



## POED Learning Model to Improve Learning Outcomes and The Tendency to Have Energy Conservation Attitudes in Learners

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### Keywords

learning model devices, POED, energy conservation attitudes

### Abstract

Energy conservation is one of the first steps to overcome the scarcity of energy resources in the future, which can be done through educational channels. This study aims to find out the validity, effectiveness, and practicality of using POED (Predict, Observe, Explain and Do) learning model devices used in increasing the tendency to have energy conservation attitudes in learners. In addition, to find out the effectiveness of POED learning model devices to improve learning outcomes in learners. The type of research used is development research that produces products in the form of learning model devices. This research procedure adapts the ADDIE development model consisting of five stages, including: analysis, design, development, implementation and evaluation. Based on the test results of the learning model device, all dimensions included in the criteria are very valid. Learning using POED model devices further increases the tendency to be energy conservation of elementary school learners compared to conventional learning models. The POED learning model is declared practical to use and able to increase the tendency to have energy conservation attitudes in learners. It can be concluded that the use of POED learning model devices is quite effectively used to improve learning outcomes and the tendency to have energy conservation attitudes in elementary school learners.

## INTRODUCTION

Entering the era of globalization there are many changes in daily life, such as an increase in the development sector. Increased development will further increase the need for energy. Energy plays a very important and strategic role in people's lives because energy is one of the indicators of a country's economic development and growth.

Energy needs in the world and Indonesia, currently still dominated by energy derived from fossil fuels, even though fossil energy is energy that is non-renewable and not environmentally friendly (Bahij et al, 2019). Kholiq (2015) states that energy is a basic human need, which continues to increase in line with the rate of life.

Energy will one day experience scarcity and no longer be able to meet consumer demand. So (2014) explained that the availability of fossil energy in Indonesia, especially crude oil, is increasingly rare which causes Indonesia to become an importer of crude oil and its derivative products. One of the efforts to overcome this problem is to make energy savings, through energy conservation measures.

Alimuddin & Mangantar (2014) states that according to language, conservation means preservation, protection, or preservation. Energy savings also mean saving money as well as reducing our reliance on fossil fuels because they are still the dominant fuel (Riadi & Erry, 2017).

Through the energy conservation movement in a simple way, we can save the earth from an energy crisis that will later have an impact on the survival of humans and other living things. In addition, we can save the environment from damage due to excessive energy use.

Schultz in Susilo (2016) stated that conservation can be realized if humans improve behavior towards the environment. It is asserted that conservation can only be done by changing behavior. According to Sumiyadi et al (2015) at the age of children, conservation education is more directed to get to know nature through direct observation in the surrounding environment.

Guyen & Sulun (2019) states that learners' conceptual understanding of energy concepts, facilitates them to find solutions to energy problems faced in everyday life.

Energy source saving efforts have long been formulated by the government through the issuance of Law No. 30 of 2007 and PP No. 70 of 2009 on energy conservation.

Jorgenson et al (2019) suggest that educators and environmental researchers today focus on research and promote energy conservation behaviors with an emphasis on children and adolescents.

Lekshmanan (2015) states that energy conservation campaigns can be a better solution to the ever-increasing demands of energy. This energy saving effort can be applied in the educational environment, namely by instilling an attitude of energy conservation in learners, especially learners at the elementary school level. Through the learning of Natural Sciences in the material "Energy Sources", teachers can channel their ideas to improve energy conservation attitudes in learners.

Natural science is not only the mastery of a collection of knowledge in the form of facts, concepts or principles but also a process of discovery (Masus1 & Fadhilaturrahmi, 2020). The purpose of natural science in general is for learners to understand the concept of natural science and its relation to everyday life (Juniari et al, 2014).

Natural science in elementary school is very important to learn because in the process of teaching teachers and learners are actively involved to process, dig information, experiment about nature and its surroundings (Devianti et al, 2017). Ali & Sudiarmika (2013) explained that natural science education is expected to be a vehicle for learners to learn themselves and the environment, as well as the prospect of further development in applying it in everyday life.

The results of the initial study on the tendency to be energy conservation in students in SD Negeri 01 Pendowo, obtained several problems, including the lack of awareness of learners in conducting energy conservation activities. In addition, there are no habits applied in schools in order to campaign for energy saving as has been proclaimed by the government. There are still many learners with natural science lesson values that are under the Minimum Completion Criteria. The learning results of learners in SDN 01 Pendowo class IVA with a total of 20 learners gained 35% completion with Minimum Completion Criteria of 70.

Research on energy conservation has been conducted by Taufiq et al (2014), with the results of research showing that the results of learning integrated natural sciences conservation themes, improved and the character of environmental care was increased. Machin (2014) stated that the

nature of conservation in natural science learning aims to get learners used to behave environmentally friendly, because the essence of conservation is caring, protecting, repairing the environment.

One of learning model that can help in the learning of natural sciences is the POE (Predict-Observe-Explain) learning model. A POE learning model is a learning model that involves learners in predicting a phenomenon or event, making observations through demonstrations or experiments, and finally explaining the results of their experiments and their previous predictions (Astuti et al, 2017). The POE model aligns learners by making predictions based on their own conceptions, then observing the event for real, and the latter explaining the results of their observations and explaining the nonconformity of their predictions with actual circumstances (Amal et al, 2013).

The application of the POE model is very important because it can improve the quality of learning in the classroom (Syawaludin et al., 2017). Novanto et al (2021) explained that POE is one of the models that can help activate learners in the learning process because in this model learners not only listen but also observe the events that occur.

According to Warsono and Hariyanto in Muna (2017), explaining some of the benefits obtained from the use of POE learning models are as follows: 1) can be used to explore the initial ideas owned by learners can be seen from the results of predictions made by learners; 2) providing information to teachers about learners' thoughts through those made by learners; 3) generating discussions both between learners and learners and between learners with teachers; 4) provide motivation to learners to investigate concepts that have not been understood to prove the results of their predictions; 5) arouse the curiosity of learners to investigate.

Wiguna et al (2017) explained that the POE model can improve the understanding of learners' concepts to the right understanding and can reduce the occurrence of misconceptions in his mind.

Previous research conducted by Jannah (2017) showed results that there was an increase in problem-solving skills in teachers and learners. Another study conducted by Lefkeli et al (2018) showed results that education allows learners to get used to rational management to save energy as well as learn to apply energy-efficient practices in their daily lives.

This POE learning model is generally applied in studying science, but in POE

learning there is no step to apply the knowledge that learners have gained through the material delivered because it still highlights cognitive aspects and skills only. Muna (2017) mentions there are 3 syntaxes in POE namely Prediction, Observation, and Explanation.

Predicting is the skill of learners in anticipating or concluding something that will happen in the future based on estimates of trends, certain patterns, relationships between data, or information. The second component is observing. The ability of observation is fundamental to exploring the environment and to test ideas by involving the use of all senses. Learners experience their own learning events so as to further deepen the concepts, understandings, and facts learned by them, because the fact is that learners themselves are looking for and discovering the concept. The next component is to explain. On the skill of explaining, learners are asked to explain the results of observations and explain the nonconformity of predictions with the actual circumstances so that learners are required to be responsible for the results of observations that learners make.

Based on research conducted by Chen (2020) states that with the stage of predicting, observing, explaining and doing, shows that learning motivation, learning achievement, and direct abilities of both groups of learners increase. The system helps learners complete practical activities using scientific research.

There needs to be an effort to emphasize the tendency to be conservation, then there needs to be action carried out by learners. UNESCO reveals 4 pillars in education, one of which is Learning to do. In this pillar, learning is interpreted as an effort to make learners not only know, hear and see with the purpose of accumulating knowledge, but rather able to do, skilled at doing or doing certain activities (something) so as to produce something meaningful for life.

Model pembelajaran POED memiliki 4 tahap pembelajaran yaitu : memprediksi suatu fenomena atau kejadian (*predict*), observasi dari permasalahan yang telah diprediksi (*Observe*), menjelaskan pengetahuan yang telah di dapat (*Explain*) dan melakukan aksi nyata berupa penerapan dari pengetahuan yang telah di dapat (*Do*).

Briefly the activities of teachers and learners in learning learners make predicting, observing, explaining and doing real action in the energy conservation

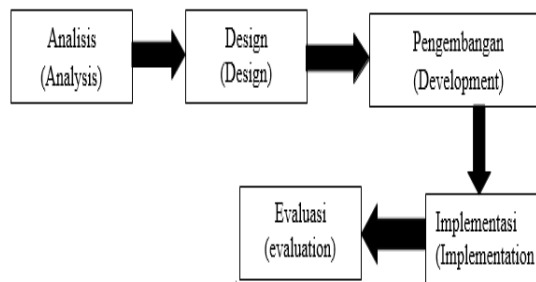
movement. Through simple energy saving actions such as turning off the lights if unused, using electronic devices wisely, saving paper use, and other energy saving measures, the character of learners will be formed because they do energy-efficient habituation in their daily lives.

POED learning model is a learning model that involves learners in predicting a phenomenon or event, making observations through demonstrations, explaining the results of their observations and their previous predictions, and performing concrete actions after discovering concepts in a learning. The existence of stages of doing (do) is developed so that learners are able to apply the knowledge that they have gained in everyday life through concrete actions so that not only knowledge they are good at but they also participate in applying or even bringing up innovative ideas to apply the knowledge they have gained so as to create a meaningful learning experience.

This POED learning model, aims to improve the tendency of energy conservation attitudes and learning outcomes in elementary school learners, in addition learners can realize the importance of energy saving. Furthermore, learners are expected to be wiser in utilizing and creating an innovation to solve the energy crisis problem in Indonesia.

## METHOD

The type of research used in this research is development research that produces products in the form of learning model devices. This research aims to develop a POED learning model device to improve learning outcomes and the tendency to behave an energy conservation character for school learners in Sub-theme Let's Save Energy for grade IV Elementary School. This research procedure adapts the ADDIE development model presented in Figure 1.



**Figure 1.** ADDIE Development Model Steps

The research procedure in Figure 1 consists of five stages that include analysis, design, development, implementation and

evaluation (Sugiyono, 2015).

This research and development procedure follows the following steps:

#### 1) Analysis Stage (Analysis)

At this stage, the main activity is to analyze the need for the development of new learning model devices and analyze the feasibility and requirements of the development of new learning model devices (Sugiyono, 2015: 200). Based on the analysis stage conducted by researchers by conducting in-depth interviews on problems in natural science learning in class IV, revealed that the learning model used in the classroom in order to apply energy conservation has not been effective, so there needs to be a learning model that is able to direct learners to increase the tendency to be energy conservation and improve learning outcomes.

The results of the literature study revealed that the POE model has a learning syntax that directs learners to discover the concept of knowledge from the process of prediction, observation and explanation, but nevertheless this learning model has not directed learners to perform real actions as a form of application of the knowledge that has been obtained by learners so that there needs to be a development model that facilitates learners to do real deeds in doing energy conservation activities.

Based on the data obtained, researchers will design effective handling by developing learning devices on grade IV elementary school source material.

#### 2) Design Stage (Design)

Based on the results of interviews with field practitioners (teacher grade IV A SDN Pendowo), the next step is to design the products developed. Product design is done by designing a learning model that is suitable and in accordance with field conditions based on the results of interviews and literature studies. The POE model has been used but has not been able to direct learners to increase the tendency to be energy conservation.

Model design consists of model devices and evaluation instruments. The model device arranged consists of a learning syllabus, RPP, teaching materials, and LKPD. Evaluation of learning compiled in the form of questionnaire sheets to measure the ability of the value of the tendency to be energy conservation in learners, as well as evaluation questions to measure the level of mastery of learners to the material. In addition, validation instruments are also prepared for product validation purposes that are prepared, consisting of model

validation instruments, model device validation instruments, and learning evaluation tool validation instruments.

The validated products include: (1) design of learning models; (2) the design of the learning model device consisting of (a) the learning syllabus, (b) RPP, (c), teaching materials and (d) LKPD; (3) the design of evaluation instruments in the form of (a) questionnaires, and (b) evaluation questions.

#### 3) Development Stage

The design of the product that has been prepared, developed based on the following stages:

(a) Researchers develop a POED learning model device. After that the researcher re-corrects the learning model device from the development results before being validated, if it is appropriate next the product is ready to be validated, (b) Make the product validity questionnaire for experts, questionnaires for teacher and student responses, (c) Validation of POED learning model design conducted by experts, (d) After getting input from experts and validated, then known weaknesses. These weaknesses are further tried to be reduced by improving the products developed. Products that have been revised and received a good predicate, then the product continues to the next stage, namely the implementation stage.

#### 4) Implementation Phase

Implementation phase is carried out in class IV SDN 01 Pendowo. The implementation phase is carried out by experimental methods on two groups of learners who are treated with different learning models (POED learning models and conventional learning models by lecturing and asking questions) to find out the effectiveness of the resulting learning model.

#### 5) Evaluation Stage

Evaluation is the process of analyzing the model device at the implementation stage there are still shortcomings and weaknesses or not. If there are no more revisions, then the learning model is worth using.

The data source is the subject on which the data is obtained. The data sources used are primary and secondary data. The primary data used is a class IV student SDN 01 Pendowo with products produced in the form of POED Model Devices for class IV with the Theme of Let's Save Energy and tend to be energy conservation for learners. While the secondary data source used in the form of questionnaires and responses from both learners and teachers in SDN 01 Pendowo.

The subjects of the limited trial of this study were 10 learners from SDN 01 Pendowo while the extensive trial used class

IV B as control class and IV A as experimental class, with 20 respondents per group. Experimental classes were given special treatment with POED learning model designs, while control classes used lecture and Q&A learning models.

Quantitative data collection techniques and instruments in the form of: (1) expert validation techniques, (2) questionnaire techniques, (3) test techniques. While the technique and instrumen qualitative data collection in the form of interview techniques. After the data is collected, the data is then tested, which includes: (1) the test of the validity of the learning model, (2) the test of the validity of the learning device, (3) the test of validity and reliability of the evaluation instrument. The data that has been tested is then analyzed qualitatively and quantitatively using the help of SPSS software. Analysis techniques with the help of SPSS were used to test different average learning outcomes and the tendency to be energy conservation in both experimental groups and control groups.

## RESULT AND DISCUSSION

Through the stage of interview with the teacher, found problems about the learning conditions in the classroom. It is known that from various subjects applied in the classroom, one of the materials that the majority of learners got score under Minimum Criteria Completion is in natural science subjects.

Natural science is a field of science that studies nature that is oriented not only to products or results, but also emphasizes the process of how a concept can be formed. So that in studying natural science learners relate to how to find out about nature systematically.

The study of natural science is not only the mastery of a collection of knowledge in the form of facts, concepts, or principles but also a process of discovery. So on the basis of this, researchers got the idea to develop learning media through the POED Learning Model Device (Predict, Observe, Explain and Do) to Improve Learning Outcomes and Trends in Conservation of Energy Learners.

Another problem was discovered after researchers conducted an interview with a class IV guardian, who said that one of the things behind the low attitude of energy conservation in learners is the lack of habits applied by schools in campaigning for energy saving such as government rules. For example, there are still many learners who are not wise in utilizing water and paper,

turning on the lights during the day in a bright position, letting the fan stay on when not used in the classroom and so on, and the absence of posters or writings in schools about energy saving invitations that cause learners to be less concerned about the attitude of energy conservation.

Through the development of this media is expected to be a solution in order to increase the tendency to be energy conservation in learners and improve learning outcomes, especially in natural science subjects.

The results of the interview are used as a basis for the analysis of needs accompanied by questionnaires given to students and teachers. The questionnaire is a need questionnaire that contains the choices of plans that will be realized into the media. In order for learners to express their initial knowledge related to the material provided, the researchers conduct cooperation between learners during the discussion, namely exchanging opinions between learners with each other. There is a conceptual change in the knowledge possessed by learners. Conceptual changes that occur are changes in the initial concept held by learners with newly proven knowledge of the truth through demonstrations or experiments, so that this POED learning model can be proven and is very suitable to be applied to the learning of natural sciences.

The next step is the validation process. The validation process is carried out to obtain assessments, inputs and suggestions on learning media, as well as a feasibility analysis step to test whether the media can be used without revision or has not been used at all. The tools validated in this study are: validation of learning model, validation of model device, and validation of evaluation instruments.

Validation results on the POED learning model, get an average rating score of 3.50, so it is declared very valid and can already be used with some revisions. Expert assessments show that the syllabus can already be used with minor revisions. The average score is 3.65. Thus, the syllabus is declared very valid. The average score obtained from the results of expert assessment of RPP showed a result of 3.62, so the RPP was declared very valid. For the acquisition of the average score on validation of teaching material shows a result of 3.29 so that it is declared very valid. The average validation score for LKPD is 3.43 so it is declared very valid. The results of the experts' assessment showed that the test

problem could be used with a slight revision, with an average score of 3.50 so it was declared very valid. The validation score for the energy conservation questionnaire sheet obtained an average score of 3.28 so that it was declared very valid, and could be used with minor revisions.

In testing learning devices, all variables have valid results where it is one of the criteria that must be met from the development of a learning model. This is in accordance with the theory of Nazarudin (2007) which says that learning devices must be fulfilled everything so that the implementation and evaluation of learning can be done systematically and obtain results as expected. Later in the instrument reliability test, although in the same reliability category, the experimental class group given the POED learning method was shown to show higher scores than the control class group using conventional learning methods. It can be concluded that from each test variable for the learning model device is said to be valid and can be passed on to other tests to increase the tendency to be energy conservation in learners.

Based on statistical tests on the assessment of the tendency to be energy conservation in learners, it is known that the results obtained from experimental classes and control classes are significant differences. Test results using Mann Whitney's non-parametric tests showed asymp.Sig values. (2-tailed) of  $0.000 < 0.05$  which means there is a difference in both classes. Then in the results obtained in the experimental class, obtained a larger value that is the average rank of 30.50 compared to the control class with an average of 10.50.

The results were based on treatment received in experimental classes that got the POED learning model, and control classes that used conventional learning models, namely lectures and Q&A. So it can be concluded that learning using POED (Predict, Observe, Explain and Do) learning model devices further increases the tendency to be energy conservation in elementary school learners compared to conventional learning models. This is in line with research conducted by Astuti *et al* (2017), which states that there is a difference in the ability to understand Science concepts in learners between learning using POE models and learning using conventional methods.

Based on the results of the N-Gain score test calculation, it shows that the

average N-Gain score for experimental values (using POED learning methods) is 27 for the minimum score and 89 for the maximum score. Then the average result shows the value of 0.5656 which is in the range of 0.3 - 0.7 and the value is included in the medium criteria. While for the average N-Gain score of the control class (using conventional learning methods i.e. lectures and Q&A) is 0.2229 and falls into the low category.

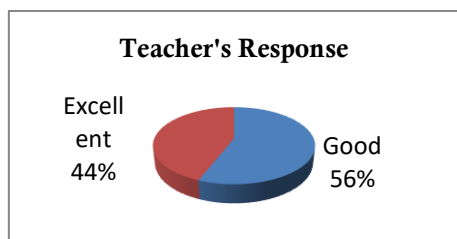
In the analysis of learning outcomes obtained a significance score of (0.570). The significance value of  $> 0.05$  means  $H_0$  is accepted and  $H_a$  is rejected, meaning that in the analysis of learning outcome data between the experimental class and the control class there is a difference between the average grade of the experiment and the control class. From these tests, it can be concluded that learning using the POED method further improves learners' learning outcomes than learning using conventional learning methods. Khathanvy & Yuenyong in Amal *et al* (2013) concluded that POE learning strategy is a strategy that can provide new knowledge to students in real terms and can increase student participation to be more active and creative so as to increase learning achievement significantly.

In the classical learning completion data test, the results of completion in the experimental class were greater than the control class with the acquisition of 100% completion experimental classes and control classes 65% completion. The analysis is in accordance with what Bodner (Indrawati, 2009: 10) states that learners in learning not only imitate and form shadows of what is observed or taught by the teacher, but actively selects, filters, gives meaning, and tests the truth of the information they receive.

Based on the analysis obtained from the above three-dimensional testing between learning outcome analysis testing, N-Gain test and learning completion, as well as from some previous research, in experimental classes and control classes have significant differences. It can be concluded that the use of POED Learning Model Devices (Predict, Observe, Explain and Do) is quite effectively used to improve learning outcomes and the tendency to be energy conservation in elementary school learners.

Practicality tests are conducted to test the exposure of learning devices by users, namely teachers and learners by carrying out learning using learning devices that have been revised based on assessments by expert validators. The average percentage of teacher responses to learning devices is presented in

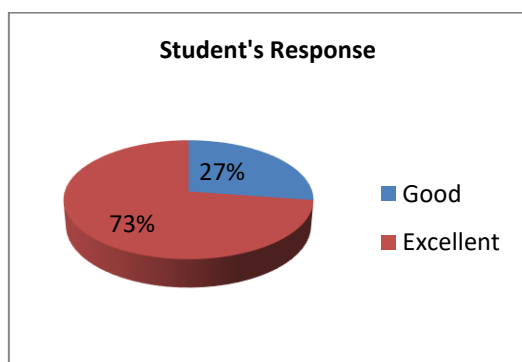
Figure 2.



**Figure 2.** The average percentage of teacher responses to learning devices

Based on the teacher's response from the questionnaire obtained in Figure 2, the average percentage of teacher responses who give good ratings gets 56% and excellent ratings 44%. The number of positive responses all get a percentage rating of 100% which is > 75% meaning that the overall assessment of the questionnaire given to teachers gets the criteria "A" is very good.

The average percentage of learners' responses to learning devices is presented in Figure 3.



**Figure 3.** The average percentage of students' responses to learning devices

Based on the student's response from the questionnaire obtained in Figure 3, the average percentage of student responses who gave good assessment got 27.3% and excellent ratings 72.7%. The number of positive responses all get a percentage assessment of 100% which is > 75% meaning that the overall assessment of the questionnaire given to students gets the criteria "A" which is very good.

Based on the results of the analysis of questionnaire answers to teachers and learners above, proving that every statement given is a favorable statement. Researchers analyzed the data using the technique of taking average answers to get the results of the analysis. Then based on the descriptions that have been presented, it is seen that teachers and students give positive responses to the application of

POED (Predict, Observe, Explain and Do) learning models for practicality in the use of learning models in increasing the tendency to be energy conservation in learners. This is seen from the average score of teacher and student responses obtained through questionnaires, including in the category of excellent once.

This finding is reinforced by the theory according to Purwanto (2014) who said that factors that greatly affect the development and formation of children's attitudes that need to be considered in education are: maturity (maturation), the physical condition of the child, family influence, social environment, school life, teachers, school curriculum, and the way teachers teach. In this case, teacher assessment and school curriculum assessment become the main thing that is discussed in this POED learning development model.

The practicality provides a rapid absorption of understanding received by learners. With a clear and directed learning model, making learners able to implement the values contained in the learning material.

The success of the use of this POED learning model device in addition to being seen from the results of the questionnaire between the assessment of teachers and learners who are declared very good, can also be analyzed from every aspect obtained after teachers and learners use the learning model. Teachers and learners assess that the use of POED learning media is very clear. Then in the aspect of coverage and indicators of learning competencies are appropriate, so that the target of improving science subject learning outcomes in elementary school can be met. In this scope there is a motivation so that learners are able to apply energy conservation attitudes.

Then on the aspect of language, teachers and learners agree that the language used in this POED learning model, is clear and easy to understand so as not to cause multi-interpretation in every sentence used in the learning model.

Thus, the researchers concluded that the teacher's response questionnaire and the response of learners to the application of the POED learning model is practically used to increase the tendency to be energy conservation in learners.

## CONCLUSION

Based on the results of research and discussion conducted, it can be concluded that the POED (Predict, Observe, Explain and Do) learning model is valid. Learning using

POED (Predict, Observe, Explain and Do) model devices further increases the tendency to be energy conservation of elementary school learners compared to conventional learning models. POED learning models are practically used and able to increase the tendency to be energy conservation in learners. The use of POED (Predict, Observe, Explain and Do) learning model devices is quite effectively used to improve learning outcomes and the tendency to be energy conservation of elementary school learners. While the use of conventional learning methods, namely lectures and Q&A is less effective to improve learning outcomes in learners, especially in natural science subject learning.

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