

Resource Scarcity and Pedagogical Practice in Sierra Leone's Government Technical Institutions: Evidence from a Multi-Site Survey

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Abstract:

➤ Background:

Government technical institutions are expected to translate education investment into occupational competence, yet this conversion depends on material resources as well as instructional capacity.

➤ Objective:

This article examined perceived resource adequacy, institutional support and pedagogical practice in selected government technical institutions in Sierra Leone.

➤ Methods:

A cross-sectional, multi-site survey was conducted in ten institutions across the Eastern, Northern and Southern regions. Of 200 questionnaires distributed, 172 were returned (86.0%). Respondents comprised 120 students, 40 instructors and 12 administrators. Five-point Likert items and a categorical teaching-method item were analysed using frequencies, percentages, means and sample standard deviations.

➤ Results:

Teaching and learning resources were rated low ($M = 2.35$, $SD = 1.29$), as were workshops and equipment ($M = 2.16$, $SD = 1.14$) and institutional support and funding ($M = 2.12$, $SD = 1.15$). In contrast, instructor qualification and pedagogical practice received a moderate rating ($M = 3.42$, $SD = 1.33$). Lecture-based instruction was the most frequently reported method (39.5%), exceeding practical or demonstration methods (30.2%), group work (22.1%) and other approaches (8.1%). Student motivation was also moderate ($M = 3.30$, $SD = 1.28$).

➤ Conclusion:

The findings reveal an input-process mismatch: comparatively positive human capacity operates within materially constrained institutions. Sustainable improvement therefore requires coordinated investment in workshops, equipment, consumables and maintenance, coupled with professional development that enables competency-based and practice-intensive instruction. The results are descriptive and should not be interpreted as causal or nationally representative.

Keywords: Technical and Vocational Education and Training; Government Technical Institutions; Instructional Resources; Workshop Facilities; Pedagogical Practice; Sierra Leone.

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I. INTRODUCTION

Technical and Vocational Education and Training (TVET) occupies a strategic position between education policy and productive employment. Its distinctive promise is

not simply that learners will know about a trade, but that they will be able to perform occupational tasks safely, accurately and adaptively. UNESCO's Recommendation concerning TVET therefore treats quality, relevance, governance, stakeholder participation and work-based learning as

mutually reinforcing features of an effective system (UNESCO, 2015). The African Union's current continental strategy similarly connects TVET with employability, social justice and sustainable development (African Union Commission, 2025).

That promise is especially important in Sierra Leone, where human-capital development and youth employability remain central national priorities. The National TVET Policy calls for a system that is relevant, flexible, effective, efficient, accessible and sustainable (Government of Sierra Leone, 2019). The World Bank's human-capital review also emphasizes high-impact investment in youth skills and employability, better workforce management and stronger implementation capacity (World Bank, 2024). These ambitions place government technical institutions (GTIs) at the centre of national efforts to build a skilled labour force for construction, engineering, agriculture, mining, manufacturing and related sectors.

Policy ambition, however, does not automatically produce effective learning. Technical competence depends on an instructional ecology in which competent instructors, appropriate pedagogy, current tools, safe workshops, consumables, reliable utilities, assessment and institutional leadership work together. Unlike subjects that can be delivered largely through text and explanation, much of TVET requires repeated demonstration, supervised practice, troubleshooting and feedback using equipment that resembles the workplace. Where these inputs are weak, instructors may be compelled to explain practical tasks that learners have insufficient opportunity to perform.

Evidence from other African settings shows that the problem is not unique to Sierra Leone. Studies in Nigeria have linked inadequate facilities and underused instructional resources with weaker teaching and learning conditions (Edokpolor & Dumbiri, 2019; Oviawe et al., 2019). Okolie et al. (2019) found that shortages of equipment, funding and government support affected workshop management and graduate outcomes in technical colleges. In Zambia, Mutale and Chileshe (2020) similarly reported shortages of appropriate modern workshop equipment, learning materials and effective industrial attachment. These studies establish resource adequacy as a persistent regional concern, but they do not substitute for context-specific evidence from Sierra Leone's government institutions.

The present article addresses that need by analysing the strongest and most complete quantitative evidence contained in a wider thesis on teaching and learning effectiveness in GTIs. It deliberately narrows the scope to institutional resources and pedagogical practice because the available dataset directly measures these domains. It does not claim to estimate the independent effect of technology or to test a causal relationship between institutional support and competency acquisition, since the data required for such claims were not available.

The article asks three connected questions: How adequate are teaching resources, workshops, equipment,

institutional support and funding perceived to be? How are instructor qualification and pedagogical practice rated, and which instructional methods predominate? What do the observed patterns imply for competency-based TVET policy and institutional improvement in Sierra Leone?

II. CONCEPTUAL AND EMPIRICAL FRAMING

➤ *Teaching Effectiveness in Practice-Oriented Education*

Teaching effectiveness is commonly understood as the extent to which instruction enables learners to achieve intended outcomes. In TVET, those outcomes are inherently multidimensional: conceptual understanding must be integrated with procedural accuracy, tool use, safety, problem-solving, work habits and the ability to transfer learning to authentic tasks. Constructive alignment is useful here because it requires intended outcomes, learning activities and assessment to reinforce one another (Biggs & Tang, 2011). If practical competence is an intended outcome, practical activity cannot remain peripheral to instruction.

The distinction between instructor capacity and the conditions under which that capacity is exercised is equally important. A qualified instructor may possess strong subject knowledge and pedagogical judgement, yet still be unable to provide adequate practice when equipment is unavailable, classes are crowded or consumables are exhausted. Teaching effectiveness is therefore not reducible to teacher quality alone. It is jointly produced by people, material resources, organizational routines and institutional support.

➤ *A Systems Interpretation of TVET Delivery*

General systems theory provides a parsimonious framework for interpreting this interaction (von Bertalanffy, 1968). Institutional inputs include finance, workshops, equipment, materials, electricity, staffing and policy support. Instructional processes include demonstration, guided practice, group work, assessment and feedback. Outputs include knowledge, practical competence, completion, employability and productive participation. Weakness at one point in the system can alter what is feasible elsewhere; a shortage of machines, for example, may shift instruction from supervised practice toward lecture even when instructors understand the value of practical work.

This framing does not assume that resources automatically improve outcomes. Equipment that is obsolete, poorly maintained, unsafe, inaccessible or disconnected from curriculum may contribute little. What matters is the conversion of resources into structured opportunities to learn. The analytical interest of this study therefore lies in the relationship between perceived institutional inputs and the reported instructional processes that occur within them.

III. METHODS

➤ *Design and Setting*

This article reports the quantitative survey component of a broader study designed under a pragmatic orientation. For the present analysis, the design is best described as a cross-sectional, descriptive, multi-site survey. Data were

collected from ten selected GTIs in the Eastern, Northern and Southern regions of Sierra Leone, providing variation across institutional and geographic contexts. Because the available article dataset consists of aggregated questionnaire frequencies, the analysis focuses on description and comparison rather than causal inference.

➤ *Population, Sampling and Achieved Sample*

The wider study population comprised students, technical instructors, heads of department, institutional leaders and relevant officials. The original sampling plan used stratified and simple random procedures for students and instructors and purposive or census approaches for leadership and specialist respondents. Although the plan identified a larger target, fieldwork constraints limited questionnaire distribution to 200 individuals. A total of 172 usable questionnaires were returned, producing an 86.0% response rate. The achieved sample comprised 120 students (69.8%), 40 instructors (23.3%) and 12 administrators (7.0%).

➤ *Instrument and Variables*

The structured questionnaire covered demographic characteristics, institutional conditions, pedagogical practice, technology, learner factors and overall teaching and learning effectiveness. The items analysed in this article used a five-point response scale ranging from 1 (strongly disagree) to 5 (strongly agree). The focal institutional variables were the adequacy of teaching and learning resources, workshops and equipment, and institutional support and funding. Pedagogical variables covered instructor qualification and practice, together with the predominant method of instruction. Student attitudes and motivation were retained as a contextual indicator of learner engagement. The study protocol records expert review and piloting in a GTI outside the main sample before field administration.

➤ *Data Analysis*

Questionnaire data were processed in SPSS version 26. Frequencies and percentages describe respondent characteristics and response distributions. Weighted item means were calculated using values of 5 to 1 from strongly agree to strongly disagree. Sample standard deviations in this article were reconstructed from the reported frequency distributions. Mean scores were interpreted using the study's prespecified bands: very low (1.00-1.49), low (1.50-2.49), moderate (2.50-3.49), high (3.50-4.49) and very high (4.50-5.00). No correlations, regressions or significance tests are reported because individual-level raw data were not available for reanalysis.

➤ *Ethical Considerations*

Ethical clearance was obtained from Njala University before data collection. Permission was also sought from the relevant authorities and participating institutions. Respondents received information about the study, participation was voluntary, and informed consent was obtained. Questionnaires did not require names, interview and survey information was treated confidentially, and participants could withdraw without penalty.

IV. RESULTS

➤ *Respondent Profile*

Men represented 60.5% of respondents and women 39.5%. Half of the sample was aged 18-25 years, reflecting the predominance of students, while 19.8% was aged 36 years or older. Table 1 presents the full profile available in the thesis dataset.

Table 1 Demographic Characteristics of Respondents (N = 172)

Characteristic	Category	n	%
Gender	Male	104	60.5
	Female	68	39.5
Age group	18-25 years	86	50.0
	26-35 years	52	30.2
	36-45 years	24	14.0
	46 years and above	10	5.8
Respondent category	Students	120	69.8
	Instructors	40	23.3
	Administrators	12	7.0

Source: Field Survey (2024). Percentages May not Total Exactly 100 Because of Rounding.

➤ *Institutional and Human-Factor Ratings*

All three institutional indicators fell within the low band. Only 23.3% of respondents agreed or strongly agreed that teaching and learning resources were adequate, compared with 66.3% who disagreed or strongly disagreed. The deficit was more pronounced for workshops and equipment: 16.9% gave a positive response and 74.4% a negative response. Institutional support and funding received the weakest rating, with only 15.7% positive responses and 75.0% negative responses.

The pattern differed for human factors. Instructor qualification and pedagogical practice produced the highest mean in the analysed dataset ($M = 3.42$, $SD = 1.33$); 58.1% of respondents rated the item positively. Student attitudes and motivation were also moderate ($M = 3.30$, $SD = 1.28$), with 51.7% positive responses. These results show a descriptive contrast between weak material and financial inputs and comparatively stronger ratings for instructors and learners.

Table 2 Ratings of Institutional Resources, Pedagogical Practice and Student Motivation (N = 172)

Indicator	Positive %	Neutral %	Negative %	Mean	SD	Band
Teaching and learning resources	23.3	10.5	66.3	2.35	1.29	Low
Workshops and equipment	16.9	8.7	74.4	2.16	1.14	Low
Institutional support and funding	15.7	9.3	75.0	2.12	1.15	Low
Instructor qualification and pedagogical practice	58.1	12.8	29.1	3.42	1.33	Moderate
Student attitudes and motivation	51.7	16.3	32.0	3.30	1.28	Moderate

Note: Positive = agree or strongly agree; negative = disagree or strongly disagree. Means use a 1-5 scale.

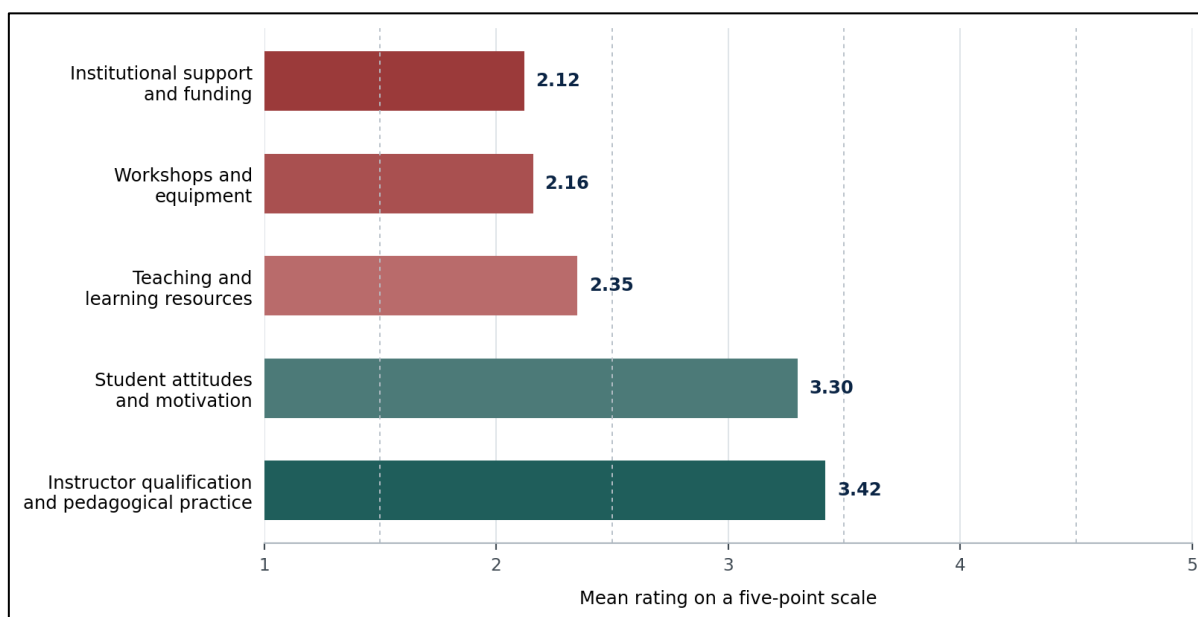


Fig 1 Mean-Rating Profile of the Five Reported Indicators. Dashed Lines Mark the Study's Interpretation Thresholds.

➤ Predominant Teaching Methods

Lecture was the most frequently reported teaching method (39.5%). Practical or demonstration methods accounted for 30.2%, group work for 22.1%, and other methods for 8.1%. Thus, practical instruction was present but did not predominate, despite the occupational and competency-based mandate of TVET.

Table 3 Predominant Teaching Methods Reported by Respondents (N = 172)

Teaching method	n	%
Lecture	68	39.5
Practical/demonstration	52	30.2
Group work	38	22.1
Other methods	14	8.1
Total	172	100.0

Source: Field Survey (2024).

V. DISCUSSIONS

➤ An Input-Process Mismatch

The central finding is not merely that respondents expressed dissatisfaction with resources. It is that every measured institutional input was rated low while instructor practice and student motivation remained moderate. The most acute weakness was institutional support and funding (M = 2.12), closely followed by workshops and equipment (M = 2.16). In a TVET system, these are not peripheral amenities. They determine whether curricula can be enacted through observation, guided repetition, supervised error correction and realistic assessment.

The result is consistent with evidence from Nigeria, where inadequate physical facilities and resource use constrained vocational education (Edokpolor & Dumbiri, 2019), and where workshop outcomes were linked to equipment, funding and government support (Okolie et al., 2019). It also accords with findings from Zambia that training institutions lacked appropriate modern workshop equipment and adequate learning resources (Mutale & Chileshe, 2020). The convergence across contexts suggests that institutional resourcing is a recurrent implementation problem in African TVET, although the present study contributes a specifically Sierra Leonean account.

➤ *Resource-Constrained Pedagogy*

The moderate rating for instructor qualification and pedagogical practice is encouraging, but it should not be read in isolation from the method profile. Lecture accounted for 39.5% of the reported approaches, compared with 30.2% for practical or demonstration methods. One plausible interpretation is that instructors possess useful professional capacity but work within environments that limit practice-intensive delivery. The survey design cannot prove that resource shortages caused lecture dominance, yet the two patterns are educationally coherent and consistent with a systems explanation.

This distinction matters for policy. Professional development alone cannot solve a shortage of functioning machines, just as new equipment alone cannot improve learning if staff are not prepared to integrate it into sequenced tasks, feedback and assessment. Effective reform must connect material investment with pedagogical use. Oviawe et al. (2019) similarly emphasize that provision and maintenance belong together; the usable life and instructional value of facilities depend on management routines, not only procurement.

➤ *Learner Motivation as Resilience, Not Compensation*

Student motivation received a moderate mean of 3.30 even though institutional support was rated low. This may indicate resilience and continuing demand for technical skills among learners. It would be a mistake, however, to treat motivation as a substitute for investment. Motivated students still require access to tools, safe workshops, materials and sufficient practice time if motivation is to become occupational competence.

The result should also be interpreted cautiously. Motivation and institutional support were not linked through respondent-level correlation or regression in the available dataset. The study therefore establishes coexisting descriptive patterns, not a tested relationship. Future research should determine whether motivation moderates the association between resources, instructional exposure and competency outcomes.

➤ *Implications for Sierra Leone's TVET Reform Agenda*

The findings support a shift from episodic procurement toward a managed instructional-resource system. A credible system would establish minimum programme-specific standards for workshop space, safety, tools, student-to-equipment ratios, consumables, power supply, maintenance and replacement. Accreditation should examine whether resources are functional and routinely used, not simply whether they appear on an inventory.

Funding arrangements also require attention to recurrent costs. Capital equipment is ineffective when institutions cannot purchase consumables, replace small parts, maintain machinery or pay for reliable utilities. A costed renewal plan should therefore combine capital and recurrent budgets, specify responsibility for maintenance and track downtime of critical equipment. This approach is consistent with national and continental commitments to

quality, relevance and sustainable TVET systems (Government of Sierra Leone, 2019; African Union Commission, 2025).

Finally, industry partnerships can supplement, but should not replace, public responsibility. Structured partnerships may support equipment access, staff attachments, curriculum review, guest instruction and workplace learning. To protect equity, such arrangements should be governed by transparent agreements and monitored against student learning opportunities rather than publicity or donation counts.

VI. POLICY AND PRACTICE RECOMMENDATIONS

➤ *Establish Programme-Specific Resource Baselines.*

The Ministry of Technical and Higher Education and relevant quality-assurance bodies should define minimum standards for workshops, tools, safety equipment, electricity, connectivity, consumables and student access for each trade area.

➤ *Adopt a Costed Renewal and Maintenance Cycle.*

Each GTI should maintain a verified asset register, identify critical equipment gaps, budget for preventive maintenance and consumables, and report equipment functionality and downtime annually.

➤ *Link Instructor Development to Practical Delivery.*

Professional learning should emphasize demonstration, supervised practice, project-based work, authentic assessment, workshop safety and strategies for organizing practice where equipment is limited.

➤ *Protect Practical Learning Time.*

Institutional timetables and class organization should ensure that practical sessions are not routinely displaced by lectures. Where student-to-equipment ratios are high, rotating workstations and structured group tasks can preserve active participation.

➤ *Formalize Industry Engagement.*

GTIs should use written partnership agreements for equipment sharing, staff placements, industrial attachment, curriculum consultation and exposure to current workplace technologies.

➤ *Strengthen Monitoring and Evidence.*

Future sector reviews should collect institution- and programme-level data on resource functionality, practical hours, assessment performance, completion, graduate destinations and gender participation. This would permit stronger comparisons and better targeting of investment.

➤ *Strengths and Limitations*

The study provides multi-site evidence from three regions and includes the perspectives of students, instructors and administrators. The 86.0% questionnaire return rate also reduces concern about nonresponse among those approached. At the same time, several limitations define the proper scope

of inference. The achieved sample of 172 was smaller than the original plan and should not be treated as nationally representative. The analysis is cross-sectional and based on self-report, so it cannot establish causality or independently verify facility condition. Aggregated thesis tables were available rather than respondent-level data; consequently, multivariable analysis, institution-level comparisons and psychometric reanalysis could not be undertaken. The available results also lacked a direct ICT-adequacy indicator, and the qualitative strand planned in the wider study was not available for integration in this article. These limitations are the reason the article reports item-level descriptive evidence and avoids unsupported claims about technological effects or predictors of competency acquisition.

VII. CONCLUSION

Government technical institutions in Sierra Leone appear to possess an important but fragile asset: respondents rated instructor qualification and pedagogical practice more favourably than the material and financial environment in which instruction occurs. The same dataset shows that lecture remains more common than practical or demonstration teaching. Together, these findings describe an input-process mismatch in which human commitment and capacity operate within weak institutional conditions.

The policy implication is not a choice between investing in people and investing in facilities. Competency-based TVET requires both. Workshops, tools, consumables and maintenance must be financed as instructional necessities, while instructors need continuing support to convert those resources into deliberate practice, feedback and authentic assessment. A coordinated approach of this kind would bring institutional delivery closer to Sierra Leone's national TVET ambitions and the wider African agenda for relevant, equitable and employment-oriented skills development.

DECLARATIONS

➤ *Author Contributions*

Mohamed Bangura conceptualised the study, conducted the investigation and initial analysis, and prepared the original manuscript. Dr Tamba Kebbie supervised the study, contributed to the methodology and interpretation, and critically reviewed and edited the manuscript. Both authors approved the final manuscript and accept accountability for the work.

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➤ *Competing Interests*

The authors declare no competing interests.

➤ *Ethical Approval and Consent to Participate*

Ethical clearance was obtained from Njala University before data collection. Permission was obtained from the relevant authorities and participating institutions, and

informed consent was obtained from respondents. Participation was voluntary and data were handled confidentially.

➤ *Data Availability*

This article reports aggregated data preserved in the source thesis. The respondent-level dataset was not included with the manuscript materials used to prepare this article.

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