

Bridging the Skills Gap: Rethinking Project-Based Training in Technical and Vocational Education in Uganda

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Abstract

This paper investigated skills gap in Technical and Vocational Education and Training (TVET) institutions in Uganda, based on assessment of six TVETs from five national examination series (November 2023 - May 2025). Evidence from on-site inspections, interviews, and photographs highlighted weak project-based learning marked by recycled projects, suboptimal learning conditions, material shortage, limited supervision and rigid curriculum which suppress creativity and scientific understanding. As a result, many graduates hold academic credentials but lack real-world competence. To bridge this gap, the paper proposes increased funding for practical training, strict enforcement of originality and technical standards, partnerships with industries, enhanced engagement with industry mentors and continuous professional development for trainers ensuring project-based training cultivate innovation, ethical engineering and workforce readiness.

Keywords: Project-based Learning, Technical and Vocational Education, Engineering Skills Development

1. Introduction

Uganda's 2019 TVET Policy under Vision 2040 sets a clear goal to build a skilled, competent, and industry-ready workforce by addressing skill shortages and promoting lifelong learning. However, practical challenges remain, including a disconnect between theoretical accreditation and actual hands-on competencies, as noted by the Ministry of Education and Sports (2020). With Africa facing an urgent demand for infrastructure, energy, and industrial development, the role of TVETs in nurturing engineering and technical capacity cannot be overstated (McGrath, 2020). Despite revised curricula and government reforms such as the Skilling Uganda initiative, practical learning outcomes remain inadequate (Moses & Liu, 2023). Engineering graduates often struggle to adapt to labor market demands due to limited real-world exposure and soft skill readiness (Agole et al., 2024).

This paper explores these gaps, particularly in the design and implementation of project-based training, through the lens of real-life assessments conducted over an 18-month period across six TVET institutions in Uganda. The evidence supports call for stronger enterprise-TVET partnerships, curriculum relevance, and practical innovation (Niwamanya et al., 2025).

2. Methodology

This study used a qualitative case study approach which involved physical project inspections, structured observations, and stakeholder interviews. Six TVET institutions were included in the study, with two of them visited twice across five national examination series: Nov/Dec 2023, Apr/May 2024,

Jul/Aug 2024, Nov/Dec 2024, and Apr/May 2025. To protect the institutions' identities, we have kept their names confidential.

The focus was on diploma-level projects in electrical engineering. We gathered insights from students, instructors, external assessors, and institutional administrators to get a well-rounded view of the challenges and practices. Photographic evidence and project documentation were used to support findings.

2.1 Case Studies and Observations

Three key issues stood out during assessments:

a) Recycled Projects: The assessment revealed that projects such as motor rewinding, star–delta starter circuits, and voltage regulator were the most frequently repeated reflecting a lack of diversity and innovation in project selection.

b) Suboptimal learning conditions: A notable case involved over 40 students crowded around a single wiring task for a dilapidated kiosk as shown in figures 1 and 2 below, a structure that was not only unsuitable for a real-life project but also unsafe and unfit for industry-relevant training. The combination of overcrowding and inadequate project infrastructure diminish the effectiveness of project-based learning. Such conditions amplify the challenges of large project groups, such as limited active participation, reduced individual practice time, and hindrance to the provision of meaningful instructor feedback resulting in skills gap and reduced employability.



Fig. 1: Exterior view of the dilapidated kiosk used for wiring practice.

The structure is visibly dilapidated, with deteriorated timber panels and signs of prolonged neglect which did not represent the type of structures or environments learners are likely to encounter in modern

electrical installation work. This reduces the transferability of skills acquired during the exercise. Furthermore, exposure to substandard and demotivating facilities could erode students' enthusiasm for their trade, reinforcing negative perceptions about the quality of training. Addressing such issues requires not only upgrading infrastructure but also aligning training resources with realistic, industry-relevant scenarios.



Fig. 2: Inside view showing loosely connected electrical accessories.

Poor structural integrity and exposed wiring increase the risk of accidents, contravening occupational health and safety practices that TVET programs are expected to model. This not only puts students at risk but also highlights a worrying gap between classroom procedures and the real-world standards they will face on the job.

c) Resource Constraints and Limited Supervision:

Many TVET institutions do not have enough materials, tools, or well-trained instructors to provide quality project-based learning. Some instructors were not fully conversant with the new project-based curriculum and preferred traditional teaching methods. The dual challenge of limited resources and inconsistent supervision underscores the need for robust project planning, timely procurement processes, and continuous instructor capacity building to ensure that real-life projects achieve their intended educational objectives.

2.2 What Stakeholders Said

We gathered feedback from those directly involved in TVET training, including trainers, assessors, administrators and students themselves:

Trainers expressed frustration over inadequate funding and high costs associated with real-life projects that often strained institutional budgets, limiting the scope and student's engagement with practical real world applications.

Assessors pointed to poor workmanship and frequent non-compliance with safety and technical standards, noting that many students struggle to demonstrate the technical knowledge needed for their trade.

Administrators identified systemic challenges such as delays in procuring necessary resources, policy gaps, and the absence of structured partnerships with industries that could support more relevant training.

Students admitted to feeling underprepared and lacking confidence when it comes to applying their skills in real-world settings, mostly because of limited hands-on practice opportunities.

However, administrative feedback highlighted that resource provision alone does not guarantee effective project implementation. Even when materials were available, some instructors reportedly bypassed certain procedures compromising the authenticity and learning outcomes of the projects. This indicates that both material resources and instructor diligence are critical for successful experiential learning.

3. Discussion

3.1 Practical Challenges in Project-Based Training

The findings revealed systemic flaws in the design and support of project-based training. Although the curricula stress practical work, the actual training often falls short due to weak supervision, a shortage of materials, and limited investment in innovative teaching approaches. This has been echoed in studies showing that institutions lack the capacity to replicate workplace conditions, leading to shallow, examination-oriented training (Agole et al., 2024). McGrath (2020) also highlights the cultural emphasis on passing examinations rather than skill mastery across many African TVET systems. The result is a qualification–skills mismatch, which undermines the pyramid of engineering comprising engineers, technicians, and artisans.

3.2 The Importance of Scientific Understanding in Skills Development

Another key problem is that vocational training often focuses on “how” to do tasks without explaining the “why” behind them. Students learn the steps but not the scientific principles that make those steps work. This lack of scientific literacy limits their ability to diagnose problems, improve methods, or innovate new solutions. Moses & Liu (2023) argue that when learners understand the underlying science, they develop confidence and the ability to solve novel problems. Building this strong foundation of scientific knowledge can unlock students’ creativity and problem-solving potential.

3.3 Finding the Right Balance Between Curriculum and Creativity

Many TVET programs prescribe strict learning outcomes and detailed project steps that leave little room for adapting projects to local contexts or encouraging student creativity. McGrath (2020) warns that such rigidity hampers learner engagement and contextual problem-solving. Curricula should evolve to give learners more flexibility, allowing them to choose or co-design projects that address real challenges in their communities while still meeting technical standards.

4. Conclusion

Uganda’s TVET sector faces an important opportunity to rethink how it prepares future engineers, technicians and artisans by strengthening project-based learning to build authentic practical skills for industrial growth and sustainable development.

To achieve this, the study recommends continuous professional development for instructors to improve the quality of project supervision and encourage innovative teaching, enforce originality and compliance to national safety codes and global goals, strengthen industry partnerships to offer mentorship, supply materials, and expose students to real-world projects. It further calls for multi-stakeholder collaboration in co-creating project guidelines, mentorship programs, and skills initiatives alongside sustainable funding through innovative financing models such as cost-sharing arrangements with students for consumable materials, community-based sponsorships, and competitive grants from national skills development programs. Together, these strategies can ensure TVET graduates acquire not only academic credentials but also the competence, creativity, and ethical grounding required to drive Africa’s industrial transformation.

5. References

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