

Relevance of Improvised Manual Foot Pump in Instruction Delivery of Motor Vehicle Mechanics in Technical Colleges in Rivers State

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Abstract:- This study examined the relevance of improvised manual foot pump in instruction delivery of motor vehicle mechanics in technical colleges in Rivers State. Specifically, this study sought to examine the relevance of improvised manual foot pump in instruction delivery of two strokes automotive engine and lubrication system in technical colleges in Rivers State. This study adopted descriptive survey design. The population of this study comprised 29 motor vehicle mechanics teachers and 16 motor vehicle mechanics instructors in technical colleges in Rivers State. The population was manageable and was used for the study, therefore, there was no sampling method adopted. Two objectives were formulated, answered and tested at .05 level of significance. The instrument used for this study was a survey questionnaire. The instrument was face validated by two experts in the Department of Vocational and Technical Education in Ignatius Ajuru University of Education, Port-Harcourt and it was tested for reliability using Cronbach Alpha Reliability Coefficient method. A reliability value of .93 was obtained. Mean with Standard Deviation were used to answer the research questions while t-test statistical tools was used to test the hypotheses. This study found among others that the use of locally fabricated manual foot pump will facilitate the teaching of parts of piston, feature of cylinder, piston movement, top dead center and bottom dead center, strokes, among others. It could also facilitate the teaching of suction and discharge thereby captivating the interest of students to learn Motor vehicle mechanics which is seen as abstract subject. Therefore, it was recommended that manual foot pump should be fabricated by students so that it could be used for teaching two strokes automotive engines for effective instruction delivery.

Keywords:- Instruction delivery, Manual foot pump, Motor vehicle mechanics, Technical College.

I. INTRODUCTION

The achievement of technology related goals has put most countries on their toes. As a very important tool for development, Nigeria as a country has keyed into strengthening its educational system to achieve a technology driven economy. This is evident with the introduction of technical colleges in the country. Ogunmilade (2017) described technical college as secondary institutions where individuals are trained to acquire skills, knowledge and attitudes required for either employment or for self-reliance. Similarly, Ochogba and Ordu (2019) described technical college as an institution that prepares individuals with vocational skills relevant for employment, self-reliance or for admission into tertiary institutions.

Consequently, technical college students are trained in different skills such as motor vehicle mechanics, woodwork, plumbing, computer craft, mechanical trades, radio, television (RTV) and electronics works, electrical installation and maintenance (Ede, Miller & Bakare, 2010). Similarly, Joseph, Makinde and Yakubu (2018) asserts that technical colleges train craftsmen and master craftsmen in building construction, Radio, Television and Electronic works, Electrical Installation, Motor Vehicle Mechanics (MVM), Plumbing and Pipe fitting, Carpentry and Joinery, Painting and Decorating, Welding and Fabrication, Cabinet Making amongst others.

However, these skills are relevant for human development through employment or self-reliance which is the aim of establishing technical colleges in the country but this study focuses on Motor vehicle mechanics. Abd-El-Aziz (2013) described Motor Vehicle Mechanics as trade programmes in technical colleges which involves the application of scientific knowledge in the design, selection of materials, construction, operation and maintenance of automobiles. In this context, Motor Vehicle Mechanics could be described as a trade in technical college that is designed to equip individuals with automobile skills relevant for the repair and production of automobile and its parts.

Basically, the goal of Motor Vehicle Mechanics subject in Nigerian technical colleges is to produce competent vehicle mechanics with sound knowledge that should be able to diagnose and carryout repairs and/or maintenance on all types of Diesel and Petrol Vehicles (Nigeria Board for Technical Education in Fadairo, 2009). Similarly, NBTE (cited in Abd-El-Azziz, 2013) stated that Motor Vehicle Mechanics trade programme/training in Nigerian technical college education was planned to produce craftsmen and master craftsmen who should be competent and skilful to carryout routine services and repair all types of vehicles.

The curriculum of motor vehicle mechanics in Technical Colleges and Senior Secondary Schools encompasses five components namely; general education subjects, trade, theory, related studies and workshop practice. This is to achieve the aim and goals of motor vehicle mechanics.

Consequently, instructional delivery of motor vehicle mechanics, which is the same as teaching of motor vehicle mechanics in technical colleges, is different from the general type of education. Akaninwor (2006) described teaching as the conscious and diligent effort by a matured or experienced person to impact information, knowledge, skill and attitude to an immature person, with the intention that the learner will learn or come to believe what he had been taught on good ground. This is to say that for teaching and learning to take place, there must be a teacher and a learner. Also, the teacher will have to make use of resources that could aid the exercise. In the case of motor vehicle mechanics, the teaching process is practical based which requires the use of facilities like machines and tools for learning to be effective. This means that the required facilities for teaching motor vehicle mechanics have to be available in order to achieve the aims of teaching.

Unfortunately, there have been serious complaints about the neglect of educational system and the worst of it all is technical colleges which is evident in the absence of facilities that could aid teaching. Based on this, motor vehicle mechanics teachers mostly resort to the use of chalkboard and lifeless engines in teaching. According to National Board for Technical and Business (NABTEB) May/June Chief examiners' report in Oyenuga (2010), the use of chalkboard in teaching practical related subjects in technical colleges account for the poor performance of students in motor vehicle mechanics in the National Technical Certificate Examination in recent years.

Consequently, motor vehicle mechanics teachers are expected to improvise, which means that they are to source for local materials or design anything that can function like an engine or serve as instructional material. For instance, Ashiedu, Nwaoha and Izelu (2016) designed manual pump and found that it is useful for agrarian in rural communities and also for teaching. Pump as a machine that is used to move gases and liquids by applying pressure greater than those of the gases or liquids (Nneji, Okon, Nwachukwu, David & Ogbuanya, 2010). Therefore, manual pump could

be described as a machine that is locally designed to move water from one place to another without the use of electricity. There are many different types of manual pump available, mainly operating on a piston, diaphragm or rotary vane principle with a check valve on the entry and exit ports to the chamber operating in opposing directions. Most pumps are either piston pumps or plunger pumps and are positive displacement (Hills, 1996).

The description of manual pump depicts two stroke automotive engines which mean that it could be used for instruction delivery of two strokes automotive engine. As the name implies, the two stroke engine only requires two pistons movements (one cycle) in order to generate power (Alturki, 2017). The engine is able to produce power after one cycle because the exhaust and intake of the gas occurs simultaneously (Wu, 2007). According to Wodi (2005), two strokes engines operate on the principle of suction and exhaust. It takes air-fuel mixture through suction and then does work with it and exhaust the mixture through the exhaust pipe. From the foregoing, it could be seen that manual pump operates like the two strokes automotive engines, hence, a locally constructed foot pump can be used in teaching a class. Therefore, the researcher deemed it fit to examine the relevance of improvised manual foot pump in instruction delivery of motor vehicle mechanics in technical colleges in Rivers State.

➤ *Purpose of the Study*

This study examined the relevance of improvised manual foot pump in instruction delivery of motor vehicle mechanics in technical colleges in Rivers State. Specifically, this study sought to:

1. Ascertain the relevance of improvised manual foot pump in instruction delivery of two strokes automotive engines in technical colleges in Rivers State.
2. Examine the relevance of improvised manual foot pump in instruction delivery of lubrication system in technical colleges in Rivers State.

➤ *Research Questions*

1. What is the relevance of improvised manual foot pump in instruction delivery of two strokes automotive engines in technical colleges in Rivers State?
2. What is the relevance of improvised manual foot pump in instruction delivery of lubrication system in technical colleges in Rivers State?

➤ *Hypotheses*

The following null hypotheses were tested at 0.05 level of significance

1. There is no significant difference in the mean responses of MVM teachers and MVM instructors in Rivers State on the relevance of improvised manual foot pump in instruction delivery of two strokes automotive engines in technical colleges in Rivers State.
2. There is no significant difference in the mean responses of MVM teachers and MVM instructors in Rivers State on the relevance of improvised manual foot pump in instruction delivery of lubrication system in technical colleges in Rivers State

II. METHODOLOGY

➤ Design of the Study

The study adopted a descriptive survey research design. According to Nworgu in Nwankwo (2013), descriptive surveys are studies which aim at collecting data for the purpose of describing systematically the characteristics, features and facts about a given population. The present study is a descriptive survey because the researcher collected data from MVM teachers and instructors in technical colleges in Rivers State in order to ascertain the relevance of improvised manual foot pump in instruction delivery of motor vehicle mechanics in technical colleges in Rivers State.

➤ Population of the Study

The population of the study comprised all the motor vehicle mechanics teachers and instructors in the four technical colleges in Rivers State which comprised Government Technical College Port Harcourt, Ahoada, Tombia and Ele-Ogu. As at the time of the study, there was an estimated population of 29 motor vehicle mechanics teachers and 16 motor vehicle mechanics instructors in the four colleges in Rivers State.

➤ Sample and Sampling Technique

The total population of 29 MVM teachers and 16 MVM instructors was manageable. Basically, the entire population was used for the study; hence, it was a census study whereby the entire population was used without sampling. Therefore, there was no sampling method used for the study.

➤ Research Instrument

The instrument for the study was a survey questionnaire titled “Relevance of the use of Manual Foot Pump in Instruction Delivery of Motor Vehicle Mechanics (RMFPIDMVM). The questionnaire was structured in the pattern of 5 point Likert rating scale of Strongly Agree (SA-5), Agree (A-4), Undecided (U-3), Disagree (D-2) and Strongly Disagreed (SD-1).

➤ Validation of the Instrument

The instrument was face validated by two experts in the Department of Vocational and Technical Education in Ignatius Ajuru University of Education, Port-Harcourt. The instrument was validated in reference to: wordings, sentence construction/construct, ambiguity, appropriateness and relevance.

➤ Reliability of the Instrument

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 6 motor vehicle mechanics teachers and instructors in Bayelsa State using purposive sampling method. The data obtained from these respondents were used to compute the reliability. The coefficient value obtained was .93 which was used to judge the reliability of the instrument and was considered high enough for the study.

➤ Administration of the Instrument

Copies of the instrument were administered directly to the respondents by the researchers. All the instruments administered were retrieved and used for data analysis.

➤ Method of Data Analysis

Mean and Standard Deviation were used to answer the research questions while t-test was used to test the hypotheses at .05 level of significance. Mean values less than 3.00 were rejected, while Mean values equal or greater than 3.00 were accepted. Also, t-cal less than t-crit were accepted meaning there was no significant difference in the mean responses of the two groups, while t-cal greater than t-crit were rejected meaning there was a significant difference in the mean responses of the two groups.

III. ANALYSIS OF DATA AND RESULTS

➤ Research Question 1

What is the relevance of improvised manual foot pump in instruction delivery of two strokes automotive engines in technical colleges in Rivers State?

Table 1: Mean Scores on the Relevance of Improvised Manual Foot Pump in Instruction Delivery of Two Strokes Automotive Engines in Technical Colleges

S/N	Relevance	MVM teachers (n ₁ =29)		MVM instructors (n ₂ =16)		DF=43	
		\bar{x}_1	SD ₁	Decision	\bar{x}_2	SD ₂	Decision
1	It is used to teach the parts of pistons	3.06	.85	Agree	3.25	.92	Agree
2	It is used to teach the nature of cylinder	3.17	.83	Agree	3.19	.92	Agree
3	It facilitates the teaching of piston movement	3.14	.75	Agree	3.06	.87	Agree
4	It enhances the teaching of swept volume	3.11	.94	Agree	3.10	.94	Agree
5	It is used to teach top dead center	3.17	.83	Agree	3.13	.88	Agree
6	Ensures the teaching of bottom dead center	3.03	1.01	Agree	3.14	.89	Agree
7	It is used to teach strokes in two stroke engines	3.14	.94	Agree	3.19	1.02	Agree
8	Makes it easier for teacher to teach complete revolution of two stroke engine	3.02	1.08	Agree	3.00	.98	Agree
9	It is used to teach the constitutes of two strokes engines such as the material used for its production	3.19	.87	Agree	3.11	1.02	Agree
10	It makes it possible for students to understand lubrication of pistons	3.25	.72	Agree	3.03	1.0	Agree

						1	
11	It facilitates the teaching of connecting rod	3.25	.83	Agree	3.19	.92	Agree
	Total	3.14	.88		3.13	.94	

Source: Field Survey, 2020

Table 1 on relevance of improvised manual foot pump in instruction delivery of two strokes automotive engines in technical colleges in Rivers State shows that MVM teachers and instructors agreed that all the items highlighted are relevance of improvised manual foot pump in instruction delivery of two strokes automotive engine. This is based on the grand mean scores of 3.14 and 3.13 respectively, which is above 3.00 stated as the acceptable mean. Also, the closeness in the standard deviation of the two groups shows

homogeneity. This finding is in line with Ashiedu, Nwaoha and Izelu (2016) that designed manual pump and found that it is useful for agrarian in rural communities and for teaching.

➤ *Research Question 2*

What is the relevance of improvised manual foot pump in instruction delivery of lubrication system in technical colleges in Rivers State?

Table 2: Mean Scores on the Relevance of Improvised Manual Foot Pump in Instruction Delivery of Lubrication System in Technical Colleges

		MVM teachers (n ₁ =29)		MVM instructors (n ₂ =16) DF=43			
S/N	Relevance	\bar{x}_1	SD ₁	Decision	\bar{x}_2	SD ₂	Decision
12	It exposes students to the principle of suction	3.19	1.02	Agree	3.14	.94	Agree
13	It exposes student to the principle of discharge	3.30	.81	Agree	3.00	.98	Agree
14	Students will have the understanding of the lubrication of engine in stroke engine	3.03	1.01	Agree	3.03	.92	Agree
15	It motivates students to learn lubrication system	3.00	1.03	Agree	3.13	.94	Agree
16	It makes the teaching of lubrication easier	3.00	1.08	Agree	3.06	.87	Agree
17	It makes the lesson more enjoyable	3.14	.89	Agree	3.03	1.01	Agree
18	It captivates the interest of students in lubrication system	3.08	.76	Agree	3.14	.89	Agree
	Total	3.11	.94		3.08	.94	

Source: Field Survey, 2020

Table 2 on relevance of improvised manual foot pump in instruction delivery of lubrications system in technical colleges in Rivers State shows that MVM teachers and instructors agreed that all the items highlighted are relevance of improvised manual foot pump in instruction delivery of lubrication system. This is based on the grand mean scores of 3.11 and 3.08 respectively, which is above 3.00 stated as the acceptable mean. Also, the closeness in the standard deviation of the two groups shows homogeneity. This finding is in line with Ashiedu, Nwaoha and Izelu (2016)

that designed manual pump and found that it is useful for agrarian in rural communities and for teaching.

➤ *Hypothesis 1*

There is no significant difference in the mean responses of MVM teachers and MVM instructors in Rivers State on the relevance of improvised manual foot pump in instruction delivery of two strokes automotive engines in technical colleges in Rivers State.

Table 3: t-Test for Relevance of Improvised Manual Foot Pump in Instruction Delivery of Two Strokes Automotive Engines

Category	n	\bar{x}	SD	DF	t-cal	t-crit	Remark
MVM Teachers	29	3.14	.88				
				43	.03	2.00	Not Significant
MVM Instructors	16	3.13	.94				

Table 3 shows that MVM teachers mean and standard deviation scores were 3.14 and .88 respectively, while MVM instructors mean and standard deviation scores were 3.13 and .94 respectively. The t-cal value was .03, while the t-crit was 2.00 with DF = 43 at .05 level of significance for two tailed test. This result shows that t-cal was less than t-crit, which means that the null hypothesis was accepted.

Thus, there was no significant difference in the mean responses of MVM teachers and MVM instructors in Rivers State on the relevance of improvised manual foot pump in instruction delivery of two strokes automotive engines in technical colleges in Rivers State.

➤ Hypothesis 2

There is no significant difference in the mean responses of MVM teachers and MVM instructors in Rivers

State on the relevance of improvised manual foot pump in instruction delivery of lubrication system in technical colleges in Rivers State.

Table 4: t-Test for Relevance of Improvised Manual Foot Pump in Instruction Delivery of Lubrication System

Category	n	\bar{x}	SD	DF	t-cal	t-crit	Remark
MVM Teachers	29	3.11	.94				
				43	.10	2.00	Not Significant
MVM Instructors	16	3.08	.94				

Table 4 shows that MVM teachers mean and standard deviation scores were 3.11 and .94 respectively, while MVM instructors mean and standard deviation scores were 3.08 and .94 respectively. The t-cal value was .10, while the t-crit was 2.00 with DF = 43 at .05 level of significance for two tailed test. This result shows that t-cal was less than t-crit, which means that the null hypothesis was accepted. Thus, there was no significant difference in the mean responses of MVM teachers and MVM instructors in Rivers State on the relevance of improvised manual foot pump in instruction delivery of lubrication system in technical colleges in Rivers State.

IV. CONCLUSIONS

Based on the findings of this study, it was concluded that improvised manual foot pump that is locally fabricated to serve as liquid pumping machine for flood victims can also be used in the classroom especially in Motor Vehicle Mechanics for the teaching of two strokes automotive engine and lubrication system. The use of this locally fabricated pump will facilitate the teaching of parts of piston, feature of cylinder, piston movement, top dead center and bottom dead center, strokes, among others. It could also facilitate the teaching of suction and discharge thereby captivating the interest of students to learn Motor vehicle mechanics which is seen as abstract subject.

RECOMMENDATIONS

Based on the findings, the following recommendations were made:

1. Considering the situation of some technical colleges with regards to poor facilities for teaching, manual foot pump should be fabricated by students so that it could be used for teaching two strokes automotive engines for effective instruction delivery.
2. In teaching lubrication system, manual foot pump should be used by teachers to explain the principle of suction and discharge for effective instruction delivery.

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