

SAFETY PRACTICE SKILLS NEEDED IN HANDLING AND STORAGE OF FUEL OIL BY STUDENTS OF MOTOR VEHICLES MECHANIC IN TECHNICAL COLLEGES IN RIVERS STATE

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Abstract

This study investigated the safety practice skills needed by students of motor vehicle mechanic in technical colleges in Rivers State. The study employed a descriptive survey design. Population of the study comprised of 106 motor vehicle teachers and motor vehicle technicians. Two research questions and one hypothesis guided the study. A self-developed questionnaire tagged "safety practice skills for motor vehicle mechanic students" (SPSMVM) was used to elicit information for the study. The instrument was validated by five experts, two from the Department of Vocational and Technology Education, Rivers State University, Port Harcourt one from Department of Mechanical Engineering, University of Port Harcourt and two from Ken Saro-Wiwa Polytechnic, Bori. The instrument was pilot tested at the Mechanical Engineering Workshop, Port Harcourt Polytechnic, Rumuola Port Harcourt where the result of the pilot test was subjected to Cronbach-alpha coefficient method which yielded 0.94. The study revealed that burns, loss of life and skin rashes are health hazards due to fuel oil. Based on the findings, recommendations made included; Rivers state government should make available safety equipment to the technical college workshops of motor vehicle mechanic students to avoid and reduce accidents and enhance maintenance and efficient repair operations in the workshops.

Keywords: *Safety Practice, Skills, Motor Mechanic, Fuel, Technical Colleges*

Introduction

Education is a right of every individuals, it unlocks the development of personal and national potentials of citizenries of a country and the world at large (Timipreye, 2016). According to Ezenwafor (2015) education is the light without which the world will be in darkness in the opinion of Okwelle and Ayonmike (2014) education is acknowledged as a means for transforming and empowering communities. There are various forms of education which include among others technical vocational education and training (TVET). In the opinion of Chinedu and Olabiyi (2015) TVET prepares human for the ever changing world of works. It has as one of its core goals and aims the quest of preparing people for employment and also to be a source of change for people in the world of works, through which these individuals can aspire to have a better life and then develop the necessary skills needed to attain such aspirations. According to Addulahaman (2013) technical and vocational education is a form of education use as a great weapon to achieve desirable change or development in country's political, economic, social, sociological and human resources. Its numerous practical educational training of technical institutions formally carried out in various technical colleges across the country, produces and encourages skilled and quality manpower development and nation growth through the giant efforts of technical college graduates.

Technical college is an institution where students are trained to acquire relevant knowledge and skills in different occupations for employment in the world of work (Ayodele, 2010). According to Abdubakar in Bakare (2010) technical college is the institution which provides recipients through training with adequate knowledge, skills and attitude for gainful employment under the guidance of the teachers in related occupations. These occupations are acquired by the students through instruction delivered by the teachers in the classrooms and instructors operating the machines and vehicles maintenance in the workshops of the technical college. The motor vehicle mechanic students are individuals offering courses in the department of motor vehicle mechanic works of technical college (Jubril, 2011).

Hilles and Coombes in Olaitan and Ikeh (2015) described motor vehicle mechanic as a skilled personnel who specializes in automobile maintenance and repairs and sometimes modification. In repairing and maintaining engine components, the student needs adequate safety practice skills to promote efficiency and avoid loss of life, damages to mechanical equipment, engine parts and workshop facilities.

Skill is a manual dexterity acquired through repetitive performance of an operation (Bakare, 2010). Furthermore Ede, Miller and Bakare (2011) explained skills as expertness, dexterity, practice or ability of facilitating and doing something. In performing a skilful job, safety needs to be practiced. Safety materials and safety trained individuals are usually required to enhance the growth of an organization and institutions involved.

Safety in the opinion of Okon (2011) is the art and science of identification, evaluation and controlling work place hazards. Okon further stated that safety is the state of being certain that adverse effect will not be caused by some agents under defined conditions. In the opinion of Oranu (2012) safety is the ability to perform every simple task involved in a job without causing damage to tools, equipment or materials used in performing the task. According to Gogo (2007) safety devices and personal protective measures have to be put in place in a work place especially the technical college workshops and filling stations where fuel and other flammable substances are kept for the safety of the workers.

Gogo (2007) stated that the third element in the fire tetrahedron is fuel. Fuel is the actual materials involved in the combustion process. The three basic fuels are solid, liquid and gases. Diesel fuel, fuel oil are non-volatile liquid. These are liquids that must be heated to release vapours. They do not readily vaporize at ordinary temperature. Fuel oil has physical properties that can make extinguishments difficult and increase the hazard to personnel. It will become unstable and ready to burn when that liquid reaches its flashpoint. The flash point is the lowest temperature at which a liquid gives off sufficient vapour to form ignitable mixture with air at or near the fuel surface (Jubril, 2011). Students is expected to handle and store fuel in such a way that there will be no loss of lives, damage to equipment, materials and workshop facilities. To ensure effective safety precautions to be observed in the technical college workshop, the technical college curriculum emphasizes the need to apply safety measures constantly and regularly at the workshops. These safety practice skills were enshrined in the syllabus for NABTEB modular trades certificate examinations, which are based on National Board for Technical Education modular curriculum that covers the following trade areas: Mechanical Trades includes: Agricultural equipment, Auto electrical work, Fabrication and Welding, Mechanical engineering, Refrigeration and Air-conditioning, Vehicle body building, Light vehicle body repair work, Foundry craft practice, Foundry craft practice, marine engine and transmission, ship building craft practice and motor vehicle mechanic work (NABTEB, 2007).

Motor vehicle mechanic works modules are sub-divided into service station mechanic, petrol engine maintenance mechanic, transmission mechanics, steering and braking system mechanics, and diesel engine maintenance mechanics. All these are studied in technical colleges across Nigeria by the students of Motor Vehicle Mechanic Works (NABTEB, 2007). It is on this premise that the study was undertaken to find out the safety practice skills needed by students of motor vehicle mechanic works in storage and handling of fuel oil in Technical College workshop of Rivers State.

Statement of the Problem

In the four NBTE accredited state government owned technical colleges in Rivers State, the motor vehicle Mechanic work teachers and students are prone to various forms of accidents. This is linked to the results of poor operational standard involved by teachers and students in carrying out safety measures during operations in the workshops. These operations include use of automotive hazardous tools and equipment, filling of fuel tanks and

containers in the workshop. Abd-El-Aziz & Adio (2012) stated that the motor vehicle mechanic workshops in technical colleges had continually experienced series of accidents due to the negative and poor handling of mechanical tools and equipment, failure to put on safety apparatus during handling of fuel. Thus, for a perfect operation free of accident in the mechanical workshop, the motor vehicle teachers and students need to possess safety practice skills with the aim to prevent or totally eliminate the occurrence of accidents in the school mechanical workshop, which most times resulted to teachers or students death and equipment damaged among others.

Furthermore, Okon (2011) opined that students working on motor vehicles in the workshop often sustain injuries, damaged cars, tools and rendered electronic machines non-functional during practical works. These students are most times sub-charged for damages sustained to expensive cars, tools and electronic machine at the end of workshop exercise. These have necessitated the anxiety of students to always obtain excuses with the intent to be absent from practical classes in the motor vehicle mechanic workshops, while others are left with the perception that motor vehicle mechanic practical exercises are risky and hazardous to human life.

However, it is common to believe that these various accidents had occurred due to negligence or failure of students to observe workshop safety rules and regulations. Ratzu (2014) maintained that Motor vehicle teachers and students are not guided with safety instructions during practical exercises; hence, they are exposed to fire explosion and other health hazards. Ratzu further noted that lack of adherence to safety rules in storing fuel in motor vehicle mechanic workshop have rendered tools, machines and equipment ineffective. It is in the light of these that there is need to conduct a study on the safety practice skills needed by students of motor vehicle mechanic in handling and storage of fuel- oil in technical college workshop to ensure safety of lives and properties.

Purpose of the Study

The purpose of this study is to investigate the safety practice skills needed in handling and storage of fuel-oil by students of motor vehicle mechanic of technical colleges workshop in Rivers State. Specifically, the study sought to:

1. Ascertain the health hazards due to poor handling of fuel oil in technical college motor vehicle mechanic workshop in Rivers State.
2. Identify the necessary precautions needed to avoid fuel oil contamination during handling in the motor vehicle mechanic workshop in technical colleges in Rivers State.
3. Determine the safety precaution to be observed when dealing with high pressure fuel injection system in the motor vehicle mechanic workshop.

Research Question

The following research questions guided the study

1. What are the health hazards due to poor handling of fuel oil in technical colleges' motor vehicle mechanic workshop in Rivers State?
2. What are the necessary precautions needed to avoid fuel oil contamination during storing /handling in the motor vehicle mechanic workshops in technical college in Rivers State?
3. What are the safety precautions to be observed when dealing with high pressure fuel injection system in the motor vehicle mechanic workshop?

Hypotheses

The following null hypotheses were tested in the study at 0.05 level of significance.

1. There is no significant difference in the mean responses of motor vehicle teachers and motor vehicle technicians on the health hazard due to handling of fuel oil in technical college motor vehicle mechanic workshops in Rivers state.
2. There is no significant difference in the mean responses of motor vehicle teachers and motor vehicle technicians on the necessary precautions needed to avoid fuel-oil contamination when storing or handling in technical college motor vehicle mechanic workshops in Rivers state.
3. There is no significant difference in the mean responses of motor vehicle teachers and motor vehicle technicians on the safety precautions to be observed when dealing with high pressure fuel injection system in technical colleges' workshop in Rivers State.

Methods

The study adopted descriptive survey design. The population of the study is 106 respondents, comprising 13 motor vehicle mechanic teachers in technical colleges and 93 motor vehicle technicians working at the motor vehicle unit, mechanical workshop of four tertiary institutions in Rivers State. They are Rivers State University, Port Harcourt, University of Port Harcourt, Choba, Ken Saro Polytechnic, Bori, Ignatius Ajuru University of Education, Rumolumeni. There was no sampling considering its manageable size of the population. The instrument was developed by the researchers and was used to gather information. This instrument was validated by five experts. Two from the Department of Vocational and Technology Education, Rivers State University, one from Department of Mechanical Engineering, University of Port Harcourt, Choba, two from the Department of Mechanical Engineering, Ken Saro Wiwa Polytechnic, Bori. Their comments and inputs were incorporated into the final draft of the instrument. The instrument was pilot tested at the Mechanical Engineering workshop, Port Harcourt Polytechnic, Rumuola and the results of the pilot test was analysed and subjected to Cronbach-alpha coefficient methods which yielded reliability coefficient of 0.94. The data collected were analysed using the mean and standard deviation to answer the research questions, while t-test statistical tool was used to test the three formulated null hypotheses at 0.05 level of significance. Mean score of 3.50 and above was termed agreed and mean scores below 3.50 were termed not agreed for the

research questions. The hypothesis was accepted if the calculated t-test value is less than the table or critical t value, and if the calculated t value is greater than the critical t value, the hypothesis was rejected.

Results

Research Question I

What are the health hazards due to poor handling of fuel oil in motor vehicle mechanic workshops in the technical colleges in Rivers State?

Table 1: Mean and Standard Deviation Rating of Motor Vehicle Teachers and Motor Vehicle Technicians on Health Hazards due to poor Handling of fuel oil by students of MVMW in Technical College Workshops in Rivers State.

S/N	Health hazard from fuel oil	Motor vehicle technicians			Motor Vehicle teachers		
		Mean	S.D	Remark	Mean	S.D	Remark
1	Burns on the face or hands	3.88	1.02	Agreed	3.55	0.43	Agreed
2	Fire outbreaks to the workshop facilities	4.21	0.90	Agreed	4.26	0.89	Agreed
3	Fire explosion to the facilities	4.01	0.95	Agreed	3.66	1.12	Agreed
4	Loss of life	3.69	1.14	Agreed	4.01	0.99	Agreed
5	Skin rashes over the body	3.74	1.09	Agreed	3.70	0.37	Agreed
Total Mean/S.D		19.55	5.10		19.18	3.80	
Grand Mean/S.D		3.91	1.02		3.84	0.76	

The result on table 1 shows that five health hazards have their mean values ranging from 3.55 to 4.26 which are above the mean cut off value of 3.50. This indicates that all respondents agreed that the five health hazards were due to poor handling of fuel oil in technical college workshops in Rivers State.

Research Question 2

1. What are the necessary precautions needed to avoid fuel oil contamination when storing or handling in the motor vehicle mechanic workshops in technical college in Rivers State?

Table 2: Mean and Standard Deviation Rating of Motor Vehicle Teachers and Motor Vehicle Technical on necessary precautions needed to avoid fuel-oil contamination when storing or handling.

S/N	Safety precautions necessary when storing or handling fuel oil	Motor vehicle technicians			Motor Vehicle teachers		
		Mean	S.D	Remark	Mean	S.D	Remark
6	Protect your eyes, hands, ears and other body parts with protect wears.	3.92	0.19	Agreed	3.67	1.39	Agreed
7	Make sure that ignition sources (sparks, smoking flames, hot surfaces) are eliminated when handling fuel and combustible liquid.	4.31	0.11	Agreed	3.89	1.19	Agreed
8	Ability to use fire fighting equipment should fire explosion arise from fuel.	3.83	1.01	Agreed	3.75	1.28	Agreed
9	Remove flammable materials that can result to fire explosion if in contact with fuel	3.71	1.05	Agreed	3.59	1.30	Agreed
10	Use impervious gloves such as nitrite when handling fuel oil	4.02	0.16	Agreed	3.53	1.46	Agreed
Total Mean/S.D		19.79	5.32		18.43	6.62	
Grand Mean/S.D		3.96	1.06		3.69	1.32	

The information presented on table 2 shows that five safety skills have their mean values ranging from 3.53 and 4.31 which are above the cut-off value of 3.50, this implies that the respondents agreed that the necessary precautions were needed by motor vehicle mechanics students to avoid fuel oil contamination when storing or handling.

Research Question 3

What are the safety precautions to be observed when dealing with high pressure fuel injection system in the technical college workshops in Rivers State?

Table 3: Mean and Standard Deviation Rating of Motor Vehicle Teachers and Motor Vehicle Technical on safety precautions to be observed when dealing with high pressure fuel injection system in Technical Colleges Workshop in Rivers State

S/N	Safety precautions observed when dealing with high pressure fuel injection	Motor vehicle technicians			Motor Vehicle teachers		
		Mean	S.D	Remark	Mean	S.D	Remark
11	Read instructional manual before gauging the fuel tank.	3.70	1.19	Agreed	3.59	0.40	Agreed
12	Keep store area cool, dry, clean.	3.89	1.11	Agreed	4.01	0.96	Agreed
13	Avoid breathing the air in the fume plume.	4.26	0.10	Agreed	3.96	0.97	Agreed
14	Use approved equipment including label safety containers for high pressure fuel injection and combustible liquids.	3.61	1.21	Agreed	3.69	1.16	Agreed
15	Ability to use fire extinguisher should fire explosion arise.	4.16	0.13	Agreed	3.81	1.20	Agreed
Total Mean/S.D		19.62	5.34		19.03	4.69	
Grand Mean/S.D		3.92	1.07		3.81	0.94	

The data presented on table 3 shows that five safety practice skills have mean values ranging from 3.51 to 4.26 which are above the cut-off value of 3.50. This signifies that all the 5 safety practice skills were needed by motor vehicle mechanic students when dealing with high pressure fuel injection system in technical college workshops in Rivers State.

Test of Hypothesis

H01

There will be no significant difference in the mean responses of motor vehicle technical teachers and motor vehicles technicians on the health hazards due to poor handling of fuel oil in technical college workshops.

Table 4: Summary of t-test Analysis on the mean Responses of Motor Vehicle Technical Teachers and Motor Vehicle Technicians on the Health Hazards due to Poor Handling of Fuel Oil in Technical College Workshops.

Respondents	Mean	S.D	Number	DF	Std error	Level of Sig.	t-cal	t _{crit}	Remark
Motor vehicle technicians	3.91	1.02	93	104	0.07	0.05	0.287	1.96	Accepted
Motor vehicle teachers	3.84	0.76	13						

Source: Researchers Computation

The result on table 4 shows that at 0.05 level of significance and 104 degree of freedom, the calculated t-value is 0.287 while t-critical from the table is 1.96. This implies that since the calculated t-value is less than the t-critical (table value), the null hypothesis is accepted. Based on this test of hypothesis, the researchers conclude that there is no significant difference in the mean responses of motor vehicle teachers and motor vehicle technicians on health hazards due to poor handling of fuel oil in technical college workshops.

H02

There is no significant difference in the mean responses of motor vehicle teachers and motor vehicle technicians on the necessary precautions to avoid fuel oil contamination when storing or handling.

Table 4: Summary of t-test Analysis on the mean Responses of Motor Vehicle Technical Teachers and Motor Vehicle Technicians on the Necessary Precautions needed to avoid Fuel Oil Contamination when storing or Handling in Technical College Workshops.

Respondents	Mean	S.D	Number	DF	Std error	Level of Sig.	t-cal	t _{crit}	Remark
Motor vehicle technicians	3.96	1.06	93	104	0.07	0.05	0.681	1.96	Accepted
Motor vehicle teachers	3.69	1.32	13						

Source: Researchers computation

The data on table 5 shows that at 0.05 level of significance and 104 degree of freedom, the t calculated is 0.681 whereas t critical is 1.96. This shows that the value of t calculated is lower than the value of the t critical. Hence, the null hypothesis is accepted that there was no significant difference in the mean responses of motor vehicle technicians and motor vehicle teachers on the necessary precautions needed to avoid fuel oil contamination when storing or handling fuel oil in technical college workshops.

H03

There is no significant difference in the mean responses of motor vehicle teachers and motor vehicle technicians on the safety precautions to be observed when dealing with high pressure fuel injection system in technical college workshops in Rivers State.

Table 6: Summary of t-test Analysis on the mean Responses of Motor Vehicle Mechanic teachers and Motor Vehicle Mechanic Technicians on the Safety Practice to be observed when dealing with High Pressure Injection System in Technical College workshops

Respondents	Mean	S.D	Number	DF	Std error	Sig.	t-cal	t _{crit}	Remark
Motor vehicle technicians	3.92	1.07	93	104	0.11	0.05	0.376	1.96	Accepted
Motor vehicle teachers	3.81	0.94	13						

Source: Researchers computation

The information on table 6 shows that the value of t calculated is 0.376 while t critical is 1.96 at 0.05 level of significance and 104 degree of freedom. This shows that since the calculated t value is lower than the t critical of 1.96, hence the null hypothesis is accepted. This implies that there was no significance different on the responses of motor vehicle technicians and motor vehicle teachers on the safety practice to be observed when dealing with high pressure injection system.

Discussion

The findings of the study revealed the health hazards due to poor handling of fuel oil in technical college workshops in Rivers State. It indicated that burns on the face, fire outbreaks to facilities, explosion, loss of lives and skin rashes over the body are among the health hazards due to poor handling of fuel in the technical college's workshops in Rivers State.

This finding is in line with Gogo (2007) which stated that air contains 21% of oxygen which is sufficient amount to produce a fire, most fuels need at least 15 percent oxygen to burn, in excess of 21%, leading to explosion which most time claimed lives and property in the society. It is also in agreement with the view of Jubril (2011) which explained that lack of adherence to safety rules in Technical College workshop has rendered many tools, machines and material in-effective and subjected students and technical teachers to various degrees of injuries in the workshop.

The finding also found that there was no significance different on the responses of motor vehicle technicians and motor vehicle teachers on health hazards due to poor handling of fuel oil in technical college.

The findings of the study further revealed that respondents agreed that the motor vehicle mechanic students require necessary precautions needed to avoid fuel oil contamination when stored or handled in technical colleges workshops of Rivers State. These safety precautions necessary identified by the respondents include: protection of the eyes, hands, ears and other body parts with protective wears, ensure that ignition sources are eliminated (sparking, smoking, flames, hot surfaces) when handling fuel and combustible liquid, ability to use fire fighting equipment should fire explosion arises from fuel, remove flammable materials that can result to fire explosion if in contact with fuel and use impervious gloves such as nitrite

gloves when handling fuel oil. This finding is in agreement with the opinion of Bakare (2010) which stated that technicians in the motor vehicle workshops should always put on safety apparatus while carrying out any operations on motor vehicle in the workshop when handling or storing fuel. The finding also consented with the view of Gogo (2007) which maintained that drivers should switch off their engines before allows the pump attendance to injects fuel into vehicle tank at any filling station to avoid flammable vapours to come in contact with sparks from bad exhaust pipes.

The finding also found that there was no significance different on the responses of motor vehicle technicians and motor vehicle teachers on the necessary precautions to avoid fuel oil contamination when storing or handling of fuel oil in technical college workshops.

The findings of this study revealed that the respondents upheld that the motor vehicle mechanic students needed safety precautions to be observed when dealing with high pressure fuel injection system. The findings identified include read instructional manual before gauging the fuel tank, keep store area cool, dry, clean working area around your engine, avoid breathing the air in the fume plume, use approved equipment including labelled safety containers for high pressure fuel injection and combustible liquids and ability to use fire extinguisher should fire explosion arises. The finding is in agreement with Gogo (2007) which stated that the Requirement of the dangerous substances and explosive atmospheres regulation and the management of health and safety regulations recommended that it is necessary to provide adequate training and relevant information for all employees involved in the storage and handling of any dangerous substances. These findings also are in line with the findings of Olaitan and Ikeh (2015) which posited that workers in the motor vehicle mechanic workshop should always use fire extinguisher should fire explosion arises, wear apron and safety boot during services and maintenance of motor vehicle.

The finding further found that there was no significant difference in the mean responses of motor vehicle technical teachers and motor vehicle technicians working on the safety practice skills to be observed when dealing with high pressure fuel injection system in technical college workshops in Rivers State.

Conclusion

The researchers drawn the following conclusions based on the findings of the study in order to avoid health hazards in the technical college workshops in Rivers State, there is dice need for students of motor vehicle mechanic to be introduced to safety practice skills in handling or storing of fuel oil in various technical colleges workshop in Rivers State. This situation would help to avoid and avert the identified health hazards which include: burns on the face or hands, fire outbreaks, explosion, loss of lives and skin rashes. Various safety precautions expected to be acquired will definitely assists the students after graduation. Most especially in the industrial work place as damages and accidents would be reduced on personnel and equipment, thereby saving cost of production among management of the industry.

Recommendations

Based on the finding, the researchers made available the following recommendations.

1. Government of Rivers State should properly equip technical college's workshops in the state with every motor mechanic safety apparatus to avoid hazards in the workshops.
2. The NBTE curriculum planners should ensure safety practice is included as compulsory course for students of MVM in the technical college curriculum.
3. The multinational oil industries should ensure regular orientation and sensitization of motor vehicle students on the needs to employ safety practice at the workshop.

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