Journal Homepage: - www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/15671
DOI URL: http://dx.doi.org/10.21474/IJAR01/15671

*RESEARCH ARTICLE*

# THE EFFECTIVENESS LEARNING MODEL OF THE PROBLEM STATE, EXPLORE,DO, ANALYSIS AND ASSESSMENT (PEDAAS) TO TRAIN CRITICAL THINKING SKILLS AND LEARNING OUTCOMES FOR JUNIOR HIGH SCHOOL STUDENTS IN SCIENCE LEARNING

**Dewi Ria Agustin, Indrawati and Sudarti**
Department of Science Masters, University of Jember, Jember, Indonesia 68121.

## Manuscript Info

***Manuscript History***
Received: 10 September 2022
Final Accepted: 14 October 2022
Published: November 2022

***Key words:-***
PEDAAs, Effectiveness, Students, Critical Thinking

## Abstract

This study aims to describe the effectiveness of the PEDAAs learning model to train critical thinking skills and improve junior high school students learning outcomes in science learning. This learning model is structured to train students' critical thinking skills which are still low. The science subject matter taken is waves, light, and sound because the scores obtained are less than the minimum completeness criteria. The research method is Quasi Experiment with Pretest-Posttest without control class. Data analysis was performed using mixed methods, which is the result of qualitative and quantitative data. The sample used was 29 students from class VIII.1 SMPN 1 Siliragung Banyuwangi. These results can be seen from the scores obtained by students, namely N-Gain. For critical thinking skills, the average N-Gain value is 0.75 in the high category. And for student learning outcomes, the N-Gain value is 0.72 in the high category. This shows that the PEDAAs learning model is effective in training critical thinking skills and improving student learning outcomes.



## Introduction:-

Critical thinking is the ability to think logically and seek valid information. The critical way of thinking is thinking rationally and reflectively, remaining open to different perspectives, and not easily believing in any information without a source that can be read further, and it requires great effort to test every belief or knowledge based on supporting evidence and conclusions. generated progress (Sholihah, Inganah, & Efendi, 2017). Critical thinking skills provide the right direction in thinking and working, and help in determining the relevance of something to others more accurately. Critical thinking needs to be developed and applied because it makes it easier for students to understand the concepts given and trains students to make decisions from various perspectives carefully, thoroughly, and logically. By bringing up critical thinking skills, it will train students to be rational and choose the best alternative choices for themselves in dealing with all problems such as choosing a job (Kattayata, Smitha, & Asha, 2016). So, it can be said that critical thinking is the ability to think openly without believing in existing sources of information and based on supporting evidence and conclusions put forward.

Critical thinking skills are skills that students must have so that students can solve problems that occur within themselves and their environment. Critical thinking skills are the main ability and very important because in critical thinking skills students can analyze situations based on facts and evidence so that they can draw conconcludeal thinking is also the ability to develop and explain arguments from data compiled into constructive decisions or ideas

**Corresponding Author:- Dewi Ria Agustin**
Address:- Department of Science Masters, University of Jember, Jember, Indonesia 68121.

(Shriner, 2006). There are five key elements of critical thinking, namely practical, reflective, rational, trustworthy, and in the form of action (Ennis & Weir, 1985). Based on this, Ennis formulated the definition of critical thinking as a reflective and rational thinking activity focused on deciding what to believe or do. In addition, there are indicators to measure a person's critical thinking ability. identified into five categories, namely: a) Basic clarification, b) basic support, c) conclusion, d) further clarification, e) strategy and and tactics (Nitko & Brookhart, 2011). The critical level of thinking skills of Indonesian students is still low. Based on PISA 2018, Indonesia is ranked 74th out of 79 countries participating in the assessment conducted by PISA (international student assessment program) (Schleicher, 2018). Indonesia's low ranking on PISA 2018 may indicate students' critical thinking skills are still low. This is because PISA questions are questions that begin with everyday questions, then from these questions students are asked to argue, communicate, draw conclusions, and generalize formulations according to indicators of critical thinking skills (ChanChangwon18).

The results of an open discussion between teachers in science subjects at SMPN 1 Siliragung (February 5, 2021), that there are several reasons why many students cannot think critically in solving problems related to the science given by the teacher, namely: (1) students lack training in critical thinking in solving problems that are in the learning process, (2) teachers in the field of physics do not know much about innovative learning media and have difficulty finding the right strategy so that students with low abilities can actively learn with limited facilities and learning resources, (3 ) the level of ability of physics teachers is not much in developing learning media that are able to train critical thinking skills and (d) the time constraints of physics teachers to be able to provide learning media in training critical thinking skills in solving student problems. Therefore, a condition that is able to train students' critical thingking skills needs to be created.

An effective effort to overcome the problems above is that the teacher must choose and determine the right learning model without leaving the intellectual development of the students themselves. One of them is a learning model that refers to constructivism and which is not teacher-centered but student-centered. Learning with constructivism theory makes students gain knowledge through the construction process to achieve a balance between knowledge schemes and new experiences (Dahar, 2011). Knowledge is a process of forming concepts that have not been determined with objects and the environment to increase understanding (Asri, 2005). Therefore, a learning model is needed that can build students' knowledge and train critical thinking skills, namely the PEDAAs learning model.

The Problem States, Explore, Do, Analysis, and Assessment (PEDAAs) learning model is a learning model designed to train skills that students must have in the 21st century, especially critical thinking (critical thinking )and by the characteristics of science learning. This learning model is designed by combining two learning models, namely the Problem Based Learning (PBL) learning model and the Guided Inquiry (GI) learning model. The Problem States, Explore, Do, Analysis, and Assessment (PEDAAs) learning model is also designed based on meaningful learning theory, discovery learning theory, and cognitive learning theory.

The most important aspect of effectiveness is to know the degree of application of a theory, or model in a given situation (Reigeluth, 1999). This level of effectiveness, according to Mager, is usually expressed on a numerical scale based on certain criteria (Reigeluth, 1999). Effectiveness refers to the degree that the experience and outcomes of an intervention are consistent with its intended purpose. In Nieveen's (1999) work related to the development of learning materials, it can be shown that Nieveen measures the level of effectiveness seen from the level of appreciation of students in learning the program and the desire of students to continue using the program. Therefore, it is necessary to measure the effectiveness of the PEDAAs learning model in training critical thinking and improving student learning outcomes.

## Research Method:-

This type of research is a quasi-experimental research with thone-groupupretest-posttestst method. Quasi-experiments were used with the aim of indicators the effect of independent variables anddependent variables after being influenced by a direct effect (cause-effect) (Yustyan, et.al, 2015). The sample used in this study only used one treatment class without a control class. The design of this research is developed with the stages of development research by Borg and Gall (1983). The research development used consists of:research and information collection, planning, develop prelimainary form of product, preliminary field testing, main product revision, main field testing, operational product revision, operational field testing, final product revision, anddissemination and implementation. The resulting product is a learning model. The effectiveness of the learning model is the average score of improving the results of critical thinking skills at least in the medium category, namely the N-gain value (0.3 <G <7). The

ststudent'sognitive learning outcomes were the mean scores of the pre-test and post-test scores of students' cognitive learning outcomes at least in the medium category (0.3<G<7).

**Product Effectiveness Analysis**

The effectiveness level of the developed product can be seen from the critical thinking skills and student learning outcomes. For students' critical thinking skills, there are 4 ranges of scores consisting of:Score 4, if very good; Score 3, if good; Score 2, if low; and score 1, if weak. The data obtained will be analyzed descriptively using the following formula:

The value of critical thinking skills is then interpreted according to the categories shown in Table 1.

**Table 1:-** Categories of critical thinking skills assessment.

| No. | Percentage (%) | Critical thinking skills |
|---|---|---|
| 1 | 81.25 x 100 | Very good |
| 2 | 62.50 x < 81.25 | Well |
| 3 | 43.75 x < 62.5 | Not good |
| 4 | 25.00 x < 43.75 | Not good |

(Source: Akbar, 2015)

To improve student learning outcomes through Normalized Gain (N-Gain). Quantitative data in the form of students' cognitive pre-test and post-test results were analyzed using the Normalized Gain (N-Gain) formula as follows:

Then, the data from the calculation of the gain index is converted using the score gain category as shown in Table 2.

**Table 2:-** Category Gain Score.

| Score | Category |
|---|---|
| G > 0.7 | High |
| 0.3 < G < 7 | Medium |
| G < 0.3 | Low |

(Source: Hake, 2002)

## Results and Discussion:-

In PEDAAs learning model research is development research that must know the effectiveness of learning activities. Effectiveness results data obtained through the test method in the form of pretest-posttest. then, the data is processed and the N-Gain value and effectiveness category can be identified. Data on the effectiveness of critical thinking are presented in Table 3.

**Table 3:-** Data on the Results of Students' Critical Thinking Skills Using the PEDAAs Learning Model.

| Meeting | Total Students | N-Gains | Total N-Gains | Category |
|---|---|---|---|---|
| I | 29 | 0.67 | 0.73 | High |
| II | | 0.78 | | |

Based on Table 3, it is shown that in general the critical thinking skills of SMPN 1 Siliragung Banyuwangi students are categorized as high with an N-Gain value of 0.73. The total value of N-Gain obtained from the average result of critical thinking skills at the first meeting was 0.67 and at the second meeting was 0.78. From these data, it can be seen that the N-Gain value increased significantly from the first meeting to the second meeting. For a clearer comparison, it can be seen in Figure 1.

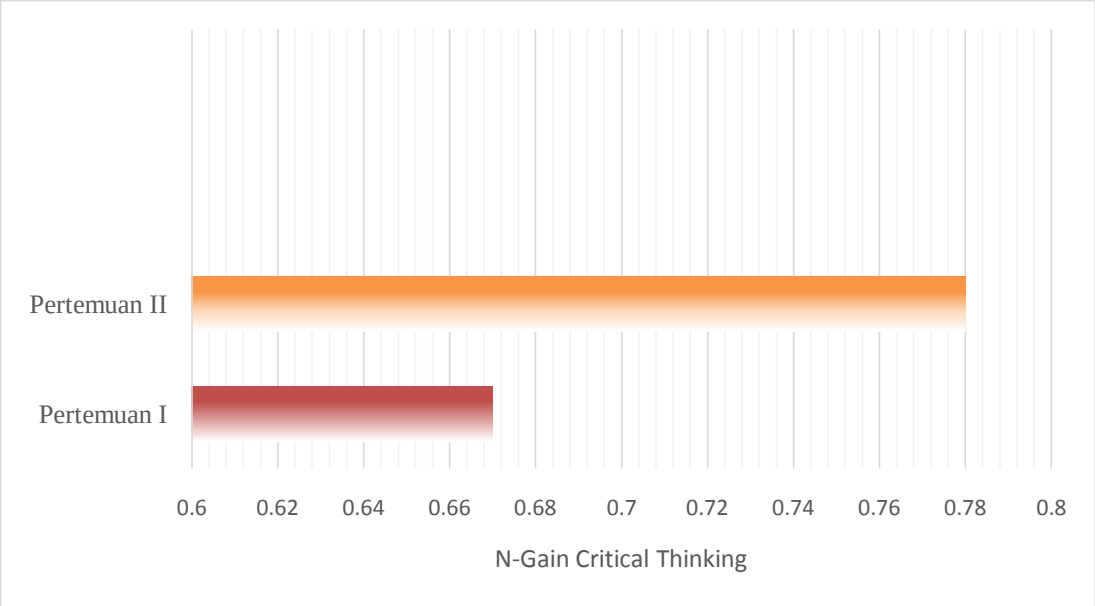


**Figure 1:-** Data Results of Students' Critical Thinking Skills Using the PEDAAs Learning Model.

After describing the effectiveness of the PEDAAs learning model in training critical thinking skills, it is continued whether it can be effective in improving student learning outcomes. Data on student learning outcomes are presented in Table 4.

**Table 4:-** Student Learning Outcomes Data Using the PEDAAs Learning Model.

| Meeting | Total Students | N-Gain | Category | Total N-Gain | Category |
|---|---|---|---|---|---|
| I | 29 | 0.68 | Medium | 0.72 | High |
| II | | 0.75 | High | | |

Based on Table 4, shows that in general the data on student learning outcomes in large-scale trials can be categorized as high with an N-Gain value of 0.72. The data was obtained from the average N-Gain value of student learning outcomes at the first meeting which was 0.68 in the medium category. Meanwhile, at the second meeting, the average N-Gain value of student learning outcomes was 0.75 in the high category. From the first meeting and the second meeting, it can be seen that there is a significant increase in the N-Gain value. To make the comparison clearer, it can be seen in Figure 2.

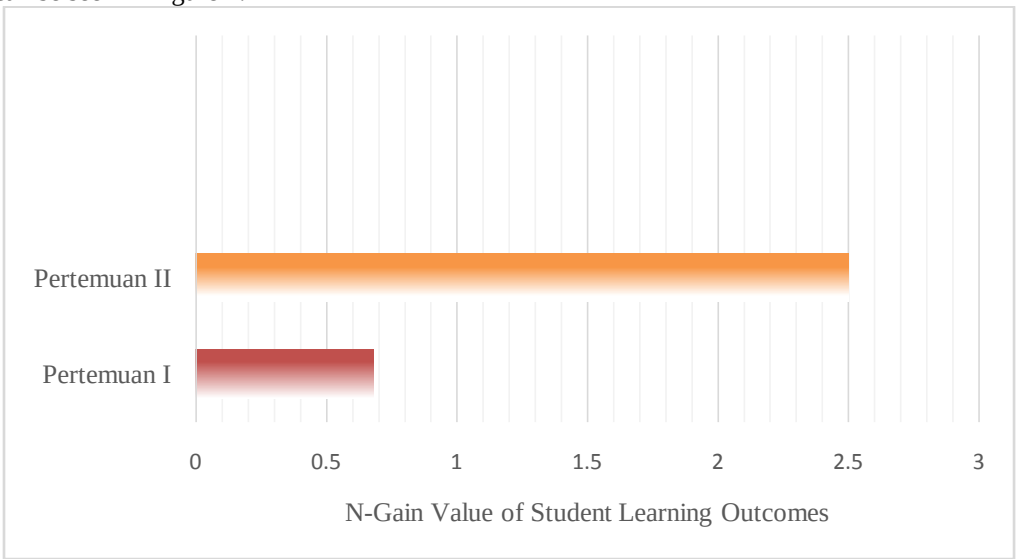


**Figure 2:-** Data on Student Learning Outcomes Using the PEDAAs Learning Model.

In this study, it is generally known that there is an increase inthe value of Again. This increase shows the ability of students toadapt to participate in learning activities. This can be because students feel happy when learning with the PEDAAs learning model. This is to a similar studyconducted by Ahyar and Edyansyah (2021). In their research, Ahyar andEdyansyah found that students often complain becauseof student discomfort in learning as a result of the teacher's lack of creativityin finding new models during the learning process. As a resultof this inconvenience, students are not interested in studying,resulting in low final grades, including final exams, and even not graduating. There are many models thatcan be applied by teachers inlearning, including demonstrations, discussions, and simulations.

These models can be applied in motivating/stimulating students so that students develop a love and interest in learning.Thus, it can be said that the development of learning models in addition to being able to enrich existing learning models, will stimulate students to have a high love and interest inlearning. Especially when viewed from the side of the condition after the Covid-19 pandemic which required students to go back to school, which started online to go offline. Then variations in applying learning models must be carried out.

## Conclusion:-

The results of developing an effective PEDAAs learning model to train critical thinking skills and junior high school student learning outcomes in science learning have an N-Gain score for critical thinking skills and student learning outcomes have increased significantly.

## References:-


1. Ahyar, J., and Edyansyah, T. 2021. Implementation of learning models by high school teachers in the time of covid-19 with the school of students in the City of Lhokseumawe. International Journal for Educational and
2. Vocational Studies . 3(5): 359-364.
3. Asri, B. 2005. Learning and Learning. Jakarta: Rineka Cipta.
4. Dahar, Ratna Wilis. 2011. Theory of Learning and Learning. Jakarta: Erlangga
5. Ennis, RH, & Weir, E. (1985). The Ennis Weir Critical Thinking Essay Test. Pacific Grove, CA: Midwest Publications.
6. Hake, R. (1999). Analyzing Change/Gain Score. Indiana: Indiana University.
7. Helperida, T. (2014, February 14). Retrieved November 3, 2018, from kekeislearning.blogspot.com: http://kekeislearning.blogspot.com
8. Howard, WL, Tang, T., & Austin, MJ (2014). Teaching Critical Thinking Skills: Ability, Motivation, Intervention, and the Pygmalion Effect. Journal of Ethnic Business, 128-138.
9. Ihsan, RS (2014). Scientific Approach in Implementation of Curriculum 2013 Based on Study of Learning Psychology Theory. EduTech, 183-195.
10. Kattayata, S., Smitha, J., & Asha, J. (2016). Critical Thinking Ability and Vocational Aspirations oh Higher Secondary Student. American Scientific Research Journal for Engineering, Technology, and Sciences, 241-250.
11. Muammar, H., Hardjono, A., & Gunawan. (2015). The Effect of ASSURE Learning Model and Prior Knowledge on Science-Physics Learning Outcomes of Class VIII SMPN 22 Mataram. Journal of Physics and Technology Education, 166-172.
12. Nieveen, N. (1999). Design Approaches and Tools in Education and Training. London: Kluwer Academic Publisher.
13. Nitko, AJ, & Brookhart, SM (2011). Educational Assessment of Student (6th ed). Boston: Pearson Education.
14. Rahmatina, DI, Sutarto, & Mahardika, IK (2016). Content and Language Feasibility Components of Multi-representation-based Physics Learning Modules for SMK Class X Even Semester. Journal of Science Learning and Education, 59-67.
15. Reigeluth, CM (1999). Instructional Design Theories and Models Volume II: A New Paradigm of Instructional Theory. New Jersey: Lawrence Erlbaum Associates Publishers.
16. Sholihah, F., Inganah, S., & Efendi, M. (2017). Analysis Critical thinking Skills by Homeschooling Students in Solving Mathematical Problems. Mathematical Educational Journals, 41-49.
17. Susilana, R., & Riyana, C. (2007). Learning Media. Bandung: CV Discourse Prima.