

REPOSITIONING INDUSTRIAL SAFETY EDUCATION IN TECHNICAL EDUCATION PROGRAMME

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Abstract

The study was designed to investigate industrial safety facilities and practice in Akwa Ibom State Technical and Vocational Institutions. Six Hundred and forty-four (644) male students and ninety-three (93) female students were randomly drawn to take part in the study. Questionnaire titled "Repositioning Industrial Safety in Technical Education (RESITE)" was the Instrument developed and used for data collection. Analysis of data involved the use of frequency, percentage, and weighted means average. Findings reveals that some, items of general physical conditions, equipment, electrical installation and personal protection safety are unsatisfactory. The study has implications for instructors, students and the department heads.

Introduction

Safety is the quality or condition of being safe; it is a freedom from danger. Antia (1996) defined safety education as a concern for the prevention of accidents which result in injury to persons or which cause damage to school buildings, facilities, equipment or tools. Among the benefits of effective safety education cited by Antia are: development of appropriate attitudes and judgments; . development of safety consciousness which students can take into their future field of employment; development of the ability to discriminate between worthwhile and undesirable risks and act accordingly; learning of self discipline and the ability to understand and live with authority; student's preparedness to cope with the obvious and presumed hazards in the world of work, and finally, employers of labour will be assured that the student who comes to them for employment has been, taught the basic fundamentals of accident prevention and safety practices.

Our new education system, demands 'that all children passing through our secondary school offer pre-vocational subjects. This implies the use of hands, hand tools, and equipment to work. Students are expected to offer technical courses in the following areas: woodwork, building, metalwork, electrical/electronics, auto-mechanics work. All of these subject areas will expose the student to the use of machines, tools and equipment - a basic course area called workshop practice. It is therefore mandatory for administration, government, instructors and students to focus attention on industrial safety practices for the prevention of industrial accident.

Accident is defined as a situation responsible for the undesired events of injuries, fatalities or any other losses. Firenze(1998), defines accident as any unexpected event which interrupts the normal shop educational process, caused by human, situational or environmental factors or a combination of these. It may or may not result in death, injury or property damage but has the potential to do so.

The course instructors in industrial/vocational education carry great influence. With their support administrators can be assured of an effective safety and health programme. Instructors have a moral and a professional responsibility to safeguard and educate those who have been placed under their supervision. Thus, instructors are generally responsible for creating a safe and healthy instructional setting and for integrating hazard recognition and control into all aspects of the curriculum. By their careful monitoring they can prevent accidents for which the school carries liability.

For all practical purposes, the instructors, like the supervisors or foremen in industry, are the eyes and ears of the shop control system. On a day-to-day basis, instructors must be aware of what is happening in their respective shops, who is doing it, how various tasks are being performed and under what conditions. As the instructors monitor their shops, they must be ready to change part of the operation or

the entire operation if they perceive the immediate need for corrective action.

The elimination or reduction of accidents in the school shop setting should be of primary importance to everyone in the school. Forster (2000) believes that the negative effects of accidents on both industry and education are comparable. He opined: "An accident to a student or teacher is just as destructive to the production of education as it is to the production of any other commodity or service."

School administrators must become cognizant of the fact that they are not maximizing their school's potential efficiency and effectiveness until they bring their operations within compliance with federal and state and health regulations, whether or not these regulations are mandatory. Administrators must insist that safety and health information be included as an integral part of instructional curricula, methods, materials and operations.

In addition, school administrators must ensure that effective fire prevention and protection controls exist. For example, they must be aware of the sources of ignition within the school plant, the safety codes and regulations which pertain to the building, how the physical structure of shops and the school facility affects the spread of fire and the methods for detecting and extinguishing a fire should it occur.

U. S. Department of Health (2000) maintains that school administrators must guarantee a system where hazard control is considered an important part of equipment purchase and process design, preventive maintenance, shop layout and design and so forth. Firenze (2001) stressed that School administrators are required to safeguard employees, and students' health by seeing to it that the shop environment is* adequately controlled. They must be aware of those shop operations which produce airborne fumes, mists, smokes, vapours, dusts, noise, vibration, etc. that have the capacity to cause impaired health or discomfort among the students population.

Administrators must be aware that occupational illness may begin in the school shop environment and may eventually take their tolls during the years after the student graduate and enters industry.

Purpose

The purpose of the study was to investigate industrial safety facilities and practices in Akwa Ibom State Technical and Vocational institutions for repositioning. Specifically, the study was designed to:

- (i) investigate the general physical condition of school shops
- (ii) investigate equipment installation safety
- (iii) investigate electrical installation safety and
- (iv) investigate students' personal protection safety

Design

The design adopted for the study was a simple survey design using questionnaire to collect information.

Sampling

The target population for this study was final year students in all technical institutions in Akwa Ibom State during the 2004/2005 academic year. Commercial or business education students were excluded from the target population because their area has little or no hazard. Because all technical schools took part in the study, a proportionate random sampling was adopted.

During 2004/2005 academic year, there were six (6) technical institutions only. Students' enrollment in these institutions during the 2004/2005 school year is shown in table 1.

Table 1: Students' Enrollment

		Male	Female
1.	Government Technical College, 'Abak	1621	
2.	Community Technical College, Ikot Akata	716	
3.	Government Technical College, Ewet	1763	
4.	Government Technical College, Ikot Udo Jka	262	93 25
5.	Union Technical College, Ikpa Mainland	724	54 34
6.	Technical College, Oron	1410	724
Total:		6,496	930

Source: State Technical School Board, Students' Enrollment per School for 2004

To select sample for the study an interval method was used using 1:10 (every 10th student on roll in the class is selected). This implies that 649 male students and 93 female students totaling 742 were selected as sample. During the process of administration of questionnaire, 737 were returned.

Instrumentation

Questionnaire titled "Repositioning Industrial Safety in Technical Education (RISITE)" was the instrument developed and used for data collection by the investigator. The RISITE was grouped and laid out in four sections. Each item was measured in a 3 point scale of;

- S Satisfactory (needs no attention)
- A Acceptable (needs some attention)
- U Unsatisfactory (needs immediate attention)

Each item was scored by giving 3 points to satisfactory, 2 points to acceptable and 1 point to unsatisfactory. Validation:

Two lecturers in the department of vocational education, University of Uyo were used to validate the questionnaire. All their observations were incorporated into the final form of the instrument before it was administered.

Reliability of the Instrument

The instrument was tested in one vocational and one technical school in Uyo Urban. The test revealed no discrepancies with a reliability index of 75.

Data Analysis

The simple percentage and weighted mean score were used to analyze the data. A weighted mean score between 2.6 and 3.00 was regarded as "satisfactory" (items that need no attention). Mean score between 1.6 and 2.5 was regarded as "Acceptable" (items that need some attention). All items that score a mean rating below 1.6 were regarded as "unsatisfactory" (items that need immediate attention).

Section A - General Physical Education No. Of Responses/Percentage

Safety Practice		Satisfactory 3		Acceptance 2		Unsatisfactory 1		Weighted Mean	Decision
		Freq	%	Freq	%	Freq	%	Score	Remark
1	Machines, Benches and other equipment are arranged so as to conform to good safety practices	221	30	295	40	221	30	2.0	A
2	Condition of stairways	110	15	368	50	259	35	1.8	A
3	Condition of aisles	184	25	258	35	295	40	1.8	A
4	Condition of floors	184	25	442	60	111	15	2.1	A
5	Condition of walls, windows and ceiling	147	20	184	25	405	55	1.6	A
6	Illumination is safe, sufficient and well place	111	15	147	20	479	65	1.5	U
7	Ventilation is adequate and proper for conditions	147	20	184	25	405	55	1.6	A
8	Temperature control	0	0	221	30	516	70	1.3	U
9	Fire extinguishers are proper types, adequately supplied, properly located and maintained	37	5	147	20	405	75	1.3	U
10	Teachers and pupils know location of and how to use proper types various fires	37	5	147	20	553	75	1.3	U
11	Number and location of exits is adequate and properly identified	147	20	258	35	323	45	1.7	A
12	Proper procedures have been formulated for emptying the room of pupils and taking adequate precautions in case of emergencies	0	0	442	60	292	40	1.6	A
13	Lockers are inspected regularly for cleanliness and fire	37	5	74	10	626	85	1.2	U
14	Lockers doors are kept closed	111	15	442	60	184	25	1.9	A

15	Walls are cleared of objects that might fall	221	30	442	60	74	10	2.2	A
16	Utility lines properly identified	37	5	442	60	258	35	1.7	A
17	Teachers know the procedure in event of including notification of the fire department and the evaluating of the building	184	25	0	0	553	75	1.5	U

18	Air in shop is free from excessive dust, smoke etc.	37	5	295	40	405	55	1.5	U
19	Evaluating for the total rating of 'A' General condition	74	10	258	35	405	55	1.6	A

Section I? - General Physical Education No. Of Responses/Percentage

Equipment Safety Practice		Satisfactory 3		Acceptance 2		Unsatisfactory 1		Weighted mean	Decision
		Freq	%	Freq	%	Freq	%	Score	Remark
1	Machines are arranged so that workers are protected from hazards of other machines, passing students, etc.	184	25	332	45	221	30	1.9	A
2	Danger zones are properly indicated and guarded	147	20	368	50	221	30	1.9	A
3	All gears, moving belts, etc are protected by permanent enclosure guards	147	20	553	75	37	5	2.1	A
4	All guards are used as much as possible	184	25	479	65	74	10	2.1	A
5	All equipment control switches are easily available to operator	295	40	221	30	221	30	2.1	A
6	All machines are 'locked off when instructor is out of the room	442	60	221	30	74	10	2.5	A
7	Brushes are used for cleaning equipment	332	45	405	55	0	0	2.5	A
8	Non skid areas are provided around machines	332	45	405	0	0	2.5	A	9
9	Machines are in safe working condition	111	15	552	75	74	10	2.1	U
10	Machines are guarded to comply with the British standard specification (BSS) and local code	111	15	552	75	74	10	2.1	A
11	Adequate supervision is maintained when students are using machines and dangerous tools	221	30	442	60	74	10	2.2	A
12	Tools are kept sharp, clean and in	74	10	516	70	147	20	1.9	A

	safe working condition								
13	All hoisting devices are in safe operating condition	74	10	516	70	147	20	1.9	A
14	Machines are shut off while unattended	405	55	332	45	0	0	2.5	A
15	Adequate storage facilities for tools, equipment, etc, not in immediate use	258	35	184	25	295	40	1.9	A
16	Evaluation of the total rating for 'B' Equipment	0		663	90	74	10	0.1	

The results in section B show that none of the listed equipment safety practice is satisfactory. All the 13 items listed were acceptable and 2 were unsatisfactory. This implies that the listed equipment safety practice require some attention

Section C - Electrical Installation No. Of Responses/Percentage

Electrical Safety Practice		Satisfactory 3		Acceptance 2		Unsatisfactory 1		Weighted Mean	Decision
		Freq	%	Freq	%	Freq	%	Score	Remark
i	All switches are enclosed	368	50	258	35	111	15	2.3a	A
2	There is master control switch for all of electrical installation	268	50	369	50	0	0	2.5	A
3	Electrical outlets and circuits are properly identified	331	45	332	45	74	10	2.3	A
4	All electrical extension cords are in safe condition and are not carrying excessive loads	405	55	285	35	74	10	2.4	A
5	All machines switches are within easy reach of the operations	221	30	479	65	37	5	2.2	A
6	Electrical motors and equipment are wired to comply with the National Electric Code	332	45	285	35	147	20	2.3	A
7	Individual cut-off switches are provided for each machine	295	40	332	45	110	15	2.3	A
8	Machines are provided with overload controls magnetic push button controls	184	25	M1	15	442	60	1.6	A
9	No temporary wiring in evidence	258	35	332	45	147	20	2.2	A
10	.Evaluation for the total rating for 'C' Electrical Installation	184	25	479	65	74	to	2.1	

The results in Section C show that none of the listed electrical safety practice is satisfactory and none is unsatisfactory.. All the nine items are however acceptable. This implies that those acceptable items would require some attention.

Section D-Personal No. Of Responses/Percentage

Electrical Safety Practice		Satisfactory 3		Acceptance 2		Unsatisfactory 1		Weighted Mean	Decision
		Freq.	%	Freq.	%	Freq.	%	Score	Remark
1.	Goggles or protective shield are required for all works where eye hazard exist	369	50	184	25	184	25	2.3	A
2	If individual goggles are not provided, hoods and goggles are properly disinfected before use.	74	10	147	20	516	70	1.1	U
3.	Shield and goggles are provided for electric welding	295	40	368	50	74	10	2.3	A
4.	Rings and Other jewelry arc removed by pupils when working in the shop.	295	40	405	55	37	5	2.4	A
5.	Proper kind of wearing apparel is worn properly for the job being done.	368	50	295	40	74	10	2.4	A
6	Leggings, safety shoes, etc, are worn special class	221	30	332	45	184	25	2. I	A
7.	Respirators are provided for dusty or toxic atmosphere conditions such as when spraying in the finishing room.	37	5	442	60	258	35	1.7	A
8.	Provisions are made for cleaning and sterilizing respirators.	111	15	37	5	589	80	1.4	U
9.	Student are examined for safety knowledge ability	III	15	294	40	332	45	1.7	A

10	Sleeves are rolled above elbow when operating machines	368	50	332	45	37	5	2.4	A	-
11	Clothing of students is free from loose Sleeves, flopping ties, loose coats, etc.	332;	50	368	50	37	5	2.4	A	
12	Evaluation for the total rating for "D" PERSONAL PROTECTION	147	20	516	70	74	10	2.1		

The results obtained in Section D show that none of the listed personal safety practice was satisfactory. Ten items were however acceptable (1, 3, 5, 6, 7, 9, 10 11, and 12), there are the items that need some attention. The rests of the items (2 & 8) are unsatisfactory and require immediate attention.

Discussion

The Central purpose of the study was to investigate industrial safety practices in all technical and vocational institutions in Akwa Ibom State. The industrial safety practices were divided into four sections, namely; general physical condition of workshops, equipment safety, electrical installation safety and personal protection safety. The results show that the evaluation for the total rating of general physical condition of workshops (1.6 weighted mean score) is merely acceptable. But most of the items, for example, items 6 (illumination) 8, (temperature control), 9, 10, 13 and 17 (fire hazard safety) are very unsatisfactory.

As regards equipment safety, the 0.1 evaluation for the total rating provokes a great concern. All machines should be in a safe working condition, danger zones should be properly indicated in the shop and in the body of the machines.

Non-skid areas should be provided to avoid falls, all hoisting devices should be kept in a safe operating condition.

In electrical installation section, the evaluation for the total rating is a bit encouraging. The 2.1 weighted mean score tells us that the condition is acceptable, it would only need, some attention. For example, the provision of overload and under load push-button controls for all machines.

With respect to personal protection safety, evaluation for the total rating is 2.1. This shows that almost all the items will require some attention. Items such as 2 (disinfections of loads and goggles in general use), item 7, (provision of respirators for toxic or dusty atmosphere) item 8 (cleaning and sterilizing respirators) and examination of students for safety knowledge (item 9).

The results obtained from the study have provided a direction for safety and health organization and practice in our public and private technical and vocational institutions. This observation is in line with the recommendation of Firenze (1999) who said that for effective processes in hazard control, we should acquire information about what specific hazards exist, rank discovered hazards according to their potential destructive consequences; estimate the probability of the hazard resulting in an accident situation. A very serious implication of the results of this study is that those responsible for maintaining equipment, machinery and facilities play an important role in reducing accidents in the industrial and vocational education workshops. Since their work should be done in conformance with good engineering practice, their job should comply with acceptable safety and health standards. They should provide planned preventive maintenance on electrical systems, machinery, equipment, etc, to prevent abnormal deterioration, loss of service, or safety and health hazards.

Recommendations and Conclusions

This study investigated industrial safety practices in technical and vocational institutions in Akwa Ibom State. The results show that some items of general physical conditions, equipment, electrical installation and personal protection safety are unsatisfactory. The identified items some of which are acceptable should form items of concern to instructors and department heads.

Instructors should regularly survey shop facilities for safety and health hazards. They should advise administration of safety and health hazards found and offer recommendation for their correction. Instructors should evaluate the acceptability of safety devices and personal protective equipment to be purchased for the school shops. They should train and educate students in work methods and techniques which are free from hazards.

The administrators and department heads should make certain that materials, equipment and machines slated for distribution to the shops under their jurisdiction are hazard free and that adequate control measures have been provided. They should make certain that equipment, tools and machinery are being used as designed and are properly maintained. There is need for a similar study to be carried out in other states of the federation to see if this result is peculiar to Akwa Ibom State Technical and Vocational Institutions.

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