Evaluation of the Implementation of Metalwork Curriculum in Technical Colleges in Abuja

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Abstract
The paper evaluated the implementation of metalwork curriculum in technical colleges in Abuja, Nigeria. two research questions and one null hypothesis was used to guide the study. The study adopted a descriptive survey research design. The study was conducted in all the three technical Colleges in Abuja. The population of the study was 15 respondents. No sampling technique was used as the whole population was used for the study. The instruments used for data collection was an observation checklist. The reliability coefficients of the instrument were determined using Cronbach's Alpha and found to be 0.89 and 0.91. The study employed the use of mean to answer the research questions and z-test to test the null hypotheses. Findings from the study revealed that tools and equipment for teaching as contained in metalwork curriculum in technical colleges in Abuja were not adequately provided. The study recommended among others that, Government should improve in the provision of tools and equipment for teaching as contained in metalwork technology curriculum in technical colleges in Abuja

Keywords: Technical Colleges, Metalwork, Curriculum & Evaluation

Introduction

Technical colleges are the institutions where students are trained to acquire relevant knowledge and skills in different occupations for employment in the world of work as craftsmen and master craftsmen. The goals of technical colleges are to provide trained manpower in the applied sciences, technology and business particularly at craft, advanced craft and technician levels; provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development; and give training and impart the necessary skill to individual who shall be self-reliant economically (Federal Republic of Nigeria, 2013). According to Umunadi (2019) technical colleges are principal vocational institutions in Nigeria which are designed to prepare the individuals to acquire practical skills, knowledge, and attitude at sub-professional level, primarily established to train craftsmen in various occupations. The occupational trades offered in technical colleges include the following programmes; block laying, bricklaying and concreting; carpentry and joinery; electrical installation and maintenance works; motor vehicle mechanic works; and metalwork technology.

Metalwork technology is a skill-based trade programme offered in technical colleges in Nigeria. It is designed to equip the trainees with knowledge, attitude and skills to carry out sheet metal work, gas welding, arc welding and cutting jobs on all types of metals and produce simple finished structural steel work projects (National Board for Technical Education NBTE, 2001). The major

oal of the programme in the technical colleges is to produce competent craftsmen and master raftsmen for industrial and technological development in Nigeria. The production of competent raftsmen requires the provision of adequate facilities for teaching and learning. Kilishi *et al.* 2014) stated that, due to the cost intensity of the facilities required for effective realization of the oals of metalwork technology, both the Federal and States governments are not meeting up with he provision of tools and equipment for effective running of the programme at technical colleges s contained in the curriculum.

Curriculum is the set of courses, their contents and facilities required for achieving the objectives of the course. According to Ololube (2006) curriculum is prescriptive and is based on a more general syllabus, which merely specify what topics must be understood, what facilities are required, and to what level to achieve a particular grade or standard. That is, a curriculum may be referred to as all courses offered at a school. The importance of curriculum in school system cannot be over emphasized. According to Elom (2009) the goal of numerous educational courses including metalwork technology are not achieved due to non-provision of tools and equipment as contained in the curriculum. Agwubike and Ogbouma (2010) noted that, for effective realization of metalwork technology goals at technical college, there must be adequate provision of the curriculum contents such as tools and equipment.

Tools and equipment could be seen as facilities required for the achievement of certain practical goal. According to Puyate (2002) the present state of tools such as tongs, hacksaw and blades, anvil, swage block, chipping hammers, sledge hammer, G-clamps assorted and equipment such as power guillotine of capacity 10swg x 36 in length, swing beam folder 10swg x 3'-6' capacity, bending roller capacity 40"x2" diameter, power-operated drilling machine maximum capacity 3/8" in technical colleges in Nigeria is very poor. Astsumbe (2002) also observed that, due to tools and equipment in technical colleges, normal workshop practice which forms 60 percent in technical colleges curriculum is fast disappearing which threatens the chances of achieving the goals of metalwork technology. Hence, there is need to evaluate the curriculum for metalwork technology trade in technical colleges ascertains the extent to which the curriculum contents are provided for effective teaching.

The major goal of the metalwork technology in the technical colleges is to produce competent craftsmen and master craftsmen for industrial and technological development in Nigeria. Unfortunately, the stated goals seem not achievable considering the documented lack of requisite skills among technical college students, including metalwork technology students. The skill shortage recorded signaled unemployment for welding and fabrication students after graduation. In attempt to address the lack of requisite skills for gainful employment among technical college students, Chukwumezie (2020) attributed the challenge to the non-provision of facilities such as textbooks, tools and equipment as mentioned in the curriculum. Despite the importance of these facilities to support the acquisition of skills among students, there is lack of empirical data to provide the extent to which they are provided as contained in the curriculum. Hence, this study sought to evaluate the curriculum for metalwork technology trade in technical colleges in Abuja to ascertain the extent to which the curriculum contents are provided for effective teaching.

Aim and Objectives of the Study

The aim of the study was to evaluate the implementation of metalwork curriculum in technical colleges in Abuja. Specifically, the study sought to achieve the following objective:

1. To determine the extent to which tools and equipment's are available for the teaching has contain in metal work curriculum in technical colleges in Abuja.
2. To determine the extent of utilization of the tools and equipment in the teaching process has contain in metal work curriculum in technical colleges in Abuja.

Research Questions

The following questions guided the study:

1. To what extent are tools and equipment being available for teaching has contained in metalwork curriculum in technical colleges Abuja?
2. To what extend are the utilization of the tools and equipment in the teaching process has contained in metal work curriculum in technical colleges in Abuja?

Hypothesis

The following null hypothesis was formulated to guide the study:

HO1: There is no significant different between the responses of metalwork teachers and workshop attendants as regards the extent to which tool and equipment are utilized for the teaching has contained in metal work curriculum in technical colleges Abuja.

Methodology

The study adopted survey research design, specifically, using cross-sectional study. The cross-sectional design allow researcher to collect information from group of respondents at the same time. The study was conducted in Abuja, Nigeria. The population for the study was 15 that consisted of 12 metalwork teachers and three workshop attendants from the three technical colleges in Abuja. The study did not employ any sampling technique used simply because of the relatively small size of the population. The instrument for data collection was an observation checklist. The instrument was designed on four-point scale of Utilized, Moderately Utilized, Slightly Utilized and Not Utilized, with numerical values of 4, 3, 2 and 1 respectively. The instrument consisted of three parts, A, B and C. The Part A sought personal information of the respondents, Part B was designed to collect data on the extent to which tools and equipment for teaching are being available, and Part C was used to find out the extent to which tools and equipment for teaching are being utilized. The instrument was subjected to both face and content validation by three technical education experts from Federal University of Technology, Minna, Nigeria. The reliability coefficients of the instrument were determined using Cronbach's Alpha and found to be 0.89 and 0.91 for Part C and the overall reliability coefficients of the instrument was found to be 0.90. Data collection was achieved through hand delivery. Data collected were analyzed using mean to answer the research questions and t-test to test the null hypotheses at 0.05 level of significance.

Results:

Research Question One

1.What are the tools and equipment available for teaching has contained in metal work curriculum in technical colleges Abuja?

Table 1: Percentage responses of respondents on the extent to which tools and equipment's for teaching are being available has contained in metalwork curriculum in technical colleges Abuja

S/N	Tools	NBTE MIN.	Quantity Average	Percentage %	Remark
	Left- and right-hand snips	5 each	2	40	Not Available
1	Straight snips	5	2	40	Not Available
2	"kit" of tools consisting	2	2	100	Available
3	of hammer, mallet, steel rule, scriber and wing compass, etc				
4	Straight edge	10	4	40	Not Available
5	Trammels dividers (set)	10	4	40	Not Available
6	Hammers	10	3	30	Not Available
7	Chisels	10	3	30	Not Available
8	Punches	10	3	30	Not Available
9	Try-squares	10	4	40	Not Available
10	Steel rules	10	4	40	Not Available
11	Smith open forge	1	0	0	Not Available
12	Vee blocks	10	3	30	Not Available
13	Electrode holders and clamps	10	4	40	Not Available
14	Electrode drying oven	1	0	0	Not Available
15	Wire brushes	10	4	40	Not Available
16	Pliers – assorted	5	3	30	Available
17	Tongs	5	3	60	Available
18	Hacksaw and blades	24	10	41.7	Not Available
19	Anvil	2	2	100	Available
20	Swage block	2	2	100	Available
21	Chipping hammers	20	9	45	Not Available
22	Sledge Hammer	2	2	100	Available
23	G. Clamps – assorted	10	4	40	Not Available
24	Self-grip pliers – assorted	6	2	33.3	Not Available
25	Magnetic clamp	3	1	33.3	Not Available
26	Flatters	2	0	0	Not Available
27	Mole grip	2	0	0	Not Available
	Equipment				
28	Power guillotine of capacity 10swg x 36 in length	1	0	0	Not Available
29	Swing beam folder 10swg x 3'-6' capacity	1	0	0	Not available

30	Bending roller capacity 40"x2" diameter	1	0	0	Not available
31	Bench mounted cone roller	2	0	0	Not available
32	Power bench grinding machine	2	0	0	Not available
33	Double-ended buffer and polisher	1	0	0	Not available
34	Universal beading and swaging machine	1	0	0	Not available
35	Power-operated drilling machine maximum capacity 3/8"	1	0	0	Available
36	Fly Press	1	1	100	Available
37	Hand nibbling Machine	2	0	0	Not Available
38	Power saw cutting machine 10mm	1	0	0	Not Available
39	Disc cutting machine	1	0	0	Not Available
40	Profile cutting machine with gas cutting nozzles	2	0	0	Not Available
41	Pillar drilling machine	2	2	100	Available
42	Straightening machine-	2	0	0	Not Available
43	Cropping machine	2	0	0	Not Available
44	Heavy duty grinding machine	1	0	0	Not Available
45	Bench-type grinding machine	2	0	0	Not Available
46	CO2 cylinders	5	2	40	Not Available
47	Transformers With rectifiers (with all Instruments)	10	3	30	Not Available
48	Electrical beaters	1	0	0	Not Available
49	Oxygen regulators	5	2	40	Not Available
50	Acetylene regulators	5	1	20	Not Available
51	Hoses and clips and all attachments set	5	2	40	Not Available
52	Blowpipes (low and high pressure	5	2	40	Not Available
53	Power operated profile cutter with turntable	2	0	0	Not Available
54	D.C generators with all connections	10	4	40	Not Available
55	A.C transformer (Argon) with all the connections	5	2	40	Not Available
56	Argon cylinders	5	1	20	Not Available

57	Regulators with flow meters	3	1	33.3	Not Available
58	Water to carbide generators	4	1	25	Not Available
59	Carbide to water generators	4	1	25	Not Available
60	Overhead projector	1	0	0	Not Available
61	Computer set	1	0	0	Not Available
62	Oxy-acetylene welding blow pipe (High pressure & low pressure)	5	2	40	Not Available
63	Gas cutting torch	2	2	100	Available
64	Set of welding and cutting nozzles	2	2	100	Available

This implies that: AV/QR × 100

Table 1 revealed that 11 out of the 64 items on the extent to which tools and equipment's are available for teaching had percentage value above 40. This indicated that, the check list are of the opinion that only the 11 items were tools and equipment's are available has contained in metalwork curriculum in technical colleges in Abuja.

Research Question Two

To what extent are the utilization of tools and equipment's for teaching has contained in metalwork curriculum in technical colleges in Abuja?

Table 2: Mean responses of respondents on the extent to which tools and equipment for teaching are being utilized has contained in metalwork curriculum in technical colleges in Abuja

S/N	Tools	$\bar{X}_1$	$\bar{X}_2$	$\bar{X}_t$	Remark
1	Left- and right-hand snips	1.61	1.88	1.65	Not utilized
2	Straight snips	1.16	1.16	1.16	Not utilized
3	"kit" of tools consisting of hammer, mallet, steel rule, scriber and wing compass, etc	3.65	3.51	3.63	Utilized
4	Straight edge	1.36	1.11	1.33	Not utilized
5	Trammels dividers (set)	1.28	1.18	1.27	Not utilized
6	Hammers	1.74	1.46	1.70	Not utilized
7	Chisels	1.62	1.33	1.58	Not utilized
8	Punches	1.28	1.03	1.25	Not utilized
9	Try-squares	1.77	1.21	1.70	Not utilized
10	Steel rules	1.89	1.68	1.80	Not utilized
11	Smith open forge	1.04	1.10	1.05	Not utilized
12	Vee blocks	1.85	1.45	1.80	Not utilized
13	Electrode holders and clamps	1.54	1.14	1.49	Not utilized
14	Electrode drying oven	1.68	1.77	1.69	Not utilized

15	Wire brushes	1.85	1.91	1.86	Not utilized
16	Pliers – assorted	3.59	3.58	3.59	Utilized
17	Tongs	3.51	3.76	3.54	Utilized
18	Hacksaw and blades	1.91	1.56	1.86	Not utilized
19	Anvil	3.61	3.51	3.60	Utilized
20	Swage block	3.67	3.71	3.68	Utilized
21	Chipping hammers	1.18	1.17	1.18	Not utilized
22	Sledge Hammer	3.61	3.68	3.62	Utilized
23	G. Clamps – assorted	1.11	1.31	1.23	Not utilized
24	Self-grip pliers – assorted	1.85	1.78	1.84	Not utilized
25	Magnetic clamp	1.00	1.11	1.01	Not utilized
26	Flatters	1.85	1.81	1.84	Not utilized
27	Mole grip	1.92	1.54	1.87	Not utilized
	Equipment				
28	Power guillotine of capacity 10swg x 36 in length	1.11	1.01	1.08	Not utilized
29	Swing beam folder 10swg x 3'-6' capacity	1.77	1.13	1.69	Not utilized
30	Bending roller capacity 40"x2" diameter	1.61	1.11	1.54	Not utilized
31	Bench mounted cone roller	1.18	1.61	1.23	Not utilized
32	Power bench grinding machine	1.60	1.53	1.59	Not utilized
33	Double-ended buffer and polisher	1.18	1.17	1.18	Not utilized
34	Universal beading and swaging machine	1.61	1.68	1.62	Not utilized
35	Power-operated drilling machine maximum capacity 3/8"	3.74	3.51	3.63	Utilized
36	Fly Press	3.85	3.78	1.84	Utilized
37	Hand nibbling Machine	1.00	1.11	1.01	Not utilized
38	Power saw cutting machine 10mm	1.85	1.81	1.84	Not utilized
39	Disc cutting machine	1.92	1.54	1.87	Not utilized
40	Profile cutting machine with gas cutting nozzles	1.69	1.69	1.69	Not utilized
41	Pillar drilling machine	3.44	3.61	3.51	Utilized
42	Straightening machine	1.51	1.61	1.52	Not utilized
43	Cropping machine	1.04	1.10	1.05	Not utilized
44	Heavy duty grinding machine	1.85	1.45	1.80	Not utilized
45	Bench-type grinding machine	1.54	1.14	1.49	Not utilized
46	CO2 cylinders	1.68	1.77	1.69	Not utilized
47	Transformers With rectifiers (with all Instruments)	1.85	1.91	1.86	Not utilized
48	Electrical beaters	1.11	1.11	1.11	Not utilized
49	Oxygen regulators	1.66	1.79	1.68	Not utilized
50	Acetylene regulators	1.91	1.56	1.86	Not utilized
51	Hoses and clips and all attachments set	1.61	1.51	1.60	Not utilized

52	Blowpipes (low and high pressure	1.67	1.71	1.68	Not utilized
53	Power operated profile cutter with turntable	1.61	1.88	1.65	Not utilized
54	D.C generators with all connections	1.16	1.16	1.16	Not utilized
55	A.C transformer (Argon) with all the connections	1.65	1.51	1.63	Not utilized
56	Argon cylinders	1.36	1.11	1.33	Not utilized
57	Regulators with flow meters	1.28	1.18	1.27	Not utilized
58	Water to carbide generators	1.74	1.46	1.70	Not utilized
59	Carbide to water generators	1.62	1.33	1.59	Not utilized
60	Overhead projector	1.28	1.03	1.25	Not utilized
61	Computer set	1.77	1.21	1.70	Not utilized
62	Oxy-acetylene welding blow pipe (High pressure & low pressure)	1.89	1.68	1.80	Not utilized
63	Gas cutting torch	3.56	3.62	3.57	Utilized
64	Set of welding and cutting nozzles	3.41	3.69	3.55	Utilized
	Grand Mean	**2.36**	**2.34**	**2.35**	**Not utilized**

Table 2 revealed that 11 out of the 64 items on the extent to which tools and equipment for teaching are being utilized had average mean value above 3.49. This indicated that, the respondents are of the opinion that only the 11 items were the tools and equipment utilized has contained in metalwork curriculum in technical colleges in Abuja.

Hypothesis

There is no significant difference between the mean responses of metalwork teachers and workshop attendants on the extent to which tools and equipment for teaching are being utilized as contained in metalwork curriculum in technical colleges in Abuja

Table 3: T-test analysis for the test of significant difference between the mean responses of metalwork teachers and workshop attendants on the extent of utilization of the tools and equipment for teaching process as contained in metalwork curriculum in technical colleges in Abuja

Respondents	N	Mean	SD	df	t-value	p-value	Remark	Decision
Teachers	12	2.44	0.68	13	0.677	0.505*	No Significant	Accepted
Workshop Attendants	3	2.36	0.55					

The p-value of t-test for equality of means with variance not assumed presented on Table 3 was 0.505 which is larger than the stated level of significance (0.05). This connoted that, there was no statistical significant difference between the mean responses of metalwork teachers and workshop attendants on the extent to which tools and equipment for teaching are utilized as contained in metalwork curriculum in technical colleges in Abuja. Consequently, the null hypothesis was upheld.

Findings .

1. Tools for teaching as contained in metalwork curriculum in technical colleges in Abuja were not adequately provided
2. Equipment for teaching as contained in metalwork curriculum in technical colleges in Abuja were not adequately provided
3. There was no significant difference between the mean responses of metalwork teachers and workshop attendants on the extent to which equipment for teaching are adequately being provided as contained in metalwork curriculum in technical colleges in Abuja.

Discussion of Findings

Findings on the extent to which tools for teaching are being adequately provided has contained in metalwork curriculum in technical colleges in Abuja revealed not adequately provided. The findings concord with the view of Onyejemezi (2001) who stated that, many schools in Nigeria experiences inadequacy of tools for practical activities. The finding of this study is further supported by the work of Yaduma and Moses (2005) who found that, workshop tool in vocational centres and technical colleges in Bauchi State were low in supply. This implied that, effective implementation of learning contents in the curriculum for metalwork technology cannot be guaranteed.

Findings on the extent to which equipment for teaching are being adequately provided as contained in metalwork curriculum in technical colleges in Abuja revealed not adequately provided. The finding is in-line with the finding of Jacob (2012) who revealed that equipment for teaching are grossly inadequate for teaching and learning of automobile technology in tertiary institutions in South-South, Nigeria. Ajayi (2011), lamented about the inadequate equipment allocation to the education sector particularly when compared with other sectors of the economy as very inadequate and result to the low educational outcomes. The implication of this finding is that, the goals of metalwork technology of equipping students with skills cannot be achieved due to the manifested lack of adequate equipment as stipulated in the curriculum.

Nevertheless, the test for difference between the mean responses of metalwork teachers and workshop attendants on the extent to which equipment for teaching are being adequately provided as contained in metalwork curriculum in technical colleges in Abuja revealed not statistically significant. This indicated that, metalwork teachers and workshop attendants are unanimous in their views on the extent to which equipment for teaching are being adequately provided as contained in metalwork curriculum in technical colleges in Abuja. The finding is related to the findings of Jacob (2012) who discovered that, there was no significant difference between the opinions of teachers and students on the adequacy of automobile technology instructional facilities in tertiary institutions in South-South, Nigeria.

Conclusions

The study provided insights on the extent to which tools and equipment for teaching are being available has contained in metalwork curriculum in technical colleges in Abuja. Findings that emerged from this study revealed that, tools and equipment for teaching are not being available has contained in metalwork curriculum in technical colleges in Abuja. This implied that, with inadequate a tools and equipment for teaching in the technical colleges, effective teaching and learning and acquisition of practical skills needed by metalwork technology students for

oductive work cannot be achieved. Therefore, tools and equipment for teaching are being equately provided as contained in metalwork curriculum in technical colleges in Abuja should made available in order to enhance development of practical skills for gainful employment ong metalwork technology students.

commendations

sed on the findings of this study, the following recommendations were made:

1. The Federal and State Governments should improve in the provision of tools and equipment for teaching has contained in metalwork technology curriculum in technical colleges in Abuja.
2. Industries sited in communities where technical colleges are located should support in the provision of tools and equipment for teaching metalwork technology curriculum in technical colleges in Abuja.

ferences

gwubike, E. O. & Ogbouma, S. (2010). Adequacy and functionality of fitness equipment and facilities in selected fitness centres in Edo and Delta states of Nigeria. *Ozean Journal of Applied Science* 3(3), 5-6.

yi, A. O. (2011). *Resource Utilization: The mandate of education Managers.* Ibadan: Wemilore Press.

umbe, N. B. C. (2002). Mechanisms for improving man power production in vocational and technical education. *Akoka Journal of Education,* 1(2), 165-178.

ukwumezie, U. F. (2020) Evaluation of facilities of secretarial and business studies programme in institutions of higher learning in Imo State. *Business Education Journal* 3(4), 1 10.

om, E. N. (2009). Strategies for planning facilities for the metal workshop. *Ebongi technology and vocational Education Journal,* 1(2), 60-64.

deral Republic of Nigeria (2013). *National policy on education (6th ed)*. Lagos: NERDC Press.

cob, P. (2012). Assessment of the functionality and utilization assessment of instructional facilities in teaching and learning automobile technology in tertiary institutions in South-South, Nigeria. *Unpublished PhD thesis*, University of Nigeria Nsukka.

ilishi, A. A., Mobolaji1, H. I., Usman, A., Yakubu, A. T., & Yaru, M. A. (2014). The effect of unemployment on crime in Nigeria: A panel data analysis. *British Journal of Economics, Management & Trade, 4*(6), 880-895.

ational Board for Technical Education (2001). *National Technical Certificate and Advanced National Technical certificate curriculum and Frameworks specifications for welding and fabrication.* Lagos: NERDC Press.

Ololube, M. P. (2006). *Teachers' Instructional Material Utilization Competencies in Second Schools in Sub-Saharan Africa: Professional and Non-professional Teachers Perspecti* In Conference Proceeding of 6th Internal Education Technology Conference, Kadu NBTE.

Onyejemezi, D. A. (2001). *Quantity, quality, production and distribution of teach resources/facilities*. Abuja: ETF Publication.

Puyate, S. T. (2002). Survey of vocational education facilities in government technical colleges Rivers State. *Journal of Nigerian Association of Teachers of Technology (JONATT),* (1),175-181.

Unwunadi, E. K. (2006). Effect of teacher constructed circuits on students' performance in be electronics and Electronics. *Unpublished Ph. D Thesis*. Department of Vocational Teac Education, University of Nigeria, Nsukka.

Yaduma, P.S. & Moses, D. (2005). A survey of some laboratory facilities in some select vocational training centres and technical colleges in Bauchi State. *Journal of Issues Technical Teacher Education,* 2(4), 80-90.