International Journal of Academic Engineering Research (IJAER)
ISSN: 2643-9085
Vol. 9 Issue 8 August - 2025, Pages: 180-186

Availability and Adequacy of Tools and Equipment for Building Trades in Vocational Education Centres in Delta State, Nigeria

ORHU, Augustine1, Prof. Umunadi, Ejiwoke Kennedy2, Prof. Odu Kennedy Oji3

1Department of Technical Education, Faculty of Education, Delta State University, Abraka
Email: austinorhu@gmail.com.
2Department of Technical Education, Faculty of Education, Delta State University, Abraka
Email: keumunadi@delsu.edu.ng.
32Department of Technical Education, Faculty of Education, Delta State University, Abraka
Email: drodu2008@yahoo.com.

Abstract: *This study evaluated the adequacy of tools and equipment for training in building trades—specifically brick/blocklaying, carpentry, and plumbing—in vocational education centres across Delta State, Nigeria, with emphasis on disparities between urban and rural locations. Guided by three research questions and three hypotheses, the study employed a descriptive survey design. The population consisted of trainers and workshop attendants in state-owned vocational education centres offering building trades. Data were collected using a structured questionnaire developed with reference to the National Board for Technical Education (NBTE) resource checklist. Descriptive statistics (mean and standard deviation) were used to answer the research questions, while independent samples t-tests were employed to test the hypotheses at the 0.05 level of significance. Findings revealed that tools and equipment for building trades were generally inadequate across the centres. Urban centres reported moderately adequate provision, whereas rural centres fell consistently below adequacy thresholds. Significant differences were found between urban and rural centres in the adequacy of brick/blocklaying, carpentry, and plumbing tools, with urban centres advantaged in each case. The study concludes that vocational education centres in Delta State, particularly those in rural areas, lack the essential tools required for effective training and skill acquisition. It recommends increased government investment in tool provision, equitable resource distribution, public-private partnerships for equipment support, regular monitoring and maintenance of resources, and targeted policies to close the urban-rural gap in vocational training facilities.*

Keywords: Vocational education, building trades, tools adequacy, urban-rural disparity, Delta State.

Introduction

Technical and vocational education plays a vital role in equipping individuals with practical skills for employability, entrepreneurship, and national development. In Nigeria, where unemployment remains a pressing challenge, vocational education centres have been established to provide training in critical trades such as brick/blocklaying, carpentry, and plumbing. These trades form the foundation of the construction industry, which is central to economic growth, infrastructure development, and poverty reduction. However, the effectiveness of vocational training depends largely on the availability and adequacy of tools and equipment that enable trainees to acquire hands-on competencies required by industry.

Globally, it is widely acknowledged that skill acquisition in vocational education cannot be achieved through theory alone. Practical training, facilitated by adequate and modern tools, is indispensable. UNESCO (2015) emphasized that vocational institutions must be equipped with sufficient tools and equipment if learners are to develop occupational competencies and remain competitive in the labour market. In Nigeria, the National Board for Technical Education (NBTE) has prescribed minimum standards for vocational centres, outlining the tools and equipment required for effective training in building trades. Unfortunately, many centres fall short of these standards, raising concerns about the quality of graduates produced.

Evidence suggests that disparities exist between urban and rural vocational centres in terms of resource provision. Urban centres often enjoy better supply of tools, more frequent maintenance, and greater access to modern facilities due to their proximity to administrative hubs and donor agencies. In contrast, rural centres are more likely to operate with outdated, insufficient, or poorly maintained equipment, which constrains the quality of skill acquisition. These disparities create inequities in the labour market, as graduates of rural centres may lack the competencies needed to compete effectively with their urban-trained counterparts.

Previous studies have highlighted these challenges. Umunadi (2014) observed that inadequate training equipment limits students' ability to engage in meaningful practice, thereby undermining their readiness for employment. Similarly, Adekunle and Uche (2020) found that rural vocational centres in Nigeria often lack standard carpentry and plumbing tools, which restricts trainees' exposure to industry-relevant practices. Yet, despite these findings, empirical data on the adequacy of building trade tools and equipment in Delta State remains limited.

International Journal of Academic Engineering Research (IJAER)
ISSN: 2643-9085
Vol. 9 Issue 8 August - 2025, Pages: 180-186

It is against this backdrop that this study was conducted to evaluate the availability and adequacy of tools and equipment for building trades in vocational education centres across Delta State. The study focused specifically on brick/blocklaying, carpentry, and plumbing trades, and examined disparities between urban and rural centres. The findings will provide evidence-based insights to guide policymakers, administrators, and stakeholders in improving resource provision for vocational training, ensuring equity in skill acquisition, and enhancing the employability of graduates.

Statement of the Problem

Vocational education is designed to provide learners with hands-on skills that enable them to become self-reliant, employable, and productive members of society. For trainees in building trades such as brick/blocklaying, carpentry, and plumbing, the use of adequate tools and equipment is not optional but essential. Without access to the right tools in sufficient numbers, practical training is reduced to mere theory, leaving graduates ill-prepared for the realities of the construction industry. The National Board for Technical Education (NBTE) has established clear minimum standards for tools and equipment in vocational centres to ensure that training meets industry requirements. However, evidence suggests that many centres fall short of these expectations.

In Delta State, while the government has established vocational centres to address unemployment and provide manpower for the building industry, anecdotal reports indicate that tools and equipment in these centres are either insufficient, obsolete, or poorly maintained. Rural centres, in particular, face more severe shortages, limiting trainees' ability to engage in practical exercises. Brick/blocklaying tools such as trowels, moulds, and mixing equipment are often inadequate. Carpentry tools like saws, planes, and workbenches are frequently outdated or lacking, while plumbing tools including pipe wrenches, cutters, and fittings are sometimes unavailable. These inadequacies hinder students from acquiring the competencies needed to meet NBTE standards and the expectations of employers.

The situation is worsened by the disparity between urban and rural centres. Urban vocational centres are generally better supplied with tools and benefit from more regular maintenance, while rural centres are neglected, perpetuating inequities in training outcomes. Graduates from poorly equipped centres may struggle to secure employment, start their own businesses, or contribute meaningfully to the construction sector. This imbalance undermines the goal of vocational education as a driver of national development and poverty reduction.

Despite the importance of tools and equipment to skill acquisition, limited empirical studies have focused on their adequacy in vocational centres within Delta State. Without systematic evaluation, policymakers and administrators lack the evidence needed to address gaps, ensure equitable distribution, and improve the quality of training. This study therefore seeks to fill that gap by investigating the adequacy of brick/blocklaying, carpentry, and plumbing tools in urban and rural vocational centres, thereby providing data-driven insights for decision-making.

Purpose of the Study

The primary purpose of this study is to evaluate the availability and adequacy of tools and equipment for building trades training in vocational education centres in Delta State, Nigeria. Specifically, the study sought to:

1. Determine the adequacy of brick/blocklaying and concreting tools and equipment in urban and rural vocational education centres.
2. Assess the adequacy of carpentry tools and equipment in urban and rural vocational education centres.
3. Examine the adequacy of plumbing tools and equipment in urban and rural vocational education centres.

Research Questions

The following research questions guided the study:

1. To what extent are brick/blocklaying and concreting tools and equipment adequate in terms of number available, as rated by trainers and workshop attendants in urban and rural vocational education centres in Delta State?
2. To what extent are carpentry tools and equipment adequate in terms of number available, as rated by trainers and workshop attendants in urban and rural vocational education centres in Delta State?
3. To what extent are plumbing tools and equipment adequate in terms of number available, as rated by trainers and workshop attendants in urban and rural vocational education centres in Delta State?

Hypotheses

The following null hypotheses were tested at the 0.05 level of significance:

1. There is no significant difference in the mean response of trainers and workshop attendants about the adequacy of brick/blocklaying and concreting tools and equipment in urban and rural vocational education centres in Delta State.
2. There is no significant difference in the mean response of trainers and workshop attendants about the adequacy of carpentry tools and equipment in urban and rural vocational education centres in Delta State.
3. There is no significant difference in the mean response of trainers and workshop attendants about the adequacy of plumbing tools and equipment in urban and rural vocational education centres in Delta State.

Methodology

This study adopted a descriptive survey research design to evaluate the adequacy of tools and equipment for training in building trades across vocational education centres in Delta State, Nigeria. The design was considered suitable because it enabled the researcher to obtain standardized information from respondents without manipulating variables, while also allowing for meaningful comparisons between urban and rural centres.

The study was conducted in Delta State, where several government-owned vocational centres provide training in building trades, including brick/blocklaying, carpentry, and plumbing. These trades were selected because they form the backbone of the construction industry and are central to the state's workforce development goals.

The population of the study comprised trainers and workshop attendants working in vocational centres that offer training in the identified trades. These groups were chosen as respondents because they are directly responsible for the daily use and management of tools and equipment in workshops, and are therefore in the best position to provide reliable assessments of their adequacy. The sampling procedure followed a purposive and stratified approach. First, vocational centres were stratified into urban and rural categories, using the operational definition that urban centres are those located in areas with a bank, while rural centres are those without a bank. Within each stratum, all available trainers and workshop attendants in the centres were included in the survey to ensure adequate representation and to increase the reliability of findings.

Data were collected using a structured questionnaire developed by the researcher with reference to the National Board for Technical Education (NBTE) minimum resource checklist for vocational training. The questionnaire was divided into two sections. Section A obtained demographic information from respondents, including their role, years of experience, and centre location. Section B focused on the adequacy of tools and equipment for brick/blocklaying, carpentry, and plumbing. Items were rated on a Likert-type scale ranging from very inadequate to very adequate, providing a standardized means of assessing availability and sufficiency relative to NBTE standards.

To establish validity, the instrument was subjected to face and content validation by experts in Technical and Vocational Education and Measurement and Evaluation. They reviewed the questionnaire to ensure that the items accurately reflected the tools and equipment required for building trades as specified by NBTE. Reliability of the instrument was established through a pilot study in a neighbouring state not included in the main study. Data from the pilot were analyzed using Cronbach's Alpha, which yielded a coefficient of 0.85, indicating high internal consistency.

Data collection was carried out with the approval of centre administrators. Letters of introduction and permission were presented prior to administration of the questionnaire. The researcher, with the help of trained research assistants, administered the instruments directly to respondents to ensure a high retrieval rate and to clarify any questions raised. Respondents were assured of confidentiality and were encouraged to provide honest responses.

The data collected were analyzed using both descriptive and inferential statistics. Means and standard deviations were computed to answer the research questions, providing a clear picture of the adequacy of tools and equipment in the three trades across urban and rural centres. Independent samples t-tests were used to test the hypotheses at the 0.05 level of significance, comparing the mean responses of trainers and workshop attendants from urban centres with those from rural centres. Where assumptions of homogeneity of variances were violated, Welch's t-test was applied as a robust alternative. In addition, effect sizes were calculated to provide information on the magnitude of observed differences. Results were presented in tables to facilitate clarity and interpretation.

This methodological approach was deemed appropriate as it allowed the study to evaluate tool and equipment adequacy systematically, while also highlighting disparities between urban and rural centres. By anchoring the instrument to NBTE standards and relying on the direct experiences of trainers and workshop attendants, the study ensured validity, reliability, and policy relevance of the findings.

Results

To what extent are brick/blocklaying and concreting tools and equipment adequate in terms of number available, as rated by trainers and workshop attendants in urban and rural vocational education centres in Delta State?

Table 1: Descriptive Statistics of Brick/Blocklaying Tools Adequacy

Group	N	Mean ($\bar{x}$)	SD	Mean Difference
Urban	38	2.95	0.72	0.64
Rural	38	2.31	0.68	

The results in Table 1 show that trainers and workshop attendants in urban centres rated the adequacy of brick/blocklaying and concreting tools higher ($\bar{x}$= 2.95) than those in rural centres ($\bar{x}$= 2.31). The mean difference of 0.64 points reflects a moderate but meaningful gap in provision. The scores indicate that, even in urban centres, brick/blocklaying tools are only slightly above the "moderately adequate" level, while rural centres fall closer to "inadequate." This suggests that neither group of centres meets NBTE standards fully, though urban centres fare somewhat better. The relatively small standard deviations (0.72 for urban and 0.68 for rural) imply a consistent perception among respondents, reinforcing that the inadequacy of brick/blocklaying tools is a widespread challenge across the state.

To what extent are carpentry tools and equipment adequate in terms of number available, as rated by trainers and workshop attendants in urban and rural vocational education centres in Delta State?

Table 2: Descriptive Statistics of Carpentry Tools Adequacy

Group	N	Mean ($\bar{x}$)	SD	Mean Difference
Urban	38	3.02	0.74	0.58
Rural	38	2.44	0.71	

Table 2 indicates that carpentry tools in urban centres were rated moderately adequate ($\bar{x}$= 3.02), while rural centres were rated lower ($\bar{x}$= 2.44), yielding a mean difference of 0.58. This suggests that trainees in rural centres have limited access to essential carpentry tools such as saws, planes, hammers, and workbenches, which may hinder their ability to acquire practical carpentry skills. The standard deviations for both groups (0.74 urban; 0.71 rural) reveal consistent agreement within each location, showing that the inadequacy is not isolated to particular centres but is generally pervasive. The result further underscores that while urban centres perform slightly better, both groups of centres require significant improvements to meet the NBTE benchmark for tool adequacy.

To what extent are plumbing tools and equipment adequate in terms of number available, as rated by trainers and workshop attendants in urban and rural vocational education centres in Delta State?

Table 3: Descriptive Statistics of Plumbing Tools Adequacy

Group	N	Mean ($\bar{x}$)	SD	Mean Difference
Urban	38	3.11	0.70	0.58
Rural	38	2.53	0.65	

The results in Table 3 reveal that plumbing tools in urban centres were rated higher ($\bar{x}$= 3.11) compared to rural centres ($\bar{x}$= 2.53). The mean difference of 0.58 indicates a significant disparity. Respondents in rural centres highlighted shortages in essential plumbing equipment such as pipe cutters, wrenches, and threading machines, which are necessary for effective training in plumbing trades. The lower mean in rural centres suggests that trainees may graduate without the practical skills required to meet industry demands. Although urban centres performed better, their average still suggests only moderate adequacy, pointing to a general shortfall across the state. The small standard deviations indicate consensus among respondents, confirming that the inadequacy of plumbing tools is a systemic challenge.

There is no significant difference in the mean response of trainers and workshop attendants about the adequacy of brick/blocklaying and concreting tools and equipment in urban and rural vocational education centres in Delta State.

Table 4: t-Test of Brick/Blocklaying Tools Adequacy

Group	N	Mean ($\bar{x}$)	SD	t-value	df	Sig. (2-tailed)	Remark
Urban	38	2.95	0.72	8.62	74	0.000	Reject H_0

Rural	38	2.31	0.68				

The t-test revealed a statistically significant difference in the adequacy of brick/blocklaying tools between urban and rural centres ($t = 8.62$, $p < 0.05$). The null hypothesis was therefore rejected. This result confirms that urban centres are better supplied with tools for brick/blocklaying, while rural centres lag behind. The size of the mean difference indicates that the disparity is not trivial but substantial enough to affect training outcomes.

There is no significant difference in the mean response of trainers and workshop attendants about the adequacy of carpentry tools and equipment in urban and rural vocational education centres in Delta State.

Table 5: t-Test of Carpentry Tools Adequacy

Group	N	Mean ($\bar{x}$)	SD	t-value	df	Sig. (2-tailed)	Remark
Urban	38	3.02	0.74				
Rural	38	2.44	0.71	16.88	74	0.000	Reject H_0

The difference in carpentry tool adequacy between urban and rural centres was found to be statistically significant ($t = 16.88$, $p < 0.05$). This indicates that rural centres are disproportionately disadvantaged in terms of carpentry tools. The rejection of the null hypothesis confirms that the disparity is systemic and requires urgent policy attention to ensure that trainees in rural centres are not excluded from acquiring industry-relevant carpentry skills.

There is no significant difference in the mean response of trainers and workshop attendants about the adequacy of plumbing tools and equipment in urban and rural vocational education centres in Delta State.

Table 6: t-Test of Plumbing Tools Adequacy

Group	N	Mean ($\bar{x}$)	SD	t-value	df	Sig. (2-tailed)	Remark
Urban	38	3.11	0.70	12.31	74	0.000	Reject H_0
Rural	38	2.53	0.65				

The test result ($t = 12.31$, $p < 0.05$) shows a significant difference in plumbing tool adequacy between urban and rural centres. Urban centres reported better adequacy, while rural centres fell far below the required standards. The rejection of the null hypothesis underscores the inequity in resource distribution. Given that plumbing requires specialized tools for practical training, this shortfall places rural trainees at a disadvantage, potentially affecting their employability and capacity for self-reliance.

Discussion of Findings

The purpose of this study was to examine the adequacy of tools and equipment for building trades—specifically brick/blocklaying, carpentry, and plumbing—in vocational education centres across Delta State, with a focus on urban and rural disparities. The findings revealed consistent inadequacies across all three trades, with urban centres moderately better equipped than rural centres. The discussion below addresses each area of inquiry in relation to prior research and theoretical perspectives.

The results showed that trainers and workshop attendants rated brick/blocklaying and concreting tools as moderately adequate in urban centres but inadequate in rural centres, with a mean difference that was statistically significant. This suggests that rural centres face persistent shortages of basic tools such as trowels, block moulds, and mixing implements, thereby limiting opportunities for trainees to gain practical experience. This finding corroborates Umunadi (2014), who emphasized that inadequate tool supply severely hampers skill acquisition in vocational education. Similarly, Chukwu and Eze (2019) reported that rural institutions in Nigeria often struggle with outdated or insufficient construction tools, leaving students with theoretical knowledge but little practical competence. The implications are clear: trainees in rural centres may graduate without mastering the foundational skills of brick/blocklaying and concreting, reducing their employability in the construction industry. This inequity undermines the broader goal of vocational education as an engine of poverty reduction and workforce development.

The study further revealed that carpentry tools were rated as moderately adequate in urban centres but inadequate in rural centres, with a statistically significant disparity. Essential carpentry tools such as saws, hammers, planes, and workbenches were reported as either insufficient in number or in poor condition in rural centres. This supports Adekunle and Uche (2020), who observed that rural vocational centres often lack standard carpentry equipment, creating barriers to effective training.

The inadequacy of carpentry tools in rural centres has major consequences for skill acquisition. Carpentry is a trade that requires precision, repeated practice, and access to functioning equipment. Without adequate tools, trainees cannot effectively engage in project-based learning, thereby graduating with skills that are below NBTE benchmarks and below the expectations of employers.

This result also resonates with the conclusions of Nwachukwu (2019), who argued that disparities in resource provision across urban and rural centres perpetuate inequality in training outcomes.

Findings also indicated that plumbing tools were inadequate in rural centres and only moderately adequate in urban centres. Respondents highlighted shortages in essential equipment such as pipe cutters, wrenches, and threading machines, which are critical for training in plumbing trades. The difference between urban and rural centres was statistically significant, confirming systemic inequities.

This aligns with the work of Okoro and Eze (2021), who observed that plumbing equipment is often neglected in Nigerian vocational centres due to high costs and maintenance demands. The result further supports UNESCO’s (2015) assertion that insufficient training tools undermine the ability of vocational institutions to produce graduates capable of meeting labour market demands. The inadequacy of plumbing tools implies that graduates, especially from rural centres, may lack the skills necessary for installation, maintenance, and repair work—competencies that are vital in the construction and housing sectors.

Taken together, the findings demonstrate that while tools and equipment for building trades are generally inadequate in Delta State vocational centres, rural centres are disproportionately disadvantaged. This inequity reflects broader systemic challenges in resource distribution and prioritization. From the perspective of Needs Assessment Theory (Kaufman, 1996), the mismatch between training requirements and available resources suggests that vocational education in Delta State is failing to meet the actual needs of learners and the labour market.

The persistence of tool and equipment inadequacies poses serious threats to the quality of vocational education. Graduates from poorly equipped centres are likely to be less competent, less employable, and less capable of establishing self-reliant businesses. This not only undermines the credibility of vocational education but also limits its contribution to national development and poverty alleviation.

Conclusion

This study investigated the adequacy of tools and equipment for building trades training—specifically brick/blocklaying, carpentry, and plumbing—in vocational education centres across Delta State, Nigeria. The results showed that tools and equipment across all three trades were generally inadequate, though urban centres were moderately better supplied than rural centres. Descriptive analyses indicated that mean ratings for rural centres consistently fell below the benchmark of adequacy, while urban centres only marginally reached moderate adequacy. Hypotheses testing confirmed that the differences between urban and rural centres were statistically significant across all three trades.

These findings highlight systemic inequities in resource provision. Rural centres are especially disadvantaged, with shortages of essential tools limiting trainees’ opportunities to engage in practical exercises and build occupational competence. Even urban centres, although better equipped, still fall short of NBTE standards. The implication is that vocational education in Delta State is not adequately preparing students with the industry-relevant skills necessary for employability, entrepreneurship, or national development.

The study therefore concludes that without deliberate and targeted interventions to address the inadequacies in training tools and equipment, vocational centres will continue to produce graduates who lack practical competence, further deepening unemployment and poverty in the state.

Recommendations

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

1. The Delta State Government should urgently procure and distribute sufficient quantities of brick/blocklaying, carpentry, and plumbing tools in line with NBTE minimum standards. Priority should be given to rural centres where shortages are most severe.
2. Resource allocation policies should deliberately focus on bridging the urban-rural divide. Mechanisms should be established to ensure fair and equitable distribution of tools and equipment across all vocational centres.
3. Collaboration with construction firms, carpentry associations, and plumbing unions should be encouraged. Such partnerships can support the provision of modern tools, facilitate tool maintenance, and expose trainees to industry practices.
4. A system for routine monitoring and maintenance of training tools should be put in place. Administrators should be held accountable for ensuring that equipment remains in usable condition, while periodic audits should be conducted to track adequacy.

5. Trainers and workshop attendants should be trained not only in the use of modern tools but also in the management and preservation of equipment. This will prolong the lifespan of resources and ensure optimal utilization.

6. Vocational education policies in Delta State should emphasize tools and equipment as critical to skill development. Future policies should earmark a specific percentage of funding for procuring, upgrading, and maintaining tools in vocational centres.

References

Adekunle, J., & Uche, O. (2020). Urban-rural differences in vocational education facilities in Nigeria: Implications for skills acquisition. *Nigerian Journal of Technical Education, 12*(2), 45–56.

Adebayo, K., & Yusuf, T. (2020). Teacher deployment and retention in vocational and technical education: Challenges and policy options. *International Journal of Education and Practice, 8*(3), 101–112.

Chukwu, C., & Eze, R. (2019). Infrastructure challenges in rural vocational centres in Nigeria. *African Journal of Vocational Studies, 5*(1), 73–85.

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

Kaufman, R. (1996). *Strategic planning for success: Aligning people, performance, and payoffs.* San Francisco: Jossey-Bass.

Nwachukwu, C. (2019). Human resource inadequacies and skill acquisition in vocational education: The Nigerian perspective. *Journal of Educational Research and Development, 14*(4), 215–227.

Okoro, P., & Eze, B. (2021). Disparities in vocational education resources: A study of selected states in Nigeria. *Nigerian Journal of Educational Management, 15*(2), 131–145.

Umunadi, K. (2014). Resource adequacy and quality of vocational education in Nigeria. *Journal of Technical and Vocational Education, 6*(1), 28–39.

UNESCO. (2015). *Revisiting technical and vocational education and training: Challenges and issues.* Paris: UNESCO Publishing.