

PHYSICAL EDUCATION: ANALYSIS OHM'S LAW PHYSICS EXPERIMENT TO ADDITION PHYSICS SCIENCE IN MPAS (FIELD WORK COURSE) AT STATE UNIVERSITY OF MALANG IN 2023

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Abstract. This study aims to examine the relationship between electric potential difference and electric current in a conductor with resistance and aims to describe the MPA relationship in adding to the scientific body of physics. The type of research used in this study is quantitative experiment, namely research by conducting practice on ohm's law physics. The data in this study were obtained from experiments, questions and answers, and documentation. Based on the experimental results shown by the graph, it proves that the potential difference and electric current strength have a significant relationship, which is in accordance with the theory of Ohm's law. Based on the discussion above, it can be concluded that there is a link or relationship between MPA and the scientific treasures of physics because MPA can add new experiences, understand new theories and so on. From the results of the graphs shown, it can be concluded that the experiments were carried out in accordance with Ohm's law theory, namely the voltage is directly proportional to the current strength. Therefore, it is necessary to have a practicum guidebook that can train the science of ohm's law physics.

Keywords: Ohm's Law, Experimen, Field Work Course

Abstrak. Penelitian ini mempunyai tujuan untuk meneliti keterkaitan antara beda potensial listrik dan arus listrik, pada sebuah penghantar dengan resistansi serta mempunyai tujuan untuk memaparkan hubungan Kuliah Kerja Lapangan dalam menambah khazanah keilmuan fisika. Jenis penelitian yang digunakan pada penelitian ini adalah kuantitatif eksperimen, yakni penelitian dengan cara melakukan praktikum materi fisika hukum ohm. Data dalam penelitian ini diperoleh dari eksperimen dan dokumentasi. Kemudian dianalisis secara deskriptif. Hubungan Kuliah Kerja Lapangan dengan khazanah keilmuan fisika yaitu pada letak dilaksanakannya eksperimen, karena eksperimen dilakukan di tempat yang baru, sehingga mahasiswa menemukan hal hal baru, seperti alat dan bahan, pengalaman baru dalam pemahaman teori, dan lainnya. Berdasarkan hasil eksperimen yang ditunjukkan oleh grafik membuktikan bahwa beda potensial dan kuat arus listrik memiliki hubungan yang signifikan, yang sesuai dengan teori Hukum ohm. Kesimpulan penelitian ini keterkaitan atau hubungan antara Kuliah Kerja Lapangan ini dapat menambah pengalaman baru khususna bidang fisika. Hasil penelitian grafik yang ditunjukkan dapat disimpulkan bahwa eksperimen yang dilakukan sesuai dengan teori hukum ohm, yaitu tegangan berbanding lurus dengan kuat arus. Proses melatih keterampilan praktikum hukum ohm untuk menambah khazanah keilmuan fisika dapat ditulis pada buku panduan praktikum. Oleh sebab itu dibutuhkan adanya buku panduan praktikum yang dapat melatih keilmuan fisika hukum ohm.

Kata Kunci: Eksperimen Fisika Hukum Ohm, Kuliah Kerja Lapangan

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INTRODUCTION

Quality education can be observed from the increased achievement of learning outcomes in the educational process or academic achievement. To obtain quality learning that is in accordance with the skills possessed, one must pursue higher education. Because college is the highest educational unit that creates a person who can be skilled according to his expertise (Munandar, 2020). According to Hikmawati (2016) Physics is part of IPA (natural science) which is the beginning of the development of advanced technology and principles of life that are relevant to the universe. Learning physics has a goal so that students can process experiences and hone skills in order to solve problems, submit and test a hypothesis through experimentation, design experimental devices, accumulate, process and analyze data and communicate experimental results in writing or orally (Langi, 2022).

Field work lectures (Kuliah Kerja Lapangan) are activities that allow students to have new experiences outside of campus in studying, traveling and others. KKL aims for students to be able to practice and develop their knowledge later after finishing college, the experience gained on campus and off campus will be invaluable for their next life (Ayuningtyas, 2015). According to Setiawan & Soedjatmiko (2018). Field work lectures is a mandatory activity that must be followed by students, because it is part of the course. Students who are required to take part are 5th semester students from the FKIP physics education study program. This Field Work Lecture takes place with the involvement of field supervisors. The KKL that will be discussed is related to the experimental material of Ohm's law physics. This ohm's law experiment was carried out because it is easy for students to understand, which is based on a simple electrical circuit. This study aims to examine the relationship between potential difference and electric current in a conductor with resistance and has the aim of explaining the MPA relationship in adding to the scientific repertoire of physics (Juwariyah, 2016).

Ohm's law discusses the relationship between electric potential difference and electric current. Electric current is a collection of electric charges that flow through the conductor in units of time, the direction of electric current is defined as one destination with a positive charge transfer. In conducting metals, the charges that experience movement are electrons or negative charges. As a result, the direction of the electric current travels against the direction of motion of the electric charge (Saefullah, 2018). The movement of an electric charge exists when there is a voltage, an electron will experience movement from low voltage to high voltage, so that it can be concluded that amperes (electric current) experience a transfer from high voltage (positive pole) to low voltage (negative pole). flowing is directly proportional to the source voltage ($I \sim V$) by the greater the voltage source, the greater the electric current (Saefullah,

2018). A conductor that can carry electric current easily depends on the variety of conductors. The ability of a conductor to carry electric current is called resistivity. Resistivity which is often referred to as resistance (R) states that the greater the resistance in an electric current, the smaller the flow of electricity. In a conductor there must be resistance, for metal conductors it must be sorted so that the resistance is very low. A component that has a function due to its resistance value is called a resistor (Langi, 2022). The relationship between volts (voltage) and amperes (current) and resistance in a circuit is stated that $V=IR$ which is the equation of Ohm's law. Ohm's law formulated by George Simon Ohm (1789-1854) is the relationship between voltage, electric current and resistance (Yasi, 2021). This field work course has a positive relationship with physics experiments, because with this field work course it can make students more enthusiastic in conducting experiments because the experiments are carried out on other campuses, so that students have a lot of experience that can be used as a reference for learning starting from getting to know the tools and materials new experiments, knowing new places, and new relationships (Ocvianti, 2021).

METHOD

The type of research used in this study is a quantitative experiment, namely by conducting lab material on Ohm's law physics to analyze the relationship between potential difference and electric current strength in electrical conductivity with resistance. The experiment was carried out by students from the Islamic University of Madura to add to the body of knowledge. The data in this study were obtained through experiments, question and answer, and documentation (Soewarno, 2015). The data collection techniques in the research are structured observation and experimentation. The way to analyze the data in this research uses comparative data analysis techniques. This data analysis technique is used to compare the two magnitudes of the current variable and the potential difference. The tools for collecting data are as in table 1 below

Tabel 1. Eksperimental and tools materials

| Tools and Materials | Amount |
|----------------------------|---------------|
| DC Voltage Source | 1 Piece |
| Multimeter | 2 Piece |
| Resistors | 1 Piece |
| Connecting Cable | Enough |

RESULTS

Based on Table 2 above, it shows that the practicum tools and materials have been assembled and are ready to be studied in finding relationships about electric potential differences and electric currents in electrical conduction using resistance. The following are 10

experimental data looking for potential difference (voltage) and electric current using a fixed resistance of 270 ohms, as well as resistance values based on calculations using the ohm's law equation $R=V/I$.

Table 2: Ohm’s law Experimental results

| Voltage(V) | Electric Current (I) | Obstacle(R) |
|------------|----------------------|-------------|
| 1,5 | 0,005 | 300 |
| 3 | 0,01 | 300 |
| 4 | 0,015 | 300 |
| 6 | 0,02 | 300 |
| 7,5 | 0,025 | 300 |
| 9 | 0,03 | 300 |
| 10,5 | 0,035 | 300 |
| 12,5 | 0,04 | 300 |
| 13,5 | 0,045 | 300 |
| 15 | 0,05 | 300 |

Based on table 2 above, a graphical display can be made as shown in Figure 1 below, which shows the relationship between voltage and electric current.

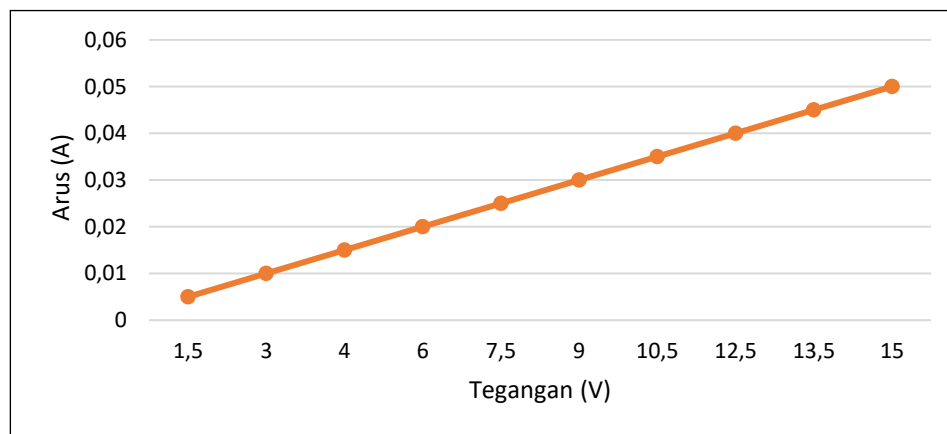


Figure 1. Graph of the relationship between electric current and electric voltage

DISCUSSION

Field work lectures is an activity that can provide life guidelines in socializing, dealing with problems, and serving the community through community empowerment and community service. The relationship between Field work lectures and the scientific treasures of physics is in the location where the experiment is carried out because the experiment is carried out in a new place, not in the campus laboratory itself as usual so that students discover new things, such as tools and materials. new experience in understanding the theory, and others. In addition, there are many positive impacts from ohm's law physics material including adding to scientific

treasures, increasing understanding, increasing knowledge, increasing creative and critical thinking competencies (Sunarsih, 2020), helping someone in calculating voltage currents and recitation of an electric circuit, also has a positive impact in everyday life such as the use of lamps, flashlights, television, radio, washing machines and others. because all electronic equipment can only turn on when there is an electric current whose source comes from an electric voltage (ohm's law).

According to Kiay (2018) Experiments are detailed and planned activities to obtain data in defining problems or testing hypotheses. Experiments will be successful if the variables that are changed and the types of responses expected are explained in detail. This physics experiment plays a very important role in training science skills, among other things: with someone having the opportunity to do it themselves, participating in the process of seeing objects, analyzing them, doing proofs, and drawing their own conclusions regarding objects, situations or processes. Based on this, a person is required to confront himself, explore the truth or look for similarities and laws and draw conclusions from the experiments experienced.

Based on the experimental results shown in the graph above, it proves that the electric potential difference (voltage) has something to do with electric current, that is, the greater the potential difference, the greater the electric current. This experiment is in harmony with the theory of Ohm's Law namely, the voltage is proportional to the electric current. The value of the resistance (R) that is sought using the formula $R=V/I$ is not much different in value from the fixed resistance. This experiment can already be said to support in adding to the body of knowledge for students. Apart from using a voltage source in the form of a power supply, this experiment can also use a battery as a voltage source. In this experimental activity the students were very enthusiastic, because in the arrangement of tools and materials students made their own with the supervision of the lecturer. when there is an error, the supervising lecturer is very detailed in his explanation. This is very helpful for students in adding to their scientific treasures. This experimental activity was carried out well (Rahman, 2019).

CONCLUSION

From the explanation above, it can be concluded that there is a connection or relationship between KKL and scientific treasures, namely in the location where the experiment is carried out because the experiment is carried out in a new place, not in the campus's own laboratory as usual so that students discover new things, such as tools and materials. new experience in understanding the theory, and others. According to the experimental results shown in the graph above, it proves that there is a relationship between potential difference and electric current,

the greater the potential difference, the greater the electric current, the experiment is relevant to Ohm's Law theory, namely, voltage is proportional to electric current. The value of the resistance (R) that is sought using the formula $R=V/I$ is not much different in value from the fixed resistance.

RECOMENDATION

The process of practicing ohm's law practicum skills to add to the scientific repertoire of physics can be written in a practicum guidebook. Therefore, it is necessary to have a practicum guidebook that can train scientific physics.

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