

Evaluation of the Results of Competency Training of Occupational Safety and Health (OSH) for Laboratory Workers and Laboratory Technicians in the Department of Electrical Engineering, Universitas Negeri Semarang

Said Sunardiyo^(IX), Henry Ananta, Ubaidilah Siroj, and Lambang Setyo Utomo

Department of Electrical Engineering, Faculty of Engineering, Universitas Negeri Semarang, Semarang, Indonesia saidelektro@mail.unnes.ac.id

Abstract. Laboratory assistants and technicians have a very important role to achieve the success of practicum for academic support. Several training programs are given to laboratory staff and technicians to prepare laboratory and technician competencies. One of them is to include laboratory technicians and laboratory technicians in occupational safety and health training. The purpose of this study is to evaluate the results of competencies occupational safety and health (OSH) training for laboratory workers and technicians and to reveal the supporting factors and obstacles encountered in the field. The benefit of the research is for the head of the laboratory and the manager of the Department as input for information in making policies in improving the work safety and health of laboratory technicians and laboratory technicians. This research was conducted in the Department of Electrical Engineering, Universitas Negeri Semarang. Variables observed were understanding and mastery of 13 OSH competencies. They have not fully mastered the practice of OSH for laboratory staff and laboratory technicians. This is because the practice of practicing technical activities is still limited by the training organizers; There was a breakthrough at the faculty level where laboratory staff and technicians were involved in OSH practices with the campus security team. The recommended suggestions are: (1) In order to increase the competence of laboratory technicians and engineering laboratory technicians majoring in Electrical Engineering, it is necessary to increase the ability of advanced OSH theory and practice. (2) It is necessary to refresh OSH skills for laboratory assistants and technicians through laboratory technical trainings both internally or externally campus.

Keywords: Evaluation \cdot OSH \cdot Laboratory and Technician \cdot Engineering Laboratory

1 Introduction

The role of occupational safety and health in universities is very important. In the academic field of higher education, the lecture process includes theory and practice. Students lecture theory in the lecture hall and conduct experiments, experiments take place in the laboratory. The role of occupational safety and health in universities is very important. In the academic field of higher education, the lecture process includes theory and practice. Students lecture theory in the lecture hall and conduct experiments, experiments take place in the laboratory [1]. Implementation of occupational safety and health is more often emphasized to companies engaged in the industry where there is a complex process, high risk, and enormous energy. Very rarely heard of the implementation of occupational safety and health in educational institutions, be it in schools and at the University. The existence of the assumption that the educational environment is a safe and comfortable place for academic activities so there is no need for the implementation of OSH programs in these educational institutions [2, 3]. The Occupational Safety and Health Administration (OSHA) has recorded several potential hazards in laboratories, including chemical, biological, physical, and safety hazards [4]. To maintain the function of the laboratory, especially the implementation of OHS, there must be an evaluation of the competence of the laboratory staff and technicians who also play an important role in the laboratory. Occupational safety includes prevention of accidents, preventing and or reducing the occurrence of occupational diseases, preventing and or reducing the occurrence of permanent disabilities, preventing and or reducing deaths, and securing materials, construction, maintenance, all of which lead to improved living standards and human welfare [5].

1.1 OSH in Laboratory of Electrical Engineering and Computer Engineering Universitas Negeri Semarang

The Department of Electrical Engineering currently includes 4 study programs, namely Electrical Engineering Education, Electrical Engineering, Information and Computer Engineering Education and Computer Engineering. To support the success of the teaching and learning process in the study program, several laboratories are provided as follows:

- 1. Electrical Power Transmission and Distribution Laboratory
- 2. Electrical Installation Laboratory
- 3. Instrumentation and Control Laboratory
- 4. Electronics and Digital Laboratory
- 5. Computer and Network Laboratory

In each of these laboratories requires occupational safety and health both lecturers, laboratory assistants and students. The implementation of excellent occupational safety and health is expected to support the results of safe and quality research works, experiments. The need that must be met related to occupational safety and health in the laboratory, the manager has assigned laboratory staff and technicians to attend occupational safety and health training at the Gadjahmada OSH certified training center Yogyakarta.

The material being trained includes 13 OSH competencies which requires a sufficient amount of time as follows:

2 Material and Method

This study was a descriptive study using direct observation, interviews, and document studies performed during the period of September–December 2021. The aim of this study was to understand the compliance with 13 OSH competencies by laboratory staff and technicians in the Department of Electrical Engineering. More specifically, the compliance in competence in every aspect, both theory and practice five OSH. The results of study the were compared with the laboratory OHS standards that were divided into three categories of OHS achievement in laboratory: >70%, 50–70%, and <50%. Mastery of practical theory is based on the results of interviews and direct observation related to the 13 OSH competencies that have been given in the training. Then the results are averaged. The results of the percentage of each competency are described for further supporting and inhibiting factors of competency achievement.

3 Results and Discussion

Mastery of the theory and practice of OSH competencies greatly affects the ability of laboratory assistants and technicians in dealing with problems in the field of health and work safety in everyday laboratories.

Based on the results of the evaluation (Table 1 and Fig. 1), the results of the 5th competency were obtained, namely M.71KKK01.005.1 Doing Measurement of Hazard Factors in the Workplace (KUK 1.1) with questions regarding the types of hazard factors in the workplace according to the Minister of Manpower Regulation No. 5 of 2018 and asked how many hours the workforce can work safely in a location where the result of

Competence Code	Description
M.71KKK01.001.1	Designing an OSH Risk Control Strategy in the Workplace
M.71KKK01.002.1	Designing an Emergency Response System
M.71KKK01.003.1	Conduction of OSH Communication
M.71KKK01.004.1	Supervise the Implementation of Work Permits
M.71KKK01.005.1	Taking Hazard Factor Measurements in the Workplace
M.71KKK01.006.1	Managing First Aid in Work Accidents (P3K) in the Workplace
M.71KKK01.007.1	Managing Emergency Response Measures
M.71KKK01.008.1	Managing Personal Protective Equipment (PPE) in the Workplace
M.71KKK01.009.1	Implementing the Occupational Health Service Program
M.71KKK01.010.1	Managing the OSH Documentation System
M.71KKK01.011.1	Implementing OSH Risk Management
M.71KKK01.012.1	Evaluating the Fulfillment of OSH Requirements and Procedures
M.71KKK01.013.1	Conducting Work Accident Investigation

Table 1. OSH training competence

Competence Code OSH	L1 (%)	L2 (%)	L3 (%)	Average
CC 01	85	89	100	91.3
CC 02	96	97	98	97
CC 03	98	96	95	96.3
CC 04	90	92	98	93.3
CC 05	70	69	68	69
CC 06	95	96	96	95.7
CC 07	98	98	97	97.7
CC 08	98	99	98	98.3
CC 09	77	76	78	77
CC 10	69	70	68	69
CC 11	67	67	67	67
CC 12	94	96	96	95.3
CC 13	88	89	87	88

Table 2. Results of mastery on OSH competence of laboratory and technician

noise measurement in a workplace is 88 dBA, both laboratory assistants and technicians have not mastered this competency to the maximum (Table 2).

In the 10th competency, namely M.71KKK01.010.1 Managing the OSH Documentation System (KUK 2.1), it is asked the reason why the implementation of the Occupational Health and Safety Management System (SMK3) must be integrated with the Management System in the company and mentions the mandatory documents required by ISO 45001:2018. The laboratory assistants and technicians have not had anything to do with the management of both OSH and management in higher education institutions, as well as related to ISO documents. In the 11th competency evaluation results, namely M.71KKK01.011.1 Applying OSH Risk Management (KUK 1.2) at the point of how to determine the level of hazard risk and create an OSH risk matrix table with the severity and level of frequency.

Taking into account these results, the researchers provide suggestions:

- 1. There is a need for continuous training on OSH by the Electrical Engineering department on a periodic basis so that laboratory assistants and technicians have a good understanding of the competencies that must be possessed.
- 2. There is a need for training in addition to theoretical as well as practical involvement with lecturers and students so that there is a synergy between laboratory managers and users.
- 3. Collaboration with faculty and university level OSH managers is needed so that there is a synchronization of mutually supportive OSH materials.
- 4. In addition to mastery of the OSH field in the Electrical Engineering laboratory by laboratory assistants and technicians, it is necessary to install fire and earthquake



Fig. 1. Results of mastery OSH competence

hazard detection devices, as well as safety devices from high voltage, electric current leakage, as well as periodic re-checking of these equipment.

5. Before every activity in the laboratory, the laboratory technician and technician provide information about the standard operating system regarding occupational safety and health in the laboratory.

The review team recommends that workplaces continue to deliver OSH training to employees because training positively affects worker practices. However, large impacts of training on health cannot be expected, based on research evidence [6]. The findings of the average laboratory staff and technicians at the Faculty of Engineering, State University of Semarang are related to the competence of "maintaining occupational safety and health" because laboratory assistants/technicians already have sufficient knowledge about Occupational Safety and Health in the Laboratory, so overall they have a good performance [7]

4 Conclusion

Based on the research conducted, it can be concluded that an ongoing evaluation is important to determine the extent to which laboratory assistants and technicians have mastered the 13 competencies trained and conduct an objective review and assessment. Have not fully mastered the practice of OSH for laboratory staff and laboratory technicians. This is because the practice of practicing technical activities is still limited by the training organizers; There was a breakthrough at the faculty level where laboratory staff and technicians were involved in OSH practices with the campus security team. The recommended suggestions are: (1) In order to increase the competence of laboratory technicians and engineering laboratory technicians majoring in Electrical Engineering, it is necessary to increase the ability of advanced OSH theory and practice. (2) It is necessary to refresh OSH skills for laboratory assistants and technicians through laboratory technical trainings both internally or externally campus.

References

- R. Araneo, P. Dehghanian and M. Mitolo, Electrical Safety of Academic Laboratories, 2019 IEEE/IAS 55th Industrial and Commercial Power Systems Technical Conference (I&CPS), 5–8 May 2019, Calgary, AB, Canada.
- 2. M.A Karim, Implementation of Occupational Safety and Health (OSH) at Universitas Gadjah Mada Indonesia IJAEDU, in: International E-Journal of Advances in Education, 4(10), 2021.
- A.P. Farah, Suroto, and I. Wahyuni, Relationship Between Knowledge, Practice of Sop Utilization, APD Practice of Use and Workers Commitment at Work Accident Risk in Pt X Tangerang, in: Journal of Public Health (e-Journal), 5(3), 2017, pp. 269–277.
- F. Lestari, A. Bowolaksono, S. Yuniautami, T. R. Wulandari and S. Andani, Evaluation of the implementation of occupational health, safety, and environment management systems in higher education laboratories, in: Journal of Chemical Health and Safety, 26(4–5), 2019, pp. 14–19. https://doi.org/10.1016/j.jchas.2018.12.006.
- U.S.P. Yulifa, E. Rimawan, Alifia, T. Murtomo and O. Julyanto, Evaluation of the Implementation of Occupational Health and Safety (OHS) to Improve the Safety Behaviour of Workers in the Cosmetic R&D Laboratory (Research and Development) X.Inc in Bogor Regency, in International Journal of Innovative Science and Research Technology, 6(8), 2021, pp. 1200–1207.
- L.S. Robson et.al, A systematic review of the effectiveness of occupational health and safety training, in: Scandinavian Journal of Work, Environment & Health, 38(3), 2014, pp. 193–208. https://doi.org/10.5271/sjweh.3259.
- S. Sunardiyo, Kinerja Tenaga Laboran dan Teknisi Laboratorium Rekayasa di Fakultas Teknik Universitas Negeri Semarang dan Faktor-Faktor Dominan yang Mempengaruhinya, in: Invotec, 10(2), 2014, pp. 121–130.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (http://creativecommons.org/licenses/by-nc/4.0/), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

