

Analysis of the Occupational Safety and Health (OSH) in the Practice of Fiber to the Home (FTTH) Network Installation

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Abstract—This study aims to analyze the knowledge and attitudes of students towards the implementation of occupational safety and health (OSH) base on SKKNI TIK.FO01.005.01 in the practice of Fiber to the Home (FTTH) Network Installation. The informants in this study were class XI students in 2017/2018 academic year at Telecommunication Access Network Technique Study Program, Vocational XYZ Vocational High School in Bandung. The method used in this research is qualitative with a descriptive approach. Comprehension test, in-depth interviews, observation, and documentation were used as the data collection techniques. The results of the study Showed that: (1) OSH in FTTH Network Installation practice has not been fully implemented a, (2) in general, students have had a knowledge of OSH, but Reviews their understanding is still low for Several aspects items, namely: general OSH, personal protective equipment (PPE) and OSH in the environment, and (3) positive attitudes were shown by students in the process of fiber optic cable connection and network measurements. Meanwhile, awareness of occupational safety is still low, they were not maintaining the workplace cleanliness and not yet wearing gloves during practice.

Keywords—occupational safety and health (OSH); FTTH network installation practices; SKKNI TIK.FO01.005.01

I. INTRODUCTION

An important part of any work in the company or laboratory is occupational safety and health (OSH). The risk of failure will always exist in a job because of a less than perfect planning, unaccurate, or unintentional. According to the ILO (International Labor Organization), every year more than 250 million accidents at workplace and more than 160 million workers ill from workplace hazards [1]. Accidents in Indonesia, up to 98,000 cases occur every year from the number of workers around 121 million people. There are approximately 2,382 people who died plus 40% cases of permanent disability [2]. Trends in number of accidents tend to increase with increasing population and labor in Indonesia.

OSH is a condition and factors that have an impact on the worker and equipment and the environment [3]. OSH shown to ensure the integrity and perfection both physical and spiritual [4]. OSH is not only to learn, but it must be lived and

implemented, because OSH is a very important part in the laboratory [3].

Vocational High School is a place for the formation of human resources that must have knowledge and understanding, as well as the purpose of vocational education is to prepare students who are able to work in certain fields [5]. The Ministry of Education and Culture establishes a link and match approach between schools and industries that must adapt each other, especially in OSH competencies [6]. The students will always be in direct contact with OSH problems. Vocational High Schools must include OSH planning as a guideline for the implementation of practical learning as well as implementing training and teacher guidance [7]. The need for OSH planning in the curriculum in practice considers the existence of hazards in the vocational laboratory which includes 9 occupational groups, namely material handling and use of hand tools, machine protection, workplace design, lighting, work weather, noise control, vibration and electricity, worker facilities and work organizations. The average level of risk of hazards contained in the vocational laboratory includes: non-hazardous (68 cases or 54%), need handling actions (43 cases or 34%), and need priority handling measures (10 cases or 8%), while others amount to 4% or 6 cases of no data [8].

The OSH regulation is contained in the Law of 1970 which contains general provisions regarding OSH that are in line with the development of industrialized societies in Indonesia [9]. The basis of the OSH implementation that is applied in the school laboratory is the Minister of Manpower and Transmigration Regulation Number PER.21 / MEN / 2007. In the practice of FTTH network installation. Specifically stated in the SKKNI ICT. FO01.005.01 regarding OSH in FTTH network installation.

One of the expertise competencies found in Vocational Schools is the Telecommunication Access Network Technique. Based on the results of interviews with data sources, many equipment for practicing FTTH networks must be accompanied by OSH. For example, fusion splicer as a fiber optic connection machine and Optical Power Meter (OPM). The use of equipment has not fully implemented OSH, so that the standard of Operational Operations (SOP) has not been achieved. This allows accidents in practice. Based on these problems, the

authors consider it important to examine how the implementation of OSH in the practice of FTTH network installation is based on the Indonesian National Work Competency Standards (SKKNI). The implementation is seen from the aspects of students' knowledge and attitudes.

II. METHOD

This study uses a qualitative method. Determination of informants by purposive sampling. The informants in this study were students of class XI of the Telecommunication Access Network Technique in XYZ Vocational School in Bandung 2017/2018 academic year, amounting to 21 students. The average age of informants is 17-18 years with a composition of 17 men and 4 female informants. But this research is not focused on the differences in the results of analyzing gender-based data.

Data collection methods used are observation, in-depth interviews, and documentation. Observation to see students' attitudes during practice. Attitude observation uses the attitude guidelines stated in the Telkom Professional Certification Center (TPCC) Module 2013. Measurement of students' knowledge through understanding tests. Understanding tests using written tests. Documentation in this study is by looking at the value of the results of the understanding of OSH and some RPP and job sheet. The last data collection was in-depth interviews with the aim of deepening students' knowledge and attitudes towards OSH implementation and knowing the constraints of students in implementing OSH. The first stage in the study is a preliminary study. Then the preparation phase of the instrument was compiled based on the SKKNI ICT FO01.005.01 guidelines according to table 1.

TABLE I. RESEARCH INSTRUMENT BASED ON ICT SKKNI. FO01.005.01

Competency Elements	Performance Criteria
Follow health, safety and security procedures in the workplace.	General health, safety and work safety procedures Special health, safety and security procedures are studied
Maintain personal safety	Personal protection equipment (shoes, helmets, etc.) are always used appropriately. Dangerous activities at work are avoided. Conditions of work environment that are comfortable and safe to maintain
Communicate health, safety and security requirements.	Information relating to occupational health and safety regulations and conditions are collected The K3 requirements are communicated to all work units. Documents regarding K3 for the field of fiber optic technology are communicated to all work units

Instruments that are ready then implemented. Meanwhile, data analysis is also carried out during the data collection process. After the data was collected, the researcher carried out the process of testing the credibility of the results by using several techniques namely triangulation, extension of observation, increasing perseverance and member check.

III. RESULTS AND ANALYSIS

A. Student Knowledge in OSH Implementation

The following levels of mastery of OSH understanding of informants based on a combination of vocational assessment in the 2013 curriculum in table 2.

TABLE II. COMPREHENSION TEST RESULTS

Score interval	Predicate	Number of informants	Category
96 - 100	A	-	SB (very good)
91 - 95	A-	-	
86 - 90	B +	1	B (good)
81 - 85	B	2	
75 - 80	B -	9	C (enough)
70 - 74	C +	7	
65 - 69	C	2	
60 - 64	C-	-	K (less)
55 - 59	D +	-	
≤ 54	D	-	
amount		21	

The level of students' knowledge regarding can be categorized, namely, 12 out of 21 students are in the good category, the remaining 9 students are in the sufficient

category. The results of the data analysis refer to material that the informant cannot answer so that the informant does not understand the OSH aspects as a whole. Other material shows good results. Description of material that is not controlled by students during the test of understanding as follows:

- OSH Act and APAR type
- Requirements for gloves that meet the standards
- Placement of work tools

The results of interviews, the tendency of students to understand but there are some material that cannot be answered by students. This is in accordance with the results of the understanding test. Then based on the results of the documentation analysis shows that students have learned OSH. In the jobsheet used as a guideline for practice there is a discussion about OSH in which each student has the jobsheet.

Based on the results of triangulation, the same data is obtained, namely students have understood OSH special work because in the XI grade of odd semester students learn OSH in IKFO subjects. While in terms of general OSH, students study in class X in TKB subjects. Some material that cannot be answered by students because it has long been studied, especially for general OSH material is only studied theoretically. In some performance criteria such as OSH general, Personal Protective Equipment (PPE), and OSH on the environment, students' understanding still needs to be improved.

There are many factors that can influence student knowledge including experience, education, beliefs, facilities, income and socio-cultural [10]. Judging from the students'

knowledge of OSH, the most influential factor is education and facilities. Some of the material is not understood by students due to the educational factor in which students learn general OSH a year ago. Students forget about OSH materials that have been studied. Unlike the specific OSH performance criteria, students understand the procedure of connecting and measuring well. This is because the OSH connection and measurement material has just been studied.

Students' knowledge cannot be separated from the role of the school that facilitates learning activities and involves students to be active [11]. When viewed from the existing facilities, XYZ Vocational Schools have not followed the standard rules, starting from the practice room, School Health Unit, and inadequate PPE. Other factors regarding experience, belief, income and socio-culture certainly also influence although not large. Judging from the experience factor, class XI students enter adolescence, despite having experience but can be sure their experience is still small and very limited. Students get experience about OSH knowledge from the process of teaching and learning activities at school. If a work accident

occurs during practice, students can think about how to minimize the possibility of an accident again and indirectly students multiply their knowledge about OSH. Income and socio-cultural factors are not very influential because research data sources are students who are still students.

Thus mastery of the understanding of OSH knowledge FTTH Network Installation practices should be mastered by students, because it aims to enable students to minimize work hazards and create a comfortable and safe work atmosphere. In accordance with OSH's objectives in general, which is protecting workers for their safety rights in carrying out work, ensuring the safety of every person in the workplace and maintenance also uses safe and efficient sources of production [12].

B. Results of Students' Attitudes towards OSH Implementation

Based on the results of observations for attitude data obtained results such as table 3.

TABLE III. STUDENT ATTITUDES TOWARD OSH IMPLEMENTATION

No.	Aspect of Attitude	The number of students
1.	Prepare a place that is clean from dust or dirt	4
2.	Use gloves for pulling, outer PE stripping and cable termination work	12
3.	Pay attention to the curve of the cable on the cornering route	14
4.	Use plastic / rubber gloves when connecting fiber optics	1
5.	Do not touch the optical fiber that has been peeled directly	21
6.	Does not blow pieces of optical fiber	21
7.	Use the correct work tools / tools	21
8.	Clean the tool or work place the rest of the work such as optical pieces, sticky jelly and other dirt after work	1
9.	Do not look directly at the fiber optic end when measuring	21
10.	Calibrate the measuring instrument and check the power used carefully	0
11.	Put the practice equipment carefully	15
12.	Install the connector correctly	21
13.	Using practice clothes	19
14.	Use shoes	16

The tendency of students to have a positive attitude towards the implementation of OSH in the practice of FTTH Network Installation. But there are still students who have not followed the SOP. The results of data analysis refer to the point of attitude that is almost partially none of the students who did it. These attitudes are:

- It does not pay attention to cleanliness and safety of the tool / workplace.
- Do not use gloves when stripping duct cables and only one student uses gloves on fiber optic connections
- Do not calibrate the measuring instrument

The results of the extension of observation show that students' attitudes are saturated. Students have a positive attitude but there are still problems so that the implementation of OSH in FTTH Network Installation practices has not been carried out perfectly. The results of source triangulation indicate that students have not paid attention to cleanliness, use of PPE, and safety of work tools. The teacher stated that the average student had not used PPE properly and correctly. There

needs to be an emphasis on the use of PPE. For example, giving a reward in the form of value.

The interesting thing about the interview results is the awareness of students in the use of PPE. Students do not use PPE not only because students do not understand the value given. Students actually feel uncomfortable when using PPE. In addition, in terms of calibrating the tool, students directly measure without calibrating first. Students argue that if doing calibration, the time to complete the lab will be longer. Then the researchers made an increase in perseverance by trying to practice independently by the fact that students did not use gloves because they were uncomfortable, so the researchers tried to practice using gloves. The result of increasing diligence is that researchers cannot complete the practice of duct cable stripping within 1 hour 25 minutes. When pulling out the PE cable feels very slippery. Different when the researcher removed the gloves, the cable was easily pulled. But this will have an impact on personal safety and health. The palm becomes hot red and irritation also occurs. The availability of cloth gloves is sufficient, but plastic / rubber gloves are not available. Thus, students do not use gloves at the time of

practice not only because of convenience problems, but because of the facilities provided by the school as well.

Based on several analyzes above, the researchers concluded that students' awareness of the use of PPE still needs to be improved. This is associated with the availability of adequate PPE, but students are still reluctant to use it. In addition, the intensity of PPE use needs to be improved so that students are accustomed to using PPE. After knowing the causes of students not using PPE that are required in practice, researchers reopen the results of the extension of the observation. It turned out that it was found that in the practice of the FTTH Network Installation, the teacher implemented a system of recording the time of the practice of each student. This makes students compete to be the fastest in completing the practice so that they often ignore cleanliness both before and after practice. In terms of cleanliness, the teacher stated the reason students did not pay attention to hygiene practices because students focused on the process and results of fiber optic connection. Observation results also show similar things. Students always ask the time during the implementation of the practice, and after completing the connection and measurement, students feel that their work has been completed.

Meanwhile the attitude when connecting fiber optics is in accordance with the procedure that is in Jobsheet. Students do not blow or touch the optical fiber that has been peeled. Students themselves already know that if the optical fiber that has been peeled is exposed to dirt or dust, it will make the connection worse. Poor connection results can be seen from the high attenuation values obtained and decreased network performance. Furthermore, the use of tools / tools is correct because students have understood the functions of various tools and tools. The awareness of OSH behavior can be grown one of them with OSH knowledge [13]. Students with extensive OSH knowledge tend to have an awareness of OSH behavior because they know what risks they will get if they don't pay attention to OSH. The awareness of OSH behavior can also be grown with a positive attitude towards OSH. Students who have a positive attitude tend to be aware of OSH behavior because he fully accepts the rules that must be fulfilled in order to create safety. With extensive OSH knowledge and a positive attitude, students' awareness of OSH behavior can be formed.

The absence of an OSH management system in the school also influences the formation of diverse student attitudes. This fact is in accordance with the definition of attitude that is a reaction that is still closed from someone to a stimulus [14]. The attitude of the informant is influenced by internal and external factors of the individual. In this case, the diversity of levels of knowledge, environment, facilities and infrastructure that exist can influence student attitudes. In addition motivation in learning is a determining factor for students to behave safely [15].

Observation of researchers in the field, the school did not pay attention to aspects of occupational safety and health, such as lack of supervision on the behavior of using sandals when in school and the behavior of not using PPE that was appropriate when practicing made the informants accustomed to and did not pay attention to their work safety.

Other people's influence factors are also a factor in attitude formation because attitudes can change if there is influence of others who are also in the same environment, such as peers. Another factor that can influence attitudes is emotionally related to the age of students who are still teenagers, although the effect is not as large as environmental factors and influences on other people, but emotional factors also influence the attitude of students. Students who are classified as teenagers have emotions that are not stable and have not been able to determine their self-confidence will certainly be very disgraceful in forming a good attitude. There are many factors that influence students' attitudes including personal experience, influence of others, influence of culture, mass media, educational and religious institutions and emotional factors [16].

Based on the technical triangulation, it can be concluded that the XYZ SMK XI grade students have a positive attitude towards the implementation of OSH in the FTTH Network Installation practice, although many have to pay more attention. Positive attitudes are also triggered because they have good knowledge so they are automatically good.

IV. CONCLUSION

The implementation of OSH in FTTH Network Installation practices in XYZ Vocational Schools in Bandung has adjusted to the ICT SKKNI. FS01.005.01. Researchers found several teaching materials sourced from the PT industry. Telkom. The implementation of productive learning, especially fiber optics, uses the guidelines of PT. Telkom in carrying out learning both practice and theory. Currently the government has not issued textbooks for the Technique of Telecommunication Access Networks, so schools directly refer to their learning to the industry. The implementation of OSH has been implemented even though there are still some students who have not fully implemented OSH. The data is supported by the results of data analysis on students' knowledge which is included in both categories and attitudes of students who can accept the implementation of OSH. The tendency of each student's attitude is not different from that of other students. This is because there is no difference in work in practice and the environment is relatively the same. Then in this study, the researchers concluded that:

- Students have not considered the importance of K3 implementation.
- Students focus more on the results of the practice according to subjects.
- The implementation of OSH has not become a culture and school habit.

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