

EFFECTIVENESS OF USING THE ‘POTENTIOMETER LEARNING KIT’ IN THE POTENTIOMETER TEACHING PROCESS

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ABSTRACT

Physics lecturers in Negeri Sembilan Matriculation College find it difficult for students to solve potentiometer related questions. These findings are based on the lecturers' experience while marking student test papers related to this topic. Therefore, this study focuses on the effectiveness of the use of 'Potentiometer Learning Kit' in the potentiometer teaching process and at the same time can increase students' understanding of the concept of potentiometer by determining the terminal voltage. The potentiometer kit consists of 16 cards used by the lecturer to make comparison of circuit diagrams and its related equations. There are two forms of delivery methods used in this study, which are real cards and virtual comparison cards using AnyFlip. The results of the study found that the achievement of excellent students has increased to 38.9% compared to 22.2%, while the good level student achievement is 55.6% compared to 5.6% and the average level student achievement is 5.6% compared to 22.2%. It was also found that no students failed after using the potentiometer kit compared to 9 students who had failed before using this kit.

Keywords: potentiometer, terminal voltage, internal resistance, circuit diagram

1. INTRODUCTION

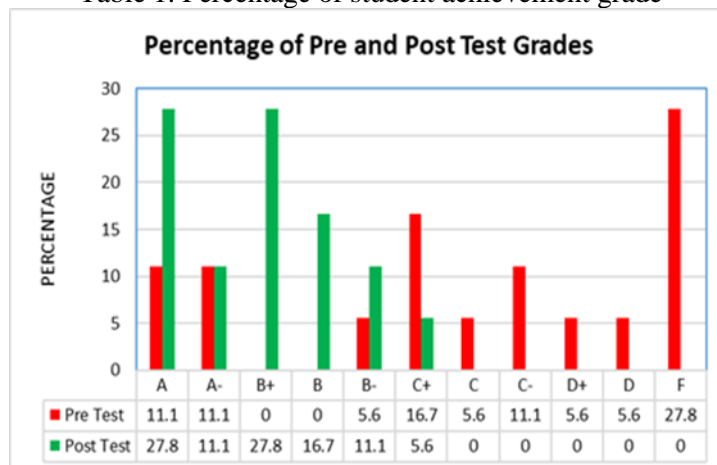
Potentiometer is a Physics subtopic in Chapter Electric and Direct Current in Semester 2, Malaysian Matriculation Programme. Based on the lecturers' experiences, almost all students are unable to solve problems involving high-level thinking skills (HLTS) questions in potentiometer subtopic. Muhammad Azrien et al., 2009 states that the main challenges of educators is to provide ways to help students become motivated, active and have problem-solving skills and make decisions because motivation is one of the important things in education. Based on the previous examination candidate report in Semester 2 2017/2018, students not skilled at solving potentiometer problems. This due the students found it was difficult to assess the information of a given question. It is hard for them to identify the information given in the question such as determining the direction of current, its potential difference and the length of wire used. Students were not able to use appropriate formulas in solving the problem.

2. MATERIAL AND METHOD

In this study, we produce Potentiometer Learning Kit in two forms of delivery methods which are real cards and virtual comparison cards using AnyFlip which is one of the leading technology providers of digital publishing software solutions. This potentiometer kit consists of 16 cards containing formulas and circuit diagrams related to internal resistance and two voltages. From Cutnell, J.D. & Johnson K.W., 2006 there are 4 maximum voltages in the battery world. From the kit, we will show the formula needed for problem

solving related to potentiometer. The lecturer guides the students to use the card using circuit comparison. Students are required to observe the arrangement of the circuits and make comparisons. The lecturer explained that different circuits will produce different equations. Hence, it will affect the value of emf and internal resistance. The method approach used in this study is quantitatively where pre-test and post-test was given to students. This form of study was chosen because we can easily collect information as well as focus more on the study conducted. By using the principles of teaching constructivism methods in the classroom proposed by Brooks and Brooks (1999) on the selected sample, we will see to what extent the effectiveness of this method in terms of student achievement. In this study, the target group is 18 students from practicum S1BP2 Module1 Semester 2 Session 2019/2020. The pre-test contains two problem-solving questions involving a potentiometer circuit and students were given 2 days to prepare for the test after the lecture was conducted. Students were given 30 minutes to answer the test. Through the tests conducted, it was found that 50% of the students failed. Students find it difficult to identify the information given in the question such as determining the direction of current, its potential difference and the length of wire used. Students also find it difficult to use appropriate formulas in solving the problem. Therefore, a teaching aid which is a Potentiometer Learning Kit was produced to solve this problem. Based on the pre-test result, students were introduced to the Potentiometer Learning Kit with guidance from the lecturer. Students' level of understanding of the potentiometer subtopic after using the Potentiometer Learning Kit were tested a day after a briefing session using the Potentiometer Learning Kit. The post-test was conducted on 21st February 2019 and it was found that there were no students at the failed level. This shows that the percentage of students who failed has been reduced by 100%.

Table 1. Percentage of student achievement grade



The result (Table 1) shows that the students' achievement before and after the test is conducted. Prior to the teaching and learning session before using the Potentiometer Learning Kit, 22.2% i.e. 4 students were at the excellent level, 5.6% i.e. 1 student got good level, 22.2% i.e. 4 students at the average level and 50.0% i.e. 9 students at the failed level. Meanwhile, after the Potentiometer Learning Kit was introduced (Table 1), the percentage of students who were at the excellent level was 38.9% i.e. 7 students, 55.6% i.e. 10 students got good level, 5.6% i.e. 1 person at the average level and 0.0% that is no students at the failed level. Figure 1 is a histogram comparing students' scores from pre-test and post-test. From the chart, it clearly shows an increase in student scores before and after using the potentiometer kit. As a result of examining students' test papers, we found that students were able to solve potentiometer questions well in the post-test. Thus we believe that once students can understand the concept of potentiometer, students can apply that concept in high-level thinking skills problem solving questions. Therefore, the objectives of this study to determine the effectiveness of the use of 'potentiometer learning kit' and increase students' understanding of the concept of potentiometer by determining the terminal voltage has been achieved.

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Kelulusan daripada pihak YBhg. Profesor dalam perkara ini amat dihargai.

Sekian, terima kasih.

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