Availability and Adequacy of Workshop Facilities for Skill Acquisition among Undergraduates in Technology Vocational Education in Universities in South East Nigeria

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Abstract- Technology education is competency- based and requires properly equipped workshops for the application of modern tools in instructional delivery. This study evaluated the availability and adequacy of workshop facilities for skill acquisition among undergraduates in technology vocational education in universities in south east Nigeria.The design of the study was ex-post facto and was carried out in the South-East geopolitical zone of Nigeria. The population comprised 55 lecturers and eight technologists purposively sampled from four universities in South East Nigeria namely, Ebonyi State University, Enugu State University, University of Nigeria, Nsukka and Nnamdi Azikiwe University, Awka. Checklists were used. The research instrument was validated by experts and its reliability established. The checklist was taken to the respective universities and used to match the availability of the various workshop facilities in line with the NUC minimum standard to determine their adequacy in each case. The findings of the study revealed among others that a total of 159 workshop facilities were identified and studied in the three option areas of technology education namely; Mechanical /automechanics, applied electrical / electronic and building/woodwork technology education in the four universities. Out of the 159 items, 67 were found available in all the universities, representing an availability percentage of 42.1 but only nine items were adequately provided in the universities representing 5.66 percent adequacy. This revealed a state of gross inadequacy in the workshop facilities available for instruction in technology education programme in universities of South-east Nigeria It was recommended among others that technology education departments in universities should collaborate and partner with firms and other non-governmental organizations in the provision of workshop facilities to ensure adequate provision and quality instruction to the students.

Index Terms- Availability, adequacy, workshop facilities, skill acquisition, undergraduates, and Technology Vocational Education(TVE).

I. INTRODUCTION

Technology Vocational Education (TVE) is a comprehensive term that refers to the various aspects of education in addition to general education that study technologies and related sciences, the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life (UNESCO & ILO, 2002). TVE aims at preparing individuals for productivity and development of the nation. Specifically, it provides trained manpower in technology, advanced craft, and technical levels; provision of vocational skills for agricultural and economic development and a targeted form of skill acquisition for the youths (Federal Republic of Nigeria, 2013).TVE programmes include technology education, business education, agriculture, fine art and home economics education.

Technology has been described as a catalyst for achieving national development. Education in relation to technology helps in the preservation and transmission of necessary skills, competencies and attitudes required for the achievement of technological objectives of a nation. Technology education is provided at tertiary levels of education as in colleges of education and universities. In universities which is the highest level of education, Bachelor of Science Degree (B.Sc) are obtained by undergraduates on completion of their programme and Master of Science (M.Sc) and Doctor of Philosophy (Ph.D) to post graduate in technology education. BSc Technology education programme equips the undergraduates with skills, knowledge and attitudes that will enable them enter scientific, technical and commercial occupations and progress in it. It is expected that both theoretical and practical knowledge of the programme is provided to the undergraduate during trainings for acquisition of skills and competencies for self and paid employment.

Skills are abilities, capabilities, aptitude and expertise acquired through deliberate, systematic and sustained training necessary to adaptively perform job functions effectively. These skills are job specific, technical and generic skills that one needs to exhibit, to make him perform effectively in any job condition

and for transfer of knowledge in occupations. VTE as a practical course requires adequate workshop facilities to make its recipients equipped for better performance in the world of work. To acquire the necessary skills in technology education, practices is essential and this requires the provision of adequate workshop facilities. These facilities as Oyeniyi (2010) emphasized, must be provided and installed to the required standard, and maximally utilized for achievement of the programme objectives.

Workshop facilities are tools, equipment and machine used for practical works and inevitable in the teaching and learning of TVE subjects. Osahon (1998) noted that well equipped workshops are of paramount importance for effective operation of technology education programme. Students are exposed to different equipment, machines and tools, for acquisition of skills; ready for effective performance in industries where the facilities are used in production. Adesina (2005) noted that the learning one receives is directly related to overall atmosphere in which the learning takes place. The performance level of TVE graduates is a function of available instructional facilities to which students are exposed to during training. Availability of adequate workshop facilities creates a balance between theory and practical experience in universities for better performance of its graduates in self or paid employment.. Owoieye and Yara (2010) discovered that students in schools with equipped workshops have better academic performance in their final examinations.

The tools, equipment and machines used in technology education may vary based on the programme options, as in mechanical/auto mechanics, electrical/electronic technology, wood work and building technology. National University Commission, NUC (2008) in its Minimum Academic Standard, provided list of tools, machines and other equipment required in the various programme options. The workshop facilities include; hacksaw frame, cold chisel, steel rule (300m) scriber, venire calipers, hammers, try square, benches vices, forging hammers, blow lamps, soldering bits, anvil, flat nose pliers, furnaces for heat treatment, punches , ring spanners, socket spanner, ball pen and grease gums. Others are pliers, assorted file, Allen keys, twist drills, tread cutting taps and dies, rubber mallet, tire levers, wielding equipment, electric soldering irons, grinding machine and wheel balancing machine among others. The adequacy of these workshop facilities for technology education programme in the universities depends on the various institutional provisions in meeting the minimum standard of its controlling body. NUCMAS (2008) provided a standard upon which workshop facilities provided in each of the universities could be considered as adequate or inadequate.

Unfortunately, these workshop facilities seems to be lacking in most of the institutions or inadequate where available (OLawepo, 1999 & Basemat- Digbori, 2010). This has been attributed to so many factors such as low level in funding of university education in Nigeria, surge in the quest of university admission and subsequent high number of students admitted in each department, greater than the facilities available for instruction. This unsatisfactory state of affairs has resulted to high rate of unemployment among our graduates due to poor skill acquisition during training as undergraduates. Emeh, Nwanguma and Abaroh (2012) noted that the high rate of unemployment among university graduates is not only as a result of the unavailability of jobs, but also because of a dearth of candidates with employable skills that employers are looking for. Obi (2015) discovered that workshop facilities for the teaching of basic technology in post primary institutions in Anambra state are inadequate. Basemat-Digbor (2010) and Uwaifo (2011) noted that facilities provided in some universities in Nigeria for instruction are inadequate. Igbinoba (2000) also discovered that the equipment capacities of polytechnics and Colleges of education in Nigeria based on the Minimum Academic Presentations for the 21st century work environment was inadequate. The equipment status investigated by Igbinoba focused on quality, variety, efficient and acceptability relative to the demands of modern offices and workshops.

However no study has ever been made to the best of the researchers' knowledge, to ascertain the availability and adequacy of workshop facilities in BSc Technology Education programme in universities in South East Nigeria. This study was therefore conceived to fill this gap. The dire need to make an in depth evaluation in this area to provide direction for improvement of the programme also necessitated the study.

II. Methodology

The design of the study was ex-post facto. This study was carried out in the South-East geopolitical zone of Nigeria. The zone is made up of five states namely; Ebonyi, Enugu, Anambra, Abia and Imo State. The population comprised 55 lecturers and eight technologists purposively sampled fromfour universities in South East Nigeria namely, Ebonyi State University, Enugu State University University of Nigeria, Nsukka and Nnamdi Azikiwe University, Awka. Checklists were used. The research instrument was validated by experts and its reliability established. The checklist was taken to the respective universities and used to match the availability of the various workshop facilities in line with the NUC minimum standard to determine their adequacy in each case. NUC minimum standard for the facilities is indicated in the table showing results. Items completely provided are equated to 100 percent. Any item of 100 percent and above was regarded as adequate and inadequate if below 100 percent.

Research Question

How adequate are the workshop facilities available for instruction in B.sc Technology education programme in Universities of South East Nigeria?

Data collected on available workshop facilities were matched with the NUC minimum standard to determine their adequacy in the respective institutions. Summary of result are shown in Tables 1 –3.

Table 1: ***Adequacy of workshop facilities available for instruction in Mechanical/Auto mechanics course area of technology education in universities of South East Nigeria***

Mechanics	Tools, equipments, materials	Institution	NUC Minimum	Number Available	Percentage Availability (%)	Decision
1	Set of taps and wrench	UNN	10	3	30	Not Adequate
		UNIZIK	10	0	0	0
		ESUT	10	15	150	Adequate
		EBSU	10	4	40	Not Adequate
2	Hack saw frames	UNN	20	2	10	Not Adequate
		UNIZIK	20	16	80	Not Adequate
		ESUT	20	10	50	Not Adequate
		EBSU	20	20	100	Adequate
3	Cold chisels	UNN	15	1	7	Not Adequate
		UNIZIK	15	9	50	Not Adequate
		ESUT	15	10	67	Not Adequate
		EBSU	15	20	133	Adequate
4	Files assorted	UNN	20	3	15	Not Adequate
		UNIZIK	20	10	50	Not Adequate
		ESUT	20	20	100	Adequate
		EBSU	20	30	150	Adequate
5	Steel rife (300m)	UNN	20	3	15	Not Adequate
		UNIZIK	20	15	75	Not Adequate
		ESUT	20	14	70	Not Adequate
		EBSU	20	2	10	Not Adequate
6	Scriber	UNN	15	1	7	Not Adequate
		UNIZIK	15	13	87	Not Adequate
		ESUT	15	15	100	Adequate
		EBSU	15	10	67	Not Adequate
7	Set of disc & stock	UNN	10	1	10	Not Adequate
		UNIZIK	10	16	160	Adequate
		ESUT	10	13	130	Adequate
		EBSU	10	0	0	-
8	Vernier calipers	UNN	10	4	40	Not Adequate
		UNIZIK	10	4	40	Not Adequate
		ESUT	10	1	10	Not Adequate
		EBSU	10	8	80	Not Adequate
9	Micrometer assorted	UNN	20	4	20	Not Adequate
		UNIZIK	20	2	10	Not Adequate
		ESUT	20	1	5	Not Adequate
		EBSU	20	10	50	Not Adequate
10	Hammers	UNN	10	1	10	Not Adequate
		UNIZIK	10	7	70	Not Adequate
		ESUT	10	10	100	Adequate
		EBSU	10	15	150	Adequate
11	Metal Scrapers	UNN	13	6	46	Not Adequate
		UNIZIK	13	9	69	Not Adequate
		ESUT	13	12	92	Not Adequate
		EBSU	13	0	0	0
12	Try Square	UNN	11	0	0	0
		UNIZIK	11	8	73	Not Adequate
		ESUT	11	8	73	Not Adequate
		EBSU	11	10	91	“
		UNN	1	2	200	Adequate

13	Sanding Machine	UNIZIK	1	2	200	Adequate
		ESUT	1	3	300	Adequate
		EBSU	1	0	0	0
		UNN	1	1	100	Adequate
14	Grinding Machine (universal)	UNIZIK	1	-		Adequate
		ESUT	1	1	100	Adequate
		EBSU	1	3	300	Adequate
		UNN	1	1	100	Adequate
15	Power Hacksaw	UNIZIK	1	1	100	Adequate
		ESUT	1	1	100	Adequate
		EBSU	1	0	0	0
		UNN	18	10	56	Not Adequate
16	Benches Vices	UNIZIK	18	1	6	Not Adequate
		ESUT	18	25	139	Adequate
		EBSU	18	2	11	Not Adequate
		UNN	5	4	80	Not Adequate
17	Central Lattice	UNIZIK	5	0	0	0
		ESUT	5	3	60	Not Adequate
		EBSU	5	2	40	Not Adequate
		UNN	10	5	50	Not Adequate
18	Grinding Wheel	UNIZIK	10	4	40	Not Adequate
		ESUT	10	6	60	Not Adequate
		EBSU	10	0	0	0
		UNN	2	1	50	Not Adequate
19	Pillar Drilling Machine	UNIZIK	2	0	0	0
		ESUT	2	1	50	Not Adequate
		EBSU	2	4	200	Adequate
		UNN	10	7	70	Not Adequate
20	Milling Cutter Assorted	UNIZIK	10	8	80	Not Adequate
		ESUT	10	12	120	Adequate
		EBSU	10	0	0	0
		UNN	1	1	100	Adequate
21	Universal Milling Machine	UNIZIK	1	0	0	0
		ESUT	1	1	100	Adequate
		EBSU	1	1	100	Adequate
		UNN	2	0	0	0
22	Surface Plates	UNIZIK	2	1	50	Not Adequate
		ESUT	2	1	50	Not Adequate
		EBSU	2	3	150	Adequate
		UNN	10	0	0	0
23	Forging Hammers	UNIZIK	10	2	20	Not Adequate
		ESUT	10	10	100	Adequate
		EBSU	10	15	150	Adequate
		UNN	4	4	100	Adequate
24	Blow Lamps	UNIZIK	4	2	50	Not Adequate
		ESUT	4	3	75	Not Adequate
		EBSU	4	1	25	Not Adequate
		UNN	20	12	60	Not Adequate
25	Soldering Bits	UNIZIK	20	1	5	Not Adequate
		ESUT	20	20	100	Adequate
		EBSU	20	40	200	Adequate
		UNN	2	2	100	Adequate
26	Anvil	UNIZIK	2	1	50	Not Adequate
		ESUT	2	1	50	Not Adequate
		EBSU	2	3	150	Adequate
		UNN	1	1	100	Adequate
27	Blacksmith Hearth	UNIZIK	1	0	0	0
		ESUT	1	1	100	Adequate
		EBSU	1	1	100	Adequate

		UNN	15	15	67	Not Adequate
28	Flat Nose Fliers	UNIZIK	15	3	20	Not Adequate
		ESUT	15	4	27	Not Adequate
		EBSU	15	5	33	Not Adequate
		UNN	2	1	50	Not Adequate
29	Furnace For Heat Treat	UNIZIK	2	1	50	Not Adequate
		ESUT	2	2	100	Adequate
		EBSU	2	1	50	Not Adequate
		UNN	2	1	50	Not Adequate
30	Piper Cutter	UNIZIK	2	0	0	0
		ESUT	2	0	0	0
		EBSU	2	2	100	Adequate
		UNN	15	10	67	Not Adequate
31	Punches	UNIZIK	15	2	13	Not Adequate
		ESUT	15	10	67	Not Adequate
		EBSU	15	20	133	Adequate
		UNN	1	1	100	Adequate
32	Life Vehicle	UNIZIK	1	0	0	
		ESUT	1	1	100	Adequate
		EBSU	1	0	0	---
		UNN	1	1	100	Adequate
33	Dead Vehicle	UNIZIK	1	0	0	---
		ESUT	1	2	200	Adequate
		EBSU	1	0	0	---
		UNN	1	1	100	Adequate
34	Diesel Vehicle	UNIZIK	1	0	0	---
		ESUT	1	0	0	---
		EBSU	1	0	0	---
		UNN	1	1	100	Adequate
35	Petrol Engine	UNIZIK	1	1	100	Adequate
		ESUT	1	0	0	---
		EBSU	1	0	0	---
		UNN	1	1	100	Adequate
36	Chassis	UNIZIK	1	0	0	---
		ESUT	1	0	0	---
		EBSU	1	0	0	---
		UNN	10	9	90	Not Adequate
37	Spanners Open Ended	UNIZIK	10	5	50	Not Adequate
		ESUT	10	10	100	Adequate
		EBSU	10	0	0	---
		UNN	10	14	140	Adequate
38	Ring Spanners	UNIZIK	10	5	50	Not Adequate
		ESUT	10	8	80	Not Adequate
		EBSU	10	42	420	Adequate
		UNN	6	3	50	Not Adequate
39	Socket Spanner	UNIZIK	6	8	133	Adequate
		ESUT	6	11	183	Adequate
		EBSU	6	10	167	Adequate
		UNN	10	5	50	Not Adequate
40	Ball Pen hammer	UNIZIK	10	6	60	Not Adequate
		ESUT	10	10	100	Adequate
		EBSU	10	1	10	Not Adequate
		UNN	10	2	20	Not Adequate
41	Pullers Assorted	UNIZIK	10	4	40	Not Adequate
		ESUT	10	3	30	Not Adequate
		EBSU	10	0	0	---
		UNN	10	2	20	Not Adequate
42	Grease Guns	UNIZIK	10	4	40	Not Adequate
		ESUT	10	3	30	Not Adequate

		EBSU	10	5	50	Not Adequate
		UNN	10	7	70	Not Adequate
43	Screw Driver Assorted	UNIZIK	10	2	20	Not Adequate
		ESUT	10	9	90	Not Adequate
		EBSU	10	0	0	---
		UNN	20	12	60	Not Adequate
44	Pliers Assorted	UNIZIK	20	4	20	Not Adequate
		ESUT	20	16	80	Not Adequate
		EBSU	20	5	25	Not Adequate
		UNN	20	10	50	Not Adequate
45	Chisel Assorted	UNIZIK	20	7	35	Not Adequate
		ESUT	20	10	50	Not Adequate
		EBSU	20	10	50	Not Adequate
		UNN	15	8	53	Not Adequate
46	Files Assorted	UNIZIK	15	6	40	Not Adequate
		ESUT	15	20	134	Adequate
		EBSU	15	30	200	Adequate
		UNN	10	4	40	Not Adequate
47	Engineers Square	UNIZIK	10	2	20	Not Adequate
		ESUT	10	6	60	Not Adequate
		EBSU	10	0	0	---
		UNN	10	6	60	Not Adequate
48	Allen Keys	UNIZIK	10	9	90	Not Adequate
		ESUT	10	13	130	Adequate
		EBSU	10	2	20	Not Adequate
		UNN	10	4	40	Not Adequate
49	Twist Drills	UNIZIK	10	7	70	Not Adequate
		ESUT	10	11	110	Adequate
		EBSU	10	20	200	Adequate
		UNN	5	6	120	Adequate
50	Tread Cutting Taps and Dies	UNIZIK	5	2	40	Not Adequate
		ESUT	5	3	60	Not Adequate
		EBSU	5	14	280	Adequate
		UNN	5	5	100	Adequate
51	Rubber Mallets	UNIZIK	5	8	160	Adequate
		ESUT	5	10	200	Adequate
		EBSU	5	4	80	Not Adequate
		UNN	5	4	80	Not Adequate
52	Tyre Levers	UNIZIK	5	2	40	Not Adequate
		ESUT	5	4	80	Not Adequate
		EBSU	5	2	40	Not Adequate
		UNN	1	1	100	Adequate
53	Air Compressor	UNIZIK	1	1	100	Adequate
		ESUT	1	1	100	Adequate
		EBSU	1	2	200	Adequate
		UNN	1	1	100	Adequate
54	Battery Charger	UNIZIK	1	0	0	---
		ESUT	1	1	100	Adequate
		EBSU	1	1	100	Adequate
		UNN	1	1	100	Adequate
55	Welding Equipment	UNIZIK	1	4	400	Adequate
		ESUT	1	1	100	Adequate
		EBSU	1	1	100	Adequate
		UNN	10	11	110	Adequate
56	Electric Soldering Iron	UNIZIK	10	3	30	Not Adequate
		ESUT	10	6	60	Not Adequate
		EBSU	10	8	80	Not Adequate
		UNN	10	6	60	Not Adequate
57	Soldering Lead	UNIZIK	10	1	10	Not Adequate

		ESUT	10	8	80	Not Adequate
		EBSU	10	0	0	---
		UNN	1	1	100	Adequate
58	Grinding Machine	UNIZIK	1	1	100	Adequate
		ESUT	1	1	100	Adequate
		EBSU	1	3	300	Adequate
		UNN	1	1	100	Adequate
59	Wheel Balancing Machine	UNIZIK	1	1	100	Adequate
		ESUT	1	1	100	Adequate
		EBSU	1	1	100	Adequate
		UNN	1	1	100	Adequate
60	Wheel Alignment Machine	UNIZIK	1	0	0	---
		ESUT	1	0	0	---
		EBSU	1	0	0	---

Data contained in Table 4 shows that 60 workshop facility items were evaluated in mechanical/auto mechanics course area in four universities (f = 240). 31 items were available (f= 124) in all the universities studied. Using the NUC minimum standard/requirement for each of the workshop facility item presented, 85 cases out of the whole were above 100 percent available and were regarded as adequate; others were found to be below 100 percent and regarded as inadequate. Generally, the workshop facilities in 85 cases were adequate and inadequate in 107 cases. Hence, the workshop facilities available for instruction in mechanical/auto mechanics course area in universities of south east Nigeria is inadequate. The facilities found adequate in all the universities include; sanding machine, power hacksaw, universal milling machine, blacksmith hearth, air compressor, welding equipment, grinding machine and wheel balancing machine.

Table 2: ***Adequacy of workshop facilities available for instruction in applied electric/electronics course area of technology education in universities of south east Nigeria***

S/N	Tools, Equipment, Materials	Institution	NUC Minimum	Number Available	Percentage Availability (%)	Decision
		UNN	3	2	67	Not Adequate
61	Universal Pipe Banding	UNIZIK	3	0	0	---
		ESUT	3	2	67	Not Adequate
		EBSU	3	1	33	Not Adequate
		UNN	10	6	60	Not Adequate
62	Long Nose Pliers	UNIZIK	10	6	60	Not +Adequate
		ESUT	10	7	70	Not Adequate
		EBSU	10	8	80	Not Adequate
		UNN	6	4	67	Not Adequate
63	Blow Lamps	UNIZIK	6	5	83	Not Adequate
		ESUT	6	6	100	Adequate
		EBSU	6	3	50	Not Adequate
		UNN	15	0	0	---
64	Hammers Assorted Sizes	UNIZIK	15	14	93	Not Adequate
		ESUT	15	16	107	Adequate
		EBSU	15	10	67	Not Adequate
		UNN	3	0	0	---
65	Hand Drill	UNIZIK	3	2	67	Not Adequate
		ESUT	3	2	67	Not Adequate
		EBSU	3	2	67	Not Adequate
		UNN	10	25	250	Adequate
66	Cold Chisel Sets	UNIZIK	10	4	40	Not Adequate
		ESUT	10	4	40	Adequate
		EBSU	10	11	110	Adequate
		UNN	20	20	100	Adequate
67	Screw Driver	UNIZIK	20	40	200	Adequate
		ESUT	20	2	10	Not Adequate
		EBSU	20	25	125	Adequate
		UNN	15	0	0	---

68	Soldering Iron Assorted	UNIZIK	15	10	67	Not Adequate
		ESUT	15	16	107	Adequate
		EBSU	15	12	80	Not Adequate
		UNN	20	0	0	---
69	Files Assorted	UNIZIK	20	0	0	---
		ESUT	20	20	100	Adequate
		EBSU	20	15	75	Not Adequate
		UNN	5	0	0	---
70	Wire Gauze	UNIZIK	5	0	0	---
		ESUT	5	2	40	Not Adequate
		EBSU	5	3	60	Not Adequate
		UNN	20	0	0	
71	Cathode Ray Tube	UNIZIK	20	6	30	Not Adequate
		ESUT	20	5	25	Not Adequate
		EBSU	20	3	15	Not Adequate
		UNN	20	0	0	---
72	Measuring Tape	UNIZIK	20	5	25	Not Adequate
		ESUT	20	4	20	Not Adequate
		EBSU	20	18	90	Not Adequate
		UNN	20	0	0	---
73	Metal Rectifier	UNIZIK	20	14	70	Not Adequate
		ESUT	20	1	5	Not Adequate
		EBSU	20	14	70	Not Adequate
74		UNN	10	0	0	---
	Fixtures-Fluorescent	UNIZIK	10	0	0	---
		ESUT	10	0	0	---
		EBSU	10	5	50	Not Adequate
		UNN	20	0	0	---
75	Capacitors Assorted	UNIZIK	20	0	0	---
		ESUT	20	0	0	---
		EBSU	20	5	25	Not Adequate
		UNN	10	0	0	---
76	Bells Electric	UNIZIK	10	0	0	---
		ESUT	10	0	0	---
		EBSU	10	15	150	Adequate
		UNN	10	0	0	---
77	Hydrometer	UNIZIK	10	0	0	---
		ESUT	10	1	10	Not Adequate
		EBSU	10	0	0	---
		UNN	10	0	0	---
78	Magnetic Kit	UNIZIK	10	0	0	---
		ESUT	10	1	10	Not Adequate
		EBSU	10	0	0	---
		UNN	10	20	200	Adequate
79	Continuity Tester	UNIZIK	10	0	0	---
		ESUT	5	0	0	---
		EBSU	10	15	150	Adequate
		UNN	5	1	20	Not Adequate
80	Motor – Wound Motor Induction	UNIZIK	5	0	0	---
		ESUT	10	1	10	Not Adequate
		EBSU	5	0	0	---
81	Miniature Circuit breaker	UNN	10	0	0	
		UNIZIK	10	0	0	
		ESUT	10	1	10	Not Adequate
		EBSU	10	2	20	Not Adequate
82	Potentiometer	UNN	10	10	100	Adequate
		UNIZIK	10	0	0	
		ESUT	10	0	0	
		EBSU	10	0	0	

83	Motor generator unit 220V	UNN	10	0	0	
		UNIZIK	10	0	0	
		ESUT	10	1	10	Not Adequate
		EBSU	10	0	0	
84	Power Supply	UNN	5	0	0	Not Adequate
		UNIZIK	5	1	20	Not Adequate
		ESUT	5	1	20	Not Adequate
		EBSU	5	1	20	Not Adequate
85	AC and DC Motor	UNN	15			
		UNIZIK	15	0	0	
		ESUT	15	4	27	Not Adequate
		EBSU	15	0	0	
	Oscilloscope (Kit/form)	UNN	4	5	125	Adequate
86		UNIZIK	4	2	50	Not Adequate
		ESUT	4	5	125	Adequate
		EBSU	4	2	50	Not Adequate
	Vacuum tube voltmeter	UNN	10	0	0	
87		UNIZIK	10	0	0	
		ESUT	10	4	40	Not Adequate
		EBSU	10	0	0	
	Voltmeter DC0-25-25-220V	UNN	10	20	200	Adequate
88		UNIZIK	10	2	20	Not Adequate
		ESUT	10	1	10	Not Adequate
		EBSU	10	15	150	Adequate
	Experimental Cell	UNN	1	0	0	
89		UNIZIK	1	0	0	
		ESUT	1	4	400	Adequate
		EBSU	1	0	0	
	Switches assorted	UNN	15	0	0	
90		UNIZIK	15	80	533	Adequate
		ESUT	15	16	107	Adequate
		EBSU	15	0	0	
91	Relays	UNN	10			
		UNIZIK	10	16	160	Adequate
		ESUT	10	10	100	Adequate
		EBSU	10	0	0	
92	Volt-ohm meter, 240 – 500V	UNN	10	20	200	Adequate
		UNIZIK	10	1	10	Not Adequate
		ESUT	10	5	50	Not Adequate
		EBSU	10	15	150	Adequate
93	Cathode ray oscilloscope	UNN	4	5	125	Adequate
		UNIZIK	4	2	50	Not Adequate
		ESUT	4	5	125	Adequate
		EBSU	4	2	50	Not Adequate
94	Ammeter DC, 054 scale	UNN	10	20	200	Adequate
		UNIZIK	10	10	100	Adequate
		ESUT	10	10	100	Adequate
		EBSU	10	15	150	Adequate
95	Bench radio	UNN	4	4	100	Adequate
		UNIZIK	4	0	0	
		ESUT	4	2	50	Not Adequate
		EBSU	4	1	25	Not Adequate
96	Watt-hour meter (NEPA) meter	UNN	10	0	0	
		UNIZIK	10	0	0	
		ESUT	10	10	100	Adequate
		EBSU	10	0	0	
97	Work benches	UNN	15	4	27	Not Adequate
		UNIZIK	15	4	27	Not Adequate

		ESUT	15	4	27	Not Adequate
		EBSU	15	6	40	Not Adequate
98	Galvanometer	UNN	10	5	50	Not Adequate
		UNIZIK	10	2	20	Not Adequate
		ESUT	10	9	90	Not Adequate
		EBSU	10	1	10	Not Adequate
99	Frequency modular	UNN	2	5	250	Adequate
		UNIZIK	2	0	0	
		ESUT	2	3	150	Adequate
		EBSU	2	1	50	Not Adequate
100	Cathode ray tubes	UNN	5	0	0	
		UNIZIK	5	1	20	Not Adequate
		ESUT	5	4	80	Not Adequate
		EBSU	5	7	140	Adequate

Data contained in Table 5 shows that 40 workshop facilities were evaluated in applied electric/electronics technology in the four universities (f = 160). Out of the 160 cases, 106 cases were available in the various universities. Using the NUC minimum requirement, out of the frequency of 106 available cases, 32 were above 100 percent availability and were regarded as adequate. Others were found to be below 100 percent and were regarded as inadequate. Generally, the workshop facilities in 32 cases were adequate and inadequate in 74 cases. None of the workshop facilities were found in an adequate number for all the universities. The workshop facilities available for applied electricity and electronics course area in technology education in universities of south east Nigeria is therefore inadequate.

Table 3: ***Adequacy of workshop facilities available for instruction in building/wood work technology course area in universities of south east Nigeria.***

S/N	Tools, Equipment, Materials	Institution	NUC Minimum	Number Available	Percentage Availability (%)	Decision
101	Portable tools (assort)	UNN	50	41	82	Not Adequate
		UNIZIK	50	42	84	Not Adequate
		ESUT	50	0	0	----
		EBSU	50	22	44	Not Adequate
102	Pipes wrenches (assort)	UNN	5	3	60	Not Adequate
		UNIZIK	5	4	80	Not Adequate
		ESUT	5	0	0	----
		EBSU	5	3	60	Not Adequate
103	Port compressor & ACC ind (Big)	UNN	2	1	50	Not Adequate
		UNIZIK	2	2	100	Adequate
		ESUT	2	1	50	Not Adequate
		EBSU	2	1	50	Not Adequate
104	Portable Concrete Mixer	UNN	2	1	50	Not Adequate
		UNIZIK	2	0	0	----
		ESUT	2	1	50	Not Adequate
		EBSU	2	2	100	Adequate
105	Portable Pipe thread	UNN	2	2	100	Adequate
		UNIZIK	2	0	0	----
		ESUT	2	1	50	Not Adequate
		EBSU	2	1	50	Not Adequate
106	Hacksaws	UNN	15	1	7	Not Adequate
		UNIZIK	15	2	13	Not Adequate
		ESUT	15	10	67	Not Adequate
		EBSU	15	12	80	Not Adequate
107	Block making machine	UNN	2	1	50	Not Adequate
		UNIZIK	2	0	0	----
		ESUT	2	2	100	Adequate
		EBSU	2	2	100	Adequate
108	Spades	UNN	10	7	70	Not Adequate

		UNIZIK	10	2	20	Not Adequate
		ESUT	10	8	80	Not Adequate
		EBSU	10	4	40	Not Adequate
109	Chisels	UNN	10	5	50	Not Adequate
		UNIZIK	10	10	100	Adequate
		ESUT	10	10	100	Adequate
		EBSU	10	30	300	Adequate
110	Trowels (assorted)	UNN	20	5	25	Not Adequate
		UNIZIK	20	4	20	Not Adequate
		ESUT	20	10	50	Not Adequate
		EBSU	20	10	50	Not Adequate
111	Tape measure (2.6m)	UNN	15	6	40	Not Adequate
		UNIZIK	15	12	80	Not Adequate
		ESUT	15	10	67	Not Adequate
		EBSU	15	10	67	Not Adequate
112	Head Pan	UNN	10	5	50	Not Adequate
		UNIZIK	10	2	20	Not Adequate
		ESUT	10	4	40	Not Adequate
		EBSU	10	5	50	Not Adequate
113	Spirit Levels	UNN	15	2	13	Not Adequate
		UNIZIK	15	2	13	Not Adequate
		ESUT	15	5	33	Not Adequate
		EBSU	15	20	133	Adequate
114	Iron Square	UNN	15	0	0	----
		UNIZIK	15	0	0	----
		ESUT	15	5	33	Not Adequate
		EBSU	15	4	27	Not Adequate
115	Shovels	UNN	10	6	60	Not Adequate
		UNIZIK	10	5	50	Not Adequate
		ESUT	10	8	80	Not Adequate
		EBSU	10	4	40	Not Adequate
116	Jacket Planes	UNN	15	1	7	Not Adequate
		UNIZIK	15	15	100	Adequate
		ESUT	15	10	67	Not Adequate
		EBSU	15	10	67	Not Adequate
117	Smoothing Planes	UNN	15	1	7	Not Adequate
		UNIZIK	15	5	33	Not Adequate
		ESUT	15	10	67	Not Adequate
		EBSU	15	10	67	Not Adequate
118	Rebate Planes	UNN	15	0	0	----
		UNIZIK	15	1	7	Not Adequate
		ESUT	15	10	67	Not Adequate
		EBSU	15	5	33	Not Adequate
119	Grooving/Plough planes	UNN	3	0	0	----
		UNIZIK	3	1	33	Not Adequate
		ESUT	3	10	333	Adequate
		EBSU	3	0	0	----
120	Compass planes	UNN	3	0	0	----
		UNIZIK	3	10	333	Adequate
		ESUT	3	0	0	----
		EBSU	3	0	0	----
121	Rip Saw	UNN	15	3	20	Not Adequate
		UNIZIK	15	10	67	Not Adequate
		ESUT	15	6	40	Not Adequate
		EBSU	15	5	33	Not Adequate
122	Crosscut handsaw	UNN	15	2	13	Not Adequate
		UNIZIK	15	5	33	Not Adequate
		ESUT	15	6	40	Not Adequate
		EBSU	15	5	33	Not Adequate

123	Tennon Saw	UNN	15	0	0	---
		UNIZIK	15	5	33	Not Adequate
		ESUT	15	13	87	Not Adequate
		EBSU	15	5	33	Not Adequate
124	Coping Saw	UNN	15	0	0	---
		UNIZIK	15	2	13	Not Adequate
		ESUT	15	8	53	Not Adequate
		EBSU	15	5	33	Not Adequate
125	Compass Saw	UNN	10	0	0	---
		UNIZIK	10	0	0	---
		ESUT	10	2	20	Not Adequate
		EBSU	10	5	50	Not Adequate
126	Keyhole Saw	UNN	10	0	0	---
		UNIZIK	10	0	0	---
		ESUT	10	2	20	Not Adequate
		EBSU	10	0	0	---
127	Fiet Saw	UNN	10	0	0	---
		UNIZIK	10	0	0	---
		ESUT	10	4	40	Not Adequate
		EBSU	10	0	0	---
128	Panel Saw	UNN	10	0	0	---
		UNIZIK	10	5	50	Not Adequate
		ESUT	10	10	100	Adequate
		EBSU	10	5	50	Not Adequate
129	Firmed Chisel	UNN	20	0	0	---
		UNIZIK	20	0	0	---
		ESUT	20	12	60	Not Adequate
		EBSU	20	0	0	---
130	Mortise Chisel	UNN	10	0	0	---
		UNIZIK	10	5	50	Not Adequate
		ESUT	10	6	60	Not Adequate
		EBSU	10	0	0	---
131	Firmer gauge Set	UNN	8	0	0	---
		UNIZIK	8	5	63	Not Adequate
		ESUT	8	1	13	Not Adequate
		EBSU	8	5	63	Not Adequate
132	Auger Set	UNN	13	2	15	Not Adequate
		UNIZIK	13	0	0	---
		ESUT	13	0	0	---
		EBSU	13	0	0	---
133	Twist Set	UNN	10	0	0	---
		UNIZIK	10	1	10	Not Adequate
		ESUT	10	0	0	---
		EBSU	10	0	0	---
134	Gimlet Set	UNN	10	0	0	---
		UNIZIK	10	3	30	Not Adequate
		ESUT	10	4	40	Not Adequate
		EBSU	10	0	0	---
135	Spoke Shaves Set	UNN	10	1	10	Not Adequate
		UNIZIK	10	3	30	Not Adequate
		ESUT	10	2	20	Not Adequate
		EBSU	10	5	50	Not Adequate
136	Screw Driver Set	UNN	10	1	10	Not Adequate
		UNIZIK	10	2	20	Not Adequate
		ESUT	10	3	30	Not Adequate
		EBSU	10	5	50	Not Adequate
137	Mallet	UNN	16	2	13	Not Adequate
		UNIZIK	16	5	31	Not Adequate
		ESUT	16	10	63	Not Adequate

		EBSU	16	10	63	Not Adequate
138	Daw Hammer	UNN	10	1	10	Not Adequate
		UNIZIK	10	1	10	Not Adequate
		ESUT	10	4	40	Not Adequate
		EBSU	10	0	0	---
139	Bradawl	UNN	10	0	0	---
		UNIZIK	10	0	0	---
		ESUT	10	10	100	Adequate
		EBSU	10	5	50	Not Adequate
140	Sash Cramp	UNN	10	7	70	Not Adequate
		UNIZIK	10	5	50	Not Adequate
		ESUT	10	10	100	Adequate
		EBSU	10	10	100	Adequate
141	G-Clamp	UNN	8	4	50	Not Adequate
		UNIZIK	8	3	38	Not Adequate
		ESUT	8	10	125	Adequate
		EBSU	8	4	50	Not Adequate
142	Circular Saw	UNN	3	1	33	Not Adequate
		UNIZIK	3	1	33	Not Adequate
		ESUT	3	1	33	Not Adequate
		EBSU	3	1	33	Not Adequate
143	Surfacing Machine	UNN	1	2	200	Adequate
		UNIZIK	1	1	100	Adequate
		ESUT	1	2	200	Adequate
		EBSU	1	1	100	Adequate
144	Wood latte Accessories	UNN	1	3	300	Adequate
		UNIZIK	1	1	100	Adequate
		ESUT	1	2	200	Adequate
		EBSU	1	1	100	Adequate
145	Band Saw	UNN	1	1	100	Adequate
		UNIZIK	1	1	100	Adequate
		ESUT	1	2	200	Adequate
		EBSU	1	0	0	---
146	Mortise	UNN	1	0	0	---
		UNIZIK	1	0	0	---
		ESUT	1	0	0	---
		EBSU	1	0	0	---
147	Sanders	UNN	1	2	200	Adequate
		UNIZIK	1	0	0	---
		ESUT	1	4	400	Adequate
		EBSU	1	1	100	Adequate
148	Crosscut Sawing Machine	UNN	1	2	200	Adequate
		UNIZIK	1	0	0	---
		ESUT	1	1	100	Adequate
		EBSU	1	0	0	---
149	Drilling Machine	UNN	1	2	200	Adequate
		UNIZIK	1	1	100	Adequate
		ESUT	1	1	100	Adequate
		EBSU	1	1	100	Adequate
150	Oil Caps	UNN	6	1	17	Not Adequate
		UNIZIK	6	1	17	Not Adequate
		ESUT	6	1	17	Not Adequate
		EBSU	6	2	33	Not Adequate
151	Sawing Machine	UNN	2	1	50	Not Adequate
		UNIZIK	2	0	0	---
		ESUT	2	3	150	Adequate
		EBSU	2	0	0	---
152	Try Square	UNN	10	12	120	Adequate
		UNIZIK	10	7	70	Not Adequate

		ESUT	10	8	80	Not Adequate
		EBSU	10	2	20	Not Adequate
153	Staples	UNN	5	0	0	---
		UNIZIK	5	2	40	Not Adequate
		ESUT	5	2	40	Not Adequate
		EBSU	5	1	20	Not Adequate
154	Marketing Gauges	UNN	10	10	100	Adequate
		UNIZIK	10	5	50	Not Adequate
		ESUT	10	19	190	Adequate
		EBSU	10	2	20	Not Adequate
155	Mortise Gauges	UNN	8	7	88	Not Adequate
		UNIZIK	8	7	88	Not Adequate
		ESUT	8	7	88	Not Adequate
		EBSU	8	14	176	Adequate
156	Marketing Knife	UNN	8	3	36	Not Adequate
		UNIZIK	8	5		Not Adequate
		ESUT	8	6	75	Not Adequate
		EBSU	8	6	75	Not Adequate
157	Meter Square	UNN	8	8		Not Adequate
		UNIZIK	8	4	50	Not Adequate
		ESUT	8	5	63	Not Adequate
		EBSU	8	1	13	Not Adequate
158	Measuring Tape	UNN	10	10		Not Adequate
		UNIZIK	10	5	50	Not Adequate
		ESUT	10	7	70	Not Adequate
		EBSU	10	0	0	---
159	Compressor	UNN	3	1	33	Not Adequate
		UNIZIK	3	1	33	Not Adequate
		ESUT	3	2	67	Not Adequate
		EBSU	3	0	0	---

Data contained in Table 6 indicates that 59 workshop facilities were evaluated in building/wood work technology course area in four universities, (f = 236). Out of the 236 cases, 104 cases were available in the various universities with 132 unavailable. Also, out of the frequency of 104 cases available only 41 were adequate in the four universities based on NUC minimum requirement and 137 inadequate cases. The available workshop facilities in building/wood work course area of technology education in universities of south east Nigeria are therefore inadequate.

III. Discussion of Findings and Implications

The findings of this study revealed that a greater percentage of workshop facilities are not adequately provided for instruction in the different course areas of technology education in the universities. Mechanical / auto mechanics has the highest number of workshop facilities, 35 out of 60 items identified with 58.3percent availability level. The workshop facilities available in all the universities include; hacksaw frame, cold chisel, file assort, steel rule (300m) scriber, venire calipers, hammers, try square, benches vices, forging hammers, blow lamps, soldering bits, anvil, flat nose pliers, furnaces for heat treatment, punches , ring spanners, socket spanner, ball pen, grease gums, pliers assorted file assorted , Allen keys, twist drills, tread cutting taps and dies, rubber mallet, tire levers, wielding equipment , electric soldering irons, grinding machine and wheel balancing machine. This study also discovered that out of the 35 workshop facilities found in all the universities studied in this course area; only four items namely; air compressor, molding equipment, grinding machine and wheel balancing machine were adequately provided for instruction in all the universities. Other items were found to be inadequately provided in some universities based on the NUC minimum recommendation for each of the items.

In the course area of applied electricity/electronics, only 11 workshop facilities out of 40 items identified were found available in all the universities. This represented 25 percent of the entire workshop facilities. This reveals that workshop facilities in applied electricity/electronics were grossly unavailable in the universities studied. The available items include; long nose pliers, blow lamps, cold chisel sets, screw driver, oscilloscope (kit/form), Voltmeter DCO-25-25-220v volt-ohm meter – 240-500v, cathode ray oscilloscope, ammeter D.C, 0.54 scale and galvanometer. Out of the 10 available workshop facilities, only one – Ammeter D.C., 0.54 scales was found adequately provided in all the universities studied. Workshop facilities for applied electrical/electronic course area of technology education were therefore discovered to be grossly unavailable and inadequate for instruction in the studied universities based on NUC minimum requirements.

The findings of this study also show that out of 59 workshop facilities identified and presented for building/woodwork course area, only 25 items were found available in all the universities studied. This represented an availability percentage of 42.4. The available workshop facilities in building construction/woodwork include; port compressor &

all in (big), hacksaws, spades, chisels, trowels (assorted), tape measure (2.6m), head pan, spirit levels, shovels and jacket planes. Others are smoothing planes, rebate planes, rip saw, cross cut hand saw, screw driver set, mallet, sash cramp, G-clamp, circular saw, surfacing machine, brand saw, wood lathe accessories, circular machine, oil claps, marking gauges and mortise gauges. Out of the 25 items found available only four workshop facilities were found adequate for instruction in all the universities based on the NUC minimum requirement. The facilities were therefore grossly inadequate for instruction in the universities.

Summarily, a total of 159 workshop facilities were identified and studied in the four universities. Out of 159 items, 67 were found available in all the universities, representing an availability percentage of 42.1. Also out of the 159 workshop facilities, only nine items were adequately provided in the universities representing 5.66 percent adequacy. This revealed a state of gross inadequacy in the workshop facilities available for instruction in technology education programme in Universities of South-east Nigeria.

These findings are in line with that of Besmat Digbori (2010) observations and Uwaifo (2011) discoveries from 10 universities studied in Nigeria. Mechanical/metal technology was found to have greater number of facilities available than other course areas, yet inadequate for instruction based on NUC minimum requirement. This problem was also discovered in other programme areas of vocational education as in business education (Ile, 2000), also in basic technology (Obi, 2005). This has been attributed to insurgency in university education and poor funding by the government and other stakeholders in the school system, resulting to poor students' performance after graduation.

This study has implications for all TVE courses that embrace technology education, business education among others. Technology education as a practical oriented programme cannot achieve its objectives in a situation where facilities required for instruction and skill development amongst undergraduates are grossly inadequate. Students cannot acquire the necessary skills required for gainful employment in the modern age without proper training that will expose them to technical equipment and maintenance. Technology education undergraduates therefore need to be prepared, exposed and made accessible to facilities used in real life situation. Inability to step up the shortfalls in these workshop facilities in line with NUC minimum standards continue to pose threats to quality of technology education graduates produced in the universities.

IV. Conclusion

Based on the findings of the study, it was concluded that workshop facilities identified in the three course areas of B.Sc. Technology Education; namely: mechanical/auto-mechanics, applied electricity/electronics and building/wood works, were not adequate for instruction in the universities of south- east Nigeria.

V. Recommendations

Based on the findings and conclusion of this study, the following recommendations are made;

1. Management of universities of south-east Nigeria should set up a committee charged with raising of fund for adequate provision of workshop facilities and lecturers in Technology/Vocational Education department.
2. Governments at federal and state levels should increase funding to universities in line with the economic conditions of the country. This will enable institutions procure adequate workshop facilities lecturers for instruction in technology education.
3. Technology education department in universities should also source fund beyond government financing and reach firms, parents, international bodies and philanthropist for adequate provision of workshop facilities for instruction.
4. Technology education department in universities should collaborate and partner with firms and other non-governmental organizations in the provision of workshop facilities to ensure adequate provision and quality instruction to the students.

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