



Assessment of Welding and Fabrication Skills Needed For Entrepreneurship Development of Students In Technical Colleges In Rivers State

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ABSTRACT

The study assessed welding and fabrication skills needed for entrepreneurship development of students in technical colleges in Rivers State. Two purposes, research questions and hypotheses guided the study. This study adopted a descriptive survey research design and was carried out in Rivers State Nigeria. The population of the study was 76 respondents. The instrument for data collection was a structured questionnaire titled “Welding and Fabrication Skills Questionnaire (WFSQ)”. The instrument was structured on five point rating scale of Strongly Agreed (SA) =4, Agreed (A) =3, Disagreed (DA) =2, and Strongly Disagreed (SD) =1. The instrument (FCSQ) was subjected to face-validation by three experts and has 0.79 reliability index. The findings of the study revealed gas welding skills and forge welding skills are needed for entrepreneurship development of students in technical colleges in Rivers State. It was recommended that Government should equip metalwork departments with modern equipment and facilities for training in welding and fabrication skills required in industries around. Skilled and qualified welding and fabrication teachers should be employed to give the real skill to students. Government should liaise with companies to identify the skill need areas by the companies. Schools should liaise with companies on practical training for the student. Skills needed by the companies/industries around should always be identified and immediately be inculcated in training of the youths.

Keywords: Welding and Fabrication, Skills, Entrepreneurship Development and Technical Colleges.

INTRODUCTION

The problems of employment have become a central global concern in recent times. This makes nearly all the governments and development partners to be fully engaged in finding a lasting solution to the problems. Technical and Vocational Education as the foundation of nation’s wealth and development, becomes a ground of takeoff. Technical and Vocational education is meant to produce semi-skilled, skilled and technical manpower necessary to restore, revitalize, energize, operate and sustain the national economy and substantially reduce unemployment. Technical and Vocational Education according to FGN (2013) is a form of education involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. This presupposes that technical and vocational education can respond to the different socio-economic and academic backgrounds and prepare the clientele for gainful employment and sustainable livelihoods. Olaitan (2004) defined vocational education as any form of education whose primary purpose is to prepare persons for employment in the recognized occupations. He further stated that vocational education provides the skills, knowledge and attitudes

necessary for effective employment in specific occupations. This specialized education is offered in technical institutions saddled with training of lower and middle level manpower, including technical colleges.

Technical Colleges in Nigeria are established to produce craftsmen at the craft (secondary) level and master craftsmen at the advance craft (post secondary) level (Federal Ministry of Education, 2013). The curriculum programmes of technical colleges according to Federal Government of Nigeria (2013) are grouped into related trades. These includes, the computer trades, electrical/electronics trades, building trades, wood trades, hospitality trade, textile trades, printing trades, beauty culture trades, business trades and mechanical trades. Mechanical trades is a general name used in describing trades that has direct bearing with metal welding/forming and or servicing/repairs of machines or machine related equipment and appliances. The trades in this group include agricultural implement and equipment mechanics work, auto body repair and spray painting, auto electrical work, auto body mechanics works, auto mechanics works, auto body building, auto parts merchandising, air-conditioning and refrigeration mechanics works, mechanical engineering craft practice, , foundry craft practice, instruments mechanics work, marine engineering craft and welding and fabrication engineering craft practice (Ogbuanya, & Fakorede 2009).

Welding and fabrication engineering craft practice deals with the forming and bonding of metals to form a useable object or structure. Fabrication is the forming of metal, usually steel plate, into various forms either by welding or other forms of metal joining processes. Welding is used to cover a range of bonding techniques. Welding is a way of joining two or more pieces of metal together permanently. Repp and McCarthy (1984) described welding as an action that occurs when metal pieces being joined flows and blends or fuses together. They explained that, the action is caused by heat, pressure or a combination of both. When heat alone is used according to them, the weld action is known as fusion weld. Schneider (2010) sees welding as a joining technique for both fabrication in production and for repairs, construction of ships, boilers and large storage, pipelines and rail lines. The author further stated that welding and fabrication involves metals and the joining actions caused by the application of heat, pressure, and with or without filter materials. Welding is a fabrication or sculptural process that joins materials, usually metals or thermoplastics, by using high heat to melt the parts together and allowing them to cool causing fusion. Welding is distinct from lower temperature metal-joining techniques such as brazing and soldering, which do not melt the base metal (Cary, & Helzer, 2005). In addition to melting the base metal, a filler material is typically added to the joint to form a pool of molten material (the weld pool) that cools to form a joint that, based on weld configuration (butt, full penetration, fillet, etc.), can be stronger than the base material (parent metal). Pressure may also be used in conjunction with heat, or by itself, to produce a weld. Welding also requires a form of shield to protect the filler metals or melted metals from being contaminated or oxidized.

Many different energy sources can be used for welding, including a gas flame (chemical), an electric arc (electrical), a laser, an electron beam, friction, and ultrasound. While often an industrial process, welding may be performed in many different environments, including in open air, under water, and in outer space. Welding is a hazardous undertaking and precautions are required to avoid burns, electric shock, vision damage, inhalation of poisonous gases and fumes, and exposure to intense ultraviolet radiation (Ullman, 2003).

Gas metal arc welding (GMAW), sometimes referred to by its subtypes metal inert gas (MIG) welding or metal active gas (MAG) welding, is a welding process in which an electric arc forms between a consumable MIG wire electrode and the workpiece metal(s), which heats the workpiece metal(s), causing them to melt and join (Anders,2003). Along with the wire electrode, a shielding gas feeds through the welding gun, which shields the process from contaminants in the air. The process can be semi-automatic or automatic. A constant voltage, direct current power source is most commonly used with GMAW, but constant current systems, as well as alternating current, can be used. There are four primary methods of metal transfer in GMAW, called globular, short-circuiting, spray, and pulsed-spray, each of which has distinct properties and corresponding advantages and limitations (Cary, and Helzer, 2005).

Forge welding is a solid-state welding process that joins two pieces of metal by heating them to a high temperature and then hammering them together. It may also consist of heating and forcing the metals together with presses or other means, creating enough pressure to cause plastic deformation at the weld surfaces (Nauman, 2004). The process is one of the simplest methods of joining metals and has been used since ancient times. Forge welding is versatile, being able to join a host of similar and dissimilar metals (Khanna 2010). With the invention of electrical and gas welding methods during the Industrial Revolution, manual forge-welding has been largely replaced, although automated forge-welding is a common manufacturing process.

However, Entrepreneurship education is the means of instilling the qualities of entrepreneurship in people with the continued general activities of managers or what can be the purposeful activity of an individual, undertaken to initiate, maintain or organize, a profit oriented business unit for the production or distribution of economic goods and services (Okoro, 2003). Entrepreneurship creativity requires a paradigm shift and there are many techniques available to help the entrepreneur to see things in a different perspective, to come up with new ideas. Innovation involves implementing newly created ideas and the process can be classified as invention, extension, duplication and synthesis (Ozigbo 2008). Entrepreneurship programme is needed in most engineering profession to enable young technicians to effectively market their skill in the society.

In every programme of technology education, especially at the post-primary and post-secondary school levels, three-credit subjects, which may be titled 'Entrepreneurship' or small business management should be introduced and made compulsory for all technology education students (Anete, Amusa, & Eze, 2009). A successful programme, according to Olaitan, (2004), will enable a student either get a job or create a job and employ others thus reducing unemployment and enhancing the per-capital income of Nigerians. The training for entrepreneurship, as Okoro (2007) observed, must be in addition to the usual skills training in any of the technology areas. Some common technological trade offered in Nigerian technical schools are tractor system, motor vehicle mechanics works, automobile electrical works, electronic works, computer craft studies, general metal work, carpentry, furniture making and so on.

Statement of the Problem

Rivers State is blessed with enormous resources and which if well managed; every citizen should be living comfortably. This is because, various categories of persons, companies and investors are in the region transacting one form of business or the other, consequently impacting the life of the citizens in the region positively such as; infrastructure, electricity, pipe borne water, good education, well equipped hospitals, better and more modern equipment for fishing, farming and hunting. There would be good roads, linking communities and with expectation that as the oil companies begin to carry out their operations more people would have the opportunity of gainful employment.

Ordinarily, majority of graduates and school leavers from primary schools, secondary schools, colleges of education, polytechnics and universities in the state are supposed to be engaged in these companies or in the government or be self employed to earn a living. But reverse is the case as no commensurate creation of employment opportunities are made by government. Also the companies still bring in foreigners as expatriates into the state to carry out certain operation (special skills) because of either mis-match of skills or lack of qualified skills among the indigenous people. People are unemployed either as a result of lack of employment or lack of employable skills. The latter is the need that must be met if the individuals must be employed. Provision of relevant job skill is very essential to meet employable skills that might be lacking in the unemployed. There will always be job opportunities but people remain unemployed as long as they lack employable skills. Ozigbo (2008) lamented that Nigeria, a rich oil producing nation, lacks sufficient skilled human capital to manage the oil industry. The experience of massive unemployment of Rivers State indigenes invariably results from the above scenario. It is however alleged that Rivers State indigenes are ill equipped for wage employment/self employment as a result of lack of technical skills needed in various industries.

Bringing basic skills programmes to unemployed youths can help to alleviate poverty and unemployment levels, while improving economic growth. The development of relevant skills and knowledge is a major instrument for improved productivity, better working conditions, and the promotion of decent work in the

informal economy (Liimatainen, 2002). New skills and knowledge can open doors to more economically and socially rewarding jobs (Marjo-Riitta, 2003). Hence the study looked at Welding and fabrication skills needed for entrepreneurship development of students in technical colleges in Rivers State.

Purpose of the Study

The main purpose of the study was to assess welding and fabrication skills needed for entrepreneurship development of students in technical colleges in Rivers State. Specifically the study sought to determine the following:

1. Gas welding skills needed for entrepreneurship development of students in technical colleges in Rivers State.
2. Forge welding skills needed for entrepreneurship development of students in technical colleges in Rivers State.

Research Questions

Four research questions were posed to guide the study:

1. What are the gas welding skills needed for entrepreneurship development of students in technical colleges in Rivers State?
2. What are the forge welding skills needed for entrepreneurship development of students in technical colleges in Rivers State?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance;

HO₁ There is no significant difference between the mean responses of mechanical teachers and instructors on gas welding skills needed for entrepreneurship development of students in technical colleges in Rivers State

HO₂ There is no significant difference between the mean responses of mechanical teachers and instructors on forge welding skills needed for entrepreneurship development of students in technical colleges in Rivers State

METHODOLOGY

Design of the Study

This study adopted a descriptive survey research design. Nworgu (2015) explained that descriptive survey research design deals with studies which aim at collecting data through questionnaire or interview and describing the data in a systematic manner that interpret the characteristics, features, and facts about a given population. The study was carried out in Rivers State Nigeria. The four Government Technical Colleges in Rivers State which was used includes: Government Technical College Port Harcourt, Government Technical College Ogu, Government Technical College Tombia and Government Technical College Ahoada.

Population of the Study

The population of the study was 76 respondents, comprising 47 Metalwork Teachers and 29 Instructors in the four Government Technical Colleges in Rivers State (Records Unit, Rivers State Secondary School Board, 2017). The study was a census as the entire population was studied. This is in consonance with Maduabum (2007) who stated that, a survey in which the entire population is studied is referred to as census. The choice of census is due to the relatively small size of the population.

Instrument for Data Collection

The instrument for data collection was a structured questionnaire titled "Welding and Fabrication Skills Questionnaire (WFSQ)". The instrument was structured on five point rating scale of Strongly Agreed (SA) =4, Agreed (A) =3, Disagreed (DA) =2, and Strongly Disagreed (SD) =1. A corresponding numerical value of 4, 3, 2 and 1. The instrument (FCSQ) was subjected to face-validation by three experts; one from the Department of Mechanical Engineering, Rivers State University, Nkpolu, one from the Department of Industrial Technology Education, Ignatius Ajuru University of Education, Rumuolumeni and one from Department of Mechanical Trade, Government Technical College Port Harcourt. The experts were requested to read through the questionnaire item by item for clarity and

appropriateness based on the research questions under investigation. The experts' comments and suggestions were utilized to structure the new questionnaire instrument that was used for the study.

Reliability of the Instrument

The internal consistency of the instrument was established using Cronbach alpha reliability method. Twenty (10) copies of the instrument were administered to twenty metalwork technical teachers and metalwork instructors in Government Technical Colleges in Bayelsa State, which is outside the area of the study but possessed similar characteristics with the area of study, in terms of curriculum. Their responses were scored using the statistical package for social science version 20 (SPSS) and 0.79 was obtained as reliability coefficient of the instrument.

Method of Data Collection

Seventy six (76) copies of the questionnaire were administered to the respondents with the help of three research assistants. The researcher informed the research assistants on the procedures required in administering the questionnaire instruments. Out of the seventy six (76) copies of the questionnaire that was administered, Seventy five (72) copies were retrieved by the researcher and the three research assistants for analysis representing 98% retrieved.

Method of Data Analysis

Data collected from the respondents were analyzed using mean and standard deviation. The mean scores were used to answer the four research questions and t-test statistics was used to test the four null hypotheses at 0.05 level of significance. In order to determine the acceptance or rejection level of each of the items in relation to research questions, a decision rule based on real limit of numbers was used. Decision was taken as follows: Accept an item if mean calculated is greater than or equal to the real limit of 2.50. On the other hand, reject an item if mean calculated is less than the real limit 2.50. Standard deviation values were used to determine the homogeneity or order wise in opinion among the respondents. The decision for hypothesis was that if the calculated value of t (t-cal) is less than the critical value of t (t-crit), accept the null hypothesis but if the calculated value of t (t-cal) is greater than or equal to the critical value t (t-crit) at 0.05 level significance, then reject the null hypothesis. The computation of the mean, standard deviation and t-test was carried out with statistical package for social sciences version 20 (SPSS).

PRESENTATION AND ANALYSIS OF DATA

The chapter presents data pertinent to the research questions and hypotheses formulated to guide the study. The data analyses were presented in tables according to research questions and hypotheses using the appropriate statistical tools for the analyses.

Research Question 1: *What are the gas welding skills needed for entrepreneurship development of students in technical colleges in Rivers State?*

Table 1: Mean and Standard Deviation on gas welding skills needed for entrepreneurship development of students

S/NO	ITEMS	Teachers			Instructors		
		X	SD	RMK	X	SD	RMK
Ability To:							
1	Measure and cut work piece to size	3.39	.837	A	2.75	.982	A
2	Open cylinder regulator	3.53	.826	SA	3.05	.833	A
3	Loose knobs on the welding touch to mix gas and flow out through the nozzle tips	3.10	.939	A	2.83	1.097	A
4	Sport light for ignition	3.11	.772	A	3.14	.953	A
5	Adjust flame to choice of use	2.97	.986		2.59	1.142	
6	Apply flux at point of weld	3.04	.755	A	3.19	.915	A
7	Apply flame direct to jointing point	3.09	.903	A	2.82	1.030	A
8	Knoch off slag if any and wash of flux	3.11	.994	A	3.19	.895	A
9	Open pressure lever on the cutting torch	3.32	.841	A	2.93	.997	A
10	Maintain straight line in welding/cutting						
	Grand Mean	3.28	.940	A	3.23	.802	A
		3.18	0.50	A	2.97	0.62	A

Table 1 revealed that the teachers had mean range of 3.04-3.53 and standard deviation of 0.75-0.99 while the instructors had mean range of 2.93-3.57 and standard deviation of 0.69-1.08. The closeness of the standard deviation shows the homogeneity of the respondents. They all agreed that the items are the gas welding skills needed for entrepreneurship development of students in technical colleges in Rivers State.

Research Question 2: *What are the forge welding skills needed for entrepreneurship development of students in technical colleges in Rivers State?*

Table 2: Mean and Standard Deviation on forge welding skills needed for entrepreneurship development of students

S/NO	ITEMS	Teachers			Instructors		
		X	SD	RMK	X	SD	RMK
	Ability To:						
1	Prepare and power furnace	3.57	.692	SA	2.81	1.039	A
2	Determine plastic state of metal to case forge welding	3.56	.732	SA	3.11	.859	A
3	Quickly super-impose the work piece	3.31	.798	A	3.16	.924	A
4	Apply hammer blows either by hand or power hammering	3.28	.750	A	3.35	.719	A
5	Select right tools and equipment for the operation	2.93	1.004	A	2.95	.932	A
6	Measure and cut workpiece to required sizes	3.16	.941	A	3.42	.844	A
7	Bevel the workpiece to easy weld	2.95	.875	A	3.09	.860	A
8	Turn on furnace, blower motor open gas valve	3.25	.931	A	3.32	.736	A
9	Immediately ignite fire.	2.99	1.088	A	3.31	.790	A
10	Adjust flame to desired size through air gas valve	3.05	.990	A	3.42	.625	A
	Ground Mean	3.29	0.50	A	3.10	0.62	A

Table 2 revealed that the teachers had mean range of 2.93-3.57 and standard deviation of 0.69-1.08 while the instructors had mean range of 2.81-3.42 and standard deviation of 0.62-1.03. The closeness of the standard deviation shows the homogeneity of the respondents. They all agreed that the items are the forge welding skills needed for entrepreneurship development of students in technical colleges in Rivers State.

Hypotheses

HO₁ There is no significant difference between the mean responses of mechanical teachers and instructors on gas welding skills needed for entrepreneurship development of students in technical colleges in Rivers State.

Table 5: The t-test analysis on gas welding skills needed for entrepreneurship development of students.

Respondents	N	X	SD	P-value	DF	t-Cal	t-Crit	RMK
Teachers	62	3.18	0.50	0.05	86	1.25	1.69	No Sig
Instructors	26	2.97	0.62					

Result in table 6 revealed that t-cal (1.25) is less than t-crit (1.69) which indicates that the hypothesis stated was accepted. Therefore there is no significant difference between the mean responses of mechanical teachers and instructors on gas welding skills needed for entrepreneurship development of students in technical colleges in Rivers State.

HO₂ There is no significant difference between the mean responses of mechanical teachers and instructors on forge welding skills needed for entrepreneurship development of students in technical colleges in Rivers State.

Table 6: t-test analysis on forge welding skills needed for entrepreneurship development of students.

Respondents	N	X	SD	P-value	DF	t-Cal	t-Crit	RMK
Teachers	62	3.29	0.50	0.05	86	1.32	1.69	No Sig
Instructors	26	3.10	0.51					

Result in table 7 revealed that t-cal (1.32) is higher than t-crit (1.69) which indicates that the hypothesis stated was accepted. Therefore there is no significant difference between the mean responses of mechanical teachers and instructors on forge welding skills needed for entrepreneurship development of students in technical colleges in Rivers State.

DISCUSSION OF FINDINGS

The findings in Table 1 revealed that the teachers had mean range of 3.04-3.53 and standard deviation of 0.75-0.99 while the instructors had mean range of 2.93-3.57 and standard deviation of 0.69-1.08. The closeness of the standard deviation shows the homogeneity of the respondents. They all agreed that the items are the gas welding skills needed for entrepreneurship development of students in technical colleges in Rivers State. This finding is in line with Adams (2008) who explained that technical college products in fabrication/welding craft practice require all the competencies in planning for establishing fabrication/welding enterprises, competencies for processing of metals into finished products, and competencies for marketing of fabrication/welding enterprises' finished products. He further stated that the identified entrepreneurial competencies be used for training of technical college products for entering into fabrication/welding enterprise as entrepreneurs. Also, that entrepreneurship education centres should be established by State Government for training of technical college products in entrepreneurial competencies for sustainable development.

The findings in Table 2 revealed that the teachers had mean range of 2.93-3.57 and standard deviation of 0.69-1.08 while the instructors had mean range of 2.81-3.42 and standard deviation of 0.62-1.03. The closeness of the standard deviation shows the homogeneity of the respondents. They all agreed that the items are the forge welding skills needed for entrepreneurship development of students in technical colleges in Rivers State. This finding is in accordance with Jain (2009), which suggests that low productivity and low levels of skilled manpower are preventing manufacturing enterprises from being competitive. The findings therefore suggest that formal training of entrepreneurs is likely to contribute to local enterprises to compete with imports.

CONCLUSION

The study on welding and fabrication skills needed for entrepreneurship development of students in technical colleges in Rivers State is as a result of the rapid technological changes in the 21st century that poses great challenges to education and employment sectors and has led to new labour market demands which have caused many metalwork graduates with various certificate to be unemployed. The study determined gas welding skills, forge welding skills, arc welding skills and underwater welding skills needed for entrepreneurship development of students in technical colleges in Rivers State. Data were collected, analyzed and interpreted. Based on the findings of the study, it was concluded that welding and fabrication skills are needed for entrepreneurship development of students in technical colleges in Rivers State.

RECOMMENDATIONS

Base on the findings of study, the following recommendations were made:

1. Government should equip metalwork departments with modern equipment and facilities for training in welding and fabrication skills required in industries around.
2. Skilled and qualified welding and fabrication teachers should be employed to give the real skill to students.
3. Government should establish training centres in the area of skill required e.g. under water welding.
4. Under water welding should be introduced into the curriculum of metal work technology.
5. Government should liaise with companies to identify the skill need areas by the companies.
6. Schools should liaise with companies on practical training for the student.

Skills needed by the companies/industries around should always be identified and immediately be inculcated in training of the youths.

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