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SAFETY STRATEGIES REQUIRED OF UNDERGRADUATES FOR EFFECTIVE UTILIZATION OF TOOLS AND MACHINES IN VEHICLE MAINTENANCE UNIT OF MECHANICAL WORKSHOPS IN RIVERS STATE

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ABSTRACT

The study identified safety strategies required for effective utilization of tools and machines in vehicle maintenance workshops. The study was conducted in three universities in Rivers State, Nigeria. Population of the study consist of 30 respondents, comprises of 11 motor vehicle workshop instructors drawn from University of Port Harcourt, 10 from Rivers State University and 9 from Ignatius Ajuru University of Education, Rumuelumini Port Harcourt. No sampling was taken considering the manageable size. Two research questions were posed while two hypotheses were equally formulated to guide the focus of the study. A self-developed instrument titled "Safety Strategies Required in Vehicle Maintenance Unit' (SSRVMU)" was designed to elicit information. The instrument was content validated by three experts. Mean and standard deviation were used to answer the research questions while the hypotheses were tested at 0.05 level of significance using the Analysis of Variance (ANOVA) test statistics. The finding revealed six causes of workshop accidents in the vehicle maintenance unit of the mechanical engineering workshop which includes untidy environment, wrong use of tools, fatigue/tiredness, over confidence, carelessness of the students/instructors among others mechanical engineering workshops in Rivers State. The finding further revealed 20 preventive measures suitable to curl workshop accidents in vehicle maintenance unit of the mechanical engineering workshops which include do not run round the workshop, stop the machine after operation, give the machine undivided attention during operation, do not make alarming noise in the workshop, wear industries protection clothing coat or apron among others. Based on these findings, it was recommended that, the Government should make available safety gadgets to instructors, students and other workshop operators in the vehicle maintenance unit of mechanical engineering workshops in Universities. The motor vehicle mechanic industries should liase with the university authorities with the aim to annually sensitise workshop instructors and vehicle maintenance students on the need to be safety conscious and always apply accident preventive measures during operation in the workshop.

KEYWORDS: TVET, Safety, Strategies, Vehicle maintenance, Utilization

INTRODUCTION

Education is an instrument used to drive away poverty, rebuild homes, empowering and equipping individuals and enshrine sustainable development in a society. Kabiru and Halliru (2018) considered Education as the cornerstone to any form of development across all nations. Ahmed and Ezekiel (2017) described education as a systematic course of instruction, giving intellectual and moral training to persons, bringing up of the young, helping the young to develop, to lead out the best in

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him or her and to evolve an integral personality. Among these forms of Education that shape human capacities and holistically improve development of societies across the globe is technical education.

Technical education is that aspect of education that involves the acquisition of techniques and application of the knowledge of science for the improvement of man's surrounding (Agishi, Unor & Aginde, 2017). Technical education is considered a powerful tool to prepare youths for the labour market and provide lifelong learning opportunities to adults. It plays a strategic role in the achievement of the 2030 Agenda for sustainable development (Mojirola&Yalam, 2018). According to United Nations Education Scientific and Cultural organisation (2014) defines vocational education as education designed to prepare skilled personnel at a lower level of qualification for one or a group of occupations, trades or jobs. Vocational education usually provided at upper secondary level includes general education, practical training for development of skills which are required by the chosen occupation and related theory. The proportion of these components may vary considerably but the emphasis is usually on practical training. King and Palmer in Marufu (2017) stressed that TVET is usually linked with improvements in productivity, quality, diversity, health and income benefits and occupational safety.

Safety is regarded as a way of avoiding accidents, injuries to persons, damage to tools, machines or equipment and materials. When carrying out any operation in mechanical workshops or technical college workshops where tools, equipment, materials and machines are involved, considerations need to be placed on the appropriate methods and strategies of practicing safety in form of attitude required in the workshop. Bakare (2013) stressed that the attitude of instructors and trainees pre-empt the safety of human and material resources towards a successful workshop operations. According to Oranu (2011) safety is the ability to perform every simple task involved in a job without causing damage to tools and equipment or materials used in performing the task. Prasha and Bansal (2011) described safety as the art and science of identifying, evaluating and controlling workplace hazards. Bolaji in Mbaba (2006) stated that real safety means safeguarding against hazards, damage to machine, tools and materials as well as preventing personal injuries. Personnel, students and instructors carrying out duties in the workshop needs to be safety conscious and put on every safety wears expected to fight against destruction of workshop facilities, mechanical tools and injuries to operators in the workshop. Beako, Okorieocha, Ojotule and kooli (2017) stated that to ensure maxima safety in the mechanical engines workshop, applying right tools for the job, perfect use of hand and machine tools, limitation of the working capacities of machines/tools are the safety rules and regulations requires to be carried out by instructors and students during every mechanical operation in the mechanical engineering work shop with the view to ensuring safety to operators, trainees, tools and equipment and other workshop facilities. Okon (2015) stated that wrong application of tools and equipment, untidy environment and carelessness of the workshop users would leads to destruction of workshop facilities, injury to personnel or loss of life. Okon further observed that accidents can be prevented if instructors or trainees do not run round the workshop, wear industrial protective clothing coat or apron, do not use chisels or files without handles, wear

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protective pair of shoes with strong toe caps, select the tools for the job, stop the machines after operation among others. These accidents preventive strategies are mostly regulates by instructors whose duties is to service, maintain and carry out repair works mainly on vehicles maintenance, machines repair and other materials used in facilities of vehicle maintenance unit of mechanical engineering workshop.

Vehicle maintenance facilities are all the instructional facilities like workshops, laboratories, studios, equipment, machines, tools, consumable materials that are used for teaching and learning in mechanical workshop in order to acquiring practical skills in vehicle maintenance. This is expected in any related engineering workshop that requires the utilization of adequate instructional resources, precisely safety that will guide the conduct of instructors, students to enable learner's follow up the process (Saidu & Abubakar, 2017). These Training facilities of mechanical workshop encompasses the basic safety apparatus, hand tools, equipment and structural facilities which include classrooms, laboratories, workshops and libraries. They are equally materials and services that help to facilitate teaching and learning in a vehicle maintenance unit of University mechanical workshops in Rivers State. Puyate in Thiama and Diraso (2017) stated that the availability and effective use of facilities for training in any mechanical workshop enhances vital process of skill acquisition which in turn empower its beneficiary to be safety conscious, productive and contribute to national development with the aid of the safety strategies applied to scuttle accident in the workshop.

Strategies is a blueprints developed to monitor and determine safe actualization of certain purpose. Wikipedia (2019) stated that strategies are plans of action designed to achieve a long term or overall aim. It further emphasis that strategies are high level plans to achieve one or more goals under conditions to uncertainty. In this context, safety strategies refers to safety schedule, plan and arrangement designed that gear towards reducing accidents, protecting lives of instructors, students and facilities in the vehicle maintenance unit of mechanical workshops in Rivers State. It is those safety outlines and lay down principles that guide the conduct of operators, instructors, students, use of tools, machines to avoid accidents and other unsafe situation in the workshop. These safety strategies will reduce accidents and enhance optimal production among instructors, operators and students in the workshop. These students will be required to regularly and carefully handle tools and equipment through the application of needed methods and workable strategies that will promote healthy environment and gear towards prolonging lifespan of tools and equipment in vehicle maintenance unit, mechanical engineering workshop in Rivers State. Hence, these situations requires effective utilization of tools and machines considering its impacts on production, prudent management of mechanical materials and avoid loss of persons and resources including its impact on practical aspect of work done in the mechanical engineering workshops, technical college workshops and other related engineering workshops that gear towards improving capacities. It is on this premise that safety strategies required of undergraduates for effective utilization of tools and machines in vehicle maintenance workshops in Rivers state was carried out.

STATEMENT OF THE PROBLEM

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Safety strategies are those mechanisms put in place to avoid damage to workshop facilities, tools and equipment, injuries to instructors and trainees and other valuable materials, machines used for production in the vehicle maintenance workshops. Bakare (2013) revealed that the safety of human and material resources required effective handling of tools and equipment by the instructors and trainees considering its importance for successful workshop practical works that would leads to effective productions. However, Usman(2012) stated that some students in the workshop often sustain injuries, damage tools and render machines non-functional during practical work. Edward and Thomas(2012)observed that poor handling of tools and machines, poor application of formidable workshop preventive measures are the causes of workshop accidents in the vehicle maintenance unit. Edward and Thomas further stated that these have contributed in the increase of damages to tools and equipment, incessant injuries to instructors and students operating in vehicle maintenance workshops in the Universities. It is on this premise, the study safety strategies required by undergraduates for effective utilization of tools and machines in the vehicle maintenance workshops in Rivers State was investigated.

PURPOSE OF THE STUDY

The general purpose of the study is to determine the safety strategies required by undergraduates for effective utilization of tools and machines in the vehicle maintenance workshops in Rivers State. But, specifically the study sought to:

1. ascertain the causes of accidents in the vehicle maintenance unit in university mechanical Engineering workshops in Rivers State.
2. find out accidents preventive measures required in the vehicle maintenance unit in university mechanical engineering workshops in Rivers State.

RESEARCH QUESTIONS

These research questions were posed to guide the study;

1. What are the causes of accidents in the vehicle maintenance unit in university mechanical engineering workshops in Rivers State?
2. What are the accidents preventive measures required in the vehicle maintenance unit of mechanical engineering workshops in Rivers State?

HYPOTHESES

These hypotheses were formulated to test the focus of the study at 0.05 level of significances.

1. There is no significant difference in the mean response of workshop instructors from vehicle maintenance unit of Uniport, RSU and UOE, Port Harcourt on the causes of workshop accidents in the vehicle maintenance unit in university mechanical engineering workshops in Rivers State.
2. There is no significant difference in the mean response of workshop instructors from vehicle maintenance unit of Uniport, RSU and UOE, Port Harcourt on the workshop accidents preventive measures required in mechanical engineering workshops in Rivers State.

METHODS

The design used for this study was a descriptive survey. The study was conducted in three Government owned universities in Rivers State, Nigeria. These three universities include University of Port Harcourt, Choba, Rivers State University, Port Harcourt and Ignatius Ajuru University of Education, Rumuelumini, Port Harcourt. The population of the study consist of 29 respondents, comprises of 12 motor vehicle workshop instructors drawn from University of Port Harcourt, 8 drawn from Rivers State University and 9 are drawn from University of Education, Rumuelumini, Port Harcourt (Field work, 2019). Two research questions were posed to guide the study while two hypotheses were formulated to guide the focus of the study. Instrument titled' Safety Strategies Required in Vehicle Maintenance Unit' (SSRVMU) was designed to elicit information from respondents. The instrument was content validated by three experts in the field of motor vehicle maintenance and technology. Two from the motor vehicle maintenance works, Honda services, pH and one from the Department of Vocational Technical Education, Niger Delta University, Amasoma, Nigeria. Questionnaire was developed and used as the instrument for data collection. The questionnaire consisted of two parts. The first part focused on personal data of respondents while the second part made up of 26 items questionnaire which based on four Point Likert scale response of highly required, required rarely, required and not required. A pilot test method with Cronbach's Alpha coefficient was used to determine the reliability coefficient of the instrument on respondents who were not part of the population. The value of coefficient obtained was 0.90 which implies that the instrument was very reliable and was used for the study. Out of the 29 copies of questionnaire distributed, all was retrieved, analyzed and was used for the study. Mean and standard deviation was used to answer the research questions while the hypotheses were tested at 0.05 level of significance using the Analysis of Variance (ANOVA) test statistics. The decision rule for research questions was any item with mean value equal to or greater than 3.50 were required while mean value less than 3.50 was not required. Hence, these hypotheses were accepted, when the value of f-calculated is less than the value of f-critical and were rejected when the value of f-calculated is greater than the value of f-critical.

RESULTS

Table 1 Mean and Standard Deviation on the Causes of Workshop Accidents

Item	Uniport instructors X S.Dremark	UOE instructors X S.D remark	RSU instructors X S.D remark
1. Untidy environment	3.76 1.31 required	4.10 0.93 required	3.51 1.34 required
2. Wrong use of tools	3.57 1.39 required	3.99 0.98 required	3.90 1.02required
3. Fatigue/tiredness	3.83 1.13 required	3.86 1.12 required	3.70 1.14required
4. Over confidence	3.63 1.29 required	3.77 1.14 required	3.82 1.13required
5. Carelessness of student/instructor	3.92 1.02 required	3.96 0.97 required	4.13 0.91required

6. Lack of knowledge/ inexperience of handling tools, machine tool and workshop equipment	3.71 1.16 required	4.12 0.93 required	3.67 1.24 required
Grand mean and Standard Deviation	**3.71 1.22**	**3.94 1.05**	**3.79 1.13**

The data on table 1 shows that the grand mean includes 3.71, 3.94 and 3.79. While the criterion mean is 3.50. Hence, the findings were accepted as the causes of workshop accidents in mechanical engineering workshop in Rivers State. This implies that poor application of tools and equipment during workshop operations and production leads to fatal accidents in the university mechanical workshops

Table 2 Mean and standard deviation on the workshop accidents preventive measures

s/n	Items	Uniport lnstructors X S.D remark	UOE lnstructors X S.D remark	RSU lnstructors X S.D remark
7.	Do not run round the workshop	3.61 1.28 required	4.14 0.95 required	3.60 1.26 required
8.	Stop the machine after operation	4.20 0.90 required	3.74 1.22 required	3.81 1.12 required
9.	Give the machine your undivided attention during operation	3.75 1.16 required	3.89 1.13 required	3.63 1.24 required
10.	Do not make alarming noise in the workshop	3.92 0.93 required	3.61 1.22 required	4.20 0.91 required
11.	Wear industrial protective clothing coat or apron	4.11 0.90 required	4.02 0.93 required	3.76 1.17 required
12	Do not use chisels or file without handles	3.69 1.23 required	3.56 1.31 required	3.62 1.24 required
13	Keep your sharp tools in a safe place	4.12 0.91 required	3.96 0.94 required	4.05 0.97 required
14	Wear protective pair of shoes with strong toe caps	4.20 0.90 required	4.04 0.98required	4.10 0.93 required
15	Select the right tools for the job	3.54 1.36 required	3.69 1.22 required	3.731.13 required
16	Wear goggle or eye shield while griddling your tools	3.98 1.00 required	3.83 1.11 required	3.66 1.22 required
17	Do not operate a machine, unless you have been taught its working operation and obtained permission before use	3.62 1.27 required	3.55 1.33 required	3.71 1.18 required
18	Start and wait until a machine gathers its operating speed before use	3.74 1.19 required	4.14 0.92 required	4.07 0.92 required
19	Do not over load a machine	4.21 0.92 required	3.92 0.94 required	4.220.90 required
20	Do not allow the workshop floor to become slippery	3.81 1.11 required	3.781.15 required	4.10 0.95required
21	Report any injury no matter how small	3.67 1.25 required	4.18 0.93 required	4.05 0.97required
22	Ask for first aid treatment when necessary	3.92 1.01required	3.90 1.02 required	3.86 1.12required
23	Keep your hand behind the cutting edge of chisel when using it for cutting	3.69 1.21 required	3.55 1.36 required	3.89 1.12required
24	Do not carry sharp tools in your			

	pocket, put them in a tool rack	4.19 0.94 required	4.10 0.91 required	3.67 1.23required
25	Keep tools in the locker after use	3.70 1.14 required	3.56 1.33 required	3.89 1.13required
26	Do not fiddle with the "on" and "off" switches of the machine and appliances	4.11 0.90 required	3.63 1.29 required	3.79 1.20required
	GrandMean and Standard Deviation	**4.07 1.07**	**3.85 1.11**	**4.05 1.10**

Table 2 shows the value of the grand means 4.07, 3.85 and 4.05 which are all greater than the criteria mean 3.50. Hence, the finding was accepted as workshop accident preventive measures in university mechanical workshop in Rivers State. This implies that the students and instructors operating machines in the workshops must be attentive and focus in discharging their duties to avoid safety breach.

Table 3Analysis of Variance (ANOVA) of the Workshop Instructors on the Causes of Workshop Accidents

Sources of variance	Df	Sum of squares	Mean of squares	F.cal	F.cri	Remark
Between groups	2	1.923	0.962	0.760	3.30	Accepted
Within groups	27	34.195	1.266			
Total	**29**	**36.118**				

Table 3 shows that the value 0.760 of F-calculated is less than the value 3.30 of F-critical. Hence, the null hypothesis is accepted. It is therefore observed and concluded that the responses of University mechanical workshop instructors on causes of workshop accidents in vehicle maintenance unit of University mechanical Engineering workshops in Rivers State was not significantly different statistically. It is implied that students and instructors should adopts the above mention items to advert the causes of workshop accidents.

Table 4 Analysis of Variance (ANOVA) of Workshop Instructors on the Works Accidents

Sources of variance	Df	Sum of squares	Mean of squares	Fcal	Fcri	Remark
Between groups	2	1.814	0.907	0.84	3.30	Accepted
Within groups	27	29.068	1.077			
Total	**29**	**30.882**				

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Table 4 shows that the value of F-calculated is 0.84 and the value of f-critical is 3.30 at 0.05 level of significance at 29 degree of freedom, hence, the null hypotheses id upheld. This implies that the opinion of workshop instructors on workshop accident preventive measures for effective teaching and learning towards improving production in the university mechanical engineering workshops in Rivers State was statistically accepted.

DISCUSSION

The finding revealed causes of workshop accidents in the vehicle maintenance unit of the university mechanical engineering workshops in Rivers State. The finding includes untidy environment, wrong use of tools, fatigue/tiredness, overconfidence, carelessness of the students/instructors among others. This finding consented to the observation of Okon (2015) which declared that wrong application of tools and equipment, untidy environment and carelessness of the workshop users would leads to destruction of workshop facilities, injury to personnel or loss of life. It is also revealed that there is no significance difference in the mean response of the workshop instructors drawn from three universities in Rivers State on the causes of workshop accidents at the vehicle maintenance unit of the university mechanical engineering workshop is Rivers State. The finding further revealed 20 preventive measures suitable to curl workshop accidents in vehicle maintenance unit of the university mechanical engineering workshops. The finding are, do not run round the workshop, stop the machine after operation, give the machine undivided attention during operation, do not make alarming noise in the workshop, wear industries protection clothing coat or apron among others. This finding is in agreement to Mbaba (2016) which stated that safety mean safeguarding against damage to machine, tools and materials as well as preventing personal injuries. This finding is in line with Beako, Okorieocha, Ojotule and kooli (2017) who stated that to ensure maxima safety in the mechanical engines workshop, applying right tools for the job, perfect use of hand and machine tools, limitation of the working capacities of machines /tools are the safety rules and regulations requires to be carried out by instructors and students during every mechanical operation in the university mechanical engineering workshop ensuring safety to operators, trainees, tools and equipment and other workshop facilities. The finding also uncovered the fact that there is no significance difference in the mean response of workshop instructors on the workshop accidents preventive measures in the vehicle maintenance unit of the university engineering mechanical workshops as Rivers State.

CONCLUSION

Safety instructions are essential to instructors and students in the vehicle maintenance workshops with the aim to improve capacity and increase production at any given time. These instructions cut across handling of tools and machines, wearing safety wears for a particular operation when it is possible to turn on or off ignition of vehicle or machine, right personnel to operate machines at any given time in the workshop. It is crystal clear that safety strategies provides an inside of safety architectural design suitable for a healthy work environment and reduces accident in and around vehicle maintenance workshops in the university campus. It is obvious that if these safety rules and

regulations are observe in the vehicle maintenance workshop, handling of tools and machines and other related materials useful in the workshop will help in prolonging the lifespan of workshop facilities, prevent loss of life and avoid damage to machines, tools and other facilities available in the workshop.

RECOMMENDATIONS

The researchers made the following recommendations:

1. Government should make available safety gadgets to instructors, students and other workshop operators in the vehicle maintenance unit of mechanical engineering workshops in Universities.
2. The motor vehicle mechanic industries should liase with the university authorities with the aim to annually sensitise workshop instructors and vehicle maintenance students on the need to be safety conscious and always apply accident preventive measures during operation in the workshop.

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