Impact of Safety Education Intervention on Safety Practices Among Construction Workers in Port Harcourt.

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Abstract— This research investigated the impact of safety education intervention on safety practices towards accident prevention among building construction workers in Port Harcourt metropolis. It adopted a pre-test and post-test quasi experimental design research to determine the impact of safety education intervention on safety practices to prevent accident. Purposive sampling method was adopted for selecting the building construction site locations. The sample used were the respondents present at the construction sites which was a total of 219. The research instrument used for the study was a structured questionnaire and a Safety Education Intervention (SEI) module. Questionnaires were administered and retrieved before the safety training was conducted, post-test was conducted 4 weeks after the pre-test. Data collection was subjected to mean and t-test. Overall, the mean rank after educating workers on safety practices slightly increased from 3.36±0.74 (pre) to 3.48±0.31 (post). The study recommends the enforcement of safety regulation and inspection of construction sites at least twice before completion.

Keywords: Safety practices, intervention, construction, safety education, accident prevention.

1 INTRODUCTION

The construction industry is one of the most hazardous industries (Edwards and Nicholas, 2002). In recent decades, the cognizance of occupational safety and health risks in the construction industry has been increasing. However, despite the considerable development, the accident rate is still significantly higher than that in most other industries (Sousa et al., 2014; Bureau of Labor Statistics, 2013; Jazayeri and Dadi, 2017). According to the Bureau of Labor Statistics (BLS), in 2012 alone, the construction industry experienced 856 fatalities, and accounted for 19% of all fatalities among all industries (BLS, 2013). With the entry of construction enterprises into the international competitive market, the health and safety risks of field workers have also increased dramatically (Lei et al., 2018). Therefore, the risks of construction occupation, especially the health and safety injury risks of construction site workers, have attracted more and more attention from construction enterprise managers (Timofeeva et al., 2017; Tremblay and Badri, 2018).

According to the research literature on the application of the occupational health and safety (OHS) management system in the construction industry, the main measures of OHS risk management are to strengthen the study and training of work posts, pay attention to the research of operation process technology, and prevent the risk influence factors (Chen and Cao, 2019). It can be seen that OHS training is the research focus of safety education in the construction industry. However, at present, there are few studies on the impact of safety education intervention for construction workers. Therefore, it is necessary to analyze the impact of safety education intervention on safety practices to prevent accident.

The essence of health and safety education in industrial works or in any setting is sensitizing the society towards safe living and operations for hazard prevention. Bolarinwa (2002) stated that education for hazard control is the systematic development and cultivation of natural powers by instructing, training and example, the goal of which is hazard-free production. Odukogbe (1995) added that safety education in industries saves a lot of things ranging from human to material wastes, thus increasing the volume of production and quality of work.

Safety education prevents unsafe behaviour of construction workers (Shang and Zhang, 2019). It involves using experiences, safety related information and communication processes to improve knowledge, influence, attitude, beliefs and values in other to promote behaviours that result in improved safety and health status (Achalu, 2019). Ayodele and Olubayo-Fatiregun (2013) also described safety education as a proactive development of knowledge, attitude, behaviour and skills for safe living. Education not only tries to enhance knowledge, but also skills, attitudes and practices that serve to prevent accidents and maintain good health. The unsafe behaviour of construction workers is linked to lack of safety education, lack of basic safety knowledge and construction skills, which makes construction workers vulnerable to safety accidents.

It is disappointing to discover that safety information acquired from research carried out in different parts of the world is yet to trickle down to the average building construction workers in Nigeria hence the need for a practicable intervention measure like safety education. Several publications have been made

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about accident prevention and control but there are still gaps that need to be filled in the area of how safety education intervention improves worker's safety practices thereby reducing accident rates.

Given that there is no comprehensive and complete information based on actual recorded data on the impact of safety education intervention on safety practices in the building construction industry in Nigeria, the purpose of this study was to identify the information gap on the impact of safety education intervention on safety practices to prevent accidents among building construction industries in the Port Harcourt.

2 Research Methodology

2.1 Research design

This study adopted a pre-test and post-test quasi-experimental research design to determine the impact of safety education intervention on safety practices towards accident prevention among construction workers in Port Harcourt. A quasi-experimental design often described as non-randomized control group pretest-posttest intervention studies with the attribute of both experimental and non-experimental was used for this study.

2.2 Study Area

Port Harcourt is one of Nigeria's leading industrial centres, 66 km upstream from the Gulf of Guinea and an estimated population of 1,865,000 inhabitants. Port Harcourt is located within latitudes 6°58′N to 7°6′N and Longitude 4°40′E to 4°55′E. Port Harcourt, the capital of Rivers State with a population of about 1,356,000 (Federal Office of Statistics, 2003) is a major industrial city in the Niger Delta region (FEPA/ World Bank, 1998) and 3,020,232 in 2020 (United Nations, 2017). Port Harcourt is a fast-growing city having several construction companies both multinational and indigenous located at different areas of the city. This is the reason for several building construction activities of residential buildings, roads and flyovers to cater for the growing population in the nearest future. The study area is presented in Figure 1.

Figure 1: Study area (Source: Google map)

2.3 Participants of the Study

Participants of the study comprised construction workers of privately owned building construction sites within the metropolis. Privately owned building construction sites were used because the multinational and medium scale construction companies have safety management system in place to ensure that their workers are safe and to prevent hazards and accidents.

2.4 Sample and Sampling Techniques

The choice for selecting the eight construction sites owned by private individuals that consented to using their facilities for this research was purposively selected. A purposive sampling technique was employed where the number of workers existing already in the construction sites participated in the study.

2.5 Data Collection and Quality Control

Questionnaires were administered and retrieved before the safety training was conducted (Pre-test), the same questionnaires were administered four weeks after the training (Post-test). A total number of two hundred and nineteen (219) workers were used for this study to determine the impact on safety practices before and after safety training. These questionnaires were administered to only workers in privately owned building construction sites. Confidentiality was maintained and informed consent was obtained. The workers were told that the collected data was just for the purpose of conducting a scientific study and they could discontinue participation in the study whenever they wished. The duration for completing a cycle of experiment is 4weeks per site. The duration for the safety education intervention model for all the sites visited is thirty-two (32) weeks.

The pre-test questionnaires were administered to the respondents after the purpose of the study has been explained to the respondents and retrieved immediately with the assistance of two safety officers trained for this task. The safety education intervention was conducted after the pre-test, while the same

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questionnaire was re-administered four weeks after (Post-test). A hundred percent (100 %) retrieval rate was achieved because all the workers on the construction site was used; this was due to the fact that it was during the COVID 19 period, so contractors confined workers on site to avoid government interference. Pre and post-test data were retrieved for analysis.

2.6 Data Analysis

Data analysis was performed using SPSS software version 22. Data gathered were presented via tables and charts and analyzed with descriptive and inferential statistics. Descriptive statistics comprised: frequencies, mean, percentages, standard deviation. Inferential statistics included the analysis of variance (ANOVA).

3. Results

3.1 Job Types and Medical History of Building Construction Workers

Figure 2 shows the job types which include machine operators (17.8%), welders (15.5%), storekeepers (15.5%), loaders (13.2%), masons (12.8%) and technical staff (10.5%). The medical history of building construction workers surveyed is shown in Figure 3. Though 58.9% reported to have encountered no medical challenge, health challenges faced by construction workers include waist pain (14.2%), eye problem (10.0%), dizziness (4.6%) and nose irritation (4.1%).

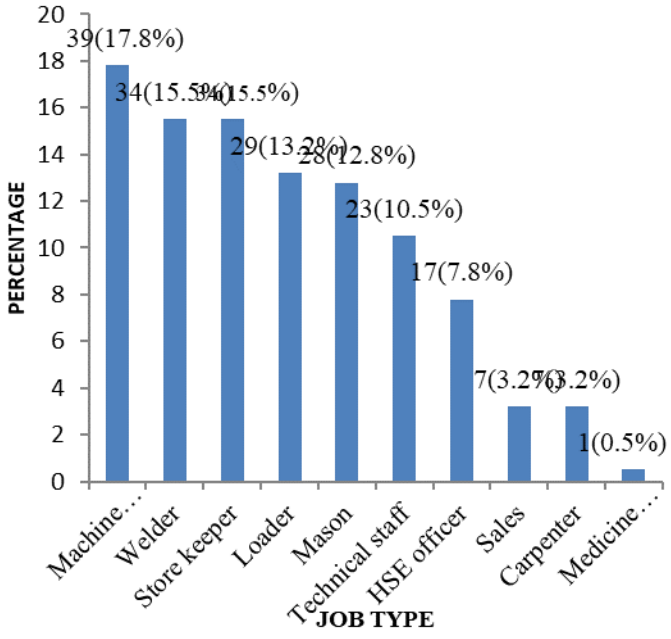

Figure 2: Job types amongst building construction workers surveyed

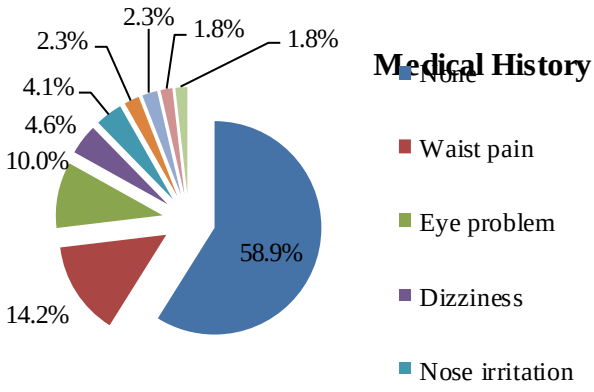

Figure 3: Medical history of building construction workers surveyed

3.2 Impact of Safety Education on Safety Practices among Workers in Building Construction Sites

From Table 1, workers exhibited good safety practices with mean scores for all questions except for alcohol intake before task which was below the criterion mean for pre (2.26±1.28) and post-test (2.48±1.31). Overall, the mean rank after educating workers on safety slightly increased from 3.36±0.74 (pre) to 3.48±0.31 (post). Mean greater than 2.5 (criteria mean) indicates good safety practices

Table 1: Safety practices among workers before and after safety education

S/N	Items	Mean±SD	
		Pre	Post
1	I turn off the machine and equipment before cleaning them	3.86±0.49	3.96±0.19
2	I report hazardous conditions when they are sighted	3.32±0.62	3.42±0.54
3	I ensure that my workspace is clean and tidy at all times	3.55±0.73	3.74±0.49
4	I obey safety signs, stickers and tags at all times	3.24±0.76	3.40±0.60
5	I do not take alcohol before undergoing any task	2.26±1.28	2.48±1.31
6	I obey correct work procedures before commencing my job	3.46±0.70	3.58±0.62
7	I am responsible for my personal safety	3.49±0.80	3.49±0.68
8	I wear PPE that is intended to keep me safe on my job	3.48±0.75	3.58±0.63
9	I take reasonable care of my safety and the safety of others	3.45±0.80	3.58±0.67
10	I look out for safety signs while at work	3.49±0.74	3.59±0.62
	Total	**3.36±0.45**	**3.48±0.31**

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Table 2: Mean comparison of building construction workers' safety practices based on selected demographic characteristics

	Pre	z-score/F cal.	Sig	Remark	Post	z-score/F cal.	Sig	Remark
Gender								
Male	3.36±0.48	0.182	0.428	NS	3.49±0.31	0.641	0.261	NS
Female	3.35±0.35				3.46±0.33			
Age								
18-20years	3.61±0.17c	2.878	0.037	S	3.67±0.21	1.620	0.186	NS
21-30years	3.29±0.51ab				3.50±0.31			
31-40years	3.29±0.51a				3.46±0.32			
51-50years	3.43±0.35bc				3.47±0.32			
Marital Status								
Single	3.43±0.51	0.937	0.174	NS	3.57±0.29a	2.122	0.017	S
Married	3.34±0.44				3.46±0.32b			
Level of Education								
Non formal	3.50±0.31ab	4.031	0.008	S	3.59±0.26ab	3.222	0.024	S
Primary	3.39±0.60a				3.50±0.38ab			
Secondary	3.30±0.40a				3.45±0.29a			
Tertiary	3.63±0.32b				3.65±0.30b			

4. Discussion

An increase in the level of knowledge after the intervention was recorded concerning the use of PPEs after conducting safety training for workers on the building construction sites. This is similar to the records of Sokas et al. (2009) which recorded a remarkable increase in knowledge and attitudes of respondents three months for a one-hour hazard awareness training session that was provided for some US and Mexican construction workers. Safety intervention training played a significant role in increasing knowledge about PPE and health problems in the wood industry (OOJEE, 2013). Aluko (2016) also confirms that the use of PPE among workers was affected by safety training education, work regulation and their knowledge of safety information.

A total mean score of 3.36±0.45 (pre) 3.48±0.31 (post) was recorded for the impact of safety education on practices where there was also a positive influence on the use of PPE after the safety education intervention. This result is in line with the study conducted by Adewoye et al. (2014) indicating that educational intervention was effective on the use of various PPE, especially helmet in welder. The safety education intervention programme had a positive impact on the knowledge and practice of the sampled building construction workers. This finding necessitates regular safety education for construction workers and employers.

Safety training and safety education are very important to creating safety awareness. Consequently, well trained employees in construction companies would implement such knowledge in their work activities. This result aligns with Ogundipe et al. (2018) findings, who found from their study that; training of staff is one of the factors that affect wearing of safety-wears on construction-sites among workers of building construction companies, in South-Western Nigeria. The result also tallies with that obtained by Wong and Soo (2019) that education/training is a factor that greatly influence safety performance in construction industries in Malaysia.

5. Conclusion

In conclusion, safety education intervention programme had a positive impact on the level of safety practice of the sampled building construction workers and this finding necessitates regular safety education for construction workers and employers.

Conflict of Interest

The author(s) declare no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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