKS	100	100	100	100	100	100%	Very good

Data on student learning outcomes were obtained from the answers to the evaluation test given at the end of the lesson. The evaluation test questions consist of 5 description questions covering knowledge about the concepts of electrolyte and nonelectrolyte solutions and electrolyte test equipment. The questions are given through WhatsApp Groups and must be done by each student. In line with this, student learning outcomes in this study were in the very good category with more students getting grades as expected. Based on research [20] states that student learning outcomes are in line with student learning activities, if student learning outcomes are as expected, student learning outcomes will be as expected. Therefore, it was proven in research that student learning outcomes were good because student learning activities during the study obtained very good data. The results of the research are in line with research [11] which suggests that Predict-Observe-Explain (POE) learning is good to use because student learning activities during learning take place very well. Thus the existence of this research with very good results can be used as a guideline or another update for further research both in the realm of almost the same or different material so that learning will continue even in non-face-to-face situations.

Table 8: Recapitulations of student activity indicators.

Indicators	Average	Average Execution	Interpretation
View	100	100%	Very good
Writing	100	100%	Very good
Oral	86	86%	Good
Motoric	100	100%	Very good
Mental	100	100%	Very good
Completing questions	100	100%	Very good
Total Student Activities	97.7	97.7%	Very good

Figure ?? below visualizes the overall observed student activity using several indicators. The results of research from [2] state that learning activities are a supporting factor in the implementation of learning. According to [21] student activity is indispensable in the learning process, one of which can be done through the application of the learning model used. Then according to [22] student activity is one of the determining factors for good learning outcomes because the active involvement of students in learning will provide discovery and concept development to produce good learning outcomes.



(a) (b)

Figure 2: Recapitulation of student learning activities according to predefined indicators.

4. CONCLUSION

Based on the results of research on student learning activities through the application of online Predict-Observe-Explain (POE) learning by using WhatsApp and Zoom Meeting media on electrolyte and nonelectrolyte solution material that has been applied to Class X IPA MA Al-Badriyah Sukabumi can show that learning activities students occupy a very good category so that it can be interpreted that one of the ways to deal with student learning activities during a pandemic is by using learning methods that match the material, one of which is the POE learning method on electrolyte and nonelectrolyte solutions.

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