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ECOPRENEURSHIP ON PROJECT-BASED LEARING (PBL) : AN APPROACH TO INCREASE LEARNING RESPONSE IN PHYSICS

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Abstract

This research aims to examine students' response to the implementation of ecopreneurship-oriented Project-Based Learing (PBL) model in physics learnig. The type of this reasearch is descriptive quantitative with true-experimental methods and control group pre-test and post-test design, which is applied to 49 science-majored sophomore students in SMA Negeri 1 Mojosari, Mojokerto.Students' response were collected through responses questionnaire which is arranged with Likert scale and the results were analyzed descriptive-quantitatively. Based on the results' analysis, students' response to ecopreneurship-oriented PBL model is in very good criteria with the average percentage of 83% which shows that the model is well accepted by the students and able to be applied more on physics learning and other subjects.
Keywords : Learning Responses, Project-Based Learning, Ecopreneurship

Abstrak

Penelitian ini bertujuan untuk mengetahui respons peserta didik terhadap pelaksanaan pembelajaran mata pelajaran fisika menggunakan model PBL berorientasi *ecopreneurship*. Jenis penelitian yang dilaksanakan adalah kuantitatif deskriptif dengan metode penelitian *true experimental design* dan desain penelitian *Control Group Pre-test and Post-test*. Subyek penelitian adalah 49 peserta didik kelas XI MIPA semester genap tahun pelajaran 2018/2019 di SMA Negeri 1 Mojosari, Mojokerto. Respons peserta didik dihimpun menggunakanan gketrespons yang disusun dengan skala Likert dan hasilnya dianalisis secara deskriptif kuantitatif. Berdasarkan analisis data diperoleh hasil bahwa respons peserta didik terhadap pelaksanaan model PBL berorientasi *ecopreneurship* dalam kriteria sangat baik dengan persentase rata-rata 83% yang menunjukkan bahwa model tersebut dapat diterima dengan baik oleh peserta didik dan dapat diaplikasikan lebih lanjut pada pembelajaran fisika maupun mata pelajaran lain.
Kata Kunci : Respons Belajar, *Project-Based Learning*, *Ecopreneurship*

INTRODUCTION

Indonesia's education which is still low in quality leads Indonesia's human resources becomes uncompetitive entering the 21st Century (Trisdiono, 2013). That low quality in education can be caused by Indonesia's learning process that is not able to relate the school life to the real-life topics. Based on Widiasworo (2017:18), the material taught in the school tends to be theoretical rather than applicable. Thus, in the school year of 2013/2014 the government began to implement the 2013 Curriculum which is expected to solve the problems of human resources in Indonesia (Sani, 2015:5).

2013's Curriculum emphasis on scientific approach (Kemendikbud, 2013) which is learned through three main learning models, namely the discovery learning, problem-based learning, and project-based learning (Kemendikbud, 2014). According to Adinugraha (2017), the scientific approach becomes more meaningful, if students can increase their ability to create a product. Product creation by students in the learning process can be done by implementing a project-based learning model.

Project-based learning (PBL) model is an instructional model that involves the students, within groups, in the activities of designing, manufacturing, and display products based on competencies and learning objectives to overcome the problems of the real world (society or environment) to find new knowledge (Isok' atun and Rosmala, 2018:107 and Pratama and Prastyaningrum, 2016). One of PBL model advantages is enhancing students' problem-solving skill (Sumarni, 2013), which is an important skill for students' due to it

has to be owned by them to become an excellent human resource in the 21st century (Turiman*et al*., 2011).

Unfortunately, problem-solving skill of Indone-sia's students, especially in physics learning which is used as a vehicle to grow the skill (Depdiknas, 2013), is considered to be low based on the results obtained by Makrufi dkk (2016) and Pradugawati dkk (2016). This problem can be solved by implementing PBL model on the learning as proved on the researches done by Rosma (2015) and Malahayati (2015).

In the implementation of PBL model a learning innovation can be done to obtain more maximal results. In this study, the innovation done by orienting PBL model on ecopreneurship concept.Ecopreneurship is a branch of entrepreneurship field that takes into account the environment's problems as the basis of innovation (Isaak, 2002). Ecopreneurship selected as the innovation in implementing PBL model because, based on Sani (2015:3), environmental problems is one of the issues that affect the lives that must be faced by learners in the future. Therefore, the students also have to be equipped with the skills to keep the environment as well as addressing environmental problems. It will make the learning more contextual just as the developing learning nowadays (Dwikoranto, 2011).

In implementing the ecopreneureship-oriented PBL model, dynamic fluid, the material which is taught to the sophomore students in senior high school, has been chosen as the material used on this research. The main thing to be the basic consideration of the material chosen is the material's basic competency in 2013 Curriculum, which requires students to be able to apply the concepts and create simple projects related to the dynamic fluid. In order for the dynamic fluid concepts to be capable of supporting ecopreneurship-oriented PBL model, the essential questions and assignments on the PBL model project must be associated with environmental problems, such as the availability of water, flooding, availability of renewable energy, and the effects of a tornado.

Based on the description in the previous para-graphs, the researcher is interested in knowing students' response towards ecopreneurship-oriented PBL model. Thus, research is held with the title: "Ecopreneurship on Project-Based Learing (PBL): An Approach to IncreaseLearning Responsein Physics".

METHOD

The experiment was conducted using True Expe-rimental Design research method and Control Group Pre-Test and Post-Test research design. The population in this study was science-majored sophomore students in SMA Negeri 1 Mojosari, Mojokerto and two classes was chosen to be research subjects using purposive sampling techniques, namely XI MIPA 4, as the experimental class, and XI MIPA 5, as the control class. In the experimental class, physics learning was carried out using the ecopreneurship-oriented PBL model, whereas, in the control class, physics learning was conducted by implementing a traditional model (lecture) that is oriented towards the concept of ecopreneurship. The following Table 1 shows the design of research that had been implemented:

Table 1. Control Group Pre-test and Post-testResearch Design

Class	*Pre-test*	Treatment	*Post-test*
Experiment	O_1	X	O_2
Control	O_1	-	O_2

Informations :

O_1 : Students' pre-test results that describe the initial capability prior to the implementation of the learning process in fluid dynamic.

X : Implementation of ecopreneurship-oriented PBL model on fluid dynamic using the understanding worksheet.

\- : Implementation of the ecopreneurship-oriented traditional models (lecture)using the understanding worksheet.

O_2 : Students' post-test results that describe the final capability prior to the implementation of the learning process in fluid dynamic.

From both the sample classes, the response question-naires are only given to the experimental class, which consists of 30 students, because the class' physics learning process is held by using ecopreneurship-oriented PBL model. Before the response questionnaires are given to the students, it was validated on two physics professors in Unesa and then the validation score results were analyzed to determine the validity and reliability of the response questionnaire.

Determining the validity of the questionnaire respon-ses was done by finding the average score of validation and categorized it based on the following criteria:

Table 2. Validity Criteria of Instrument Research

No.	Interval Validation Scores	Criteria
1.	$3.6 \leq SV < 4$	Very Valid
2.	$2{,}6 \leq SV < 3.5$	Valid
3.	$1.6 \leq SV < 2.5$	Less Valid
4.	$1.0 \leq SV < 1.5$	Invalid

(Ratumanan and Laurens, 2011)

Then, the reliability was determined by using percentage of agreement formula:

$$percentage\ of\ agreement = \left(1 - \frac{(A-B)}{(A+B)}\right) x100\% \text{.....(1)}$$

Informations :

A = The highest frequency of ratings

B = The lowest frequency ratings

The results of instrument research reliability is analyze by categorizing it based on the following criteria:

Table 3. Reliability Percentage Interpretation of Research Instruments

No.	Percentage Reliability (%)	Criteria
1.	81-100	Very High
2.	61-80	High
3.	41-60	Moderate
4.	21-40	Low
5.	<20	Very Low

A developed learning device said to be reliable if it has a value of reliability with a percentage of ≥ 75% (Borich, 1994).

The response questionnaire that is used contains 10 statements on Likert scale that includes 3 indicators, they are (1) implementation ecopreneurship-oriented PBL model, (2) worksheet and textbook used, and (3) the benefits perceived by the students. There is also one open-ended question to collect the difficulties experienced by students during learning physics using ecopreneurship-oriented PBL model. The results of the response questionnaires com-pleted by the students were analyzed descriptive-quantitatively and classified by categorizing it according to students responses classifica-tion by Riduwan and Sunarto (2013:23) on Table 4.

Table 4. Students Response Classification

No.	Percent of Students (%)	Category
1.	0-20	Very Poor
2.	21-40	Not Good
3.	41-60	Pretty Good
4.	61-80	Well
5.	81-100	Very Good

RESULTS AND DISCUSSION

The following is a table that shows the validity and reliability analysis results of the responses questionnaire used on this research.

Table 5. Results of Research Instruments Validity Analysis

Research Instruments	Validation scores	Category
Students' response questionnaire	3.60	Very Valid

Table 6. Results of Research Instruments Precentage of Agreement Analysis

Research Instruments	Percentage Reliability (%)	Category
Students' response questionnaire	95.71	Very High

Based on the results in Table 5 and Table 6, it can be concluded that the responses questionnaire is in the valid and reliable category and fit for use on the research.

Here is a recapitulation of the students' response questionnaire towards Learning physics using ecopre-neurship-oriented PBL model:

Table 7. Summary Results of Response Questionnaire

Indicators	Statements	Response Percentage (%)			
		VA	A	D	VD
1	Ecopreneurship-oriented PBL model in physics learning is very pleasant	30	67	3	0
	Ecopreneurship-oriented PBL model makes physics learning becomes more beneficial	40	60	0	0
2	Projects worksheet on ecopreneurship-oriented PBL model helped me to plan projects and solve problems	23	77	0	0
	Understanding worksheet on ecopreneurship-oriented PBL model helped me to understand the concepts and solve problems	37	63	0	0
	Textbook used on ecopreneurship-oriented PBL model helped me to understand the concepts	20	80	0	0
3	Learning physics using ecopreneurship-oriented PBL model makes me be better in understanding environmental issues	43	57	0	0
	Learning physics using ecopreneurship-oriented PBL model makes me able to plan projects related to environmental issues	27	73	0	0
	Learning physics using ecopreneurship-oriented PBL model enabled me to	30	70	0	0

Indicators	Statements	Response Percentage (%)			
		VA	A	D	VD
	evaluate the various actions that can be done to address environmental issues				
	Learning physics using ecopreneurship-oriented PBL model makes me be better in problem solving	10	83	7	0
	Learning physics using ecopreneurship-oriented PBL model helps me to further explore the ability of project creation	37	63	0	0

Informations :
VA = very agree
A = agree
NA = disagree
VN = very disagree

The results of the students' response questionnaire in Table 7 as a whole possesses an average percentage of 83% in very well criteria.

Based on the percentage of responses obtained on indicator 1 can be seen that the students agreed that learning physics using ecopreneurship-oriented PBL model is beneficial, although there is a minority of students who declared their disagreement that the model is pleasant. This might be caused by the students feel less comfortable with the implementation of ecopreneurship-oriented PBL model in learning physics. These findings coincide with those summarized by Sumarni (2013) in deficiencies encountered in the implementation of PBL models, namely students feel less comfortable with this model compared to the traditional learning model. Then, the percentage of responses obtained on the indicator 2 indicates that the worksheets and textbook provided could help students during learning physics using ecopreneur-ship-oriented PBL model. Based on Mardiana (2017), this case occurred due to the worksheets and textbook given had been provided steps that must be done by the students to find information about the projects and explore their own knowledge. Lastly, the percentage of the indicator 3 shows students agreements towards several benefits provided by the ecopreneurship-oriented PBL model, such as understanding to environmental issues, in project designing skills and solving problems related to environmental issues, although there is of students disagreed to these statements. In the researcher's opinion, this case occurred due to the ecopreneurship-oriented PBL model was implemented during the 1 x 3 meetings only. If the ecopreneurship-oriented PBL model has been applied several times in learning physics, students will be more likely to feel the benefits gained.

In connection with open-ended questions to regather the difficulties faced by the students during the implementation of ecopreneurship-oriented PBL model, as many as 15 students found different difficulty. Some students stated that they were less able to describe the occurring environmental issues and the others stated that the overall project timeline is considered very less. The findings are in line with the statement by Cintang *et al.* (2018), that the readiness of students and the timing chosen to conduct the PBL model are included in the challenges that may affect the implementation of PBL model. Cintang *et al.* further stated that the challenges related to the readiness of learners can be carried out by continually try to apply the PBL model in learning so that students can familiarize themselves with various abilities and skills required. Then, related to the timing of the implementation of PBL models, teachers can summarize the times which are considered effective for students to do and accomplish the project.

CONCLUSION

Based on the results obtained can be concluded that learning physics using ecopreneurship-oriented PBL model gained a very good response. Ecopreneurship-oriented PBL model not only let students to learn physics concept on their own in a different way by doing a project, but also practice and enhace skills whish are important to be owend in 21st Century, such as problem-solving skill and project-making skill. Through the learning, students were introduced to environmental issues around them through ecopreneurship concept and it can grow students' interest and awareness to the environmental conditions which is unless important in this century. Based on the findings, the researchers found ecopreneurship-oriented PBL model should be applied more either in physics or other variety of subjects that are taught in schools to give students an interesting and valuable learning.

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