Analysis Validation Results of Learning Material with POE (Predict-Observe-Explain) Model Based Work Laboratory to Enhance Basic Science Process Skills

Zhian Friska[*], Z.A Imam Supardi[**], Tukiran[**]

[*] Student of Science Education Study Program, Postgraduate, Universitas Negeri Surabaya
[**] Lecturer of Science Education Program, Postgraduate, Universitas Negeri Surabaya

E-mail:zhian.friska@gmail.com

The aim of this research is to analyse material learning instrument with Predict-Observe-Explain based work laboratory to train basic science process skills on the topic of straight motion. Learning tool/instrument is developed by using 4D model. This developmet method is used to generate learning instrument, then its validity and reliability are verified. Data of this study was obtained in the form of validation result from two experts. All of experts are lecturer in Science Post Gradute Program of Universitas Negeri Surabaya. The product of this study is the result of analysis of validation. Based on the result, the validation of learning instrument are very valid and reliable to use.

Index Terms- material learing instrument, POE model, basic science process skills

I. INTRODUCTION

Indonesia has developed itself to make educational new in a planned, directed, and sustainable. Renewal of Education in Indonesia is more focused after the issuance of Government Regulation No.32 of 2013 which is a change of government regulation No.19 of 2005 on National Education Standards.

Physics as one of the disciplines of science has a scope of study of natural phenomena that occur in everyday life. Science consists of four components, namely the scientific process, scientific products, scientific attitude, and application of scientific products in everyday life. Described by Chiapetta & Koballa (2010: 15) that there are four dimensions that should be there in science learning, namely (1) science as a way of thinking (2) science as a way of investigating scientific), (3) science as a body of knowledge, and (4) science and its interactions with technology and society (the application of scientific products in everyday life.

Based on the observations and interviews with teachers in SMA Negeri 4 Sidoarjo we get information that in physics learning is still teacher centered. The students didn't get laboratory activity, using material to experiment.

Every physics teacher wants competence to be achieved in every learning outcomes. One such form of competence is the skill of the process of science. Through the science process skills, students are expected to grow a sense of couriousity towards physics so that in the end students will be trained science process skill and ultimately impact on achievement of learning outcomes.

Now, many learning models have been developed. One of the learning models is the POE model. POE model in physics learning is defined as teacher guidance in planning and carrying out learning activities that aim to learners can find concept, principle, theory, principle, rule, and / or physics law by itself through scientific activities that can cultivate scientific attitude. This activity can be done individually or in groups. In the learning model of scientific activities, learners are trained to find their own scientific products through scientific activities that can cultivate a scientific attitude.

The use of learning models will have an impact on student learning outcomes. Student learning outcomes are not only limited to cognitive aspect only, but also psychomotor and affective. Students learning outcomes in this school focus more on cognitive learning outcomes, especially on cognitive products. In addition to product cognitive, cognitive processes (science process skills) also need to be considered to obtain a more optimal learning outcomes. In fact, not all schools teach their students about basic science process skills. The basic science process skills are not the primary demands of learning

competencies in schools, but the basic science process skills become one of the competency standard demands of the curriculum used as described Regulation of the Minister of Education and Culture no. 20 year 2016.

Based on the description, it is necessary to analysis developing learning tools using a laboratory-based POE (Predict-Observe-Explain) learning model to train the skills of the basic science process skills of senior high school students.

II. RESEARCH AND COLLECT IDEA

1. Types of Research

   This research is a development research using Predict – Observe – Explain model's to enhance science process skill of grade X senior high school.

2. Subject Research

   Research subjects are learning tools POE (Predict, Observe, Explain) -based laboratory work.

3. Procedure Research

   Model of learning device development using 4D model. The 4D stages are definitions, design, development, and dissemination.

   a. Definition

      Need analysis consist of front and analysis, learner analysis, task analysis, concept analysis, and Specifying instructional objectives.

   b. Design

      Thiagarajan divides the design phase into four activities, namely: 1. Preparation of test standard (constructing criterion-referenced test), 2. Media selection, appropriate with material characteristics and learning objectives, 3. Format selection, namely to study the format of teaching materials that will be developed, 4. Making the initial design (initial design)

   c. Development

      Consist of *expert appraisal* with following revision, and development testing

   d. Dissemination

      This research disseminate in international conference and international journal.

4. Design of Research

   The design of this research using *randomized control group pretest post test design*.

   This design has fulfilled the three basic principles of experimental design namely replication, randomization, and control.

5. Instrument of Research

   a. Learning device

      Consist of syllaby, lesson plan, student work sheet, test science process skills

   b. Instrument to collect data

      Consist of product mark from expert

6. Data Analysis Technique

   a. Data analysis of Learning tools validation

   Data analysis of validation of learning devices includes syllabus, lesson plan, learning materials for students, students work sheet, and test of basic science process skills. Analysis of the results of validation is done by averaging the scores of each component based on instrument of assessment of materials instrument. The average score is obtained by comparing scores from the results of collecting data from all validators with scores.

   Data from the validation results were analyzed using qualitative descriptive analysis techniques. Percentage of appraisal match of two validators of physics products based on the inter observer agreement obtained from statistical analysis of percentage of agreement (R) (Borich, 1994):

$$R = \left[1 - \left\{\frac{A - B}{A + B}\right\}\right] \times 100\%$$

Information:

R = percentage of agreement

A = the highest score of 2 validator

B = lowest score of 2 validator

III. RESULTS AD DISCUSSIONS

Learning tools developed using the POE model are declared valid based on the assessment by two validators. According to Sugiyono (2013) the validity assessment is carried out at least by three experts who hold doctoral degrees. According to (Nieven, 2007) the validity of the contents of the learning device relates to the needs and reliability of the theoretical foundation that builds learning devices. Construct validity relates to the consistency of the learning device components with supporting theories and is logically designed.

Based on the Regulation of the Minister of Education and Culture No. 22 of 2016 (2016: 5), the syllabus is a reference for the learning framework for each material study material. He also explained according to (Suyono & Hariyanto, 2015) syllabus is a reference in the preparation of learning plans, management of learning activities, and development of learning outcomes assessment. Syllabus contains: (a) the identity of the subject; (b) school identity; (c) core competencies; (d) basic competencies; (e) subject matter; (f) learning; (g) assessment; (h) time allocation; (i) learning resources.
Based on the assessment of the validity of the syllabus which refers to Table 4.1 shows that the average validity of all components is 3.875 with very valid criteria. So the syllabus can be used in learning. The description of the syllabus is in the RPP scenario.

The Learning Implementation Plan is guided by a copy of the attachment to the Minister of Education and Culture Regulation Number 22 of 2016 (2016: 22). Lesson plan is a plan for face-to-face learning activities for one or more meetings. Lesson plan is a development of the syllabus. RPP is prepared based on basic competencies. The components assessed in the Lesson plan include the format, content, and language used in making lesson plans. The results of the validity of all components were 3.83 with very good criteria. Based on the results of the validator's assessment, Lesson plan is worthy of use. Achievement of good quality is due to the preparation of the Lesson plan after referring to the Minister of Education and Culture Regulation No. 22 of 2016 (2016: 22). The Lesson plan component contains: (a) school identity; (b) the identity of the subject; (c) class / semester; (d) subject matter; (e) time allocation; (f) learning objectives; (g) basic competencies and indicators of competency achievement; (h) learning material that contains relevant facts, concepts, principles and procedures; (i) learning methods; (j) learning media; (k) learning resources; (l) learning steps, and (m) assessment of learning outcomes.

The Student Worksheet compiled by researchers includes straight-motion material. Student work sheet ucontains work steps for students in each one-time face-to-face learning. Student work shhet was developed to support teaching plans. There are two student work sheet, namely for sub-material with uniform linear motion and non uniform linear motion. Student worksheet is prepared by identifying the types of process skills that will be developed when studying the material, as presented by Suyono & Hariyanto (2015). The process skills developed in this Student work sheet are the skills of basic science processes. Matters needed in the preparation of the student work sheet include: a) the title of the student work sheet must be in accordance with the material; (b) Material in accordance with children's development; (c) Material is presented systemically and logically; (d) the material is presented simply and clearly; and (d) support the involvement and willingness of students to actively engage in learning. Validation results from three validators obtained an average of 3.75 with very valid criteria. This shows that student work sheet is suitable for use in learning.
Teaching material developed using the POE model has been validated by two validators with an average value of 3.52 with very valid criteria. Criteria for aspects of assessment by two validators include aspects of content / material, presentation of material, language, and physical. According to (Akbar, 2015) states that good teaching materials include accuracy criteria in presenting, material relevance, communicative, complete and systematic, student centered oriented, correct language rules, and high readability.

The assessment sheet used in this development research in the form of an assessment of science process skills was measured to determine the achievement of basic competencies derived from the indicator provisions. Based on the Regulation of the Minister of Education and Culture No. 23 of 2016 (2016: 2) states that assessment is the process of gathering and processing information to measure student achievement. The assessment was viewed from two aspects, namely through the pretest posttest and the assessment of the LKPD. The assessment of basic science process skills that are measured is the skill of predicting, observing, explaining, and concluding in accordance with the syntax of the POE learning model. The item in the form of a description of 14 items. Content and language aspects determine whether or not the item is valid.

IV. CONCLUSION

Based on the results of research and discussion, the conclusion is POE model learning tool based on laboratory work to train students' basic science process skills that have been developed is very valid and can be used in physics learning activities. The value of validity obtained from the two validators is obtained as follows.

a. The value of the syllabus validity is 3.875 with very good criteria.

b. The value of lesson plan validity is 3.83 with very good criteria.

c. The value of the student work sheet validity is 3.75 with very good criteria.

d. The validity value of teaching material is 3.52 with very good criteria.

e. The value of the validity test cognitive is 3.73 with very good criteria.

V. Acknowledgements

VI. References

[1] Akbar, S. 2015. *Konsep dan Makna Pembelajaran: Untuk Membantu Memecahkan Problematika Belajar Mengajar*.Bandung: Alfabeta.

[2] Chiapetta & Koballa. 2010. *Science Instruction in the Middle and Secondary School Third Edition*. New York: Merril Publishing Company.

[3] Nieven. 2007. *Prototyping to Reach Product Quality*. Dordrecht.: Kluwer Academic Publisher.

[4] Permendikbud no. 20 year 2016

[5] Permendikbud no. 22 year 2016

[6] Permendikbud no. 22 year 2016

[7] Sugiyono. 2013. *Metode Penelitian Kuantitatif Kualitatif dan R&D*. Bandung: Alfabeta.

[8] Suyono & Hariyanto. 2015. *Implementasi Belajar dan Pembelajaran*. Bandung: PT Remaja Rosda Karya.