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Safety Practices among Display Screen Equipment Operators in Tertiary Institutions in Rivers State

Etiobhio, Faith I. & Ekenedo, Golda. O

Department of Health Promotion, Environmental and Safety Education, Faculty of Education, University of Port Harcourt

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ABSTRACT

The purpose of the study was to investigate safety practices among display screen equipment operators in tertiary institutions in Rivers state. This study adopted a descriptive research design. A sample of 333 respondents were selected from a population of 934 display screen equipment operators in Tertiary institutions in Rivers State through a multistage sampling procedure. A validated self-structured instrument titled "Safety Practice Questionnaire (SPQ)" with a reliability index of 0.88 was used to collect data for the study. Data collected was analyzed using SPSS version 26.0. The statistical tools employed include: Percentage, Mean, Standard Deviation, Z-tests and ANOVA. the findings revealed that: the practices of OHS was poor ($\bar{x}<2.50$); and there was a significant difference in the practices of OHS among the display screen equipment operator in in tertiary institution in Rivers State based on level of education and gender ($p<0.05$) but not significantly different based on work experience ($p>0.05$). The study was concluded that the display screen equipment operator practices of OHS was poor. Also, work experience does not influence practices of OHS. However, educational status and gender influences practices of OHS and recommended among others that government should launch a behaviour change intervention programme to improve the practice of OHS among the display screen equipment operators by partnering with health experts in the tertiary institutions.

Keywords: Safety Practices, Display Screen Equipment Operators

INTRODUCTION

In the modern educational landscape, the pervasive use of display screen equipment (DSE), such as computers and projectors, has become integral to the operations of tertiary institutions. While these technologies facilitate learning and administrative tasks, they also pose significant health and safety risks to operators if not managed properly.

The Occupational Safety and Health Council (OSHC, 2009) defined Display Screen Equipment (DSE) as any screen that displays letters, numbers, characters, or graphics, regardless of the display process involved. Similarly, the Birmingham City Council (2015) described DSE as screens used for displaying information such as text, numbers, or graphics and DSE encompasses various devices, including computers, projectors, tablets, and other electronic screens used in diverse occupational settings.

DSE operators spans across various occupations, including banking, telecommunications, entertainment, education, and notably in business centers throughout cities where DSEs are the primary equipment (Ekenedo & Jonathan, 2016). Display Screen Equipment (DSE) operators in this context are individuals who frequently use computers, projectors, and other screen-based devices as part of their job. This group includes a wide range of professionals, including word processing workers, secretaries/typists, data input operators, news sub-editors, journalists, customer complaint/account enquiry/directory enquiry operators, television editing technicians, security control room operatives, air control operators, graphic designers, and librarians are considered heavy users of DSE. Moderate users include scientists/researchers, client managers, bank customer support officers, airline check-in clerks, and receptionists (HSE, 2008).

The role of DSE operators typically involve tasks such as data entry, teaching, research, and administrative

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functions that require prolonged periods of screen use. This prolonged use exposes them to various health risks, including musculoskeletal disorders, eye strain, and mental stress. Musculoskeletal disorders (MSDs) are a significant concern, with studies such as Robertson et al. (2017) in the United States and Hagberg et al. (2016) in Sweden demonstrating the impact of ergonomic interventions on reducing MSDs among office workers. Similarly, computer vision syndrome (CVS) has been widely studied, with Sheppard and Wolffsohn (2018) highlighting factors contributing to CVS and recommending interventions to mitigate its effects.

Although specific data may not be available, it is commonly observed that most top businesses in Nigeria heavily depend on DSEs to enhance their operations. In fact, no occupation is exempt from the use of DSEs. Concerns about the health effects of DSE use vary across different industries and sectors. According to a TUC report (2013), DSE use was the second highest health concern in the banking, insurance, and finance industries (73%), and in central government (56%). It was also a concern for 38% of workers in energy and water, 27% in other services, and 17% in agriculture, where it was listed as the fifth concern.

Although specific data for Nigeria may not be available, it is commonly observed that top businesses in the country heavily depend on DSEs to enhance their operations and tertiary institutions are not exempted. Tertiary institutions, which include universities, colleges, and polytechnics, are environments where learning, teaching, and administrative tasks heavily rely on technology. DSE operators in these settings encompass administrative staff, lecturers, students, and IT personnel (Olaniyi, 2017). Their roles involve extensive use of computers and other screen-based devices for data entry, teaching, research, and administrative functions. The importance of safety practices among DSE operators in tertiary institutions cannot be overstated, given the potential health risks associated with prolonged screen use.

In Rivers State, Nigeria, the reliance on DSE in tertiary institutions is significant. With the increasing integration of technology in academic and administrative functions, the need for safety practices among DSE operators becomes critical. Ekenedo and Jonathan (2018) noted that many DSE operators in Nigeria suffer in silence due to the lack of legislation covering their protection. Therefore, understanding and implementing safety practices in Rivers State's tertiary institutions is essential to mitigate health risks and improve the well-being of DSE operators.

Safety practices refer to a set of guidelines, procedures, and behaviors designed to prevent accidents, injuries, and health issues in the workplace (Jilcha & Kitaw, 2016). These practices are essential for creating a safe and healthy work environment, especially for individuals who are exposed to potential hazards during their job. In the context of Display Screen Equipment (DSE) operators, safety practices include various ergonomic, visual, and mental health measures, workstation adjustments, regular breaks, and awareness programs on potential health risks aimed at reducing the risks associated with prolonged screen use.

The importance of safety practices for DSE operators cannot be overstated. Proper safety practices help reduce the incidence of musculoskeletal disorders, eye strain, and mental stress, leading to improved productivity and overall job satisfaction. Studies such as those by Robertson et al. (2017) and Hagberg et al. (2016) have shown that ergonomic interventions significantly reduce the incidence of neck and back pain among office workers. Similarly, Sheppard and Wolffsohn (2018) emphasized the need for proper lighting, screen adjustments, and regular eye exercises to alleviate symptoms of Computer Vision Syndrome. Mental health safety practices, as highlighted by Wiegand et al. (2016) and Nwankwo and Kalu (2019), are crucial for reducing stress and improving the mental well-being of DSE operators.

In Nigeria, research by Ezenwa (2014) and Akinsola and Popoola (2017) has underscored the need for comprehensive ergonomic training and awareness programs to improve safety practices among DSE operators. Implementing these practices can significantly reduce health risks and enhance productivity, making safety practices an essential component of workplace health and safety. By defining and implementing effective safety practices, organizations can create a safer and healthier work environment for DSE operators, ultimately leading to better health outcomes and improved operational efficiency.

Demographic factors such as gender, work experience, and level of education can influence safety practices among DSE operators. Gender differences may affect the perception of ergonomic risks, adoption of safety

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practices, the experience and reporting of discomfort related to DSE use. Research indicates that women are more likely to report higher levels of musculoskeletal discomfort and visual strain than men. This disparity may be attributed to physiological differences, such as body size, muscle strength, and ergonomic factors (Toomingas, Alfredsson, Timpka, & Wigaeus Hjelm, 2016; Marcus & Gerr, 2016). Additionally, societal roles and expectations may influence how men and women perceive and prioritize safety, with women potentially being more vigilant in reporting issues and seeking solutions (Punnett & Herbert, 2020).

Work experience influences safety awareness in a dual manner. Experienced DSE operators may have developed coping mechanisms and awareness of risks due to prolonged exposure. However, they might also exhibit complacency, relying on outdated practices rather than adhering to updated safety guidelines (Kraemer, et al., 2015). Conversely, newer employees might lack practical experience but benefit from recent training on DSE safety. Continuous training and updating safety protocols are essential to ensure that all DSE operators maintain high safety awareness levels, regardless of their experience (Dembe, Erickson, Delbos, & Banks, 2015).

The level of education plays a crucial role in shaping an individual's approach to safety. Higher educational attainment is generally associated with better awareness and understanding of occupational health and safety issues (Harvey, Bolam, Gregory, & Erdos, 2019). Educated DSE operators are more likely to be aware of ergonomic principles and the importance of regular breaks, proper posture, and workstation adjustments. Conversely, operators with lower educational levels might not fully comprehend the risks associated with DSE use or the importance of preventive measures. Educational programs tailored to different educational backgrounds can enhance safety awareness across all levels (Johnson & Hall, 2017).

The ABC (Antecedent-Behavior-Consequence) theory can provide a framework for understanding and improving safety practices among DSE operators. According to this theory, behaviors (B) are influenced by antecedents (A) and consequences (C). In the context of DSE operators, antecedents could include ergonomic training and awareness programs, behaviors could be the adoption of safety practices, and consequences could be reduced health risks and improved well-being. Implementing the ABC theory in this study can help identify effective interventions to promote safety practices among DSE operators. Despite the growing body of research on DSE safety practices, there is a noticeable gap in the literature regarding the specific context of Rivers State, Nigeria. While international studies provide valuable insights, there is a need for localized research to address the unique challenges faced by DSE operators in this region. This study aims to fill this gap by examining the safety practices among DSE operators in tertiary institutions in Rivers State

Research Questions

The following research questions were raised and answered to guide the study:

1. What is the OHS practice among display screen equipment operators?
2. What is the difference in OHS practice among display screen equipment operators based on education status?
3. What is the difference in OHS practice among display screen equipment operators based on work experience?
4. What is the difference in OHS practice among the Display screen equipment operators in tertiary institutions in Rivers state based on gender?

Hypotheses

The following hypotheses were postulate and tested at .05 level of significance

1. There is no significant difference in the OHS practices among display screen equipment operators based on educational status.
2. There is no significant difference in the OHS practices among display screen equipment operators based on work experience.
3. There is no significant difference in the OHS practice among display screen equipment operators based on gender.

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METHODOLOGY

This study adopted a descriptive survey design. The sample size for the study was 333 Display Screen Equipment operators drawn from the population of 934 display screen equipment operators in tertiary institutions in Rivers State (National Students Union Government, 2020). The sample size was selected using two sampling procedures involving proportionate stratified random sampling, and purposive sampling technique. Proportionate sampling technique was used to draw 35.7% of the population of computer operators in each of the five major tertiary institutions in Rivers State. Purposive sampling technic was used to draw the actual participants. The criterion for sampling will include: must have an office, must be functional, must have been operational for at least one year and must be located within the school campus.

The instrument for data collection was a validated self-structured questionnaire titled "Safety Practice Questionnaire (SPQ)" with a reliability index of 0.88. The instrument was divided into two sections (section A and B). Section "A" gathered information about the respondents' demography while section B gathered information necessary to address the research questions and hypotheses. The section B was designed such that Always (A), Occasionally (O), rarely (R) and Never (N) items statement was used to elicit data for safety practices. The data for the study were collected through the administration of the instrument on 333 respondents drawn from the tertiary institutions. This was done by the researcher with the help of two trained research assistants. For ethical reasons, an introductory letter was obtained from the Head of Department and sent the Business Operators Union Chairman for pre-information and permission to conduct the study.

The completed copies of the questionnaire were collated, coded and analyzed using the statistical package of social sciences (SPSS) version 26. Descriptive statistics of percentages, mean and standard deviation was adopted to answer the demographic data and research questions respectively. While inferential statistics of Z-tests and ANOVA were used to test the hypotheses at 0.05 alpha.

RESULTS

Table 1: Summary of Demographic Characteristic of Respondents

Demographic	Groups	f	%
Gender	Male	155	46.5
	Female	178	53.5
	Total	333	100.0
Highest Educational Status	No formal education	10	3.0
	Primary	81	24.3
	Secondary	162	48.6
	Tertiary	80	24.0
	Total	333	100.0
Years of Experience	1-9 years	239	71.8
	10-19	91	27.3
	20 and above	3	.9
	Total	333	100.0

Results in Table 1 showed that majority of the respondents were female (53.5%) while 46.5% were male. Hence

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the display screen users were mostly females. Education wise, 48.6% of the respondents had secondary education, 24.3% had primary education, 24.0% had tertiary education and 3.0% had no formal education. In relation to working experience, a good number of the respondents (71.*%) had 1-9 years of working experience, 27.3% had 10-19 years of working experience and 0.9% had 20 years working experience and more.

Table 2: Mean and Standard Deviation of the OHS practices among display screen equipment operators

Safety Practices	$\bar{x}$	St.D	Remark
I wear protective goggle	1.73	.779	Poor
I sit upright with hands well placed on the desk	2.10	1.268	Poor
I tilt the display screen slightly backward	2.79	.971	Good
I blink my eyes constantly to reduce the rays of the light that enter my eyes	2.90	.986	Good
I take in between break to rest	2.62	1.000	Good
I observe proper placement of keyboard and mouse	2.32	1.033	Poor
I make use of elbow rest	2.25	.919	Poor
I make use of footrest constantly to reduce the tension on the foot	2.13	.983	Poor
I observed recommended monitor/ I distance	2.26	.925	Poor
I make use of document holder while typing	2.18	1.011	Poor
I ensure adequate lightening of the workstation	2.29	1.062	Poor
I dispose paper waste regularly	2.71	1.023	Good
I dispose spoilt equipment fast to reduce radiation and emission problems	2.53	1.158	Good
I avoid using faulty equipment to prevent electrical and other related accidents	3.08	.980	Good
Aggregate	2.45	1.007	Poor

Results in Table 2 showed that the occupational health and safety practices among display screen equipment operators. The result revealed that the good OHS practices of the operators include tilt the display screen slightly backward avoid the use of faulty equipment (3.08±0.980); constant eye blinking (2.90±0.986); tilting of screen backward (2,79±0.971); regular disposal of waste (2.71±1.023); taking break in-between work time (2.62±1.000) and disposal of spoilt equipment (2.53±1.153).

Table 3: Summary of One-Way ANOVA of OHS practice among display screen equipment operators based on educational status

Education* Safety Practices	Sum of Squares	df	$\bar{x}$ Square	Fcal	Fcrit	Sig.	decision
Between Groups	4.147	3	1.382				Significant
H0 rejected							
Within Groups	86.285	329	.262	5.271	3.86	.001	
Total	90.432	332					

*P<0.05; Fcal> Fcrit

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Table 3 revealed that (Fcal = 5.271; Fcrit = 3.86; P.val = 0.001) at df of 332 and alpha level of 0.05. Since *P<0.05; Fcal> Fcrit, the null hypothesis was rejected. This means that there is a significant difference in the OHS practice among display screen equipment operators based on educational status. Therefore, the stated null hypothesis was rejected and the alternative hypothesis was accepted. This implies that computer operators' highest level of education affected their OHS practices.

Table 4: Summary of One-Way ANOVA of the OHS practice among display screen equipment operators based on work experience.

Work experience* Safety Practices	Sum of Squares	df	x̄ Square	Fcal	Fcrit	P.val	Decision
Between Groups	1.379	3	0.690				Not Significant
Within Groups	89.053	329	.270	2.556	4.26	0.079	H0 accepted
Total	90.432	332					

*P>0.05; Fcal<Fcrit

Table 4 showed that (Fcal = 2.556; Fcrit = 4.26; P.val = 0.001) at df of 332 and alpha level of 0.05. Since *P<0.05; Fcal< Fcrit, the null hypothesis was accepted. This means that there is no significant difference in the OHS practice among display screen equipment operators based on work experience. Therefore, the stated null hypothesis was rejected while the alternative hypothesis was accepted. This implies that computer operators' working experience affected their computer operators' OHS practices.

Table 5: Summary of Z-test Analysis of the OHS practice among display screen equipment operators based on gender

	Gender of Respondents	N	x̄	St.D	Zcal	df	Zcrit	P.val	Decision
Safety Practices	male	155	2.50	.551					Significant
	female	178	2.40	.492	1.727	331	1.66	0.043	H0 Rejected

*P>0.05; Zcal>ZCrit

Table 5 revealed that (Zcal = 1.727; Zcrit = 1.66; P.val = 0.043) at df of 331 and alpha level of 0.05. Since P<0.05; Zcal>ZCrit the null hypothesis was rejected. This means that there is no significant difference in the OHS practice among display screen equipment operators based on work experience.

DISCUSSION

Practice implies regular behaviour or constant obedience to a set of injunction or behaviour. Practice in another angle could mean the application of knowledge. Hence, safety practices connotes the application of safety knowledge and in the workplace. Safety practice is very crucial to healthy workforce. Unfortunately, the scholarly results in terms of safety practices is mixed. While many reported good practice among a cohort, others reported poor practices. In the analysis of this study, poor level of practices of OHS was observed.

Table 4.3 showed the display equipment workers occupational health and safety practices include to: avoid the use of faulty equipment (3.08±0.980); constant eye blinking (2.90±0.986); tilting of screen backward (2.79±0.971); regular disposal of waste (2.71±1.023); taking break in-between work time (2.62±1.000) and disposal of spoilt equipment (2.53±1.153).The display screen equipment operator practices of OHS was poor (x̄<2.50).

The above result contradicts the findings of Muhammad, Aroj, Ali, Malik, Muhammad, Moeen, Jahanzaib, and Faisal (2014) who alongside their report of high level of awareness, reported that the over 80% of the respondents

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wear their protective goggle. They also observed that on the aggregate, 65% DSE operators practice OHS. Similarly, Gebrezgiabher et'al. (2013) found that 82% of DSE operators in Ethiopia wear protective equipment. The demarcation in the results could be due to level policies differences of the level if enforcement of OHS policies.

Nevertheless, in line with the results of the present study, Aluko et'al. (2016) found that OHS practices among DSE operators in healthcare centers in Nigeria was poor. Many reported not using the PPE, nor conforming to recommended screen to eye distance, elbow and hand to keyboard placement.

Similarly to the findings of this study, Jideonwo (2017), the OHS practice among DSE operators in University of Port Harcourt include taking of short breaks from work, keep their mouse at the same level with the keyboard. This aligns with the recommendations of BEBOSH health and safety (2016) which state that employers across all the countries should endeavour to provide adequate break for all the employees without discrimination. In Marahatta, Gautam, Paudel and Yadav (2018) study, only 47% of the DSE operators observed the necessary OHS practices.

Human behavior is influence by many environmental and genetic factors. That is to say that the environment individuals find themselves have a way it influence their actions. similarly, according to ABC theory and ecological system theory, the human behavior is nurtured by exposure to environmental conditions such as education, work experience while the trait theorists believe that genetics and human nature such as gender play role in determining human behavior, based on this scholarly understanding, the researcher examined the OHS practices in relation to gender, level of education and working experience.

Based on the mean score, there is a difference in the practices of OHS among the respondents based on gender. There was a significant difference in the practices of OHS among display screen equipment operators in in tertiary institution in Rivers State based on level of education and gender ($p<0.05$) but was not significant based on work experience ($p>0.05$).

Numerous studies have documented gender differences in OHS practices and ergonomic awareness. For example, a study by Smith et al. (2014) found that women reported higher levels of musculoskeletal discomfort and were more likely to adopt ergonomic practices compared to men. This aligns with the current study's finding that gender influences OHS practices among DSE operators. Education level has been consistently linked to better awareness and implementation of safety practices. Ezenwa (2014) found that higher educational attainment was associated with greater knowledge of ergonomic principles and better OHS practices among computer users in Nigerian universities, supporting the current study's findings. Robertson et al. (2017) found no significant correlation between years of work experience and the adoption of ergonomic practices among office workers, which corresponds with the current study's findings.

Villanueva and Cook (2015) found that more experienced workers were more likely to adopt ergonomic interventions and report fewer musculoskeletal problems. This suggests that work experience positively correlates with better OHS practices. Igbaria et al. (2017) on the other hand, showed a mixed result as the study indicated that while education level influenced awareness, it did not always translate to better ergonomic practices, suggesting that other factors like organizational culture and support might play a role.

The significant difference in OHS practices based on gender and education level is largely expected as dender differences in ergonomic practices have been well-documented, with women often being more proactive in adopting ergonomic solutions due to higher reported discomfort levels. Similarly, higher education levels are generally associated with greater awareness and understanding of ergonomic principles, leading to better OHS practices. However, the lack of a significant difference in OHS practices based on work experience is somewhat surprising, given that more experienced workers are often assumed to have greater exposure to ergonomic training and awareness over time. However, this finding suggests that experience alone may not be sufficient to influence OHS practices without ongoing training and organizational support.

CONCLUSION

Based on the findings of this study, it was concluded that the display screen equipment operator practices of

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OHS was poor. Also, work experience does not influence practices of OHS. However, educational status and gender influences practices of OHS.

RECOMMENDATIONS

Based on the findings of this study, it was recommended that:

1. Government should launch a behavior change intervention programme to improve the practice of OHS among the display screen equipment operators

2. display screen equipment operators should endeavor to improve on their practices of OHS in order to promote their health

3. Health education experts should collaborate with government and non-government agents to educate the display screen equipment operators on the risk of hazards inherent in their environment since awareness was not able to improve their practices.

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