

THE SIMPLE PRACTICUM KIT TO IMPROVE UNDERSTANDING OF THE STUDENT'S CONCEPT DYNAMIC ELECTRICITY

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Abstract

The present study was conducted to describe an improved understanding of the student's concept dynamic electricity. The simple practicum kit has unique characteristic in terms of being a 3-dimensional, simple, be equipped with symbols and safety device, interactive real laboratory that enables students to learn incooperative class, and having been designed on the student's of thinking level. The kind of research is true experimental with control group pretest posttest design. The samples of this study were XI IPA 2 as the experimental class with learning using by simple practicum kit and XI IPA 3 as the control class with conventional learning methods using by application. To determine 66 ($n=32$ experimental and $n=34$ control class) was using purposive sampling technique. The technique of data analysis was used as n gain based on the pretest and posttest. The results from the paired sample t -test indicated that the students who were learned using simple kit had significantly scores in terms of achievement than those taught by the traditional approach and it was also found n gain 0.57 in the medium category which indicated that the learning using simple kit was more successful in improving the understanding of the student's concept dynamic electricity.

Keywords: simple practicum kit, dynamic electricity, understanding of the concept

Abstrak

Penelitian ini dilakukan untuk mendeskripsikan peningkatan pemahaman konsep listrik dinamis peserta didik. Kit praktikum sederhana memiliki karakteristik unik dalam hal menjadi 3-dimensi, sederhana, dilengkapi dengan keterangan atau simbol dan pengaman, laboratorium nyata yang interaktif yang memungkinkan peserta didik untuk belajar dalam kelompok kooperatif, dan desain telah dirancang sesuai pada tingkat berpikir peserta didik. Jenis penelitian ini adalah true experiment dengan desain control group pretest posttest. Sampel penelitian ini adalah XI IPA 2 sebagai kelas eksperimen dengan pembelajaran menggunakan kit praktikum sederhana dan XI IPA 3 sebagai kelas kontrol dengan metode pembelajaran konvensional dengan menggunakan aplikasi. Untuk menentukan 66 ($n = 32$ eksperimen dan $n = 34$ kelompok kontrol) menggunakan teknik purposive sampling. Teknik analisis data digunakan sebagai n gain berdasarkan hasil pretest dan posttest. Hasil dari paired sample t -test menunjukkan bahwa peserta didik yang belajar menggunakan kit sederhana memiliki skor signifikan dalam hal prestasi daripada yang diajarkan oleh pendekatan tradisional dan juga ditemukan n mendapatkan 0,57 dalam kategori sedang yang menunjukkan bahwa pembelajaran menggunakan kit sederhana lebih berhasil dalam meningkatkan pemahaman konsep listrik dinamis peserta didik.

Kata kunci: kit praktikum sederhana, listrik dinamis, pemahaman konsep

INTRODUCTION

In the last century, it was quite important to access information and to learn information quickly for the development of individuals and society. In the 21st century it has become impossible to follow improvements in information technologies. This convenience in accessing information has brought contributed significantly to the development of global especially education. Due to developments in education

technology and learning theories been had diversity that more increased.

The physics curriculum at the Indonesian been oriented to the scientific approach and theoretical. Laboratory activities were mostly attached to theoretical counterpart. In many cases, the lab reports were not even taken into account for the final grade, the preserved the old equipment with the old methodology, where students receive a set of learnings on how to understanding

concept by conventional methods. Most students find these learnings boring; they claim that they do not learn anything and many change major to mathematics with the hope of becoming good theoretical physicists. To solve problem, in learning must to apply laboratory activities were using media like as the simple kit. Because the essence of physics covers "a body of knowledge" that physics as a product, "a way of Investigating" ie physics as a process, and "a way of thinking" that physics as a gesture. Based on the essence, expected learning physics is not just a theory, rote formula, and computes. However, emphasizing the provision of direct experience to the students so that they can explore and understand the characteristic of scientific (Prihaningtyas, 2012). It's will helps student to understand of the concept better, with integrates and organizes from previous and new knowledge. One of sub topics in physics is dynamic electricity.

Dynamic electricity is a theoretical and abstract's topic so that in explain of its, students are required to imagine or describe objects or events that are not physically look like a current (Rusilowati, 2006). Current is defined as the rate of flow of electric charge through a cross-sectional area. The current direction is considered in line with the flow of positive charge. The Convention was adopted before it is known that the free electrons, which are negatively charged particles actually move and consequently produces a current in the wires. The motion of negatively charged electrons in one direction is equivalent to the flow of positive charge opposite direction. Thus, the electrons move in a direction opposite to the direction of flow (Tipler, 2001). The Ohm's Law says: "Large of current (I) flowing through a conductor will be directly proportional to the potential difference / voltage (V) and inversely proportional to its resistance (R)". For example river or pipes that are affected by gravity. The current flow in the wire is not only dependent on the voltage, but also on a resistance (Giancoli, 2001).

Current in the stream also undergo branching. When an electric current through the branching, the electric currents are divided at every branching and depends resistance at the branch. Kirchhoff's law says: "Amount currents are coming into a node is equal to the amount currents are outing of the point of that node." As for the use of the second law of Kirchhoff in a closed circuit that is because there is a series that can not be simplified using a combination of series and parallel. Kirchhoff's Second Law reads: "In a closed circuit, the algebraic sum of electromotance (ϵ) with differential of voltage (IR) equal to zero" (Serway and Jewett, 2010).

The topic is abstract, if only the learning directly, students will have difficulty understanding the dynamic

electricity's concept. These difficulties can be caused due to various factors, such as converting units (Rusilowati, 2006), the number of the topics (Heller & Heller, 1999) learning is still using traditional methods (GOK and Silay, 2008), and learning that is not contextual (Amirudin 2010). These findings are also supported by data from the results of initial studies in the field.

Initial studies in SMA N 1 Tongas, obtained by the fact that the activity is rarely performed experiments, laboratorium instrument limitations, time to explain of physic topics, the absence of a laboratory so that some of the tools of physics damaged. Other supporting data that 95% said physic topics will be more understood easily by using a media, 92.5% report never do practical of dynamic electricity, and 86% agree if learning using practical tools which are supported by student's worksheets (LKPD). Based on the informations, the topic of dynamic electricity can be explain with learning can provide more opportunities to students be active in the learning process. This can be done through practical activities.

The simple practicum kit of dynamic electricity designed as a tool to support the explain of dynamic electricity's topic. The simple kit is designed to use the support tools include ammeters, voltmeters, resistors, batteries, fuses and switches that can be an alternative to laboratory equipment. The simple practicum kit is expected to make it easier to gain an understanding of related concepts learned in accordance with the purpose of learning to the curriculum in 2013 (Kemendikbud, 2011). Based on these descriptions do research titled "The simple practicum kit to improve understanding of the student's concept dynamic electricity".

METHODOLOGY

The kind of this study was true experimental with control group pretest posttest design. The experimental was group apply learning using by simple practicum kit to understanding concept of dynamic electricity and the control group apply conventional method by application. The study manipulates learning physics with control on the model learning so that its can improve understanding of the student concept of dynamic electricity. Improve dynamic electricity understanding of concept can be formulated as follows (Hake, 1999):

$$\langle g \rangle = \frac{\% \langle G \rangle}{\% \langle G \rangle_{\max}} = \frac{(\% \langle S_f \rangle) - (\% \langle S_i \rangle)}{(100\% - \% \langle S_i \rangle)}$$

Notes :

- $\langle g \rangle$ = N Gain
- $\langle S_f \rangle$ = Pretest score
- $\langle S_i \rangle$ = Postest score

As for the categories from the calculation of n gain, that are:

Table 1. Interpretation N-Gain Scale

N Gain (g)	Category
$\langle g \rangle > 0,7$	High
$0,3 < \langle g \rangle \leq 0,7$	Medium
$\langle g \rangle < 0,3$	Low

This study was conducted in SMAN 1 Tongas in the second semester of the academic year at 2018/2019. The sample of this study was determined by purposive sampling. Samples were XI IPA 2 as an experimental class and class XI IPA 3 as a control. The respondents were 66 (n=32 experimental and n=34 control class). The technique of data collection using a test sheet. The test consists of ten conceptual's questions. Before it, the test has been validated by validator. The analysis technique using the n gain.

RESULT

The simple practicum kit are used to improve understanding of dynamic electricity concept. The simple kit was validated by Unesa Physics lecturers. The descriptions of the simple kit's design are has unique characteristic in terms of being a 3-dimentional, simple, be equipped with symbols and safety device, interactive real laboratory that enables students to learn in cooperative class, and having been designed on the student's of thinking level. The results of the description of validation are presented in Figure 1.

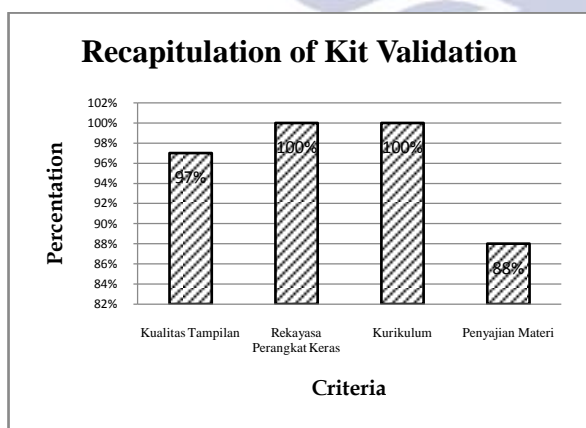


Figure 1. Graph of the Simple Kit Validation Value

According to the results of validation in Figure 1 was obtained score for each aspect of the assessment of its. The recapitulation of validation shows that the average percentage validation is 96% so that the simple kit is included in valid categories. The simple kit is one of the facilities for laboratories and physics teachers to carry out practical activities. The practicum will support the understanding of subject matter (Yanti et al., 2016).

Students will have difficulty understanding the material presented when the motivation to learn will decrease (Faiz, Laksono, 2014). Thus, it can be concluded that dynamic electric kits are suitable to be used to support practical activities.

Based on the results of pretest and posttest data showed an increased understanding concept of students. Pretest done before the class is treated with the process of learning activities that have been designed, while the posttest performed after the learning. The recapitulation of the increased understanding of the concept of students in each class, as follows:

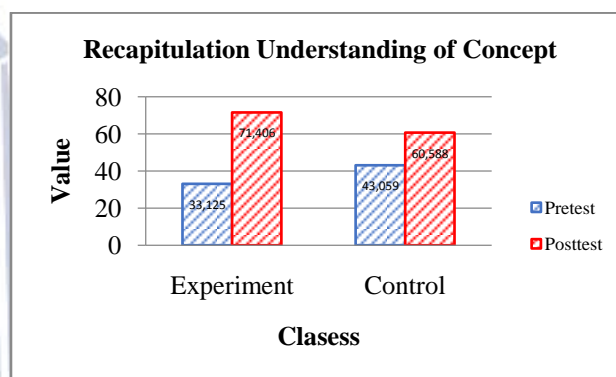


Figure 2. Graph of Concept Understanding's Value

Based on Figure 2, it is known that both classes have improved. For improvements in each class, are:

Table 2. Results N Gain Understanding of Concept

Class	The n gain	Category
XI IPA 2	0.57	Medium
XI IPA 3	0.31	Medium

Based on Table 2, grade XI IPA 2 earned a n gain of 0.57 with the details of five children in the high category, 23 in the medium category, and four children in the low category. As for grade class XI IPA 3 earned a n gain of 0.32 with the details of two children in the high category, 19 in the medium category, and 13 in the low category. Improved understanding of the concept is calculated using the n gain score. Prasetyarini (2013), Aliyah (2018) state that the use of props sains in improving the understanding of the concept of students. Both of classes got the difference values are not too far away. Based on the interpretation N Gain scale of both grade was in the medium category. In line with research conducted by Simbolon (2015) states that the real experiment-based learning and virtual labs to improve learning outcomes of students. Thus, learning to use the kit of dynamic

electricity practicum can to improve understanding of the concept of students.

CONCLUSION

Based on data from the results of this study concluded that the learning using by simple practicum kit can improving the understanding of the student's concept dynamic electricity with n gain 0.57 in the medium category which indicated that the learning using simple kit was more successful in improving the understanding of the student's concept dynamic electricity..

For suggestion is practicum's kit can be designed more effectively in the use of components such as the availability of the connector cable so that it can do further study related to critical thinking skills.

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