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Evaluation of Safety Compliance of Welding and Fabrication Workshop in Petroleum Training Institute, Warri

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ABSTRACT: This study investigates the evaluation of safety compliance of welding and fabrication in Petroleum Training Institute Warri. Specifically, this work sought to: evaluation of safety compliance in welding operations, fabrication operations, the use of tools, use of machines general workshop rules and regulations in welding and fabrication workshop in Petroleum Training Institute, Warri. A descriptive survey design guided the study. The population of the study comprises all the welding and fabrication students and lecturers/instructors Petroleum Training Institute Warri. Consisting of 105 students and 20 lecturers/instructors which is a total of 125. it was a census study. Two research questions and hypotheses were answered and tested at .05 level of significance. survey questionnaire tagged evaluation of safety compliance of welding and fabrication workshop. The instrument was face validated by the research supervisor and two others. The reliability of the instrument was established using Cronbach Alpha Reliability Coefficient. The coefficient of the reliability obtained was .93. Mean and Standard Deviation were used to answer the research questions while z-test was used to test the hypotheses at .05 level of significance. Based on the findings of this study, it was concluded that there is high level safety compliance in general workshop rules and regulations in Petroleum Training Institute Warri.

KEYWORDS: Welding, Fabrication, Safety-compliance

I. INTRODUCTION

Welding and Fabrication is one of the exchange courses offered in the Petroleum Training Institute in Nigeria, the exchange course readies the items for craftsmanship preparing as welder and fabricator. Welders are needed to make, join and fix the metal parts for a gigantic scope of hardware, gear and structures while Fabricators are associated with the creation and fix of one or the other light (water tanks, ducting, metal chains) or hefty metals (for example building structures, boats' frames, spans). As a fabricator you are probably going to represent considerable authority in either light metal manufacture - including pipes, water tanks, metal seats, and airplane parts or in weighty metal creation - including building structures, ships bodies, and extensions. As a welder you are probably going to discover work in one of the accompanying kinds of associations: Architectural, Agricultural, Marine, Transport, Structural, Heavy car or General designing. Understudies in the welding and manufacture exchange course (welding and primary steel) will pick up the principal aptitudes needed to pick up work as a welder. These remember aptitudes for: Interpreting drawings, making estimations, Industry security, Thermal cutting, Arc welding and MIG welding.

Nigeria an industrial hub of the West African region is stunned by engineering workshops with machines for fabrication, manufacturing and construction purposes. Amongst them are, welding, sawing, guillotine, pounding, painting, radiograph, twisting, and so forth. These workshops are conceivably in perilous conditions and requires a coordinated way to deal with wellbeing and security for optimal productivity [6]. In an extensive survey by Agwu [1], on workplace incidents on laborers' profitability, suggest that workshops in Nigeria should be properly managed with national directives to ensure the wellbeing, safety of personnel, and the integrity and quality of outputs for final consumption which should conform to country Standards. Reports have indicated that one laborer/understudy bite the dust like clockwork around the world, 6,000 specialists/understudies pass on consistently and in excess of 2,000,000 laborer/understudies dies every year because of business related mishaps and illnesses [3]. Work related mishaps and sicknesses bring about yearly for percent misfortune in worldwide total national output (GDP) or about 2.8 trillion US dollars aberrant and direct expense of wounds and infection [11]. In Nigeria work places are quick getting hazardous for laborers as the issue of wellbeing and wellbeing in work environments is being treated with so much cockiness. Examinations uncovered at least 200 instances of modern mishaps with high pace of fatalities and billions of capital misfortunes particularly from the assembling area. In accordance with this examination, [5] express those numerous



mishaps that happens in the welding and creation workshop is because of poor or insufficient wellbeing consistence in the utilization of devices and machine, lacking security consistence in welding tasks, deficient wellbeing consistence in manufacture activities while others are because of non-adherence of laborers/understudies to work technique just as wellbeing measures. In light of this, the researchers consider it significant to assess the safety compliance of welding and fabrication workshop in Petroleum Training Institute, Warri, Delta State.

II. LITERATURE REVIEW

Welding activity is an exceptionally designed cycle that has advanced with developing innovation. The International Standard Classification of Occupations (ISCO) characterized welders as laborers who join and cut metal parts utilizing fire or electric bend and different wellsprings of warmth. This activity contributes fundamentally to the financial improvement of the nation [2]. [10] characterized the welding measures as contrast in the way in which temperature and weight are joined and accomplished. Welding Processes can likewise be named follows (in light of the wellspring of energy):

Gas Welding: (I) Oxyacetylene (ii) Oxy hydrogen, Bend. Welding: (I) Carbon Arc (ii) Metal Arc, Submerged Arc (iv) Inert-Gas-Welding (v) TIG and MIG (vi) plasma Arc (vii) Electro-slag, Opposition Welding: (I) Spot (ii) Seam (iii) Projection (iv) Butt Welding (v) Induction Welding, Strong State Welding: (I) Friction Welding (ii) Ultrasonic Welding (iii) Explosive Welding (iv) Forge and Diffusion Welding, Thermo-Chemical Welding: (I) Thermit Welding (ii) Atomic H₂ Welding, Brilliant Energy Welding: (I) Electron Beam Welding (ii) Laser Beam Welding

The decision of a specific welding cycle will rely upon the accompanying elements [8]:

(i) Type of metal and its metallurgical attributes (ii) Type of joint, its area and welding position (iii) End utilization of the joint (iv) Cost of creation (v) Structural (mass) size (vi) Desired execution (vii) Experience and capacities of labor (viii) Joint availability (ix) Joint plan (x) Accuracy of amassing required (xi) Welding gear accessible (xii) Work grouping (xiii) Welder ability

Common Types of Welding Processes as described by [12]: Shielded Metal curve Welding (SMAW or "Stick Welding"), Gas Metal bend Welding (GMAW), Flux-Cored Arc Welding (FCAW), Gas Tungsten Arc Welding (GTAW), Submerged Arc Welding (SAW), Plasma Arc Welding (PAW), Oxy-Fuel Welding

Occupational Hazards Associated with Welding Operations Safety: Is a basic thought for any welding project. To help guard welders, associations, for example, the Health and Safety Executive (HSE), American Welding Society (AWS), The Welding Institute (TWI) among others offer safety rules to help control, limit or help bosses and laborers try not to weld dangers and laborers are urged to agree to the accompanying significant rules in the working environment

Dangers related with the welding tasks incorporate electric stun, vapor and gases, fire and blasts, circular segment radiation, hot parts, flying flashes, splash, metal or soil, electric and attractive field (EMF), clamor, moving part, gas chambers, falling hardware and surface coatings and regulations among others. The determination of these dangers factors depends on conversations with specialists in the field and writing survey.

The arrangement of OSHA and NIOSH assisted with opening the eyes of the various enterprises in that the working environment expected to guarantee that representatives could finish their undertakings without agonizing over their prosperity. Congress perceived the need to zero in on security in development, and in 1990, Congress coordinated NIOSH to begin exploration and train organizations on approaches to decrease the openness to infections and wounds for U.S. development laborers [7].

III. METHODOLOGY

The research methodology is structured to offer insights on the safety compliance level of welding and fabrication workshops in PTI, Warri, Delta State. The research population entails 125 (120 students and 25 instructors)

The data collection process for the study was done using questionnaire from the selected population and a census research method was adopted. The instrument for the study was a survey questionnaire tagged "evaluation of safety compliance of welding and fabrication workshop" (ESCWFW). The questionnaire was structured in the pattern of 5-point Likert rating scale of Strongly Agree (SA-5), Agree (A-4), Disagree (D-3), Strongly Disagreed (SD-2) Undecided (U-1). The instrument was face validated by the research supervisor and two experts in the Department of Environmental and Safety in University of Port-Harcourt. The instrument was validated in reference to: wordings, sentence construction/construct, ambiguity, appropriateness and relevance. The reliability of the instrument was established using Cronbach Alpha Reliability Coefficient method for a measure of internal consistency of the instrument. Copies of the instrument were administered to 16 students and lecturers/instructors that were drawn from



Rivers State. The data obtained from these students and lecturers/instructors were used to compute the reliability. The coefficient value obtained was 0.93 which was used to judge the reliability of the instrument and was considered high enough for the study.

All data were managed statistically using IBM SPSS[®] 20 software. Mean and standard deviation were used in answering the research questions while z-test was used to test the hypotheses at .05 level of significance. Decision was taken after z-Test and analysis technique based on statistical rule as follows: If calculated (f-cal) is less than the critical (f-crit), H₀ should be accepted. On the other hand, if f-cal is greater than f-crit, the H₀ should be rejected. For the questionnaire items, mean scores equal or greater than 3.00 were taken as agree, while mean scores less than 3.00 were taken as disagree.

IV. RESULTS AND DISCUSSION

Mean Scores on Safety Compliance in Welding Operations in Welding and Fabrication Workshop in Petroleum Training Institute

S/N	Students (n=98) Safety compliance in Welding	Lecturers/Instructors (n=20)			M	SD	Decision
		M	SD	Decision			
1	Wearing of goggle when welding	4.83	.72	Agree	4.70	.98	Agree
2	Wearing of face shield when welding	4.92	.50	Agree	4.65	1.09	Agree
3	Wearing of hand gloves	4.81	.10	Agree	4.65	1.09	Agree
4	Wearing of safety boots	4.92	.47	Agree	4.55	1.10	Agree
5	Wearing of overall	4.84	.67	Agree	4.85	.49	Agree
6	Ensuring that welding machine is well earthed	4.87	.60	Agree	4.60	.10	Agree
7	Ensuring that electrical cables are well coated	4.83	.71	Agree	4.55	.10	Agree
Total		4.87	.51		4.67	.81	

Source: field survey, 2020

The data on safety compliance in welding operations in welding and fabrication workshop in Petroleum Training Institute Warri shows that welding and fabrication students and lecturers/instructors agreed that all the items highlighted are safety compliance in welding operations in welding and fabrication workshop in Petroleum Training Institute Warri. This is based on the grand mean scores of 4.87 and 4.67 respectively, which is above 3.50 that was earlier stated as the acceptable mean. Furthermore, the closeness in the Standard Deviation for the two groups which is .51 and .81 shows homogeneity in their responses. This finding is in line with [4] that found that welding operations is dependent on multitudes of factors encompassing technical, operational, organisational and external issues; thus, necessitating the development of a generic model that can be used to model disruption scenarios in welding operations.

Mean Scores on Safety Compliance in the use of Tool in Welding and Fabrication Workshop in Petroleum Training Institute

S/N	Students (n=98) Safety compliance in the use of tools	Lecturers/Instructors (n=20)			M	SD	Decision
		M	SD	Decision			
1	Using the right tool	4.86	.64	Agree	4.50	1.28	Agree
2	Returning of tools to its position after usage	4.77	.78	Agree	4.75	.91	Agree
3	Placing of tools proper in the tool rack	4.76	.85	Agree	4.55	1.23	Agree
4	Avoiding the use of damaged tools	4.73	.82	Agree	4.65	.75	Agree
5	Cultivating the habit of not playing with tool	4.76	.80	Agree	4.90	.31	Agree
6	Not dropping of sharp tools on the floor	4.76	.77	Agree	4.65	.75	Agree
7	Ensuring that tools are not at the tip of machine table or work bench	4.71	.89	Agree	4.70	.92	Agree
Total		4.76	.79		4.67	.87	

Source: field survey, 2020



The data on safety compliance in the use tools in welding and fabrication workshop in Petroleum Training Institute Warri shows that welding and fabrication students and lecturers/instructors agreed that all the items highlighted are safety compliance in the use tools in welding and fabrication workshop in Petroleum Training Institute Warri. This is based on the grand mean scores of 4.76 and 4.67 respectively, which is above 3.50 that was earlier stated as the acceptable mean. Furthermore, the closeness in the Standard Deviation for the two groups which is .79 and .87 shows homogeneity in their responses. This finding is in line with [9] that found that Some practices that are required of workshop users include the use of Personal Protective Equipment, the appropriate use of tools, seeking permission before using any machine and the use of machine guards, and many more.

V. CONCLUSION

From the above research, and relevant reviewed literatures, the wearing of goggle when welding, wearing of face shield when welding, wearing of hand gloves, wearing of safety boots, wearing of overall, ensuring that welding machine is well earthed, and ensuring that electrical cables are well coated, securing of workpiece properly before cutting, wearing of hand gloves when cutting of workpiece, wearing of safety boots, using the right tool, returning of tools to its position after usage, placing of tools proper in the tool rack, avoiding the use of damaged tools, cultivating the habit of not playing with tool, not dropping of sharp tools on the floor and ensuring that tools are not at the tip of machine table or work bench are in safety compliance in welding operations in welding and fabrication workshop in Petroleum Training Institute Warri.

VI. RECOMMENDATIONS

Based on the findings, the following recommendations were made;

- i. The students on entry into fabrication and welding craft practice in petroleum training institute should be guided to select two or three occupational areas in which they should be effectively trained.
- ii. A close association between the technical teachers of the department of fabrication and welding craft practice in petroleum training institute and the industries, who are the consumers of the products of these institution graduates, should be maintained at all time.
- iii. Federal Government should wade in, to facilitate co-operation between petroleum training institute and the industries to work out programs for the overall educational development of young Nigeria, in the area of these soft skills.

REFERENCES

1. Agwa, H. (2000), Informal sector 2012. Available from: <http://www.onlinenigeria.com>(cited
2. Amadike,O&Ochogba C.O (2019). Factors Responsible for Wrong Practices in Technical and Vocational Education and Training Workshops in Rivers State Tertiary Institution. *Journal of Vocational and Technology Education*, 1, 2651-6306
3. Dickson, A. (2015). Modelling of welding hazards in an industrial workshop using FFTA method. *International Journal of Scientific & Engineering Research*. 2017; 8(7):781-799.
4. John, R. L. (2014). Management (fourth edition). The Dryden press. New York: Harcourt
5. Khan, H. (2014). Occupational health problems of welders in Benin City, Nigeria. *Journal of Biomedical Sciences*. 2006; 5(1): 64-69.
6. Lezaasi, A. (2013), Safety considerations in a welding process: A review. *International Journal of Innovative Research in Science, Engineering and Technology*. 2013; 2(2): 341-350.
7. Moksen, A.B. (2013). Workshop safety management amongst students and teachers at vocational secondary schools. *Journal of Resources Development and Management*, 1, 41- 43.
8. Nevhage, B., & Lindahl, H. (2008). A Conceptual Model, Methodology and Tool to Evaluate Safety Performance in Organization, pp 1-17
9. Nneji, G.N., Okon, E.J., Nwachukwu, V.C., David, N.A. &Ogbuanya, T.C. (2010). Basic technology for junior secondary schools. Lagos: Longman Nigeria Plc.
10. Umeokafor, B. (2004). American Welding Society. Ventilation for welding and cutting. Safety and fact sheet. April 2014; 3604/14.
11. Victor, K. (2013). Concept of health and disease. In: Park's textbook of preventive and social medicine. 20th ed. India. Banasidas Bhanot. 2009. PP 36.
12. Vinodkumar, S.C &Bhesi, A. (2010). Facility Planning for Secondary Workshop. Enugu: Cheston Agency Limited.



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