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Availability and Adequacy of Curriculum Resources for Mechanical Trade Instruction: A Study on Technical Colleges in Anambra State, Nigeria

Marycynthia Chetachukwu Obineche[1]*; Lilian-Rita Ifeoma Akudolu[1]; James Akal-Karali Obineche[2]

[1]*Department of Educational Foundations, Nnamdi Azikiwe University Awka*
[2]*Department of Industrial Technology Education, Nnamdi Azikiwe University Awka*

Corresponding author

Abstract: The research is aimed at examining the availability and adequacy of curriculum resources for the instructional delivery of mechanical trade students in technical colleges in Anambra State, Nigeria. Specifically, the study provides empirical evidence on the current state of human and material/physical resources available and their adequacy for teaching mechanical trade students in both federal and state technical colleges in Anambra State, Nigeria. A descriptive survey research design was adopted for the study. The study was guided by one research question, and one corresponding null hypothesis was tested. The target population comprised four technical staff, consisting of two-unit head technical teachers and two technicians, drawn from one federal and one state technical college that have been officially accredited by the National Board for Technical Education (NBTE) to offer Mechanical trade programme in Anambra State, Nigeria. A census approach was adopted; hence, no sampling procedure was used. The instrument for data collection was a 228- item observational checklist titled "Availability and Adequacy of Curriculum Resources for Mechanical Trade Instruction Questionnaire (AACRMTIQ)". The instrument was developed using the NBTE minimum standard benchmark, which outlines the required human and material resources for effective instructional delivery of technical education in Nigeria. Since the NBTE benchmark was a standardized and officially approved instruction for accreditation, no further validity and reliability tests were conducted. Percentage was used to answer research question, while chi-square was used to test the null hypothesis at the 0.05 level of significance. The findings revealed that the curriculum resources for the instructional delivery of Mechanical trade students in both federal and state technical colleges were inadequately available, hence were below NBTE standards. The study concluded that adequate provision of curriculum resources will enable technical colleges to achieve the philosophy underlying their establishment. Based on the finding, it was recommended that Federal and State government should establish sustainable funding mechanism such as special intervention funds or public-private partnership (PPPs) to ensure consistent upgrade and maintenance of resources in technical colleges.

Keywords: Availability, Adequacy, Curriculum resources, Mechanical trade, Technical Colleges

INTRODUCTION

The quest for national development in Nigeria has repeatedly been undermined by negligence, undue politicking, ignorance, and poor prioritization of key educational sectors,

Corresponding author: mc.obineche@unizik.edu.ng

thereby increasing the country's economic dependence and suppressing the latent potential of its citizens. A shift from this long-standing reliance on developed nations toward a system that embraces and harnesses local talent through functional education is urgently required. Education, being globally recognized as an instrument of change and development (FRN, 2014), must therefore reflect societal needs, aspirations, and challenges. This is especially imperative for skill-oriented programmes such as mechanical trade in technical colleges, which demand the integration of cognitive, affective, and psychomotor domains to stimulate creativity, innovation, and technological advancement.

Over the years, policy documents such as the National Policy on Education (FRN, 2013; FRN, 2014) have consistently emphasized the importance of Technical and Vocational Education (TVE) in equipping individuals with technological skills and competencies necessary for nation building. Osokoya cited in Ogundele and Oyelade (2018) affirms that TVE unlocks hidden potential and facilitates self- employment and job creation, thereby reducing poverty and promoting technological progress. Similarly, the Federal Ministry of Education (FME, 2012) reports that nearly 80% of jobs globally require vocational and technical skills. Despite this, vocational education in Nigeria continues to suffer neglect, resulting in unskilled graduates who cannot effectively contribute to economic transformation.

Technical colleges, which serve as the primary institutions for vocational and technical education in Nigeria, play a crucial role in developing artisans, craftsmen, and technicians capable of handling practical oriented tasks central to industrial growth. According to *Eze et al.* (2020), technical colleges exist to train students for employment in the world work through hands-on instruction in various occupations. The Federal Republic of Nigeria (FRN, 2013) further defines technical colleges as institutions designed to produce highly skilled craftsmen and technicians at advanced craft levels. Their instructional focus emphasizes practical training through the application of scientific principles, tools, equipment, and modern technologies (Eze, 2009).

Among the trades offered in technical colleges, mechanical trade is central to this study. Mechanical trade, also known as metalwork technology or mechanical crafts, involves training students to design, construct, operate, and understand machinery and tools. Practitioners in this field are responsible for tasks related to maintenance, testing, preventive servicing, and operation of systems such as heating, ventilation, and air-conditioning (HVAC), as well as the distribution of steam, chilled water, domestic water, and fire protection systems. The trade also encompasses welding and fabrication, foundry practice, instrumentation, and general metalwork technology (Amadi, Chiorlu, & Obed, 2018; Okwelle, Beako, & Ojotule, 2019). These areas demand up-to-date facilities and qualified instructors to ensure that students to perform these duties effectively. Thus, the realization of these goals depends heavily on the adequate availability of curriculum resources/educational resources which was used interchangeably in this study, for effective instructional delivery.

Curriculum or educational resources encompass human, material (digital or physical), financial and learning resources required to support instruction (Styllianides, 2016; Irondi, 2019). Irondi further adds that human resources constitute school administrators, teacher, bursar, typists, clerks, messengers, cleaners, watchman, cooks, divers librarians, gardens. In the context of this study, curriculum resources take into account both human expertise and the entirety of the learning environment, including facilities such as classroom, workshops, laboratories, studios, libraries, showrooms, playgrounds, and theaters, as well as printed and non- printed digital and analog materials. Such resources are essential for effective instructional delivery, especially in mechanical trade, where practical engagement is of optimum essence. These resources facilities, motivate, and concretize learning, thereby

optimizing learning outcomes and promoting the acquisition of knowledge, mastery of skills, and positive attitude to work. Ekundayo and Alonge (2012) assert that the attainment of educational objectives is directly proportional to the availability of curriculum/educational resources. Thus, inadequate curricular support renders technical trade instruction ineffective, overly theoretical, and incapable of producing competent graduates.

For these objectives to be achieved, the government and regulatory bodies such as NBTE must ensure the provision of adequate educational resources, including qualified personnel and functional facilities (*Eze et al*.,2020). For no nation can compete globally with an unskilled workforce. According to Muoghalu (2018) affirms that the underdevelopment of human resources remains a major challenge in developing countries like Nigeria. Technological advancement depends on a skilled workforce equipped with appropriate knowledge, skills, and attitudes, which technical education is designed to provide.

Despite its importance, technical in Nigeria faces numerous challenges, including inadequate funding, shortage of qualified teachers, poor infrastructure, lack of workshops and equipment, brain drain, and weak industry collaboration (Nwosu & Micah, 2017). Authors such as Muoghalu (2018), Onwusa (2022), and Usman, Rony and Saine (2025), emphasizes that poor funding undermine the effectiveness of technical colleges and hinders national development, addressing these issue requires prioritizing both human and material resources, which are by-product of curriculum resources.

The determinant factors to addressing the ineffectiveness of curriculum resources can be examined through these variables: availability and adequacy. James (2015) defines availability as the extent to which facilities, services, or materials are provided and made ready for use. In the context of this study, availability refers to the degree to which curriculum resources such as tools, machines, workshops, equipment, as well as human expertise are present and ready to engage in achieving educational objectives. Adequacy, on the other hand, refers to the sufficient provision of these resources in the required quantity, quality and capacity. Hence, adequate availability connotes not merely the presence of resources but their sufficiency in accordance with NBTE standards for effective instructional delivery.

Nigerian technical colleges have historically faced challenges such as inadequate funding, resulting in poorly equipped workshops, obsolete tools, insufficient machines, and a shortage of qualified instructors (Uwaifo, 2010; Okoye & Onyenwe, 2016). When resources are lacking, teaching becomes largely theoretical, contradicting the essence of technical education and producing graduates deficient in practical competence. The consequences of inadequate availability of curriculum resources are evident in Nigeria's rising unemployment, poverty, and reliance on imported goods. Ukachi and Ejiko (2018) attribute Nigeria's technological backwardness to the neglect of technical and vocational education. The country imports simple tools and machines that could be produced locally if technical colleges were adequately equipped to train competent artisans. Onyiah (2020) further argues that developing indigenous technicians would save Nigeria significant foreign exchange spent on importing unsuitable machinery.

The availability of curriculum resources remains a critical determinant of effective technical and vocational education. Amadike and Agwi (2016) emphasize that achieving the goals of technical education depends largely on the adequacy of instructional resources. However, several studies highlight persistent inadequacies in technical education facilities across Nigeria. Osarenren-Osaghae and Irahor (2012) reported hat available resources fall below prescribed standards, while *Okoli et al*. (2023) found gross inadequacies in workshop facilities. Similar deficiencies have been reported in technical colleges, including shortages of

equipment, qualified staff, and adequate infrastructure (Suleiman & Bamidele, 2023; Agbonghale & Adavbiele, 2018; Ubanwa, 2023).

Taken together, these studies reveal a longstanding pattern of inadequate curriculum resources in Nigeria's technical education sector. This persistent inadequacy undermines practical skill development and limits students' readiness for the modern workforce. The present study aligns with this broader national concern by examining mechanical trade programmes in Anambra State. Given these challenges, it becomes necessary to empirically assess the state of curriculum resources in technical colleges offering mechanical trade in Anambra State, Nigeria. Such an assessment will determine whether these institutions meet NBTE minimum benchmarks. It is against this background that the present study examines the adequate availability of curriculum resources for instructional delivery of mechanical trade students in technical colleges in Anambra State, Nigeria.

Research Question

How adequately available are curriculum resources for mechanical trade instruction in technical colleges in Anambra State, Nigeria?

Hypothesis (tested at 0.05 level of significance)

There is no significant difference in the proportions of adequately available curriculum resources for mechanical trade instruction between state and federal technical colleges in Anambra State, Nigeria.

METHODS

The study adopted a descriptive survey research design. According to Creswell and Creswell (2018), survey design aims at obtaining information useful for providing an empirical, quantitative description of current trends, conditions, or resources statuses within a target population for strategic decision-making. This is appropriate because it enables the collection of accurate data on adequacy of curriculum resources for teaching mechanical trade in technical colleges in Anambra State, Nigeria. The study adopted National Board for Technical Education (NBTE) accreditation benchmark as the standard parameter for assessing curriculum resources. The population comprised four technical staff: two-unit head technical teachers and two technicians drawn from one federal and one state technical college accredited by NBTE to offer mechanical trade programmes in Anambra State. The selection of unit heads ensured the collection of reliable data due their supervisory roles and in-depth knowledge of instructional processes. A census approach was adopted; hence, no sampling procedure was used. The instrument for data collection was a 228- item observational checklist titled "Adequate Availability of Curriculum Resources for Mechanical Trade Instruction Questionnaire (AACRTMTIQ), developed based on NBTE standards. The instrument had two sections, Section A: collected demographic data, while Section B: measured the adequate availability of curriculum resources using NBTE benchmark. Respondents indicated the number of available resources, which were then compared with NBTE standards to determine adequacy. Resources fully provided were equated to 100%. An item at 100% or above was considered adequate, while those below 100% were regarded as inadequate. Percentage was used to answer the research question, while chi-square was used to test the null hypothesis at the 0.05 level of significance.

RESULTS

Availability and Adequacy of Curriculum Resources for Mechanical Trade Students' Instruction in Technical Colleges

The data presented in Table 1 shows the availability and adequacy of curriculum resources for mechanical trade students in technical Colleges.

Table 1: Frequency and Percentage on Availability and Adequacy of Curriculum Resources for Mechanical Trade Students' Instruction in Technical Colleges

S/N	Tools/Equipment	College	NBTE Minimum	No. Available	% Availability	Decision
	Minimum Required Human Resource Personnel					
1.	Mechanical Technical Teachers	FSTC Awka	5	2	40	inadequate
		GTC Onitsha	5	2	40	inadequate
2.	Mechanical Technicians	FSTC Awka	2	0	0	inadequate
		GTC Onitsha	2	1	50	inadequate
3.	Workshop Attendants	FSTC Awka	1	0	0	inadequate
		GTC Onitsha	1	1	100	inadequate
	Minimum Required Instructional Resources					
	FITTING					
4.	Vices 150mm	FSTC Awka	22	6	27.3%	inadequate
		GTC Onitsha	22	4	18.2%	inadequate
5.	Benches	FSTC Awka	6	2	33.3%	inadequate
		GTC Onitsha	6	6	100%	adequate
6.	Hacksaws	FSTC Awka	20	1	5%	inadequate
		GTC Onitsha	20	2	10%	inadequate
7.	Files	FSTC Awka	22	1	4.5%	inadequate
		GTC Onitsha	22	6	27.3%	inadequate
8.	250mm flat rough	FSTC Awka	22	2	9.1%	inadequate
		GTC Onitsha	22	2	9.1%	inadequate
9.	10" Hand rough	FSTC Awka	22	3	13.6%	inadequate
		GTC Onitsha	22	3	13.6%	inadequate
10.	10" Round rough	FSTC Awka	22	4	18.2%	inadequate
		GTC Onitsha	22	2	9.1%	inadequate
11.	10" Three rough	FSTC Awka	22	6	27.3%	inadequate
		GTC Onitsha	22	1	4.6%	inadequate
12.	10" Square rough	FSTC Awka	22	10	45.5%	inadequate
		GTC Onitsha	22	2	9.1%	inadequate
13.	10" Half round 2nd cut	FSTC Awka	22	10	45.5%	inadequate
		GTC Onitsha	22	1	4.6%	inadequate
14.	200mm Warding file	FSTC Awka	22	2	9.1%	inadequate
		GTC Onitsha	22	2	9.1%	inadequate
15.	100" Retail file	FSTC Awka	22	1	4.5%	inadequate
		GTC Onitsha	22	2	9.1%	inadequate
16.	Wallets of warding files	FSTC Awka	22	2	9.1%	inadequate
		GTC Onitsha	22	2	9.1%	inadequate
17.	Steel rules (12") 300m	FSTC Awka	20	4	20%	inadequate
		GTC Onitsha	20	1	5%	inadequate
18.	Tape rule 3000mm	FSTC Awka	20	6	30%	inadequate
		GTC Onitsha	20	2	10%	inadequate
19.	Dividers	FSTC Awka	10	2	20%	inadequate
		GTC Onitsha	10	2	20%	inadequate
20.	Scribers	FSTC Awka	10	3	30%	inadequate
		GTC Onitsha	10	5	50%	inadequate
21.	Pocket size (200mm) vernier	FSTC Awka	10	1	10%	inadequate
		GTC Onitsha	10	11	110%	adequate
22.	Calipers	FSTC Awka	10	2	20%	inadequate
		GTC Onitsha	10	2	20%	inadequate
23.	Centre punches	FSTC Awka	10	0	0%	inadequate

		GTC Onitsha	10	0	0%	inadequate
24.	(1/2 1b) Hammer 3/4 kg	FSTC Awka	5	2	40%	inadequate
		GTC Onitsha	5	3	60%	inadequate
25.	(11/2 1b) Hammer 3/4kg	FSTC Awka	5	1	20%	inadequate
		GTC Onitsha	5	7	140%	adequate
26.	Oil can	FSTC Awka	5	1	20%	inadequate
		GTC Onitsha	5	4	80%	inadequate
27.	Pair of Pliers 150mm	FSTC Awka	20	2	10%	inadequate
		GTC Onitsha	20	3	15%	inadequate
28.	Tool box & lock	FSTC Awka	10	1	10%	inadequate
		GTC Onitsha	10	3	30%	inadequate
29.	Odd-leg calipers	FSTC Awka	20	1	5%	inadequate
		GTC Onitsha	20	1	5%	inadequate
30.	Engineers Squares 100	FSTC Awka	5	2	40%	inadequate
		GTC Onitsha	5	1	20%	inadequate
31.	Screw drivers 200mm	FSTC Awka	5	1	20%	inadequate
		GTC Onitsha	5	2	40%	inadequate
32.	Pair of tin slip Nippy vice	FSTC Awka	5	2	40%	inadequate
		GTC Onitsha	5	2	40%	inadequate
	Fitting – Workshop Equipment					
33.	Drilling machines sensitive	FSTC Awka	4	1	25%	inadequate
		GTC Onitsha	4	0	0%	inadequate
34.	Drilling machines Pillar	FSTC Awka	4	0	0%	inadequate
		GTC Onitsha	4	0	0%	inadequate
35.	Drilling machines Radial	FSTC Awka	4	0	0%	inadequate
		GTC Onitsha	4	3	75%	inadequate
36.	Surface table 12000 x 12000mm (4'x4')	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	4	200%	adequate
37.	Surface plates 500 x 500mm (18"x18")	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	2	100%	adequate
38.	Surface Gauge	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	2	100%	adequate
39.	Vernier Height Gauges	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	1	50%	inadequate
40.	Vee Blocks 100 x 100mm pairs	FSTC Awka	4	0	0%	inadequate
		GTC Onitsha	4	4	100%	adequate
41.	Vee Blocks 200mm	FSTC Awka	4	2	50%	inadequate
		GTC Onitsha	4	4	100%	adequate
42.	Parallels strips (pairs) 37 x 25x300	FSTC Awka	4	2	50%	inadequate
		GTC Onitsha	4	2	50%	inadequate
43.	Flat scrapers	FSTC Awka	4	1	25%	inadequate
		GTC Onitsha	4	3	75%	inadequate
44.	Half round scrapers	FSTC Awka	4	1	25%	inadequate
		GTC Onitsha	4	2	50%	inadequate

45.	Triangular scrapers	FSTC Awka	4	4	100%	adequate
		GTC Onitsha	4	2	50%	inadequate
46.	Stock and Dies	FSTC Awka	5	2	40%	inadequate
		GTC Onitsha	5	1	20%	inadequate
47	Metric sets 3mm – 12mm	FSTC Awka	5	2	40%	inadequate
		GTC Onitsha	5	1	20%	inadequate
	(BA) 150 sets 0-10	FSTC Awka	5	1	20%	inadequate
		GTC Onitsha	5	3	60%	inadequate
48.	Sockets spanners 3-22mm	FSTC Awka	5	2	40%	inadequate
		GTC Onitsha	5	0	0%	inadequate
49.	Open ended 3-22mm (spanner)	FSTC Awka	5	1	20%	inadequate
		GTC Onitsha	5	0	0%	inadequate
50.	Pedestal Grinders	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	0	0%	inadequate
51.	Reamers 3-25mm	FSTC Awka	3	1	33.3%	inadequate
		GTC Onitsha	3	2	66.7%	inadequate
52.	Reamers machine 3.25mm	FSTC Awka	3	0	0%	inadequate
		GTC Onitsha	3	1	33.3%	inadequate
53.	Dial Gauge	FSTC Awka	3	0	0%	inadequate
		GTC Onitsha	3	1	33.3%	inadequate
54.	Chisels	FSTC Awka	10	2	20%	inadequate
		GTC Onitsha	10	2	20%	inadequate
55.	Flat	FSTC Awka	10	2	20%	inadequate
		GTC Onitsha	10	1	10%	inadequate
56.	Round	FSTC Awka	10	1	10%	inadequate
		GTC Onitsha	10	3	30%	inadequate
57.	Diamond	FSTC Awka	10	1	10%	inadequate
		GTC Onitsha	10	3	30%	inadequate
58.	Cross cut	FSTC Awka	10	0	0%	inadequate
		GTC Onitsha	10	2	20%	inadequate
59.	Drills	FSTC Awka	5	0	0%	inadequate
		GTC Onitsha	5	0	0%	inadequate
60.	Straight shank 11/2 – 10mm	FSTC Awka	5	3	60%	inadequate
		GTC Onitsha	5	0	0%	inadequate
61.	Straight shank 6 – 15mm	FSTC Awka	5	2	40%	inadequate
		GTC Onitsha	5	0	0%	inadequate
62.	Taper shank 3 – 22mm	FSTC Awka	5	1	20%	inadequate
		GTC Onitsha	5	0	0%	inadequate
63.	Drift	FSTC Awka	2	6	300%	inadequate
		GTC Onitsha	2	0	0%	inadequate
64.	Heat treatment furnace (medium size)	FSTC Awka	3	2	66.6%	inadequate
		GTC Onitsha	3	0	0%	inadequate
65.	Micrometer 0-25	FSTC Awka	3	3	100%	inadequate
		GTC Onitsha	3	0	0%	inadequate
66.	25 – 50	FSTC Awka	3	2	66.7%	inadequate
		GTC Onitsha	3	3	100%	adequate
67.	50 – 75	FSTC Awka	3	1	33.3%	inadequate
		GTC Onitsha	3	2	66.7%	inadequate

68.	75 – 100	FSTC Awka	3	1	33.3%	inadequate
		GTC Onitsha	3	1	33.3%	inadequate
69.	100 – 125	FSTC Awka	3	3	100%	adequate
		GTC Onitsha	3	1	33.3%	inadequate
70.	125 – 150	FSTC Awka	3	2	66.7%	inadequate
		GTC Onitsha	3	2	66.7%	inadequate
71.	Protractors	FSTC Awka	3	4	133.3%	adequate
		GTC Onitsha	3	3	100%	adequate
72.	Bevel	FSTC Awka	3	2	66.7%	inadequate
		GTC Onitsha	3	3	100%	adequate
73.	Combination sets	FSTC Awka	3	1	33.3%	inadequate
		GTC Onitsha	3	2	66.7%	inadequate
74.	Vernier	FSTC Awka	3	8	266.6%	adequate
		GTC Onitsha	3	2	66.7%	inadequate
75.	Optical	FSTC Awka	3	4	133.3%	adequate
		GTC Onitsha	3	1	33.3%	inadequate
76.	Limit Gauge	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	6	300%	adequate
77.	Telescopic gauges	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	0	0%	inadequate
78.	Plug gauges	FSTC Awka	2	6	300%	adequate
		GTC Onitsha	2	3	150%	adequate
79.	Slip gauges (set)	FSTC Awka	2	6	300%	adequate
		GTC Onitsha	2	2	100%	adequate
80.	Feeler 05 – 64	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	1	50%	inadequate
81.	Engineers squares 150mm	FSTC Awka	2	4	200%	adequate
		GTC Onitsha	2	1	50%	inadequate
82.	Calliper	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	2	100%	adequate
83.	Screw pitch gauges	FSTC Awka	2	0	0%	inadequate
		GTC Onitsha	2	5	250%	adequate
84.	Blacksmith forge (gas)	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	0	0%	inadequate
85.	Blacksmith Tools	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	3	150%	adequate
86.	Anvil, hammers, chisels fuller, shape	FSTC Awka	2	4	200%	adequate
		GTC Onitsha	2	2	100%	adequate
87.	Block, pinches and drifts	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	1	50%	inadequate
88.	Tongues of different types	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	1	50%	inadequate
89.	Arboy press	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	1	50%	inadequate
90.	Extractors	FSTC Awka	2	7	350%	adequate
		GTC Onitsha	2	4	200%	adequate
91.	Snips (Tin sheat) 200mm	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	2	100%	adequate
92.	Stud extractors	FSTC Awka	2	8	400%	adequate
		GTC Onitsha	2	6	300%	adequate

93.	Circlip plier (internal & external)	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	6	300%	adequate
94.	Pipe wrench 250mm	FSTC Awka	2	6	300%	adequate
		GTC Onitsha	2	2	100%	adequate
95.	Pipe wrench 250mm	FSTC Awka	2	8	400%	adequate
		GTC Onitsha	2	2	100%	adequate
96.	Self grip wrench of mole grip	FSTC Awka	1	2	200%	adequate
		GTC Onitsha	1	6	600%	adequate
97.	Pipe sender	FSTC Awka	1	2	200%	adequate
		GTC Onitsha	1	1	100%	adequate
98.	Gullotine machine	FSTC Awka	5	2	40%	inadequate
		GTC Onitsha	5	2	40%	inadequate
99.	G. Clamp	FSTC Awka	5	1	20%	inadequate
		GTC Onitsha	5	1	20%	inadequate
100.	Tool maker clamp	FSTC Awka	5	2	40%	inadequate
		GTC Onitsha	5	1	20%	inadequate
	Turning					
101.	Centre lathe 150	FSTC Awka	5	0	0%	inadequate
		GTC Onitsha	5	2	40%	inadequate
102.	Large size lathe 250	FSTC Awka	5	2	40%	inadequate
		GTC Onitsha	5	2	40%	inadequate
103.	Three jaw chuk	FSTC Awka	5	1	20%	inadequate
		GTC Onitsha	5	1	20%	inadequate
104.	Four jaw chuk independent and self centring	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	2	100%	adequate
105.	Face plate	FSTC Awka	1	4	400%	adequate
		GTC Onitsha	1	1	100%	adequate
106.	Taper turning attachment	FSTC Awka	1	4	400%	adequate
		GTC Onitsha	1	0	0%	inadequate
107.	Driving plate	FSTC Awka	2	3	150%	adequate
		GTC Onitsha	2	2	100%	adequate
108.	Driving dog	FSTC Awka	1	2	200%	adequate
		GTC Onitsha	1	1	100%	adequate
109.	Mandrill – one each of all sizes	FSTC Awka	1	1	100%	adequate
		GTC Onitsha	1	0	0%	inadequate
110.	Capstan and Turrreth lathes	FSTC Awka	1	2	200%	adequate
		GTC Onitsha	1	0	0%	inadequate
111.	Screwing machine	FSTC Awka	5	1	20%	inadequate
		GTC Onitsha	5	4	80%	inadequate
	Instruments Measuring					
112.	Vernier callliper	FSTC Awka	5	4	80%	inadequate
		GTC Onitsha	5	3	60%	inadequate
113.	Micrometers 0-25	FSTC Awka	5	6	120%	adequate
		GTC Onitsha	5	3	60%	inadequate
114.	25 - 50	FSTC Awka	5	6	120%	adequate
		GTC Onitsha	5	2	40%	inadequate
115.	75 – 100	FSTC Awka	5	2	40%	inadequate

		GTC Onitsha	5	1	20%	inadequate
116.	Boring tools	FSTC Awka	5	1	20%	inadequate
		GTC Onitsha	5	1	20%	inadequate
117.	Adjustable mandrill	FSTC Awka	5	2	40%	inadequate
		GTC Onitsha	5	1	20%	inadequate
118.	Sleeves: 0 - 1	FSTC Awka	1	0	0%	inadequate
		GTC Onitsha	1	0	0%	inadequate
119.	Centre drills	FSTC Awka	1	19	1900%	adequate
		GTC Onitsha	1	3	300%	adequate
120.	Drill – sizes – all sizes	FSTC Awka	1	3	300%	adequate
		GTC Onitsha	1	2	200%	adequate
121.	Reamers: Parallel shank of all sizes	FSTC Awka	1	2	200%	adequate
		GTC Onitsha	1	1	100%	adequate
122.	Taper reamers – one each of all sizes	FSTC Awka	1	1	100%	adequate
		GTC Onitsha	1	2	200%	adequate
123.	Adjustable reamers	FSTC Awka	1	2	200%	adequate
		GTC Onitsha	1	6	600%	adequate
	Knurling Tool					
124.	Taping M3 to M12	FSTC Awka	2	3	150%	adequate
		GTC Onitsha	2	2	100%	adequate
125.	M6 to M16	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	2	100%	adequate
126.	Dies: M3 to M12	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	2	100%	adequate
127.	M6 to M16	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	1	50%	inadequate
128.	Centre finder	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	1	50%	inadequate
129.	Gauges 10mm – 50mm	FSTC Awka	1	3	300%	adequate
		GTC Onitsha	1	3	300%	adequate
130.	Oil can	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	2	100%	adequate
131.	Dial indicator	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	1	50%	inadequate
132.	Boring bars	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	1	50%	inadequate
	Shaping					
133.	18" shaping machine	FSTC Awka	3	3	100%	adequate
		GTC Onitsha	3	4	133.3%	adequate
134.	Swivelling vices	FSTC Awka	3	2	66.7%	inadequate
		GTC Onitsha	3	3	100%	adequate
135	Straight, Right and Left hand shaping tools	FSTC Awka	3	1	33.3%	inadequate
		GTC Onitsha	3	3	100%	adequate
136.	Parallel blocks 8" 200mm	FSTC Awka	3	2	66.70%	inadequate
		GTC Onitsha	3	4	133.3%	adequate
137.	Vee blocks 6''	FSTC Awka	3	3	100%	adequate
		GTC Onitsha	3	6	200%	adequate
138.	Surface gauges	FSTC Awka	3	4	133.3%	adequate
		GTC Onitsha	3	14	466.7%	adequate
139.	Inside and outside calipers	FSTC Awka	3	3	100%	adequate

		GTC Onitsha	3	0	0%	inadequate
140.	Copper and hide faced	FSTC Awka	3	4	133.3%	adequate
		GTC Onitsha	3	0	0%	inadequate
141.	Hammer	FSTC Awka	3	2	66.7%	inadequate
		GTC Onitsha	3	2	66.7%	inadequate
142.	Bevel protractor	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	1	50%	inadequate
	Slotting Machines					
143.	Slotting machine (training size)	FSTC Awka	2	4	200%	adequate
		GTC Onitsha	2	4	200%	adequate
144.	Parallel blocks	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	4	200%	adequate
145.	Straight, left and right hand tool	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	8	400%	adequate
146.	Swivelling vices	FSTC Awka	2	4	200%	adequate
		GTC Onitsha	2	2	100%	adequate
147.	Rotary tables	FSTC Awka	2	3	150%	adequate
		GTC Onitsha	2	2	100%	adequate
148.	Vernier calipers	FSTC Awka	4	2	50%	inadequate
		GTC Onitsha	4	1	25%	inadequate
	Milling Cutters					
149.	Complete range of slab cutters	FSTC Awka	4	6	150%	adequate
		GTC Onitsha	4	6	150%	adequate
150.	Complete set of gearing cutters	FSTC Awka	4	2	50%	inadequate
		GTC Onitsha	4	14	350%	adequate
151.	Assorted slitting saws	FSTC Awka	4	1	25%	inadequate
		GTC Onitsha	4	10	250%	adequate
152.	Assorted side and face cutters	FSTC Awka	4	2	50%	inadequate
		GTC Onitsha	4	2	50%	inadequate
153.	Assorted end mills	FSTC Awka	4	4	100%	adequate
		GTC Onitsha	4	3	75%	inadequate
154.	Assorted shell and mills	FSTC Awka	4	2	50%	inadequate
		GTC Onitsha	4	2	50%	inadequate
155.	Double angle cutters	FSTC Awka	4	1	25%	inadequate
		GTC Onitsha	4	2	50%	inadequate
156.	Single (60) left and right	FSTC Awka	4	3	75%	inadequate
		GTC Onitsha	4	1	25%	inadequate
157.	45° cutter (left and right)	FSTC Awka	4	2	50%	inadequate
		GTC Onitsha	4	1	25%	inadequate
158.	Complete range of form cutters(concave and convex)	FSTC Awka	4	1	25%	inadequate
		GTC Onitsha	4	0	0%	inadequate
159.	30° single cutters (left and right)	FSTC Awka	4	0	0%	inadequate
		GTC Onitsha	4	0	0%	inadequate
160.	Universal boring heads	FSTC Awka	4	0	0%	inadequate

		GTC Onitsha	4	0	0%	inadequate
161.	Slot drills	FSTC Awka	2	3	150%	adequate
		GTC Onitsha	2	4	200%	adequate
162.	Face mill	FSTC Awka	2	4	200%	adequate
		GTC Onitsha	2	6	300%	adequate
	Milling Machines					
163.	Plain milling machine	FSTC Awka	2	6	300%	adequate
		GTC Onitsha	2	2	100%	adequate
164.	Vertical milling machine	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	2	100%	adequate
165.	Universal milling machine	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	1	50%	inadequate
	Accessories					
166.	Dividing head	FSTC Awka	2	4	200%	adequate
		GTC Onitsha	2	1	50%	inadequate
167.	Tail stock	FSTC Awka	2	4	200%	adequate
		GTC Onitsha	2	1	50%	inadequate
168.	Indexing plate	FSTC Awka	2	3	150%	adequate
		GTC Onitsha	2	0	0%	inadequate
169.	Collect chucks	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	1	50%	inadequate
170.	30mm dia arbors	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	2	100%	adequate
171.	Rotary table	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	2	100%	adequate
172.	Slotting attachment	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	3	150%	adequate
173.	Can milling attachments	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	8	400%	adequate
174.	Coolant pump	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	8	400%	adequate
175.	Milling clamps	FSTC Awka	2	4	200%	adequate
		GTC Onitsha	2	0	0%	inadequate
176.	Milling collars	FSTC Awka	2	6	300%	adequate
		GTC Onitsha	2	0	0%	inadequate
177.	Universal vice	FSTC Awka	2	8	400%	adequate
		GTC Onitsha	2	2	100%	adequate
178.	Vertical attachment	FSTC Awka	2	8	400%	adequate
		GTC Onitsha	2	1	50%	inadequate
179.	Medium parallel strips	FSTC Awka	2	8	400%	adequate
		GTC Onitsha	2	6	300%	adequate
	Drilling Machines					adequate
180.	Portable breast drill	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	3	150%	adequate
181.	Senstive drilling machine	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	2	100%	adequate
182.	Pillar drilling machine	FSTC Awka	2	0	0%	inadequate
		GTC Onitsha	2	1	50%	inadequate
183.	Radial drilling machine	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	4	200%	adequate
184.	Drilling machine vice	FSTC Awka	2	2	100%	adequate

		GTC Onitsha	2	3	150%	adequate
185.	Solid angle plate	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	2	100%	adequate
186.	Adjustable angle plate	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	1	50%	inadequate
187.	Drills (1mm dis – 6mm dia)	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	1	50%	inadequate
188.	Drills (6mm dia – 12mm dia)	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	4	200%	adequate
189.	Taper shank drills (13mm) diameter-40mm diameter (in steps of 0.5mm)	FSTC Awka	2	6	300%	adequate
		GTC Onitsha	2	3	150%	adequate
190.	Taper sleeves of all sizes	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	0	0%	inadequate
191.	Machine reamer 6mm dia to 25mm dia	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	4	200%	adequate
192.	Adjustable reamer	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	0	0%	inadequate
193.	Floating reamer	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	4	200%	adequate
194.	Small vee block	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	3	150%	adequate
195.	Large vee block	FSTC Awka	2	4	200%	adequate
		GTC Onitsha	2	2	100%	adequate
196.	Countersinking tool of different sizes	FSTC Awka	2	4	200%	adequate
		GTC Onitsha	2	2	100%	adequate
197.	Counterboring tools of different sizes	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	2	100%	adequate
198.	Parallel strips:- Medium size	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	1	50%	inadequate
199.	Large size	FSTC Awka	2	6	300%	adequate
		GTC Onitsha	2	0	0%	inadequate
200.	Jacob chuck	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	2	100%	adequate
201.	Jacob chuck key	FSTC Awka	2	4	200%	adequate
		GTC Onitsha	2	3	150%	adequate
202.	Boring bar micrometer	FSTC Awka	2	4	200%	adequate
		GTC Onitsha	2	0	0%	inadequate
	Planner					
203.	Planner	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	0	0%	inadequate
204.	Strap clamp	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	2	100%	adequate
205.	U clamp	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	2	100%	adequate
206.	G clamp	FSTC Awka	2	0	0%	inadequate

		GTC Onitsha	2	0	0%	inadequate
207.	T bolts	FSTC Awka	2	0	0%	inadequate
		GTC Onitsha	2	0	0%	inadequate
208.	Parallel strips – 12mm square to 50mm square	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	4	200%	adequate
209.	Solid shank cutting tools:	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	2	100%	adequate
210.	Left hand	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	2	100%	adequate
211.	Right hand	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	1	50%	inadequate
212.	Straight	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	2	100%	adequate
213.	Parting off	FSTC Awka	2	6	300%	adequate
		GTC Onitsha	2	3	150%	adequate
214.	Angle plate (solid & adjustable)	FSTC Awka	2	6	300%	adequate
		GTC Onitsha	2	0	0%	inadequate
215.	Oil can	FSTC Awka	2	4	200%	adequate
		GTC Onitsha	2	2	100%	adequate
216.	Grease gum	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	1	50%	inadequate
217.	Vernier height gauge	FSTC Awka	2	4	200%	adequate
		GTC Onitsha	2	1	50%	inadequate
218.	Vernier caliper (range 350mm)	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	2	100%	adequate
219.	Vice	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	4	200%	adequate
	Grinding Machine					
220.	Off-hand grinder	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	0	0%	inadequate
221	Portable grinder	FSTC Awka	2	2	100%	adequate
		GTC Onitsha	2	0	0%	inadequate
222	Surface grinder	FSTC Awka	2	1	50%	inadequate
		GTC Onitsha	2	0	0%	inadequate
223.	Cylindrical grinder	FSTC Awka	2	3	150%	adequate
		GTC Onitsha	2	0	0%	inadequate
			1972			

The analysis from Table 1 indicates that curriculum resources for the instruction of Mechanical trade students in technical colleges in Anambra State were generally inadequate available. Both FSTC and GTC Onitsha fell short of the NBTE minimum requirements for key human resources, including Mechanical technical teachers, technicians and workshop attendants. Finding shows, that most instructional tools, workshop equipment and machines required for fitting, turning, milling, drilling, shaping, planning and grinding operations were below the prescribed standards. Finding observes few resources were adequately in some areas, but majority of the assessed resources were inadequate.

Hypothesis

There is no significant difference in the proportions of adequacy of available curriculum resources for mechanical trade instruction between state and federal technical colleges in Anambra State, Nigeria.

Table 2: Summary of chi-square test of independence for adequacy of available curriculum resources and school type (federal Vs State)

	FSTC Awka	GTC Onitsha	
A	556	493	1049
NA	986	986	1972
	1542	1479	3021

	Federal	State	
A	535.438	513.562	1049
NA	1006.56	965.438	1972
	1542	1479	3021

	Federal	State	
A	0.78963	0.82327	1.6129
NA	0.42004	0.43793	0.85798
	1.20967	1.2612	2.47087

X^2	1.6129	
DF	1	
P-Value	0.20408	0.001

The analysis of Table 2 shows a chi- square test of independence to determine whether the adequacy of available curriculum resources for mechanical trade instruction differed by school type (federal versus State technical colleges). The result reveals no statistically significant association between school type and the adequacy of available curriculum resources, X2 (1, N= 3,021) =1.61, p=.204. Since the p=value exceeded the 0.5 significance level, the null hypothesis was not rejected.

DISCUSSION

The finding of the study on adequate availability of curriculum resources for the instructional delivery of mechanical trade students in technical colleges in Anambra State, Nigeria revealed generally inadequately available human and physical/material resources in both State and Federal owned technical colleges. According to NBTE minimum standard benchmark, each technical college is expected to have a total of 223 curriculum resources (human and physical) adequately available in right quantity for effective instructional delivery in the Mechanical trade. Thus, the data collected indicated that the available items across the colleges were grossly inadequate, hence significantly fall below NBTE benchmark. This is agreement with research findings of Osaghe and Irahor (2012) which reported that available resources fall below prescribed standards, while *Okoli et al*. (2023) reported gross inadequacies in workshop facilities. Also findings of Agbonghale and Adavbiele, (2018); Suleiman and Bamidele, (2023) which reported deficiencies and shortages of equipment, qualified staff, and adequate infrastructure in technical colleges. Also, Ubanwa (2023) found that only a few machines, such as drilling machines and swage blocks, were available, while the majority of required equipment did not meet the minimum standards set by the NBTE.

CONCLUSION

Based on the study's finding, it was concluded that adequate provision of curriculum resources will enable technical colleges to achieve the philosophy underlying their establishment.

RECOMMENDATIONS

Federal and State government should establish sustainable funding mechanism such as special intervention funds or public-private partnership (PPPs) to ensure consistent upgrade and maintenance of resources in technical colleges.

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