THE IMPLEMENTATION OF 7E LEARNING CYCLE IN SUB MATERIAL NEWTON LAWS OF MOTION TO TRAIN STUDENTS' SCIENCE PROCESS SKILLS

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Abstract

This research reported the implementation of learning cycle 7E to train science process skills and describing the student's science process skills. The research was pre experimental with one group pretest posttest design. The teaching learning materials were validated before being used. The research data were analyzed by implementation learning analysis, pre-test and post-test analysis, worksheet assessment analysis. The change of students' science process skills were analyzed by t-paired test. The results of the research showed that: (1) the quality of learning cycle 7E implementation gots very good category. (2) Students' science process skills got a significant improvement based on the paired t-test.

Keywords: Learning Cycle 7E, Newton Laws, Science Process Skills.

Abstrak

Penelitian bertujuan mendeskripsikan keterlaksanaan pembelajaran dengan model *Learning Cycle 7E* terhadap keterampilan proses sains dan mendeskripsikan keterampilan proses sains yang dimiliki peserta didik. Penelitian ini menggunakan *pre experimental* dengan desain *one group pre-test-post-test*. Perangkat pemebelajaran yang digunakan telah divalidasi sebelum digunakan. Data penelitian dianalisis menggunakan analisis keterlaksanaan pembelajaran, analisis nilai *pre-test* dan *post-test*, serta analisis tes kinerja. Hasil dari penelitian ini menunjukkan: (1) Kualitas keterlaksanaan pembelajran *Learning Cycle 7E* berkriteria sangat baik. (2) Keterampilan proses sains peserta didik mengalami peningkatan yang signifikan berdasarkan uji-t.

Kata kunci: *Learning Cycle 7E*, Hukum Newton, Keterampilan Proses Sains.

INTRODUCTION

Physics is a scientific branches of science. Physics can be studied effectively through scientific investigation and direct observation. One effort that can be done by educators to students is to practice science process skills. Science process skills is the ability of learners to acquire knowledge directly in scientific investigation. Important science process skills are taught so that learners are able to describe objects and events, asking questions, making the explanation, the explanation examine the scientific knowledge and communicate these ideas (Opara 2011).

Based on the pre-study questionnaire conducted in SMAN 1 Krian, result that learners ever doing lab activities on some specific material in one semester. In general, science process skills of students were low quality because they only understood observing skill from several aspects of science process skills such as observing,

formulating problems, develop hypotheses, identify variables, conduct experiments and process data. In learning of physics, the same learning model can not be applied to all material in physics. Training aspects of science process skills in physics need the learning model that could help explain the physics to be more easily understood, not only theory but also its application in real life. Science process skills of learners can be developed with the 7E Learning Cycle model (Kartikawati & Azizah, 2017).

Constructivist learning included in 7E Learning Cycle model that allows learners play an active role in learning. 7E Learning Cycle has seven phases elicit, engage, explore, explain, elaborate, Evaluate, and extend (Einskraft, 2003). 7E Learning Cycle begins from questions by the teacher to know prior knowledge possessed learners (Elicit) and ends on the introduction of

a concept or a scientific principle that had been understood in a more complex situation (Extend). According Eisenkraft (2003) in Sadia (2014) 7E Learning Cycle in accordance with the constructivist theory to improve students understanding of the concepts and scientific principles of a subject matter.

Constructivist learning aims for learners to discover and understand complex information through their own means (Slavin, 2009). Teachers should not be directly providing knowledge to students, but giving a chance learners to construct their own knowledge through experience in the process of discovery of facts and concepts and principles for the learners themselves. In students centered learning, the teacher as a facilitator to help the students find their own knowledge and control all activities of the classroom (Slavin, 2009). Based on the background description of the problem applying 7E Learning Cycle was able to train aspects of science process skills of learners, researchers conducted a study entitled "The Implementation of 7E Learning Cycle in Sub Materials Newton Laws of Motion to Train Students' Science Process Skills".

METHOD

The research used quantitative-descriptive study with pre experimental design (one group pretest posttest) because it does not use a control group. Research conducted at SMAN 1 Krian Sidoarjo on the school year 2018/2019. The population in this study was 10th grade natural science students of SMAN 1 Krian Sidoarjo and the samples were selected three classes from its by purposive sampling. In this research 7E Learning Cycle as independent variables, implementation learning and science process skills as dependent variable.

RESULT AND DISCUSSION

The normality test results obtained sig> α (0.05) for each class, it can be said that each class had normally distributed population. Obtained homogeneity test carried sig> α (0.05), it conclude that the samples were homogeneous population. Learning process was done based on the research method. Observation on teacher and student activities during learning process had done also. The observation of implementation 7E Learning Cycle in the three classes as follows:

Table 1. Learning Activity result

Class	Percentage (%)		Category
	1st Meeting	2nd Meeting	
X IPA 5	93,0 %	94,5 %	Very Good
X IPA 6	93,0 %	95,3 %	Very Good
X IPA 7	93,8 %	93,0 %	Very Good

Based on data on the above table, the implementation of the 7E Learning Cycle model for three classes got very good category on first and second meetings. The percentage reduction in X IPA 7 class which as second replication of 93.8% to 93.0%. It was not very significant score because it was still in the very good category. This is according to research conducted by Herdiana and Supardiyono (2018) stated that the implementation of 7E Learning Cycle model accomplished with very good category.

Analyzing of science process skills results using two assessment, based on the pre-test and post-test score and worksheet assessment. The pre-test and post-test score were analyzed by t-paired test after the prerequisite test (normality and homogeneity) are met. Paired t-test is used to determine the increasing science process skills of students after implementating 7E Learning Cycle based on the difference between the post-test and pre-test. H_0 hypothesis was stated average improvement not significant, while the average H_1 stated average significant improvement. H_0 criteria was rejected if t> t table. T-paired test results are shown in Table 2.

Table 2. T-Paired Test Score

Class	t	t_{table}	Conclusion
Experiment	8,881	1,711	
Replication 1	7,338	1,711	H_0 rejected
Replication 2	5,293	1,708	

Based on Table 2 H_0 was rejected because t> t table, which means the increasment in students' science process skills were significant.

The second assessment based on worksheet result. It assessed the students' performance when learning takes place. This assessment results of the three classes can be seen in Figure 1 below:
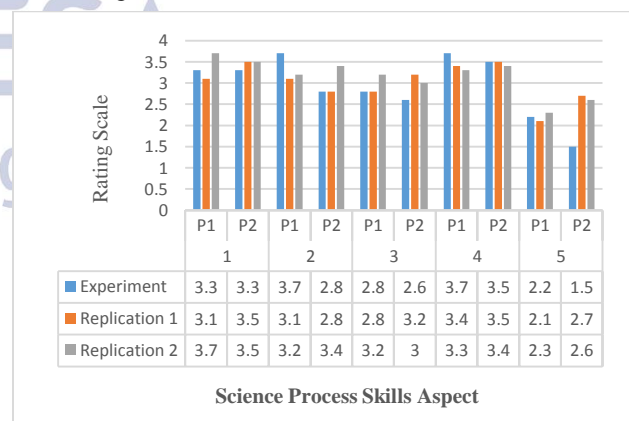

	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2
	1		2		3		4		5	
Experiment	3.3	3.3	3.7	2.8	2.8	2.6	3.7	3.5	2.2	1.5
Replication 1	3.1	3.5	3.1	2.8	2.8	3.2	3.4	3.5	2.1	2.7
Replication 2	3.7	3.5	3.2	3.4	3.2	3	3.3	3.4	2.3	2.6

Science Process Skills Aspect

Figure 1. Science Process Skills Assessment Result

Based on Figure 1 the percentage of the highest aspect for three classes at the first and the second meetings was experimenting aspect with average of 3.46, while the

lowest percentage was obtained by processing data aspects with an average of 2.23.

CONCLUSION

The results show that the quality of implementation 7E Learning Cycle model to train students' science process skills was very good and their science process skills experienced got significant increasment.

Suggestion

If the research is going to be continued, it is expected that processing data aspect need to be trained continously because students are still confused to process and analyze the data after obtaining data through experiments.

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