



Increasing the Capacity of Teachers and Educational Personnel of Muhammadiyah Susukan Vocational School, Semarang Regency Through Electrical K3 Training

Laily Muntasiroh^{1,*}, Aris Kiswanto², Hendriansyah³, Muhammad Ahdi⁴

^{1,2,3,4} Department Electrical Engineering, Universitas Muhammadiyah Semarang

✉ lailymuntasiroh@unimus.ac.id

ARTICLE INFO

Article history

Received : 24-1-2025

Revised : 27-4-2025

Accepted : 6-5-2025

Keywords

K3 electricity, training, electric shock

ABSTRACT

SMK Muhammadiyah Susukan is a vocational high school offering specialized training programs in three key technical disciplines: electronics engineering, automotive mechanics for light vehicles, and computer networking technologies. The results of observations and interviews with the school, it was found that the understanding and application of electrical K3 at SMK Muhammadiyah Susukan is still far from optimal. The importance of K3 in the field of electricity cannot be underestimated. Based on data from the National Disaster Management Agency (BNPB) and the Ministry of Manpower, incidents related to electricity, including fires and electric shocks, are still one of the main causes of accidents in the workplace and educational institutions. These incidents result in not only financial damages but also create significant safety and health risks for students, educators, and school personnel. Utilizing a pre-experimental one-group pretest-posttest research design, the training involved an initial pretest, theoretical instruction, and a concluding post-test. By applying the Gain test formula to analyze pre- and post-test results, researchers discovered an average N-Gain of 0.68. According to N-Gain assessment criteria, this value signifies a notable improvement in participants' comprehension following the training. The findings demonstrate that the training activity effectively enhanced the knowledge and skills of educational staff and personnel to a moderate degree.

This is an open access article under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.



A. INTRODUCTION

SMK Muhammadiyah Susukan is one of the vocational high schools that has expertise programs in electronic engineering, light vehicle engineering and computer network engineering. As an educational institution that focuses on technical fields, the aspect of occupational safety and health (K3) is very crucial to ensure the creation of a safe and productive learning environment. However, from the results of observations and interviews



with the school, it was found that the understanding and application of electrical K3 at SMK Muhammadiyah Susukan was still far from optimal. The importance of K3 in the electrical field cannot be underestimated.

Based on data from the National Disaster Management Agency (BNPB) and the Ministry of Manpower, electrical incidents, including fires and electric shocks, are still one of the main causes of accidents in the workplace and educational institutions. These incidents not only cause material losses, but also threaten the safety and health of students, teachers, and education personnel. At SMK Muhammadiyah Susukan, several main problems were found that contributed to the low implementation of electrical K3. First, the lack of understanding and skills of educators and education personnel in recognizing and managing electrical hazards. Many of them have not received special training on electrical K3, so their knowledge of how to prevent and handle electrical hazards is still very limited. Second, the lack of facilities and personal protective equipment (PPE) available at the school. PPE such as insulating gloves, safety shoes, and protective helmets are important components in the implementation of electrical K3. However, at SMK Muhammadiyah Susukan, the availability of PPE is still very limited. This makes teachers and students often exposed to the risk of electrical accidents when practicing in the laboratory or when working with electrical equipment.

Based on observations made by the proposing team and in-depth discussions with the principal and teachers, several problems were found that will be answered in this community service program, as follows: 1). How to improve the understanding and skills of teachers and education personnel at SMK Muhammadiyah Susukan in the aspect of electrical K3? and 2). How to develop and implement consistent electrical K3 standard operating procedures at SMK Muhammadiyah Susukan? From the problems faced, the Community Service Team with partners determined the main priorities that must be addressed immediately, namely: 1). Conducting electrical K3 training for teachers and education personnel at SMK Muhammadiyah Susukan. 2). Development and implementation of electrical K3 standard operating procedures at SMK Muhammadiyah Susukan.

B. LITERATURE REVIEW

Previous community service has discussed a lot about the training given to students, for example the training conducted by (Akhmadi et al., 2017) the training aims to provide students with knowledge and skills in finding work or becoming entrepreneurs. Based on testing using the NGain formula, the effectiveness of this training activity has a moderate impact on increasing students' knowledge and skills in the field of SMAW welding. The success of this method is also used by (Basuki et al., 2020; Djuanda et al., 2022; Khalid et al., 2020). The results of this community service are to provide insight into welding materials and SMAW welding practices for each participant as provisions for becoming entrepreneurs and finding work. To measure the understanding of the concept, the community service team used an experimental class as conducted by (Arisa et al., 2020) with the average result of students' understanding of physics concepts in the experimental class increasing with an N-Gain of 0.68 in the moderate category and in the control class 0.49 in the moderate category. The highest increase was in the exemplifying indicator by obtaining an N-Gain result of 0.88 in the high category. While the lowest increase was in the comparing indicator by obtaining an N-Gain result of 0.59 in the moderate category. The application of the Novick learning model to improve students' understanding of physics concepts has a high level of effectiveness with an effect size of 1.36.



Despite the success of the method used in the community service, no team has initiated training aimed at educators and education personnel, therefore the community service team and partners have agreed to have electrical K3 training at SMK Muhammadiyah Susukan, Semarang Regency, targeting educators and education personnel.

C. METHODS

The community service program employed a pre-experimental research methodology using a single-group pretest-posttest design, where the same group undergoes measurement before and after receiving a specific treatment. The implementation stages are as follows:

1. Planning and coordination with partners (SMK Muhammadiyah Susukan, Semarang Regency), this aims to ensure that this electrical K3 training program is in accordance with the needs of partners.
2. Providing pre-tests to training participants to measure the basic knowledge of training participants.
3. Providing theories about electrical K3, this method is used to provide theoretical understanding related to the basics of electrical K3. In this session, participants will receive an explanation of the importance of K3, the types of electrical hazards that can occur, and preventive measures that can be taken. In addition, a question and answer session will be held to answer questions and resolve participant confusion regarding the basic concepts of electrical K3.
4. Providing post-tests to measure the level of participant understanding of electrical K3 after participating in electrical K3 theory and practice learning activities.
5. Performing a comparative analysis of pre-test and post-test values using the N-Gain test formula to evaluate the effectiveness and impact of the training intervention.

D. RESULTS AND DISCUSSION

The results and discussion section contains the outcomes of the community engagement activities and their analysis. Describe the sequence of activities in detail and the results obtained (impact and benefits) supported by adequate photos or data. The results should address the problems described in the introduction.

1.1. Pre-test

The pre-test activity was carried out after the opening of the electrical K3 training. The number of participants who took part in the training was 29 people. The pre-test questions given were in the form of multiple choices totaling 20 questions. The following are the results of the pre-test scores from each participant: Community Engagement Activities.

Table 1. Pre-test results of electrical K3 training participants

No Participants	Score	No Participants	Score
01	55	16	40
02	70	17	40
03	45	18	45
04	35	19	35
05	50	20	55
06	45	21	35



07	85	22	50
08	95	23	45
09	45	24	40
10	55	25	30
11	30	26	35
12	35	27	50
13	30	28	55
14	45	29	60
15	50	30	-

1.2. Electrical K3 training

Theory Learning Before participants do the practice, participants are given material from the introduction of electrical K3 first which is delivered by the resource person. The materials provided are as follows: General K3, Electrical K3, K2, K3 (electronic engineering expertise program, light vehicle engineering and computer network engineering), cultivating 5R work (Compact, Neat, Clean, Maintain, Diligent). The participants were very enthusiastic about learning the theory of electrical K3. This can be seen from the many questions from participants when the theory learning was given.

1.3. Post-Test

After receiving the instructional material from the resource person, participants underwent a post-test to evaluate their comprehension of the educational content and practices presented. The results of the post-test scores for each participant are as follows:

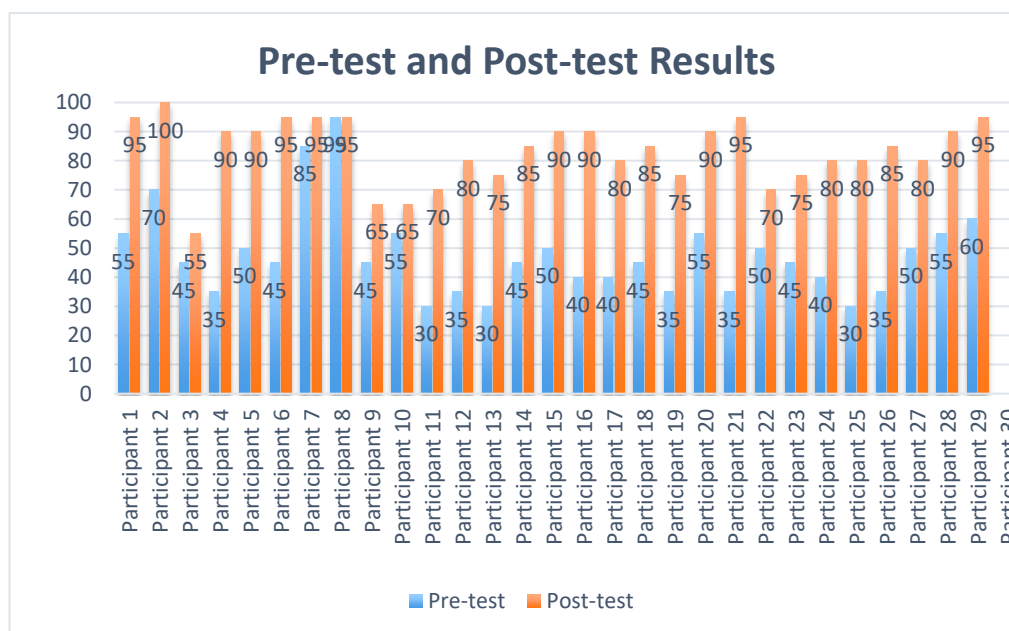
Table 2. Post-test results of electrical K3 training participants

No Participants	Score	No Participants	Score
01	95	16	90
02	100	17	80
03	55	18	85
04	90	19	75
05	90	20	90
06	95	21	95
07	95	22	70
08	95	23	75
09	65	24	80
10	65	25	80
11	70	26	85
12	80	27	80
13	75	28	90
14	85	29	95
15	90	30	-



4. Analysis of pre-test and post-test results

The Gain test was utilized to assess the increase in scientific process skills and cognitive learning outcomes by comparing pre-test and post-test results, measuring the knowledge progression before and after the instructional intervention.



The following is the N-Gain formula used:

$$N\ Gain = \frac{post\ tes\ score - pre\ test\ score}{ideal\ score - pre\ test\ score}$$

Hake (Arisa etc, 2020)

The analysis of the values revealed an average N-Gain of 0.68. As shown in Table 3, this training activity proves to have a moderate effect in improving participants' knowledge, particularly in the field of human resource development for educators and education personnel. This is influenced by the provision of material by the presenter after the participants have taken the pre-test. This theory is also reinforced by providing a post-test after the end of the material.

Tabl3 3. N-Gain criteria

N Gain	Category
$G > 0,7$	High
$0,3 \geq G \leq 0,7$	Middle
$G < 0,3$	Low



E.CONCLUSION

SMK Muhammadiyah Susukan is one of the vocational high schools that has expertise programs in electronic engineering, light vehicle engineering and computer network engineering. As an educational institution that focuses on the technical field, the aspect of occupational safety and health (K3) is very crucial to ensure the creation of a safe and productive learning environment. Using the N-Gain formula for testing, the effectiveness of this training activity was found to have a moderate impact on enhancing the knowledge of educators and educational staff.

F.ACKNOWLEDGEMENTS

We would like to thank Universitas Muhammadiyah Semarang for funding this community service activity through the 2024 Internal Grant funding. Hopefully in the coming year our team will be trusted again to continue to contribute to spreading benefits to the community.

G. AUTHOR CONTRIBUTIONS

Activity implementation: LM, AK, MA, Article preparation: LM, MA, Impact analysis: LM, MA, Results presentation: LM, Article revision: LM.

H. REFERENCES

- Akhmadi, A., Qurohman, M. T., & Syarifudin, S. (2017). Peningkatan Kompetensi Auto CAD Bagi Siswa SMK Ma'arif NU Talang Kabupaten Tegal. *Jurnal Pengabdian Masyarakat Progresif Humanis Brainstorming*, 1(1), 15-21. <https://doi.org/10.30591/japhb.v1i1.683>
- Arisa, N., Johansyah, & Ali Hanif, M. K. (2020). Keefektifan Model Pembelajaran Novick terhadap Pemahaman Konsep Fisika Siswa SMK Negeri 17 Samarinda Materi Elastisitas dan Hukum Hooke. *Jurnal Literasi Pendidikan Fisika (JLPF)*, 1(01), 45-55. <https://doi.org/10.30872/jlpf.v1i01.77>
- Basuki, Retno Eka P, M. Munib Rosadi, Fajar Satriya Hadi, & Minto. (2020). Pelatihan Pengelasan Pemuda Karang Taruna Di Desa Ngampel Ngusikan Jombang. *ABIDUMASY Jurnal Pengabdian Kepada Masyarakat*, 1(1), 24-28. <https://doi.org/10.33752/abidumasy.v1i1.652>
- Djuanda, Aqsha, I., Jayanegara, S., Samnur, & Asia, M. (2022). PKM pelatihan pengelasan SMAW untuk pembuatan rak bunga pada kelompok karang taruna Desa Mambu Kecamatan Luyo Sulawesi Barat. *INOVASI : Jurnal Hasil Pengabdian Masyarakat*, 2(2), 140-145.
- Khalid, A., Darmansyah, D., Barry, A., Saberani, S., & Fauzi, Y. R. (2020). Pelatihan Pengelasan Smaw Serta Keselamatan Kesehatan Kerja Dan Pencegahan Kecelakaan Kerja Pada Pengelasan Bagi Usaha Kecil Menengah Se Kota Banjarmasin. *Jurnal IMPACT: Implementation and Action*, 2(1), 52-57. <https://doi.org/10.31961/impact.v2i1.796>