

Implementation of POE (*Predict, Observe and Explain*) in Grade 5 Elementary School Students Using KIT Experiments On The Nature of Water

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Abstract: The purpose of this study was to provide an overview of student's understanding of the science concept of the nature of water with the application of POE (Predict, Observe and Explain) learning with the accompanying use of KIT in the nature of water. This study uses descriptive method with data collection techniques in the form of observation, interviews and tests. The sample used was grade 5 elementary school students in Bandung. The results showed that as many as 87,5% of students experienced an increase in the understanding of the science concept on the nature of water and 100% of students stated used experimental KIT very enjoyable.

Keywords: POE learning, KIT Experiment, Nature of Water

1. Introduction

21st century is century of with challenge in all field, a challenge that demands everyone to go forward, have the skills and ability to compete with other countries. These skills can of course be obtained through education, therefore education must also make changes both in terms of curriculum planning and in the application of classroom learning so as to create students who have competitiveness in the 21st century.

The Indonesian government formulates 21st century skills according to BSNP (*Badan Standar Nasional Pendidikan*; National Education Standards Council), (2010) the 21st century's learning are (a) Critical-Thinking and Problem-Solving Skills, be able to think critically, laterally, and systematically, particularly in the context of problem-solving; (b) Communication and Collaboration Skills; be able to communicate and collaborate effectively with various parties; (c) Creativity and Innovation Skills, be able to elaborate creativity to procreate the various innovative breakthroughs; (d) Information and Communications Technology Literacy, be able to make use of the technology of information and communication in improving performance and daily activities; (e) Contextual Learning Skills, be able to undertake the contextual independent learning activities as part of self-development; and (f) Information and media Literacy Skills, be able to comprehend and utilize communication medias to deliver several ideas and undertake collaboration and interactional activities with various parties.

The 21st century's learning described above can be developed through the learning of science, for science essentially holds the characteristic which distinguish it with others disciplines. Science is a set of disciplines that constitute fact, concept, or principle on nature phenomenon by way of scientific process and attitude. Essentially, science consists of three components, i.e., scientific attitude, scientific process, scientific product. As a process, science concerns the process or mode of action to derive the outcome (product). This process is being known as scientific process afterwards. Through the scientific processes that based on scientific attitude the scientific inventions obtained. Among others example of scientific attitude are objectiveness and fairness in data collection. Generally, the application of science learning in elementary school have the following objectives: 1. To attain the faith toward the mightiness of the One True Almighty God be based on the existence, the sublimity and the orderliness of the universe He created; 2. To develop the cognition and the comprehension on the useful concepts of science applicable to everyday life; 3. To develop curiosity, positive attitude as well as the awareness of the interplaying connection between science, environment, technology and community; 4. To develop environmental-investigation, problem-solving and decision-making skills; 5. To escalate the awareness to actively participate in maintaining, preserving and conserving the environment; 6. To escalate the awareness to cherish the environment with all its orderliness as the one of God's creation; 7. To obtain the source of knowledge and scientific skill as a foundation for further education level. USAID (2014).

The implementation of such learning that may bolster the 21st century's learning ideals as well as to develop the scientific attitude in the learning of science can be done in a classroom by means of various strategies and learning models, e.g., by means of POE (*Predict, Observe, Explain*) learning model which was first introduced in 1995 by White and Gustone in their book entitled *Probing Understanding*. This is the one of learning models that refers to the constructivist learning model, in which students are essentially construct their own prior knowledge on learning assisted by the teacher; they attempt to find new things and eventually are capable to construct knowledge in accordance with the learning outcomes obtained. POE is learning model in which teacher plays a substantial role in exploring their students comprehension by urge them to implement the three key tasks, i.e., *predict, observe* and *explain*. (Indrawati and Setiwan in Fathonah, 2016).

On this research, the POE learning model on science learning in the learning content of water properties is applied, by performing the experimental demonstration using the SCIENCE KIT (*Komponen Instrumen Terpadu*: Integrated Instrument Component) designed by UPI Elementary Education Learning Program Team. The aim of this SCIENCE KIT (*Komponen Instrumen Terpadu*: Integrated Instrument Component) application is to increase the students' comprehension on concepts through the direct observation. The impact of the POE implementation by means of SCIENCE KIT (*Komponen Instrumen Terpadu*: Integrated Instrument Component) toward the students measured

afterwards by using the six tiers test. Due to time constraints, this study was carried out on science materials about one of the properties of water, namely water can dissolve air.

2. Literature Review

The result of the research conducted by Yupani, Garminah and Mahadewi in *Syawaludin* (2015) reveals that the excellences of POE are: 1) stimulating students to be more creative, especially in proposing prediction; 2) may reduce verbalism; 3) since students are not only perceive but they observe the consisting occurrences, accordingly the learning process becomes more interesting; and 4) students win the opportunity to compare prediction with the result of direct observation.

In his study, Gernale (2015) stated that not only students' academic grade are increased by means of POE learning model, it is affects their learning attitude as well; they learn to identifying and solving problem in sequence, they learn to develop ideas in the stage of prediction and attain new knowledge in the stage of observation.

The implementation of POE strategy, according to Kibirige (2014), effected positively on students' misconception; thus he suggests that science teachers, curriculum developers and text book authors should work hand in hand to include the elements of POE in the curriculum as a model of conceptual shifting in science learning.

Beside POE learning approach, the utilization of visual aids or experimental KIT (Integrated Instrument Component) can also bolster up the enhancement of students' comprehension; for students will be more comprehend what is actually happened at the time a certain scientific concept or occurrence took place by using experimentation KIT. According to Ismail (2016), the utilization of KIT in an experiment may improve the students' learning activities, learning interest toward the learning of science, construct the fun learning atmosphere, and develop students' ability to cooperate and participate in group activities.

Visual aids or KIT is the fundamental factor of learning, for it related with students' learning experience and the meaning of learning outcome. When students experience the occurrences in the firsthand, the learning becomes more meaningful accordingly; the more meaningful the outcomes they obtained as well. The good learning is the one that provides learning content that is directly experienced or seen by students. The KIT utilized should appealing and appropriate to students' character, so as it may motivate students to learn.

KIT or Integrated Instrument Component used in this research is design by Elementary Education Learning Program Team for examining the properties of water and air; this KIT consists of several laboratory equipment stored in a wooden box; as for the KIT that used for examining the properties of water are test tube, wooden clamp, baker glass and methanol burner.

3. Methodology

This research was conducted on 16 students of 5 grade SD Cerdas Mulia Ekselensia, 2018-2019 school year. The research uses the qualitative descriptive research method. Capturing data carried through observation of direct observation in class. The tests given are carried out in three stages in accordance with the POE learning syntax. The first phase (*predict*) the students are given two questions contain a question about their prediction or conjecture about what will happen will do experiments with explanations. The second stage is *observe*, students observe the experiment where in this study a demonstration is conducted by the researcher, after observing the demonstration experiment, the students are again given a written question about the suitability of the students with what happened in the experiment. In the third stage, *explain*, the researcher then explains what happened during the experiment. After listening to the explanation of the research, to gauge whether students understand the material already described, students are given a written question in the form of tests *six tiers*, the question consists of a question and a confidence level option, its reasons and the level of confidence as well as illustrations or pictures along with the level of confidence.

The next stage was interviewed and all students wrote their impressions about science learning with the method as they had been done.

4. Results and Discussion

Some of the findings observed during this study are:

- a. In the predict stage, before the experiment begins, students are given questions with 3 options which are guesses about what will happen in the experiment where 2 options are the choices given by the researcher and the third option is an empty answer that will be filled by students who feel they have a guess others that are not in accordance with the available options provided by the researcher. The next question is about the reason they choose the option. The results are as follows,

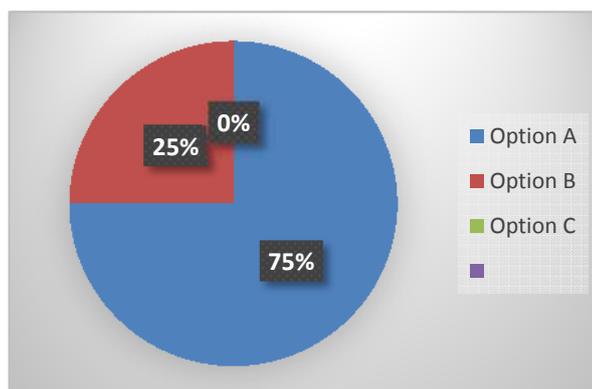


Figure 1. Students Prediction

As a result 12 students or 75% of students chose the same option (option A) for similar reasons. 4 students or 25% of students choose other options (option B) and no students fill in option C which is an empty answer, this means there are no students who have other expectations that are not in accordance with the options provided.

- b. In the second stage, *observe*, students observe experiments conducted in demonstration by researchers and then again given written questions about the suitability of students' expectations with the experiments that have been conducted and 100% of students answered their allegations that they did not match the results of the experiment.
- c. At the explain stage, the researcher then provides an explanation of the material related to the experiment, to measure the level of students' understanding of the material properties of water described by researchers, students were given questions in the form of six tiers tests with the following results:

No. Student	Option	Level of Confidence	Reason	Level of confidence	Illustration	Level of confidence
1	Correct	Sure	Correct	Sure	Wrong	Sure
2	Correct	Sure	Correct	Sure	Wrong	Not sure
3	Correct	Sure	Correct	Sure	Wrong	Sure
4	Correct	Sure	Correct	Sure	Wrong	Not sure
5	Wrong	Sure	Wrong	Not sure	Wrong	Not sure
6	Correct	Sure	Correct	Sure	Wrong	Sure
7	Correct	Sure	Wrong	Sure	Wrong	Sure
8	Correct	Not sure	Wrong	Not sure	Wrong	-
9	Correct	Sure	Correct	Sure	Wrong	Sure
10	Correct	Sure	Correct	Sure	Wrong	Not sure
11	Correct	Sure	Correct	Sure	Wrong	Sure
12	Correct	Sure	Correct	Sure	Wrong	Sure
13	Correct	Sure	Correct	Sure	Wrong	Not sure
14	Correct	Sure	Correct	Sure	Wrong	Sure
15	Correct	Sure	Correct	Sure	Wrong	Sure
16	Correct	Sure	Correct	Sure	Wrong	Sure

Table 1. Six Tiers Test Results

Based on the six tiers test results can be made as follows:

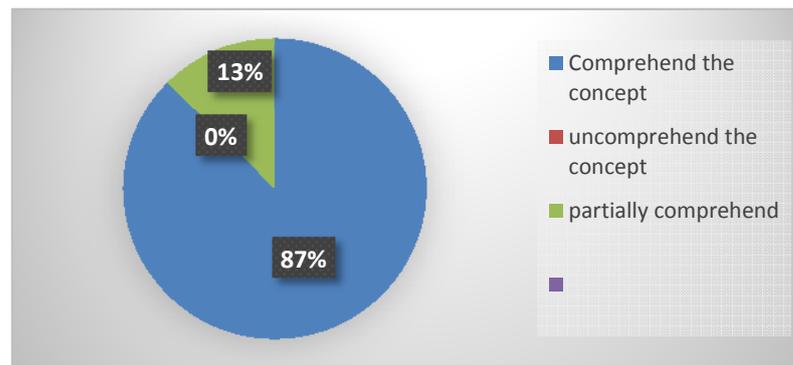


Figure 2. Six Tiers Test Results

Subsequent to the implementation of POE learning model with phases as above described, the diagram reveals that most of the students, that is 87.5% or 14 students are fully comprehend the given concept of the learning content; 12.5% or 2 students are merely comprehend some of the concept; and there are still 0% or no student who completely not comprehend the concept.

- d. The result of the interview – both verbally and through the written questions about the students' impression of science learning, the material about one of the characteristics of water, – reveals that all of the students were enthusiastic and delighted about such learning implementation, particularly about the experimentation part albeit by observing the demonstration the researcher conducted; they opined that by means of experiment they give more credence over certain idea or theory, for the proof can be directly seen.

5. Conclusion

It can be said that this POE learning model is highly effective to explain certain learning content to students due to its regular, structured and detailed stages; it begins with providing an opportunity for students to propose predictions based on their own knowledge; afterwards, conducting an experiment to really prove the accuracy of the students' predictions; and ended with teacher's explanation to complete the knowledge of the students. The effectiveness of this POE learning model can be perceived in the post-test outcomes which indicate that most of the students (87.5%) comprehend the concept of the learning content given. Moreover, this POE learning model is able to foster the scientific and constructivism attitude toward the students; the students' enthusiastic responses in participating in this very learning model along the experiment using visual aids in the form of KIT were facilitating them to grasp certain learning content.

The shortcoming of the POE learning model in this research is mainly in the aspect of the experimental KIT visual aids provision; hence, that it is only possible to conduct a demonstration.

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