STATUS OF SAFETY EDUCATION IN TECHNICAL COLLEGE WORKSHOPS IN NIGER STATE

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Abstract

Safety referred to condition of being free from danger or harm. School accidents are usually attributed to environmental hazards and unsafe student behavior. This study was therefore designed to investigate into the status of safety education in technical college workshops in Niger State. This study was carried out in all Technical colleges' in Niger State. A descriptive survey research design was adopted for the study. The respondents comprised a total of 365 respondents out of which 98 were teachers and 267 students randomly sampled in all technical colleges. A structured questionnaire consist of 46 items was used for data collection. The instrument used for this study was subjected to validation and the reliability coefficient (Alpha) of the instrument was 0.80. Mean and standard deviation were the statistical tools used to answer the two research questions that guided the study while t-test was employed to test the two hypotheses at 0.05level of significance. The findings revealed among others that safety equipment and materials in technical college workshops are inadequate, good teaching methods and instructional materials for teaching safety education are not utilized. Some of the recommendations made in line with the findings are that adequate safety equipment and materials such as lightening arrestors, earthling rod, and safety precaution of display chart in technical workshops should be provided by Government and NGOs. Demonstration and problem solving teaching methods and instructional materials such as overhead projectors, television and videotape films should be employed for teaching safety education

Keywords: Safety Education, Technical Education, Accident, Workshop

Introduction

Safety refers to condition of being free from danger of harm. It requires observing necessary measures to meet the challenges of the hazardous situation. Living safely, however, demands the potential to function at optimum level in the midst of danger. Nzehun, (2004) reported that safety implies a state of relative security from accident, injuries or death due to measures designed to guide against accidents. Laws that encourage the maintenance of safety standards are often called safety laws. Safety as explained in Scientifics and technical terms in dictionary is the methods and technique of avoiding accident or diseases. Safety education in the context of this study therefore, as they relate to vocational and technical education laboratory and workshops are process of teaching, training and learning to improve knowledge and skills. Mohammed, Gayus, Oscar and Solomon (2002) pointed out that safety are the approaches that can keep participants or users of workshops free from dangers. They are observable rules, principles, dos and don'ts that may provide condition of

being safe from understanding one type of activity or the other in the laboratory or workshops.

The school workshops play very important roles in technical colleges, it is a building under training where practical (manipulative) activities of various trades like, building, electrical/electronics, metal work, auto-mechanics and woodwork trades etc carried are out. The workshops are usually equipped with the basic industrial materials, equipments tools and relevant energies of industrial technology. In many aspects of school workshop or laboratories are models of various disciplines of the industries.

Every day large number of accidents occur in the factories and industries of this country. (Ojo, 2006) These sometime result in death sometime impermanent disability. Chapman (2000) explained that people are killed and 750 injured everyday in industrial accidents. Every three accidents that occur, two are caused by personal elements of the victim, and one is beyond control. To put it briefly it may be said that two out of three are the victim's own- fault, and the third was his employer's for not making safe working conditions which means skill personnel need to be guided and be educated on the importance of precaution and adhere to it.

Ogunyemi (2002) stated that, educational development of personnel such as scientists, engineers, technologists, technicians, craftsmen and artisans, are categories of skilled personnel that make up the technological team required to design, produce, fabricate and service products for human use and consumption. Fajimi (2002) supported that, the general assumption, is that these skilled men have had a lessons on safety before graduation. Adeife (2005) noted that the present technology demands that school should take up the programme for safety education more seriously than mere assumption. Therefore, teachers, school management and workshop personnel of technical colleges have by the very nature of their positions, a moral legal obligation to keep the tools, equipment and workshop environment assigned for their use in the best possible condition.

Blake (2007) revealed that, in actuality both unsafe acts and unsafe condition are involved in majority of industrial accidents. A study conducted by National Safety Council Committee made the following conclusions. 18% of injuries are due wholly to mechanical causes, 19% of injuries are due wholly to personal causes, 63% are due to a combination of both of these causes (Blake, 2007).

From the above percentage one will agree that injuries are mostly due wholly to both mechanical and personal causes. Because laboratories and workshops are known with the presence of dangerous chemicals, heavy equipment, poisonous gases, means of generating high voltage and large currents, and explosive etc as such students should be made to adhere strictly to workshop rules and regulation.

Olaitain, Onyemachi, Nwachuswu, Igbo and Ekong (2002) supported the above statement that, tools and machines etc have no human leniency in their behaviour, for the future betterment of individual who is not mature enough to appreciate the dangers must cautions

and respect the role Ojo (1994) explained that, a review of literature dealing with the school shop safety inevitably leads to the statement that 88% of individual accidents are caused by the act of and 10% are caused by the physical environment.

The above statement has been so much reported in most of all accident review journals and conference such that if accepted at face value, one would almost arrive at the conclusion that efforts devoted to reducing hazardous conditions might better be used influencing people to adopt an attitude of safety consciousness. Upon this, background, it becomes pertinent to investigate into the status of safety education in the workshops of technical college programme in Niger state.

Research Questions

(i) How adequate are the safety equipment and materials in technical college workshops in Niger State?

(ii) What are the teaching methods and instructional materials that are frequently used in teaching safety education in technical colleges in Niger State?

Hypotheses

Ho_1: There is no significance difference in the mean responses of the students and teachers on the adequacy of safety equipment and materials in workshops of technical college in Niger State.

Ho_2: There is no significance difference in the mean responses of the students and teachers on the teaching methods and instructional materials that are frequently used in teaching safety education in technical colleges in Niger State.

Methodology

A survey research design was used for the study. The area of the study covered all the six technical colleges and a federal technical college in Niger State which includes the followings. Government Technical College, Eyagi – Bida; Government Technical College, New – Bussa; Government Technical college Chanchaga, Minna; Suleiman Barau Technical College, Suleja; Government Technical College, Kontagora; Mamman Kontagora Technical College, Pandogari; and Federal Government Science and Technical College, Shiroro. The target population for this study was 936 respondents, out of which 130 were technical teachers and 806 were students. Simple random sampling technique was adopted and a sample size of 365 was obtained out of which 267 were students and 98 were technical teachers in all the technical colleges. Yaro Yamane formula was used to determine the sample size of each group of respondents. A structured questionnaire consisted of 46 items was used for data collection. The instrument used for this study was subjected to validation by senior lecturers in Federal University of technology, Minna and the reliability coefficient (Alpha) of the instrument was 0.80. A four rating scale of strongly agree (4-point), agree (3-point), disagree (2-point) and strongly disagree (1-pont)were used.

Results

Research Questions 1

How adequate are the safety equipment and materials in technical college workshops?
The responses to this research question is presented in Table 1

Table 1: Respondents mean scores and standard deviations on adequacy of safety equipment and materials in the technical college workshops

$n_1 = 98, n_2 = 267$

S/NO	ITEMS	$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2	$\bar{X}t$	Remarks
1.	Goggles available	2.67	0.77	2.79	0.90	2.73	Adequate
2.	Workshop coats/overall/aprons	2.84	0.78	-2.56	0.82	2.70	Adequate
3.	Foot protective	2.03	1.07	1.90	1.07	1.98	Not Adequate
4.	Fire extinguishers available	2.06	0.97	1.90	0.88	1.99	Not Adequate
5.	Provision of toilets facilities	2.01	0.89	2.97	0.91	1.98	Adequate
6.	Information and Instruction on the Use of workshop equipment	2.89	0.82	3.05	0.92	2.97	Adequate
7.	Provision of machine manual books	2.01	0.69	1.92	0.92	1.97	Not Adequate
8.	Provision of reading / testing meter	2.92	0.78	2.94	1.02	2.93	Adequate
9.	First Aid Kits	2.19	1.00	203	1.03	2.11	Not Adequate
10.	Sand bucket	2.64	1.29	3.25	0.88	2.95	Adequate
11.	Electrical bells available	2.15	1.00	1.93	0.94	2.04	Not Adequate
12.	Water buckets	2.27	1.08	1.92	0.95	2.10	Not Adequate
13.	Written Safety precaution	3.03	0.79	3.13	0.98	3.08	Adequate
14.	Buzzers	2.06	0.86	1.87	0.89	1.97	Not Adequate
15.	Safety Switches	3.21	0.97	3.19	0.92	3.20	Adequate
16.	Buggler Alarm	1.97	0.89	2.00	0.95	1.99	Not Adequate
17.	Telephone	1.79	0.96	1.89	0.88	1.84	Not Adequate
18.	Lightening arrestors	2.12	0.94	1.87	0.89	1.99	Not Adequate
19.	Earthling rod	1.97	0.88	1.95	0.99	1.96	Not Adequate
20.	Safety precaution of Display Chart	2.37	1.06	1.96	0.93	2.17	Not Adequate

Key

n_1 = Number of teachers

n_2 = Number of students

SD_1 = Standard deviation of teachers

SD_2 = Standard deviation of students

$\bar{X}t$ = Mean of respondents of teacher

$\bar{X}_1$ = Number responses of teachers

$\bar{X}_2$ = Number responses of students

The mean responses of teachers and student as shown in table 1 indicated that out of 20 items, only 8 items i.e. 1, 2,5,6,8,10,13, and 15 were identified as adequate while others are not adequate provision of safety equipment and materials which is in line with standard deviations.

Research Question 2

What are the teaching methods and instructional materials that are frequently used in teaching safety in technical colleges in Niger State?

Table 2: Respondents mean scores and standard deviation on the teaching methods and instructional materials that are frequently used in teaching safety education in technical college in Niger State

S/NO	Items	$\bar{X}_1$	$S.D_1$	$\bar{X}_2$	$S.D_2$	$\bar{X}_t$	Remarks
21.	Conference and Seminars	2.15	1.01	1.93	0.94	2.04	Disagree
22.	Demonstration method	2.19	1.00	2.07	1.08	2.13	Disagree
23.	Field trip observation	1.97	0.88	2.01	0.91	1.99	Disagree
24.	Discussion method	2.50	1.10	2.99	0.77	2.75	Agree
25.	Lecture approach	2.11	0.82	2.05	0.98	2.08	Disagree
26.	Problem solving approach	2.06	0.97	1.91	0.91	1.99	Disagree
27.	Discovering method	2.13	1.02	2.01	0.91	2.07	Disagree
28.	Diagrams	3.35	0.96	2.91	1.09	3.13	Agree
29.	Charts	2.76	0.95	2.91	0.81	2.83	Agree
30.	Photograph	2.68	0.77	3.06	0.93	2.87	Agree
31.	Journal, Magazine, Periodicals	2.39	1.05	3.16	0.85	2.28	Disagree
32.	Overhead Projector	1.60	0.86	1.88	0.89	1.74	Disagree
33.	Opaque Projector	1.97	0.88	2.05	0.88	2.08	Disagree
34.	Television Set	2.14	0.93	2.07	1.00	2.11	Disagree
35.	Models	2.99	1.05	3.10	1.83	3.05	Agree
36.	Computer System	2.01	1.09	3.14	0.84	2.58	Agree
37.	Realia (real Object)	2.03	0.87	1.96	0.88	1.99	Disagree
38.	Motion Picture (16mm film)	2.21	0.92	1.96	0.93	2.08	Disagree
39.	Slides	1.77	0.96	1.95	0.99	1.86	Disagree
40.	Film Stripes	2.99	0.89	3.24	0.80	3.12	Agree
41.	Video tape film	1.74	0.88	1.89	0.88	1.82	Disagree
42.	Audio tape recording etc.	1.78	0.98	1.95	0.98	1.87	Disagree
43.	Video tape recorder	2.18	0.88	2.16	1.05	2.17	Disagree
44.	Transparencies	2.86	0.55	2.16	1.05	2.51	Agree
45.	Projection screen	2.05	0.90	1.90	1.04	1.94	Disagree
46.	Motion picture projector	1.86	0.96	2.01	1.12	1.94	Disagree

The result presented in table 2 revealed that the mean responses of 8 out of 26 items are the type of teaching method and instructional materials frequently used for teaching safety education while other 18 mean responses of respondent disagree with the items. Although there were

divergent opinions on items 36 where students agreed with the item and teachers disagreed also on item 44 where by teachers disagreed with the item and students agreed.

Hypothesis one

Ho_1: There is no significance difference between the mean responses of the students and teachers with respect to adequacy of safety equipmen and materials in technical college workshops.

Table 3: t-test of the mean responses of respondents on the adequacy of safety equipment and materials in technical college workshops

S/NO	ITEMS	X_1	X_2	$S.D_1$	$S.D_2$	t-cal	Remarks
1.	Goggles available	2.67	2.79	0.77	0.90	1.20	*
2.	Workshop coats/overall/aprons	2.84	2.56	0.78	0.82	2.80	
3.	Foot protective	2.03	1.90	1.07	1.07	1.08	*
4.	Fire extinguishers available	2.06	1.90	0.97	0.88	0.01	*
5.	Provision of toilets facilities	2.01	1.91	0.89	0.91	1.00	*
6.	Information and instruction On the use of workshop Equipment	3.05	2.89	0.82	0.92	1.60	*
7.	Provision of machine Manual books	2.01	1.92	0.69	0.92	0.90	*
8.	Provision of reading / Testing meter	1.92	2.04	0.78	1.02	4.74	
9.	First Aid kits	2.19	2.03	1.00	1.02	1.33	*
10.	Sand bucket	2.64	3.25	1.29	0.88	-5.08	*
11.	Electric bells available	2.15	1.93	1.00	0.94	1.83	*
12.	Water buckets	2.27	1.92	1.08	0.95	3.18	
13.	Written Safety precaution	3.03	3.13	0.79	0.98	-1.00	*
14.	Buzzers	2.06	1.87	0.86	0.89	1.90	*
15.	Switches	3.21	3.19	0.96	0.92	0.18	*
16.	Buggler Alarm	1.97	2.00	0.89	0.95	-0.27	*
17.	Telephone	1.79	1.89	0.96	0.88	-1.0	*
18.	Lightening arrestors	2.12	1.87	0.94	0.89	2.50	
19.	Earthing rod	1.97	1.95	0.88	0.99	0.18	*
20.	Safety precaution of Chart Display	2.37	1.96	1.06	0.93	3.42	

Key* = significant t – table = ± 1.96

The result as presented in table 3 shows that there is no significance difference ($P<05$) in the mean responses of students and teachers on the adequacy of equipment and materials in the Technical college workshops. The analysis revealed that 15 out of 20 items of calculated t-value were less than the table value. Thus the null hypothesis was not rejected.

Hypothesis Two

Ho_2: There is no significant difference between the mean responses of the students and teachers on the teaching methods and instructional materials that are frequently used in teaching safety education in technical colleges in Niger State.

Table 4: t-test of the mean responses of respondents on the teaching methods and instructional materials that are frequently used in teaching safety education in technical colleges in Niger State

S/No.	Items	X_1	X_2	$S.D_1$	$S.D_2$	t-cal	Remarks
21.	Conference and Seminars	2.15	1.93	1.01	0.94	2.0	
22.	Demonstration method	2.19	2.07	1.00	1.08	1.09	*
23.	Field trip observation	1.97	2.01	0.88	0.91	-0.40	*
24.	Discussion method	2.50	2.99	1.10	0.77	-4.45	*
25.	Lecture approach	2.11	2.05	0.82	0.08	0.6	*
26.	Problem solving approach	2.06	1.91	0.97	0.91	10.4	
27.	Discovering method	2.13	2.01	1.02	0.91	1.09	*
28.	Diagrams	3.35	2.91	0.96	0.09	4.0	
29.	Charts	2.76	2.91	0.95	0.81	-1.5	*
30.	Photograph	2.68	3.06	0.77	0.93	-3.8	*
31.	Journal, Magazine, Periodicals	2.39	2.16	1.05	0.85	2.09	
32.	Overhead Projector	1.60	1.88	0.86	0.89	-1.1	*
33.	Opaque Projector	1.97	2.05	0.88	0.88	-0.8	*
34.	Television Set	2.14	2.07	0.93	1.00	0.64	*
35.	Models	2.99	3.10	1.05	1.85	0.85	*
36	Computer System	2.01	3.14	1.09	0.84	-10.3	*
37.	Realia (real Object)	2.03	1.96	0.87	0.88	0.7	
38.	Motion Picture (16mm film)	2.21	1.96	0.92	0.93	2.27	*
39.	Slides	1.77	1.95	0.96	0.99	-1.64	*
40.	Film Stripes	2.99	3.24	0.89	0.80	-2.5	*
41.	Video tape film	1.74	1.89	0.88	0.88	-1.5	*
42.	Audio tape recording etc.	1.78	1.95	0.98	0.98	-1.55	*
43.	Video tape recorder	2.18	2.16	0.88	1.05	0.18	*
44.	Transparencies	2.86	2.16	0.55	1.05	7.78	
45.	Projection screen	2.05	1.90	0.90	1.04	1.36	*
46.	Motion picture projector	1.86	2.01	0.96	1.12	-1.36	*

The result in table 4 shows the opinion of the respondents as regards to the teaching methods and instructional materials that are frequently used in teaching safety education in technical college in Niger State. The analysis shows that, the calculated t-value of 21 out of 26 items were less than the table value. This leads to the acceptance of the null hypothesis.

Discussion

The findings indicated that most of the technical college workshops had no adequate facilities. Table 1 consist of 20 items and revealed that, only 40% were identified as adequate this includes, foot protective, fire extinguishers, functional first aids box, first aid kits, electrical bells, water buckets and buggier alarm among others.. The remaining fifteen items (60%) were inadequate This is in line with the study of Aina (2002) that, one of the major problem facing technical education in the federation and state is inadequacy of safety equipment and materials in the technical college workshops. These findings were also supported by Nzolum (2004) that the problems of technical and vocational education in Nigeria are made worse by the poor condition/inadequacy of safety training facilities. Adequate safety workshop facilities are necessary for any quality learning to take place. Facilities aid, the teachers and the workshops attendance to communicate more effectively and the learners to learn more interestingly, meaningfully and permanently.

In the same vain Blake (2007) lamented that where safety equipment and materials are not functional or adequately provided, technical training programmed will suffer and will lead to the production of highly unskilled personnel who are unemployable and unproductive in view of that, inadequate safety equipment and materials in technical colleges programme retarded skill acquisition. Only few safety equipment available in the Technical colleges are adequate according to the findings.

The findings on teaching methods and instructional materials that are frequently used in teaching safety education as revealed in table 2 shows that respondent disagreed with 60% of items listed as teaching method and instructional materials. The findings shows that only eight items (35%) were agreed by respondents as methods of teaching and instructional materials used in technical colleges' therefore, the stated general objectives/aims could not be achieved. These findings is in consonance with the study of Laid (2000)which explained that teaching methods and instructions in vocational and technical educational should be capable of arousing mental and physical activities among students and provide them with an opportunity to learn. There are many methods and techniques in teaching safety education; this is in line with Bello (2001) who said that methods and techniques are meant for communicating with students.

The findings also shows that conference and seminar, demonstration method, lecture approach, discovering method and questioning methods are not been used in teaching safety education. The statement is consistent with the opinion of Okoro (2006) that effective teaching takes place when the teacher know which method to use in a particular situation to meet specific goals. That is to say that methods are way and means of relating the teacher and student in a teaching and learning environment.

The findings also revealed that most of technical college employs more of written test method, oral test method and discussion method of teaching. Other methods that are not most employ are conference and seminars, demonstration, field trips, questioning method, and lecture approach. In line with this Okoro (2008) stated that lecture, discussion, questioning, demonstration, project experiment, and field trips are the basic instructional

methods that should be employed in teaching safety education programmed. However, demonstration is an instructional method which enables students to observe procedures and techniques that illustrate specific skills principles or concepts. In conducting a practical lesson, like education, a teacher must know the best method of presenting new skills and safe working habits associated with practical lessons.

Although, findings also shows that majority of teachers in technical colleges do no employ journals, magazines, periodicals, overhead projector, opaque projector, television set, computer system Realia (Real object) motion picture (16mm Film), slides, video tape films, audio tape recordings, projection screen and motion picture projector as a mean of instruction materials for teaching safety education programmes. In line with this Walklin (2001) maintained that good and up to date instructional materials always be used in teaching practical subjects so as to help student acquire the skills necessary to prepared for the real world of work and testing knowledge in a controlled setting to reduce degree of accident in the field of work.

Conclusions

Based on the findings from this study, the following conclusions are made; that safety equipment and materials in Technical College Workshops are not adequate. Demonstration, discovering and problem solving teaching methods and instructional materials such as overhead projectors, television set and videotape films as regards to safety education are not utilized. Conference and seminars have not been organized for students and other workshops users.

Recommendations

Based on the findings of this study, the following recommendations have been proffered in order to have effective safety education in workshops of technical college in Niger State:

(i) Adequate safety equipment and materials should be provided for in technical colleges' by government and NGOs, such as lightning arrestors, earthling rod and safety precaution of display chart

(ii) Demonstration, discovering and problem solving teaching methods and instructional materials such as overhead projectors, television set and video tape films as regards to safety education should be employed.

(iii) Conference and seminars should be organized from time to time for students and workshops users.

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