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IMPLEMENTATION OF INQUIRY BASED-PHYSICS LEARNING TO IMPROVE STUDENTS' SCIENTIFIC PROCESS SKILLS ON MOMENTUM AND IMPULS IN GRADE X OF SENIOR HIGH SCHOOL

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Abstract

The goals of this research was to describe the practicality of inquiry based-physics learning to improve students' scientific process skills in term of teacher's activities treatment and students' activities, and to describe the effectiveness in term of the scientific process skills improvement, classical mastery and students' responses. This research was pre experimental research by using one group pretest-posttest design. The sample of this research was determined by ensuring that the population was distributed normally and had homogenous ability, so it obtained grade XI MIA 1 and X MIA 2 of SMAN 1 Sooko as the samples. Inquiry based-physics learning could be implemented and successfully increased students' scientific process skills in very good category. Students' activity was categorized as good. Students' learning achievement scope of knowledge could obtained classical mastery by 93,06 %. Students' response of inquiry based-phisics learning model had very good criteria in both class. Based on that result, it showed that implementation of inquiry based-physics learning model could improve students' scientific process skills.

Keywords: inquiry, scientific process skills, momentum and impuls.

INTRODUCTION

The learning process at schools is an educational activity that seeks to bring the community (learners) to be better. Based on the observation, the success of education is not separated from the teaching and learning process. According to constructivist learning theory, learning is an active process of the students to build their own knowledge and seek the meaning of some materials or concept that has been learned (Yuliati, 2008).

The learning consists of five learning experiences: 1) observing, 2) questioning, 3) gathering information, 4) associating, and 5) communicating. Then science consists of content or products, processes or methods, attitudes and technology, when the learning process takes place, the learners will experience those above things (Kemdikbud, Permendikbud No.23, 2016). However, in the process of physics learning, many things are still oriented to the product only and less trained to the other aspects such as processes, attitudes and technology. The limited learning on the product aspect leads to content-based learning that results in the lower ability of science process skills and lower higher-order thinking (Prayitno, 2011).

According to Sumiati (2007) the learning process encountered in practice which is executed by a teacher shows a monotonous state for the learning material that is taught. Each material should be presented with a learning model that matches the characteristics of the material. If the teacher still maintains the monotony then no wonder if the learning process becomes uninteresting and even boring for learners, not least in physics learning.

The problems with conventional learning can be overcame by applying innovative learning. Innovative learning is a learning that is able to attract students' attention through active involvement of the students concerned. In this regard, it is necessary to design an interesting learning activity for the students (Isjoni, 2010).

Guided inquiry-based physics learning will give students the opportunity to learn how to discover facts, concepts and principles through their own experience. Therefore students not only learn by reading and then memorizing the subject matter, but also get the opportunity to practice developing the ability to think and behave scientifically to enable the construction of knowledge well so that students can improve the understanding of the material that is studied.

From the integration of science process skills in guided learning model, students can find their own concept in a structured way so that what they get will be more familiar and meaningful, besides the students can be easier to solve the problems encountered.

For learners, physics lesson is a frightening lesson as they are full of formulas that are not easy to be implemented in everyday life, moreover when in the classroom teachers deliver physics material with highly monotonous lectures and rarely facilitate students with experiments to train the thinking process (Lukma, 2011). Based on the results of a questionnaire given on June 2017 to the learners at SMAN 1 Sooko, it was found that physics was a difficult subjects for them.

Based on the research titled Profile of High School Student Error in Working Problem on Impulse and Momentum Material, it is found that the type of mistake done by students in solving the problems in Impulse and Momentum materials is due to strategy error (36%), translation error (84%), concepts (68%),

miscalculation (60%), and mark error (48%) (Rufaida, 2012). Based on this, researcher conducted a research entitled "**Implementation of Inquiry Based-Physics Learning to Improve Students' Scientific Process Skills on Momentum and Impuls in Grade X of Senior High School**".

METHOD

This research is a type of experimental research with one-group pretest-posttest design. A class sample was given a pretest test to diagnose the prior knowledge. After obtaining the data, the teacher gave treatment in the form of delivering the momentum and impuls material by using guided inquiry learning model. At the end of the learning the students were given a posttest (Sugiyono, 2010).

This research was conducted in SMAN 1 Sooko Mojokerto in the odd semester of academic year 2017/2018. The population in this research, the object that was observed is all members of the class X MIA in SMAN 1 Sooko Mojokerto. Thus study used purposive sampling, which is a technique of determining the sample with certain considerations (Sugiyono, 2010). The samples were two classes, class X MIA 1 and X MIA 2. The research design used is in figure 1.

Pretest	*Perlakuan*	*Posttest*
P_1	X	P_2

Fig. 1. Research Design
(Sundayana, 2015)

Information:
P_1 = Pretest score before treatment
P_2 = Postest score after treatment
X = Treatment given to the students

When collecting data, the method used was validation, observation, test, and questionnaire. Validation was done to validate learning tools, lesson plan, pretest and posttest questions, students' worksheet, instructional learning sheets and student response questionnaires. Observation is a method of collecting data based on systematic observation of the behavior of individuals directly in the learning process. The test was done in writing in order to obtain students' learning outcomes after the learning activities. In this study, there were two types of given tests, those are pretest and posttest. Pretest is used to determine students' prior knowledge, whereas posttest is used to know the ability or result of students' learning. The questionnaire method is used to identify students' responses about the learning through real laboratory activities. This questionnaire was completed after the learning activity.

The analysis technique used in this research was the normality and homogenity test analysis to determine the sample and normalized gain score analysis to know the improvement of students' learning outcomes.

RESULT AND DISCUSSION

Based on the analysis by using four criterias that are validity, reliability, difficulty level, and different power problem, it is obtained that the feasible problem used as pre test and post test was only 20 out of 25 tested problem.

From the result of normality test, X^2calc <X^2table for each class is obtained, so the samples are normally distributed at a significant level of 0.05, then the homogenity test in all populations obtained F^2calc < F^2table, so it was homogeneous.

The analysis of the learning implementation by three observers who observed four aspects: preliminary, core activities, closing and classroom conditions, shows an average percentage of 91% , which is very good

The learning outcomes of the skills scope in terms of observed performance values based on the skills of the scientific process can be seen from the following graph

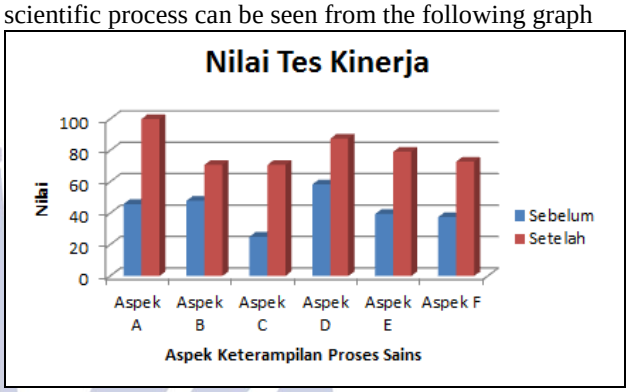

Fig. 2 Performance Test Score Graph
Source: Personal Data

Based on the graph, it can be analyzed the students' science process skills in each aspect. Before the Guided Inquiry-based Physics learning is conducted, learners have the skills of the science process skills sorted from the highest respectively on the aspects of collecting data, then making hypothesis, identifying variables, interpreting data, making conclusions to the lowest making operational definition of variables. This indicates that before the learning was done, learners have science process skills based on the learning that has been followed. Then after the learning was done, the aspect of identifying the variables obtained an average score of 100.00. The aspect of making the hypothesis obtained an average score of 70.83. The aspect of making the definition of operational variables obtained an average score of 70.83. The aspect of collecting data obtained an average score of 87.50. The aspect of interpreting the data obtained an average score of 79.17. In addition, the aspect of making the conclusion obtained an average score of 72.92. The six aspects of this science process skills have an average score of 80.21, it can be said that the science process skills are quite good.

Based on previous research, learners were not been able to formulate the hypothesis correctly because they are still confuse in linking the phenomenon with the temporary answer in the existing problems (Wahyudi & Supardi, 2013). In the indicators of making the operational definition of variables, collect data, interpreting data, and making conclusions, learners gained a moderate category improvement due to the requirement of practice independently, and make opinions that should be familiarized in every learning, while this study held only in two meetings. If there are still many learners who improve their science process skills in the moderate category, it is important to add time

to implement the skills of the science process, because the training of the science process must be carried out in a sustainable manner so that learners are trained and have the power to find solutions to the problems faced (Sheeba, 2013).

While for the learning result in the scope of knowledge refers to the individual minimum passing score applied in SMAN 1 Sooko, each learner is said to be complete if they are able to reach the value of 76. In this research 67 students pass the test from 72 students, and only 5 students didn't pass the test. The passing score in classical can be said to pass the test if 85% learners reach the minimum score (Wahyudi & Supardi, 2013). From this data, researcher obtained completion classically as 93.06% has passed the test.

CLOSING

Conclusion

Based on the results and data analysis has been done, the conclusions that can be taken are as follows:

1. The guided inquiry-based physics learning on momentum material and impulse class X in SMAN 1 Sooko Mojokerto can be done very well.
2. Guided Inquiry-based Physics Learning applied on momentum and impuls in class X material at SMAN 1 Sooko Mojokerto has an impact on improving students' science process skill in each studied class.

Recomendation

Based on the research that has been done, researchers provide suggestions as follows:

1. Based on the result of this research, Skills of Scientific Process that need to be trained further are making hypothesis, making conclusion, and making operational definition of variable.
2. Guided Inquiry learning model on momentum and impulses takes longer time so that teachers should be able to manage the learning time well
3. Skills training in the science process should be conducted on a sustainable basis and in more than two meetings, since skills training in science processes requires habituation until learners can be declared trained and ready for evaluation.

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