



JOJAPS

eISSN 2504-8457



Journal Online Jaringan COT POLIPD (JOJAPS)

Awareness of Mechanical Engineering Students on Occupational Safety and Health (OSHA) in Machine Workshop, Politeknik Sultan Haji Ahmad Shah

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Abstract

Lately there are accidents and injuries at work including in educational institutions. Accidental events should be taken into account in order to achieve zero accident rates (Halimatus et al., 2010). The learning system in polytechnic emphasizes on theoretical and practical aspects. In addition during the process of learning, there are several things that need to be addressed by the students such as security policies, tools, machines and the environment. Therefore, awareness of safety practices is important to prevent accidents or injuries in the workshop so that it can affect the teaching and learning process (T&L). The main purpose of this study was to examine the level of student awareness and perceptions on occupational safety and health management system (OSHA) in the Machine Workshop, Polytechnic Sultan Haji Ahmad Shah (POLISAS). The relationship between the level of awareness and the level of implementation of the system is also examined. The questionnaire was distributed to 203 students representing the respondents. The data analysis method used in this study is descriptive statistics (frequency and mean score) using Statistical Packages for Social Science (SPSS) for Windows version 16.0. The reliability of the instrument is $\alpha = 0.92$. The results showed that the respondents gave a positive perception to the research questions. It is found that the mean value obtained for the level of awareness and implementation level of OSHA is 4.18 and 4.24 which are in the interpretation of agree. The findings also show a significant positive relationship between the level of awareness and the implementation of OSHA. Based on the findings, several suggestions have been proposed to help raise awareness and implementation of OSHA among students and improve the system as well as minimize the risk of accidents.

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Key-word: - OSHA, students, awareness, implementation

1.0 Introduction

Lately there are accidents and injuries at work including in educational institutions. Accidental events should be taken into account in order to achieve zero accident rates (Halimatus et al., 2010). Therefore vital to inculcate awareness on occupational safety and health amongst students in educational institutions, especially in institutions of higher learning. This is because today's teaching and learning activities of educational institutions are also exposed to the risk of safety and health which is involved with machinery and heavy equipment in the workshop and laboratory. In addition, there are also institutions of higher learning that use chemicals that can pose a hazard to safety and health in laboratories. Hence, teaching and learning activities at the Polytechnic's workshop and laboratory (POLISAS) that offer engineering courses that use of heavy equipment, machinery, heavy machinery and chemicals that bring risks to health and safety. It is therefore important to inculcate awareness on occupational safety and health among POLISAS citizens, especially students involved in workshops and laboratories.

1.1 Background

Mustazar Mansur et. al (2009) explains that occupational safety is the elimination of a potential situation or situation that causes occupational injury as a branch of preventive medicine that links the health of workers to work and the impact of work on the health and welfare of workers. Awareness on safety and health issues in Malaysia has increased in the community especially after the fireworks factory accident in Sungai Buloh, Selangor in 1991. It has led to the creation of the 514 Act which is also known as the 1994 Occupational Safety and Health Act aimed at ensuring safety, health and the welfare of working people and also to protect others against occupational safety or health risks in relation to the activities of people in the workplace (OSHA 1994). Siti Nakiah et. al (2015) states that safety and health at the workplace should also be taken seriously in ensuring that no risks will result in accidents and affect the employees of the company and surrounding environment.

1.2 Problem Statement

Safety and health at work is an important issue and is closely related to the safety and health of the community as well as to individuals who are surrounded (Hapriza et.al, 2007). Accidents in the industry can be reduced if students in school are exposed to occupational safety and health issues (Fong Chan Onn, 2000). Sabri (2012) states that in order to avoid accidents and accidents, one should be aware and responsible and that's why the student's awareness of safety and health is very important when it comes to any practical activities in workshop and laboratory. According to Ab. Aziz and Intan (2002) occupational safety and health are one of the most important human resource management activities and the role of providing protection to workers from and accidents during work. To prevent injuries, occupational safety and health aspects are the responsibility of all parties including employers and workers. (Durrishah et al., 2004). According to HSE (2004) almost two-thirds of reported accidents arise from the movement of people, goods and vehicles out into the workshop. Ramlan (1997) said that safety awareness is a cause for the realization of the importance of security to avoid the misfortune. Awareness of security means being unperturbed and always alert or disciplined while in the work or when in the workplace zone. According to Nor Azimah Chew Abdullah et. al (2013) when more employees understand and gain knowledge about occupational safety and health then this will reduce the risk of negligence and reduce accidents at workplace. Arifin et al. al. (2010) found that many benefits were received by 26 organizations that have applied the Occupational Safety and Health Management System to their organizations. Therefore, this study was conducted to examine the level of student awareness on occupational safety and health management system (OSHA) and students' perception towards the implementation in Machine Workshop, Department of Mechanical Engineering (DME), Polytechnic Sultan Haji Ahmad Shah (POLISAS). The relationship between the level of awareness and the level of implementation of the system is also examined.

1.3 Objective

Therefore, in this study several objectives have been listed to be achieved by the researchers:

- a) To study the awareness of the Department of Mechanical Engineering students on occupational safety and health management systems (OSHA) in machine workshops
- b) To view students' perceptions on occupational safety and health management systems (OSHA) in machine workshops
- c) To Measure the relationship between the level of awareness and implementation of occupational safety and health management system (OSHA) at the DME machine workshop, POLISAS.

1.4 Importance of the study

This study is important for the Department of Mechanical Engineering (DME) and Polytechnic Sultan Haji Ahmad Shah (POLISAS). This is because the Occupational Safety and Health Management System (OSHA) have been implemented from the end of 2014 to the present. It is therefore important to know the level of awareness and perceptions of students involved in teaching and learning activities in machine workshops in the Department of Mechanical Engineering (DME). This will assist the Department of Mechanical Engineering and POLISAS to take more proactive measures to improve the effectiveness of the system as well as the awareness of occupational health and safety to ensure the safety and health of students in the workshop and reduce the risk of accidents in workshop.

1.5 Limitation of the study

This study was conducted to the students of Department of Mechanical Engineering (DME), Polytechnic Sultan Haji Ahmad Shah who took the subject of Workshop Practice for the December 2016 Session. The number of respondents selected was 203 representing 422 students taking the Work Practice subject. This group is selected because students who take the subject of Practice Workshop are they are the most risky group that exposed to hazard and accident risk.

2.0 Literature Review

In 1996, the Occupational Safety and Health Management System (OSHA) were introduced with the ISO 14000 standard of Environmental Management System in 1996. In 2016 the Occupational Safety and Health Master Plan 2016-2020 (OSHMO 2020) was launched by the Malaysian Ministry of Health and Occupational Safety (DOSH), Ministry of Human Resources. The plan is a strategy and program designed to boost the country's level of safety and health (OSHA) to more excellent level that protect the nation's human resources as an important asset for the success of the country's development program to achieve the Vision 2020's goals. The plan is the contribution of the educational institution by integrating the OSH in teaching and learning activities to foster the awareness of OSHA among students or potential employees and produce specialists in the field of OSHA (JKKP, 2016). In a study conducted by Kadir Arifin et. al. (2010) titled 'Occupational Safety and Health Management System (OHSAS: 18001): An Analysis of Its Implementation Benefits to Malaysia' in 26 organizations that have received the OHSAS certification: 18001 in 2010 found 9 key benefits received by the organization. The 9 key benefits that received by the organization are the benefits of enhancing employer's thinking and awareness, enhancing legal compliance, enhancing systematic policy management, reducing the number of accidents and liabilities, creating security awareness among employees, creating more effective occupational safety and health programs, enhancing the organization's image to the community, enhancing the image of the organization to competitors, meeting the needs of consumers / customers, increasing the overseas market and increasing competitiveness in the market. The study by Nur Fazreen (2013) entitled 'Awareness on the Safety of Students in the UTHM Engineering Laboratory' concludes that the aspect of knowledge in safety practices is very important and should be mastered by students while working in laboratories such as personal safety, equipment security and environmental safety. Abdul Wahid et. al (2012) in his study entitled 'Student Perception on Knowledge and Related Skills Duty 1: Adhere To Safety Rules And Regulations Among Students Level 3 In One An IKBN In Johor found that 91.9% student understand the aspects of wearing safety clothing in the workshop. In terms of performing first aid treatment at the workshop only 58.4% of them are saying that this phenomenon is probably due to the attitude of the student who does not care about anything injuries. In terms of regulatory aspects and types of fire extinguishers, 60.4% of students are aware of the importance of reducing fire risk when in the workshop and at work.

3.0 Methodology

This study was carried out using quantitative survey research. Data were collected through a set of questionnaires distributed to students at the Department of Mechanical Engineering related Occupational Safety and Health Management System (OSH) at Machine Workshop, JKM, POLISAS. Data obtained are categorized as quantitative as the data analysis method uses frequency and percentage and mean score analysis. The research method used is descriptive research method of sample survey. According to Mohd Majid Konting (2000), descriptive research is a research that aims to explain a phenomenon that is taking place. Sample survey study is a survey conducted on the part of the population studied and random samples used to represent the population being studied.

3.1 Population and Sample

The population is the target group of researchers, which is the group to whom the results will be generalized (Gay and Air, 2003). The sample was the respondents that been selected to represent a population. The determination of the population of the study is important because the population will determine how many samples we will choose as well as the expenditure of the study. A total of 203 students were randomly selected as respondents from Mechanical Engineerings' students which took the Mechanical Workshop Practice Course 1,2,3 and 4. The suitability of the number of these samples refers to the Krejcie and Morgan (1970) schedules.

3.2 Instrument of the study

This study is a descriptive survey study. Questionnaire was used to obtain information from respondents. The questionnaire is more practical and effective for large populations as it can measure a large sample size and will increase the accuracy of sample statistical to estimate population parameters (Mohd Majid, 1990).

This questionnaire form consists of 27 items which are divided into several sections. According to Kamarudin & Roslim (1990), the purpose of the questionnaire was to obtain accurate and complete information.

3.2.1 Method of Data Analysis

All items were analyzed using Statistical Package for Social Science (SPSS) version 16.0. Descriptive data analysis methods are used to describe information related to research questions. To achieve that goal, mean analysis and standard deviation are used to illustrate the descriptive score distribution of each item. To measure the level, respondents' responses were classified into three mean scores with three levels of low, medium and high as in Table 1 below.

Table 1: Interpretation Min Score

Mean Score	Interpretation
1.00 -2.33	Low
2.34 - 3.67	Moderate
3.68 - 5.00	High

Source: Wiersma & Stephen (2005)

Furthermore, the correlation statistical analysis was used to identify the strength of relationships among the variables in this study by using the strength scale proposed by Healey (2008) in Table 2 as below.

Table 2: Correlation Value

Correlation value (r)	Interpretation
below 0.1	Weak relation
0.10 - 0.30	Moderate relation
0.30 - above	Strong relation

Source: Healey (2008)

3.3 A pilot study

Pilot study was conducted to test the reliability of the instrument that was built and to make sure the questions in the questionnaire were in line with the respondent situation. According to Mohd Salleh and Zaidatun (2001), reliability is a measure of the ability of a research instrument to measure the problem of consistency every time it is used at different times, places and samples. The maximum value of the reliability coefficient is 1. If the coefficient value is less than 0.6, then it may be considered that the instrument used in the study has low reliability value.

Pilot study was conducted on 10 students at DME, POLISAS which was randomly selected. To test the reliability of the research instrument, the researchers used the Alpha Cronbach Model (α) from SPSS software version 16.0. The value of α obtained is 0.920. According to Sekaran (2003), if the coefficient of Cronbach's Alpha is between 0.9 and 1.0, it shows that the item is very good and effective and acceptable. Table 3 shows Cronbach's Alpha findings for each questionnaire items.

Table 3: Data of Cronbach's Alpha

Section	Number of Item	Cronbach's Alpha
Awareness	10	0.850
Implementation	15	0.922
Total	25	

4.0 Result and Discussions

Data obtained through questionnaire from respondents were collected and analyzed by using SPSS 16.0 program. The findings of demographic factors were analyzed using frequency and percentage and translated into table form. The objectives of the study are expressed in mean and standard deviation. Data analysis is made and arranged according to the objectives and questions of the study.

4.1 Respondents's Profile

Respondents' demographic information, which consists of program of study, gender and semester of the students, is shown in Table 4 to Table 6.

Table 4: Distribution Of The Number And Percentage Of Respondents by Program

Program	Number of Respondents	Percentage
DKM	139	68.5
DAD	64	31.5
Total	203	100

Table 4 shows the distribution of the number and percentage of respondents according to the program. The total number of randomly selected respondents is 203. Out of this total, 139 (68.5%) students are Diploma in Mechanical Engineering while 64 (31.5%) students are Diploma in Diesel Automotive. The total number of DKM students is higher than DAD as respondents is because the questionnaire is distributed to students who take the subject of mechanical workshops only

Table 5: Distribution of Number and Percentage of Respondents by Gender

Gender	Number of Respondents	Percentage
Male	172	84.7
Female	31	15.3
Total	203	100

Table 5 shows the distribution of the number and percentage of respondents by gender. The total number of randomly selected respondents is 203. Of these, 172 (84.7%) were male and 31 (15.3%) were female. The total number of male lecturers as respondents is higher because the mechanical engineering field is monopolized by men.

Table 6: Distribution of Number and Percentage of Respondents by Semester

Semester	Number of Respondents	Percentage
1	25	12.3
2	46	22.7
3	18	8.9
4	113	55.7
5	1	0.5
Total	203	100

Table 6 shows the distribution of numbers and percentage of respondents according to their respective semesters. Based on the analysis conducted, semester 4 monopolizes the number of respondents which are 113 persons (55.7%). This was followed by a semester 2 of 46 (22.7%) while the 1st semester was 25 (12.3%).

Semester 3 and semester 1 recorded the least number of respondents at 25 persons (12.3%) and one (0.5%). This is because the number of semester 4 students is the most for the December 2016 study session.

4.2 Awareness

Respondents should answer 10 items related to the level of awareness of OSHA in Machine Workshop. This is because knowledge about safety features is important because through Mior Ismail (2003), every student involved in laboratory and workshop activities must equip themselves with safety knowledge of practicing a safe work culture. The mean interpretation method as in Table 1 is used. . Table 7 shows the average mean of all items in this section is 4.178 and is at the agreed level. Item 7 has the highest mean value of 4.36. While the lowest mean score is on item 4. This analysis shows the students in DME understand and realize that failure to comply with the prescribed safety rules will invite danger and may result in injury. This shows that students have a clear exposure to OSHA and have been given a complete description of safety aspects in the Machine Workshop, JKM. This is because each individual will be more aware of safety and health issues through the practice of proper and safe procedures (Husin, 2007).

Table 7: Mean Analysis for OSHA Awareness Level

No. Of Item	Item	Standard deviation	Mean Score	Level
1	I know the importance of the workplace safety and health system in the workshop	0.728	4.07	High
2	I was briefed on the occupational safety and health system at POLISAS	0.789	4.11	High
3	I have seen POLISAS's safety policy in the workshop.	0.754	4.02	High
4	I have read POLISAS's security policy	0.703	3.97	High
5	I know there are safety rules in the workshop	0.601	4.28	High
6	I have to comply with all safety rules	0.672	4.33	High
7	My failure to comply with safety rules may result in injury to me and co-workers.	0.734	4.36	High
8	Complying with the instructions given prior to commencement of work is essential for safety at the workshop.	0.704	4.32	High
9	I know what to do if there is an accident at the workshop.	0.729	4.21	High
10	I know what to do if there is an accident risk in the workshop	0.778	4.11	High
Total Mean Score		0.719	4.178	High

4.4 Implementation

Table 8 shows the level of implementation of OSHA in Machine Workshop, DME. In this section there are 15 items to be answered by the respondent. The overall mean score for these items is 4.24 with a standard deviation of 0.777 which is at a high level. Item 6 obtained the highest mean score of 4.35 and the standard deviation of 0.681. This indicates the majority of students in DME, POLISAS agreed that there was a fire extinguisher in the workshop and knew the location of the extinguisher. This gives a positive view as students need to know about the safety aspects such as fire extinguisher and first aid kit. Libau (2002) stated in his study that students should know where there are emergency first aid equipment such as fire extinguishers and first aid kits for any accident and fire that may occur. Item 3 records the lowest mean score of 4.

This show that necessary action should be taken care by lecturers and institutions and should be dealt with promptly as students should know and be aware of the contact numbers in case of any misfortune.

Table 8: Mean Analysis for OSHA Implementation Level

No. Of Item	Item	Mean Score	Standard deviation	Level
1	There is POLISAS Safety Policy at the workshop	4.18	0.711	High
2	There is an Emergency Response Plan in workshop	4.14	0.692	High
3	There is an Emergency Contact Number in workshop	4	0.83	High
4	Safety and health briefing is provided before workshop session.	4.17	0.741	High
5	There is an Emergency Box (First Aid) at the workshop	4.3	0.697	High
6	There was a fire extinguisher in the workshop	4.35	0.683	High
7	I adhere to safety regulations at the workshop	4.26	0.685	High
8	I use personal protective equipment (P.P.E) when doing activity at a workshop	4.34	0.681	High
9	I report to the lecturer in case of an accident.	4.33	0.641	High
10	I report to the lecturer if there is an accident or injury risk	4.26	0.767	High
11	Lecturers monitor when work at the workshop is done.	4.23	0.803	High
12	I make sure the appliance is always clean and tidy after use	4.25	0.752	High
13	Materials / equipment are stored in a suitable and safe place in the workshop	4.3	0.67	High
14	I reported to the lecturer if there was a damage to the workshop.	4.28	0.753	High
15	There are many exit lines available in the workshop	4.17	0.896	High
Total Mean Score		4.24	0.733	High

4.6 Correlation between Awareness and Implementation

Table 9: Correlation between Awareness and Implementation

		Awareness	Implementation
Awareness	Pearson Correlation	1	0.618**
	Sig. (2-tailed)		0
	N	203	203
Implementation	Pearson Correlation	0.618**	1
	Sig. (2-tailed)	203	
	N	59	203

Based on the table above, the Pearson correlation value obtained is 0.618. This shows that there is a strong positive relationship between OSHA awareness level and implementation level. This can be referred in Table 2. Thus there is a significant relationship between OSHA awareness and its implementation. Students' attitudes play an important role in effort to avoid any accidents or injuries when run any activities in a machine workshop. Students with high awareness will practice and implement all the safety rules and procedures. Study conducted by Laney (1987) show that the factors that led to the accident were due to the attitude of the employee or the student itself to the safety aspect.

5.0 Suggestions

The results of the research have shown that the respondents have responded positively to the research questions. However, some improvements can be made by DME and POLISAS to increase students' awareness on occupational health safety (OSHA) while in the workshop such as below:

- a. Improve training, promotion or briefing activities to raise the awareness on occupational safety and health that contribute to the effectiveness of OSHA in DME and POLISAS
- b. Encourage DME students to be actively involved in any activity related to occupational safety and health.
- c. Encourage DME students to give opinions and suggestions related to occupational safety and health
- d. Improve bilateral communication between DME's management and DME's students to increase students' awareness of OSHA and improve the effectiveness of OSHA in DME and POLISAS.

6.0 Conclusion

The results of the research have shown that the respondents have responded positively to the research questions. This shows overall DME's students, who use machine workshops practicing safety regulations at workshops while doing any practical activities. This illustrates that students have a high awareness of the importance of OSHA to themselves or others when conducting practical work. This proves that students understand what OSHA is and are aware of their importance. A continuous effort should be made in educating the student to always practice a healthy work culture so that the teaching and learning process will run in conducive environment

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