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The Implementation of Occupational Safety and Health (OSH) in Practical Courses of the Electronics Engineering Education Study Program, Faculty of Engineering, Yogyakarta State University

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Abstract. Occupational Safety and Health (OSH) is a part of the practical courses in educational institutions. This research was aimed at investigating: (1) students' knowledge of OSH used in practical courses, (2) students' attitudes toward OSH, and (3) the implementation of OSH in practical courses in the Electronics Engineering Education Study Program, Faculty of Engineering, Yogyakarta State University. It is a non-experimental study employing a quantitative descriptive approach. This study was conducted in the Electronics Engineering Education Study Program, Faculty of Engineering, Yogyakarta State University from February to June 2018. The subject of this study included students, lecturers, and technicians. Students' knowledge of OSH in practical courses in the Electronics Study Program is good (74.2%). Their attitudes toward OSH are also good (92.2%). Although some students do not implement OSH procedures when conducting practical courses, the implementation of OSH in the study program is categorized good (63.3%). Furthermore, more intensive studies on the importance OSH implementation in practical courses needs to done.

1. Introduction

Article 23 of Law No. 23/1992 on health states that every work place shall provide health services, especially the ones having a great health risk. The provision aims at protecting the workers from danger and diseases which may affect them as well as their communities and creating the optimum work productivity as stated on the regulation of worker protection. The implementation of OSH is a must in this globalization era, so it should be conducted in every area including the educational field where practical courses are conducted in order to minimize the risks of accidents and work-related diseases. Furthermore, OSH should be implemented to improve comfort and safety of the students, lecturer, and people around them.

Occupational Safety and Health or laboratory safety is important since studies reveal that there has been an alarming intensity of work accidents of 9 people each day. Thus, OSH should be implemented in the practical courses conducted in laboratories. A laboratory is a place where lecturers, students, and technicians conduct experiments with specific materials and tools. There might be potential hazards during the process of making use of the materials and tools. The main cause of the accidents is negligence and recklessness, so it is essential to put an effort into the hazard prevention by improving



students' awareness on the importance of OSH procedures in laboratories. The occupational safety in practical courses should be relevant to the industrial work in order to investigate the potential hazards and the ways to prevent them. Therefore, in educational field, there is a need to present the materials on OSH continuously, so the students may become more careful and aware of OSH procedures.

Implementation is a process of applying a concept in order to achieve a specific goal. The implementation of OSH in this study refers to the implementation of prepared designs as a set of equipment when students learn about OSH in the practical classes. The students may control the prevention, design and modification, procedure and work instructions, as well as a partial work delivery. After conducting those activities, the students evaluate by rejecting or accepting the knowledge of OSH. It is expected that the students will behave in a way that OSH proposed since the knowledge is given continuously. The students' behavior is formed by knowledge and attitude. In addition, the given knowledge and performance character is expected to help the students gain the intended goals of the implementation of OSH.

The Electronics Engineering Education Study Program is one of the study programs in the Faculty of Engineering, Yogyakarta State University. There are some practical courses in this study program where students use some tools which are prone to accidents, so the knowledge on OSH which has been presented in classes should be fully implemented in order to minimize the number of accidents. If the students are used to implementing the knowledge of OSH procedure, they will get the view of real work with the implementation of OSH in the workforce, so the number of work accidents will be minimized. Therefore, a study on the implementation of OSH in practical courses in Electronics Engineering Study Program needed to be conducted. The study aimed at investigating students' attitudes and knowledge of OSH as well as investigating the implementation of OSH in practical courses.

The underlying philosophy of Occupational Safety and Health is providing safety and health for workers by preventing any potential hazards in work places. If all potential hazards are under control and safe, there will be a safe and healthy work environment which impacts on the well-running production processes, and as a result, the total production will improve.

Occupational Health and Safety are very essential, and people should pay attention to them. International attention to Occupational Health and Safety has risen since Occupational and Safety Management Systems (OHSAS) 18001: 1999 (consisting of management standard of OSH) was established by British Standard International (BSI) and other world certification bodies. Indonesia has been focusing on Occupational Safety and Health. It is realized by stipulating some laws on Occupational Safety and Health i.e. Law No. 1/1970 on health and Law No. 13/2003 on labor. Moreover, according to Law No. 1/1970, the main reason of implementing occupational safety is assuring the safety of each worker and people around the work place. Assuring that each resource is used efficiently, and it may improve the national welfare and productivity [1].

Article 3 of Law No. 1/1970 elaborates the requirements of OSH implementation in work places which includes: 1. preventing and minimizing work accidents; 2. preventing, minimizing, and stopping fire; 3. preventing and minimizing the effect of explosion; 4. providing an emergency evacuation route; 5. providing first aid for work accidents; 6. providing personal protective equipment for the workers; 7. controlling temperature, humidity, dust, dirt, smoke, vapor, radiation, noise, and vibration; 8. preventing and handling work-related diseases and poisoning; 9. providing adequate and appropriate lighting; 10. maintaining appropriate temperature and humidity; 11. providing adequate ventilation; 12. keeping the workplace clean and maintaining health and order; 13. organizing workers, tools, environment, procedure, and working process in harmony; 14. securing and facilitating human, animal, plant, and good transportation; 15. maintaining buildings; 16. securing the process of good

loading, unloading, and storing; 17. preventing dangerous electric current; 18. minimizing the number of work potential hazards [1].

The term “learning” is now used extensively and is replacing the previous terms, such as teaching and teaching learning which are related to teacher-centered activities. Learning is a series of activities which are planned for facilitating students’ learning [2].

Law No. 20/2003 on national education system states that learning is an interaction among students, teachers, and learning resources which are established in a learning environment. It is a process created by teachers in order to improve students’ critical thinking and abilities to construct new knowledge as the effort to improve understanding about the learning materials [3]. It is pointed by Trianto [4] that learning is a teacher’s conscious effort to educate the students (by establishing interactions between students and learning materials) in order to meet intended learning goals. The ideal learning goals are to facilitate students to the ideal learning. In order to meet the intended goals, teachers should work harmoniously with the students with the support of adequate learning facilities [5].

Learning is an activity of delivering information which is created to facilitate students in achieving a specific goal. Learning environment is one of the most important factors to facilitate learning. Instruction is the arrangement of information and environment to facilitate learning. Furthermore, learning environment includes the models, methods, strategies, media, and other facilities required to facilitate learning [6]. Learning is a system consisting of linked components [7].

On the other hand, practicum is a method of providing opportunities for discovering an evidence which is needed or wanted to be known by the students. Practicum activities can basically be used for: 1. obtaining or formulating a concept, agreeing upon a definition to raise arguments or regulations through experiments; 2. conducting verification or testing of a concept that has been learned [8]. A practicum is one of the forms of a continuous teaching process where skills, understanding, and attitude are taught. A practicum requires skills and opportunities to implemented and integrated. When students make use of knowledge and skills in practicum classes, they are doing a scientific activity called scientific inquiry.

Changing or instilling someone’s behaviors can be done through knowledge and attitude [9]. Knowledge is a learning product, and it is a result of perceiving senses through the sight, hearing, smell, and touch senses. It is also stated that the knowledge included in cognitive domain covers five attitudes. Attitude is defined by some experts differently, so it leads to various definitions too. However, those various definitions convey a comprehensive meaning. Attitude is someone’s readiness to react to an object in a specific way [10]. Attitude is a tendency of consistently responding an object in either positive or negative way [11].

Attitude is a tendency to act, make perception, think, and feel when dealing with an object, an idea, a situation, and a value [12]. Based on the above definitions, attitude can be defined as someone’s reaction or response to a specific object. Attitude has three components namely: 1. trust which is composed of an idea or a concept of an object; 2. emotional aspect or an evaluation of an object; and 3. a tendency to act. Attitude is classified into responsibility and response [9]. Responsibility is shown when someone takes all risks, and it is the highest level of attitude. When students give answer to the questions related to tasks, it shows a good response, and it indicates good attitude.

2. Methodology

This is a non-experimental study employing quantitative descriptive approach. This descriptive research was aimed at collecting information or views about the implementation of Occupational Safety and Health in the practical courses in the Electronics Engineering Study Program of Faculty of Engineering, Yogyakarta State University.

This study was conducted in workshops and laboratories of Electronics Engineering Study Program of Faculty of Engineering, Yogyakarta State University from February to June 2018. It included technicians, lecturers, and students of Electronics Engineering Study Program of Faculty of Engineering, Yogyakarta State University as the research population. Samples from the lecturers and students were collected based on the representation of practical courses and the implementation of laboratories and workshop uses.

Probability sampling was used to take the sample by giving the same opportunities for each member of the populations to be chosen as the sample. Proportionate stratified random sampling was a sampling technique done by considering the strata in a population. Stratified data were then classified into some categories, such as: high, medium, and low. In this study, tests, observations, and questionnaires were employed to collect the data. The observations were done in practical courses conducted in laboratories and workshops of Electronics Engineering Study Program of Faculty of Engineering, Yogyakarta State University. The data from OSH questionnaires were collected from respondents. The instruments for collecting the data correspond to the types of data, such as: observation sheets, open-ended questionnaires, and closed-ended questionnaires. The open-ended questionnaires included some questions in which the answers were in accordance with the respondents' intention and condition. Meanwhile, the closed-ended questionnaires required respondents to put checklist marks on provided answers.

3. Result and Discussion

The 1992 Workplace Health, Safety, and Welfare Regulation and the Approved Code of Practice no: L24 established a standard of OSH procedures in workshops. The most important factor of practical courses conducted in workshops is facility. OSH facilities shall decrease the number of accidents and work-related diseases. Therefore, there is a need to observe OSH facilities since OSH facilities at workshops should be improved. Based on a study conducted by Wulandari [13] on OSH facilities, the Electronics Engineering Education Study Program workshops have met the standard. There are many facilities, so the workshops are suitable places for conducting practical courses.

Notoatmodjo [9] argues that knowledge is the product of learning and it happened when someone has perceived senses involving the sight, hearing, smell, and touch senses. Knowledge is the most prominent aspect in the implementation of OSH in practical courses at the Electronics Engineering Education Study Program. Based on the data of students' knowledge, it can be seen that students' knowledge is categorized good because 60% of the students have sufficient knowledge on OSH. Therefore, it can be stated that the implementation of OSH in practical courses is good.

Based on those data, the most influential factors in the implementation are experience, education, and facility. The OSH materials which are collected and presented by the lecturers are sufficient, so the teaching learning processes are in accordance with the standards. The students have prior knowledge of OSH that they acquired from their previous educations i.e. Vocational High School or Senior High School, so they can minimize the number of work accidents. The data show that students' knowledge of OSH is good (85%).

In this study, the indicators of students' attitudes are responsibility and response. The students are considered to have high level of responsibility regarding OSH in practical courses; it is shown by 92 of the total students (71 students). Then, 6.49% of them have moderate level of responsibility, and 1.29% of the students have somewhat lack responsibility. Based on the analysis, the lowest score is 8 and the highest is 20. Therefore, the average of students' attitude scores is 18, and it is categorized as good.

As many as 71 of students (92%) have good responses to OSH procedures in laboratories, 5 students (6.49%) have sufficient response, and a student (1.29%) has lack response. Based on the descriptive analysis, it is found that the lowest score is 8, and the highest score is 20. Then, the average score of the student attitude aspect is 18, and it is categorized as good.

Based on the observations of both indicators namely responsibility and response, it can be concluded that the students have very good attitudes. There are many factors influencing their attitudes, such as mass media, culture, other people's perceptions, personal experience, educational institution, religions, and the emotional aspect. Azwar [10] argues that an environment which consists of situations, regulations, and obstacles contribute in shaping someone's attitude. Environment has significant effect in determining someone's attitude and behavior, and it sometimes has more effect than someone's age and experience. Those factors influence the learning courses, but they are not too dominant since students basically have sufficient knowledge. It can be seen from the data that 74.2% of the students are categorized as good, and the average score is 19.45 (max 25).

The observation which employs the 20-item-attitude observation sheets show how students implement OSH in the practical courses. It involves working in accordance with the SOP, using the tools for practicum as needed, abiding the laboratory regulations, cleaning after practicums, putting the waste into the dustbin, washing hands after practicums. The data collected from 77 students show that 59 out of them work as stated in SOP, 43 of them make use of practicum tools as needed, 63 students abide the laboratory regulations, 56 students put the waste in the dustbin, and 49 students wash their hands after the practicums, but some of them do not implement OSH in the practical courses. The disobedience probably caused by students' individual factor. They do not aware of OSH procedure when conducting practicums although it is indeed a very important procedure. Therefore, a review of the importance of OSH needs to be done by the lecturers. They shall explain the importance of OSH and the way the OSH procedures are implemented during practicums.

Although some students have not completely implemented OSH in practical course yet, all aspects in the research have been implemented by more than 60% of them during the courses. Based on the data analysis, student knowledge and attitude toward OSH are good. It indicates that 60% of the students are aware of their own health and safety during the courses, and they are aware of the importance of occupational safety and health.

4. Conclusion

According to above discussion and data analysis, it can be concluded that the implementation of Occupational Safety and Health (OSH) in the Electronics Engineering Study Program is good. The implementation is closely related to the establishment of OSH which suggests the implementation of OSH in work places.

The students' knowledge of OSH is categorized as good. Preventing the potential hazard in workshops and laboratories is a must, and it is very important so that it should be implemented in every practical course. Students' attitudes toward OSH in the practical courses is also categorized as good because

they already have sufficient knowledge of Occupational Safety and Health. As a result, they can plan every stage of courses well and in a systematic way.

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