The Elementary Students' Skills in Predicting and Understanding Concepts Using Predict-Observe-Explain (POE) Strategy In Zoom-Meeting Learnings

Sheryl Mutiara Putri [1]*, Wahyu Sopandi[2], Atep Sujan[3], Rendi Restiana Sukardi[4]

Pendidikan Dasar, Universitas Pendidikan Indonesia, Bandung, Indonesia
*Correspondence: E-mail: sherylmutiaraputri@upi.edu

A B S T R A C T

As an impact of the Covid-19 pandemic, learning is now carried out online. The purpose of this study was to describe the effectiveness of the Predict-observe-explain (POE) strategy in improving elementary students' skills in predicting and understanding the science concept assisted by zoom meeting. This study used a pre-experimental method with a one-group interpretation-posttest design. The subjects of this study consisted of 20 students of grade V (five) odd semester of a private elementary school in the city of Bandung. Research instruments in the form of pretest, posttest, and predicting skills were given to students using a two-level diagnostic test. Data collection is done using google forms. The results showed that the predict-observe-explain (POE) strategy, through demonstration video-assisted by zoom meeting could help students improve their predicting skills and conceptual understanding.

1. PENDAHULUAN

Since the issuance of Circular Letter Number 4 of 2020 concerning the Implementation of Education Policies in an Emergency for the Spread of COVID, the learning process is carried out at home through online / distance learning / SFH (School from Home) (Kemendikbud, 2020) even abroad this learning has been done for a long time (Thorne, 2003). Face-to-face teaching is ready to turn into learning from home by optimizing a wide variety of applications.

In Indonesia, the situation of online / distance learning / SFH (School from Home) is still not optimal. Lots of problems have arisen, including in teaching science. The teacher more often provides ready-made information in the form of concepts that are already in books using the lecture method, question and answer, and exercises on doing questions. In addition, there is also a lack of frequency in conducting experiments on science learning. This is based on the phenomenon of online learning due to the COVID-19 pandemic (Radar, 2020), complaints of junior high school teachers in Depok that science subjects are not suitable for online because science learning requires practice and direct explanation with a lot of time in understanding the subject matter provided, while online is very limited. The essence of science learning itself is the process of systematically investigating the natural surroundings, either directly or indirectly. Indirectly it can be done by using demonstration videos. The benefits of the demonstration video are; 1) clarifying the presentation of the message so that it is not to verbalize (knowing the words, but not knowing the meaning); 2) the meaning of the learning material will become clearer so that it can be understood by students and allows mastery and achievement of learning objectives; 3) teaching methods will be more varied, not solely based on verbal communication through words (Harjanto, 2003). For this reason, it is not impossible which online learning can be applied in learning that requires a practicum.

One of the popular applications used by online learning is the zoom meeting application. Zoom meeting provides remote conferencing services by combining video conferencing which users can record and save videos during the meeting, schedule online meetings, support presenting material files to students, and both students and teachers can scribble on the presentation. So that it will make it easier to deepen the material.

Learning using the zoom meeting application in science learning should provide opportunities for students to be involved in predicting what patterns might be observed, observation or observation activities, and activities that can train students' rhetoric, namely communicating or explaining the relationship between predictions and observation results, so that learning activities will be more meaningful for students (Restami, Suma, & Pujani, 2013). To realize these goals, it is necessary to apply effective learning strategies to obtain and improve students' scientific concepts and to efficiently create student discussions about scientific concepts (White & Gunstone, Graficraft Typosetters Ltd). One of the learning strategies which can improve the concept and involve students in predicting activities is using the Prediction, Observation, and Explanation strategy. POE activities include predicting, observing, and explaining which can form the cognitive structure of students to be better because the activities in this strategy provide opportunities for students to learn concretely (Hariyanto, 2014). POE emphasizes investigating concepts that are not yet understood. The ability of POE (Prediction, Observation, Explanation) can investigate students' ideas and their way of applying knowledge to the actual situation (practicum), and investigate it, questions are needed that can explore these three abilities, namely questions of prediction, observation, and explanation (Nurjanah, 2011).

Numerous studies are using POE strategies to improve students' predicting skills and conceptual understanding at various levels of education ((Fuadi, 2020); (Pamungkas, 2017); (Karamustafaoglu, 2015); (Rosdianto, 2017); (Purwanto, 2019) (Berek, 2016)) however, based on those research shows which there have been no studies on POE in-home or online learning situations. So, this study aims to determine the improvement of students' predicting skills and conceptual understanding in learning situations from home or online. Learning from home with an online system is an unavoidable condition today. Therefore, this study was conducted to answer the question of whether there was an increase in students' predicting skills and understanding of concepts in-home learning situations with an online system.

2. METHODS

This study used an experimental method with one group pretest-posttest design. The research participants consisted of 20 fifth graders at an elementary school located in Bandung, consisting of 8 boys and 12 girls. The test instrument was used to measure the conceptual understanding and predicting ability of students through video learning experimental demonstrations using zoom meetings in the form of a two-level diagnostic test. The first level is the answer choices, the second level is the explanation of the answer choices at the first level. For example, "What will happen to three candles of different sizes (6 cm, 4 cm, and 2 cm) that are not covered with cups?" as a first, and giving the reason for the question is the second level. This test was chosen to produce a detailed explanation of what students really think about the concepts learned both before and after being given treatment (Anam, 2019). In addition, this research instrument uses worksheets, lesson plans, and observation sheets. The test instrument is validated by an expert who is a lecturer in the Environmental Education-Oriented Science Education Practicum course. Validity is carried out concerning the adequacy, structure, language, and relevance of the instrument. The expert validation process is not based on scores but rather on direct advice on what to improve on the test instrument.

Researchers deliberately devised a POE strategy based on experimental video demonstrations using zoom meetings in the teaching process about the nature of fire. The learning process lasts for 90 minutes with 3 different experiments. The study begins with a pre-test on 20 students. Furthermore, the core learning with the POE strategy. Finally, a post-test is given to all students who participate in this teaching.

Research data to get an overview of the improvement of students' predicting skills and conceptual understanding were obtained from several tests, including the pretest, predictive test, and posttest.

Table 1. Predicting Skills Profile

Percentage of Student's Predicting Skills		
Experiment 1	Experiment 2	Experiment 3
64%	65%	75%

In the first stage of POE, students learn to predict a situation that will occur related to the application of certain concepts, and students are also expected to provide explanations or reasons related to the assumptions given. The results of the analysis regarding the predictive ability of students are shown in Table 1.

Table 1 shows that the students' ability to predict the video demonstration experiments of oxygen required in combustion increased after the presence of the treatment. In the first prediction, where students have not received treatment, get an average of 64%, the second

prediction after students receive treatment gets an average of 65%, and the third prediction gets an average of 75%. Students who answered the first level test could also answer correctly on the second level test, likewise, students who answered incorrectly on the first level test were also wrong on the second level test.

Based on data obtained from this research and the analysis after the learning took place, it showed that the POE learning strategy on the material properties of fire, namely oxygen demonstration videos, was needed in effective combustion in improving predictive skills and concept mastery. POE learning strategies when learning from home or with online settings still provide direct experience for students. Students are required to focus on the demonstration video that is presented, be directly involved in learning by having to make predictions then make observations to prove the answers to the predictions that have been made, and explain the suitability between predictions and observations. It also stimulates discussion in online learning. Where text discussion becomes an obstacle in online teaching and learning (Meech & Richardson, 2020). The justification at the predictive stage allows students to classify and justify their pre-conceptions (Hsu, Tsal, & Liang, 2011). From the involvement of students in these learning activities, predicting skills and understanding of concepts can indirectly increase.

In addition, several factors cause students to experience only a 1% increase from experiment 1 to experiment 2. Among them are 6 out of 20 students who do not read the introductory material given by the teacher one day before the implementation of learning through zoom meetings, the time given by the teacher to read the introductory material is only one day so that the students are less likely to be maximal and less serious about reading and understanding the introductory material provided by the teacher, and based on observations during the zoom meeting, some students complain that the time given in filling out the worksheet predicts too fast. Whereas in experiments 2 to 3 students experienced an increase of 10%, this was because students had begun to understand the concept of the material displayed in the demonstration video based on experiment 1.

Table 2. Conceptual Understanding Profile

Percentage of Students' Conceptual Understanding	
Pre-test	Post-test
56%	64%

Table 2 shows, the students' pretest mean score was 56% and the students' post-test average score was 64%. This proves that after the treatment, students' conceptual understanding increased by 10%. The POE process even though it is not a direct experience, through demonstration videos still makes learning more interesting, because students' activities not only listening to but also observing events which occur through experimental demonstration videos, by observing students will have the opportunity to compare their expectations with the results of their observations. Thus, students will have more confidence in the truth of the learning material.

Even though it only experienced a 10% increase, doing science learning with demonstration videos assisted by zoom meetings provides a different learning experience, where this learning experience is very important. (Hamid, 2013). The pre-test can also be said to be a process (assimilation) of material that has been mastered by students with the material that has just been taught which can make student development better or adjust (accommodation) the material that has been mastered by students with the material to be

taught. The learning process must be adjusted to the stages of cognitive development which students go through where the learning process consists of three stages, namely assimilation,

accommodation, and equilibration (Piaget Piaget's balancing in (Suciati & Prasetya, 2001). Giving a post-test at the end will greatly help students in repeating or drawing conclusions during the lessons they have participated in so that what students have absorbed will last longer in students' memories.

4. CONCLUSION

Based on the results of this study, students' predicting skills have increased from 65% to 75%. Predicting skills that will become this knowledge is important for a teacher because it can provide information to teachers about student difficulties in achieving new concepts and choosing effective strategies to help students overcome difficulties. From the results of these predicting skills, understanding of the concept increases. This is evidenced by the increase in the average pretest-posttest students from 56% to 64%. Even though the learning situation is hampered by a pandemic, students can still see natural phenomena through demonstration videos. With the results obtained, it can be concluded that this POE strategy can be applied to help students understand science concepts and practices while learning from home.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

6. REFERENCES

Anam, R. (2019). Analisis Representasi dan Perubahan Konsepsi Guru Serta Siswa Sekolah. Universitas Pendidikan Indonesia.

Anderson, L. W., Krathwohl, D. R., & Airasian, P. W. (2001). A Taxonomy For Learning, Teaching, and Assessing, A Revision of Bloom's Taxonomy of Educational Objectives. New York: Addison Wesley Longman, Inc.

Ary, D., Jacobs, LC, & Sorensen, C. (2010). Pengantar Penelitian dalam Pendidikan. Kanada: Nelson Education, Ltd.

Bahrul. (2007). Sikap Ilmiah. https://blogbahrul.wordpress.com/2007/11/28/sikap-ilmiah/. Berek. (2016). Concept Enhancement Of Junior High School Students In Hydrostatic Pressure And Archimedes Law By Predict-Observe-Explain Strategy. 238. Jurnal Pendidikan IPA Indonesia.

Bundu, P. (2006). Penilaian Keterampilan Proses dan Sikap Ilmiah dalam Pembelajaran Sains Sekolah Dasar. Jakarta: Depdiknas Dirjen Pendidikan Tinggi Direktorat Ketenagaan.

Dahar, R. W. (1988). Teori-teori Belajar. Jakarta: Erlangga.

Fisher, W. P. (2007). Rating Scale Instrument Quality Criteria. Retrieved from https://www.rasch.org/rmt/rmt211a.htm.

Fuadi, F. N. (2020). Perubahan Konseptual Siswa pada Pembelajaran Tekanan Udara Menggunakan Strategi Predict-Observe-Explain. Mimbar Sekolah Dasar.

Gustina, O., Fadiawati, N., Kadaritna, N., & Diawati, C. (2013). Peningkatan Keterampilan Memprediksi Dan Penguasaan Konsep Pada Materi Termokimia Melalui Model Siklus Pembelajaran Predict-Observe-Explain. Chemistry Education, University of Lampung.

Hakim, L., & Khusniyah, N. L. (2019). Efektifitas Pembelajaran Berbasis Daring: Sebuah Bukti Pada Pembelajaran Bahasa Inggris. Jurnal Tatsqif, 17(1), 19-33. https://doi.org/10.20414/jtq.v17i1.667.

Hamalik, O. (2010). Proses Belajar Mengaja. Bandung: Bumi Aksara.

Hamid, M. (2013). Studi Perbandingan Penggunaan Umpan Balik (Feedback) pada Lembar Jawaban Siswa Terhadap Penguasaan Konsep Fluida Statis Siswa SMA melalui Model Pembelajaran Contextual Teaching And Learning (CTL). http://digilib.unila.ac.id/1694/.

Hariyanto, W. (2014). Pembelajaran Aktif: Teori dan Asesmen. Bandung: RemajaRosdakarya.

Harjanto. (2003). Perencanaan Pengajaran. Jakarta: PT. Rineka Cipta.

Hsu, C., Tsal, C., & Liang, J. (2011). Memfasilitasi Pengetahuan Ilmiah Anak Prasekolah Konstruksi melalui Game Komputer Mengenai Cahaya dan Bayangan: Pengaruh Strategi Prediksi-Pengamatan-Penjelasan (POE). *Jurnal Pendidikan Sains dan Teknologi*, 20 (5). 482-493. https://doi.org/10.1007/s10956-011-9298-z

Kaltakci-Gurel, D., Eryilmaz, A., & McDermott, L. C. (2017). Development and Application of A Four-tier Test to Assess Pre-service Physics Teachers' Misconceptions About Geometrical Optics. *Research in Science and Technological Education, 35(2), 1–23.* https://doi.org/10.1080/02635143.2017.1310094.

Karamustafaoglu, S. (2015). Understanding Electrochemistry Concepts using the Predict-Observe-Explain Strategy. *Eurasia Journal of Mathematics, Science & Technology Education*.

Keengwe, J., & Georgina, D. (2012). The digital course training workshop for online learning and teaching. *Education and Information Technologies*, 17(4), 365–379. https://doi.org/10.1007/s10639-011-9164-x

Kemendikbud. (2020). Edaran Tentang Pencegahan Wabah COVID-19 di Lingkungan Satuan Pendidikan Seluruh Indonesia. Jakarta: Kemendikbud RI.

Kusnadi, Hamdiyati, Y., & Azkya, A. (2018). Penerapan Model Belajar PDEODE (Predict-Discuss-Explainobserve-Discuss-Explain) Untuk Meningkatkan Penguasaan Konsep Siswa Sma Pada Materi Pencemaran Lingkungan. *Jurnal Program Studi Pendidikan Biologi*, Vol 8 (2).

Lawshe, C. H. (1975). A Quantitative Approach to Content Validity. *Personnel Psychology*, 28(4), 563–727. https://doi.org/10.1111/j.1744-670.1975.tb01393.x.

Mahmudin. (2010). Komponen Penilaian KPS. http://mahmudin.wordpress.cohttp://mahmudin.wordpress.cokomponenpenilaian-tembolok.html.

Meech, S., & Richardson, J. (2020). *Introduction to the Special Issue: Highlighting AERA's Online Teaching and Learning.* https://olj.onlinelearningconsortium.org/index.php/olj/article/view/2578/992

Minarta, W. O., & Mintohari. (t.thn.). Pengaruh Teknik Pembelajaran POE (Predict, Observe, Explain) Pada Metode Pembelajaran Kooperatif Terhadap Hasil Belajar IPA Tema Pahlawanku Di Sekolah Dasar.

Muna. (2017). Model Pembelajaran Poe (Predict-Observeexplain) Dalam Meningkatkan Pemahaman Konsep dan Keterampilan Proses IPA. *El-Wasathiya: Jurnal Studi Agama*. 5(1). p-ISSN 2338-9648, e-ISSN: 2527631X.

Muslich, M. (2008). KTSP Pembelajaran Berbasis Kompetensi dan Konstekstual. Jakarta: Bumi Aksara.

Nurjanah. (2011). Penerapan Model Pembelajaran Predict-Observe- Explain (POE) untuk Meningkatkan Penguasaan Konsep Tekanan dan Keterampilan Berpikir Kreatif Siswa MTS. Bandung: Tesis, FPMIPA Universitas Pendidikan Indonesia.

Pamungkas, M. S. (2017). Penerapan Model Pembelajaran POE dengan Metode Praktikum untuk Meningkatkan Rasa Ingin Tahu dan Prestasi Belajar Kimia Siswa. Pedagogia.

Prodjosantoso, A. K., Hertina, A. M., & Irwanto. (2019). The misconception diagnosis on ionic and covalent bonds concepts with three tiers diagnostic test International. *Journal of Instruction*, 12(1), 1477–1488. https://doi.org/10.29333/iji.2019.12194a

Purwaningsih, D. D. (2007). Pengaruh Sikap Ilmiah Siswa Terhadap Hasil Belajar Materi Bangun Ruang Siswa Kelas VIII SMP Negeri 16 Semarang. Semarang: Skripsi Unnes 22.

Purwanto, M. G. (2019). Enhancing Junior High School Students Conceptual Understanding Using the POE-based Demonstration Technique on Electrostatics. *Journal of Physics: Conference Series*.

Putra. (2010). Pengaruh Sikap Ilmiah Siswa Terhadap Hasil Belajar Matematika Kelas XII IPA SMA N 9 Kota Jambi Tahun Ajaran 2010/2011. Jambi: Universitas Jambi.

Radar. (2020). Fenomena Pembelajaran Daring Akibat Pandemi Covid-19. Depok: Radar Depok.

Restami, M. P., Suma, K., & Pujani, M. (2013). Pengaruh Model Pembelajaran POE (Predict-Observe-Explaint) Terhadap Pemahaman Konsep Fisika dan Sikap Ilmiah Ditinjau Dari Gaya Belajar Siswa. *e-Journal Program Pascasarjana Universitas Pendidikan Ganesha*.

Restami, M. P., Suma, K., & Pujani, M. (2013). Pengaruh Model Pembelajaran POE (Predict-Observe-Explaint) Terhadap Pemehaman Konsep Fisika Dan Sikap Ilmiah Ditinjau Dari Gaya Belajar. *e-Journal Program Pascasarjana Universitas Pendidikan Ganesha*.

Rosdianto, H. (2017). Implementasi Model Pembelajaran Poe (Predict Observe Explain) Untuk Meningkatkan Pemahaman Konsep Siswa Pada Materi Hukum Newton. *Jurnal Pendidikan Fisika*.

RS, A., Widodo, A., Sopandi, W., & Wu, H. (2019). Mengembangkan Tes Diagnostik Lima Tingkat untuk Mengidentifikasi Kesalahpahaman Siswa dalam Sains: Contoh Konsep Perpindahan Panas. *Dasar Pendidikan, Online*, 18(3), 1014–1029. https://doi.org/10.17051/ilkonline.2019.609690.

Sagala, S. (2010). Konsep dan Makna Pembelajaran. Bandung: Alfabeta.

Samatowa, U. (2010). Pembelajaran IPA Di Sekolah Dasar. Jakarta: PT Indeks Permata Puri Media.

Slameto. (2003). Belajar dan Faktor-faktor yang Mempengaruhinya. Jakarta: Rineka Cipta. Suciati, & Prasetya, I. (2001). Teori Belajar dan Motivasi. Jakarta: Universitas Terbuka.

Sugiono. (2010). Statistika Untuk Penelitian. Bandung: Alfabeta.

Sumintono, B., & Widhiarso, W. (2015). Aplikasi Pemodelan RASCH pada Assessment Pendidikan. Cimahi: Trim Komunikata Publishing House.

Sumirat, F. (2017). Efektivitas Model Pembelajaran Predict Observe Explain (POE) Untuk Memfasilitasi Perubahan Konseptual Siswa SD Dalam Pembelajaran IPA. *Tunas Siliwangi Universitas 45 Bekasi*, 76-85.

Suparno, P. (t.thn.). Metodologi Pembelajaran Fisika Kontruktivistik & Menyenangkan.

Teerasong. (2007). Development of a Predict-Observe-Explain Strategi for Teaching Flow Injektion an. *The International Journal of Learning*, 17(3). 137.

Thorne, K. (2003). Blended Learning: How to Integrate Online & Traditional Learning.

London & Sterling: VA: Kogan Page Limited.

Trianto. (2007). Model-model Pembelajaran Inovatif Berorientasi Konstruktivistik. Jakarta: Prestasi Pustaka.

Wah, C. L., & Treagust, D. (2004). The Effectiveness Predict –Observe – Explain (POE) Technique in Diagnosing Studen's Understanding of Science and Identifying Their Level of Achievement.

White, & Gunstone. (Graficraft Typosetters Ltd). Probing Understanding. Hongkong: 1992.

Wilson, F. R., & Schumsky, D. A. (2012). Recalculation of The Critical Values for Lawshe's Content Validity Ratio. *Measurement and Evaluation in Counseling and Development*, 45(3), 2197–2210. https://doi.org/10.1177/0748175612440286.

Yang, C., Noh, T., Scharmann, LC, & Kang, S. (2014). Pembelajaran di Sekolah Dasar Kesadaran Guru tentang Konsepsi Alternatif Siswa tentang Perubahan Keadaan dan Pembubaran. *Asia Pacific Pendidikan Peneliti*, 23(3), 683–698. https://doi.org/10.1007/s40299-013-0140-7.