



## Bridging Certification Gaps in Electrical Installation and Maintenance: A Competency-Based Improvement Framework for TESDA Assessment Outcomes

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**Abstract.** *Technical-vocational education and training (TVET) have become increasingly significant in the Philippines as the Department of Education (DepEd) and the Technical Education and Skills Development Authority (TESDA) seek to produce employable graduates through the Senior High School (SHS) Technical-Vocational-Livelihood (TVL) track. Despite sustained national efforts, certification outcomes in programs such as Electrical Installation and Maintenance (EIM) remain inconsistent, resulting in skills certification gaps and attrition between program completion and national assessment. This study addressed these challenges by designing a Competency-Based Improvement Framework (CBIF) to enhance TESDA assessment outcomes in EIM at Tablon National High School, Cagayan de Oro City. Using a sequential explanatory mixed-methods design, the study analyzed three cohorts of EIM learners from 2022 to 2025, examining trends in assessment participation and performance alongside learner-related and institutional factors. Findings revealed pronounced attrition points across cohorts, marked by declining assessment participation and fluctuating passing rates. The framework proposes a practical and transferable model for strengthening SHS TVL implementation and improving TESDA certification outcomes.*

**Keywords:** *competency-based improvement framework, TESDA assessment outcomes, electrical installation and maintenance (EIM)*



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## **A. Introduction**

Technical and vocational education and training (TVET) prepare the Filipino workforce for local and international jobs. In the Philippines, TESDA sees TVET as providing learners with industry-relevant skills for changing sectors such as construction, manufacturing, and energy (TESDA, 2021). With ASEAN economic integration, national certification improves employability, labor mobility, and competitiveness (ADB, 2021). In support of these goals, the Department of Education (DepEd) institutionalized the Technical-Vocational-Livelihood (TVL) track within the Senior High School (SHS) K to 12 curricula. The TVL track aligns school-based training with TESDA Training Regulations, enabling learners to take national competency assessments upon completing their specialization (DepEd, 2019). Beyond immediate employment, the TVL track is intended to support entrepreneurship and further education, thereby expanding postsecondary pathways for learners (Department of Education, 2019; Malipot, 2022).

Despite policy goals, studies show ongoing challenges in TVET participation, implementation, and certification. The Philippine Institute of Development Studies (2024) highlights socio-economic barriers, such as costs, limited information, and weak parental support, that hinder disadvantaged youth's access. It notes uneven institutional responses to industry demands, causing skill mismatches that can impair certification. These structural barriers create early disadvantages that can persist through training and certification.

Moreover, reports from the Second Congressional Commission on Education (EDCOM II, 2024, 2025) highlight ongoing attrition and low graduation rates in TVET, especially in the SHS TVL track and post-secondary programs. Although the final report lacks detailed disaggregated data, it places TVET reform within the National Education and Workforce Development Plan (2026–2035), focusing on pathway coherence, better DepEd–TESDA–CHED coordination, and alignment with labor market needs (EDCOM II, 2026).



Tablon National High School (NHS) in Cagayan de Oro City was among the public schools that pioneered offering EIM under the TVL track when SHS was rolled out in 2016. The program aligns with TESDA's standards for the Electrical Installation and Maintenance NC II, focusing on wiring, safety, and troubleshooting (DepEd Region X, 2020). Over time, the school has trained and endorsed learners for TESDA assessments to support DepEd's goal of producing workforce-ready graduates. At the school level, the national challenges are reflected in the implementation of EIM training. Hence, in response, this study focuses on the design of a Competency-Based Improvement Framework (CBIF) for the EIM program at Tablon NHS, grounded in local assessment trends and contextual factors influencing TESDA outcomes.

## **B. Methodology**

### **Research Design**

This study used a sequential mixed-methods design, starting with quantitative analysis of five years of TESDA assessment results to identify trends and influencing factors. The qualitative phase explored learners' challenges and experiences. Combining these data informed the development of a Competency-Based Improvement Framework (CBIF), balancing statistical trends and stakeholder insights for an evidence-based framework.

### **Locale and Participants**

The study was conducted at Tablon NHS, Cagayan de Oro City, involving three student cohorts completing the program and taking the TESDA assessment: Batch 1 (2022–2023) with 15 students, Batch 2 (2023–2024) with 10 students, and Batch 3 (2024–2025) with 21 students. From each batch, three participants were purposively selected for FGDs, ensuring they had direct experience with the assessment process and school implementation (Palinkas et al., 2015).

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### **Data Gathering Procedure**

Data collection was in three phases. First, TESDA assessment results were gathered, including enrollee numbers, assessment takers, and pass/fail rates per year, which served as the basis for identifying performance trends. Second, learner- and institutional-related factors were collected from school records. Third, thematic insights were generated through FGDs with students, who reflected on challenges, strategies, and experiences related to TESDA assessment. These data sources enabled triangulation and strengthened credibility (Fetters et al., 2013).

### **Instruments Used**

A document analysis guide was used to record TESDA assessment results, enrollment figures per year, demographic, academic, and socio-economic data from learners, as well as indicators of school support and resources. An FGD protocol guided the discussions with selected students. Finally, a framework validation tool was prepared for expert assessors and practitioners to evaluate the clarity, relevance, and feasibility of the proposed CBIF.

### **Data Analysis Plan**

Data analysis involved multiple stages. Quantitative data from TESDA assessments were examined using descriptive statistics, including frequency counts, percentages, and pass/fail comparisons across three batches. Qualitative data from FGDs underwent thematic analysis using Braun and Clarke's (2006) six-phase framework, yielding themes categorized into learner-related and institutional dimensions. Results were integrated through triangulation, linking quantitative trends with qualitative insights to develop the CBIF. Expert feedback was analyzed qualitatively to refine the framework in line with the standards and context.



## Ethical Considerations

The study followed ethical principles, obtained permission from the school, and secured written consent from participants, ensuring voluntary participation, anonymity, and confidentiality. Codes protected identities during analysis. Sensitive socio-economic data, like 4Ps participation, was reported anonymously. The study also complied with the Philippine Data Privacy Act of 2012 to protect personal information.

## C. Results and Discussion

### Enrolment, Assessment Participation, and Results

The enrollment and TESDA assessment participation trends at Tablon NHS reveal both growth and challenges across cohorts. As shown in Table 1, Batch 1 (2022–2023) enrolled 18 learners, but only 1/3 (33.3%) proceeded to take the TESDA assessment, suggesting that many learners were either unprepared or faced barriers to participation. Batch 2 (2023–2024) showed the lowest participation, with 11 enrollees, but none attempted the assessment. By contrast, Batch 3 (2024–2025) recorded the highest enrollment, with 20 learners, and a relatively higher participation rate of 35%, reflecting modest improvements in student engagement with certification requirements.

Low TESDA assessment participation among Tablon NHS students reveals a challenge in the SHS TVL track: persistent dropout between program completion and certification. This aligns with studies showing that many students complete TVL, but few take assessments, creating a skills certification gap (Abao, Balaba, Cap-atan, Cosmiano, & Mahinay, 2025). This leakage undermines the K to 12 reform's goal of using certification for employability and industry alignment (EDCOMM II, 2026; Department of Education, 2019).

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This turnout may reflect socio-economic barriers, such as financial constraints, opportunity costs, and a lack of support, that hinder assessment completion (Philippine Institute for Development Studies, 2024). This explains zero participation in Batch 2, possibly due to resource and motivation deficits. Insufficient institutional support, such as limited access to tools or coaching, also discourages attempts at assessment (Pascua & Molina, 2021). Fluctuating participation reveals gaps in institutional support; Batch 1's strong performance shows potential with robust support.

**Table 1**

*Enrolment, Assessment Participation and Results by Cohort*

Cohort	Enrollees	Takers	Passers	Enrollees Who Took Assessment (%)	Takers Who Passed (%)
Batch 1 (2022–2023)	18	6	6	33.33	100
Batch 2 (2023–2024)	11	0	0	0.00	-
Batch 3 (2024–2025)	20	7	3	35.00	42.86
Total	49	13	9	26.53	69.23

The lack of sustained strategies leads to declines, and disparities in facilities and partnerships affect TESDA's assessment readiness, underscoring the need for ongoing investment (Ferrer, 2022). Internationally, TVET systems struggle to align training with national frameworks, leading to uneven outcomes (Asian Development Bank, 2021). To close enrollment-

to-certification gaps, schools like Tablon High must intervene at the learner and institutional levels, providing resources, building confidence, and framing TESDA assessments as attainable for employment (Dizon & Elbinas, 2020). Addressing structural and motivational barriers is vital to boost participation, despite steady or rising enrollment.

The TESDA assessment results for Electrical Installation and Maintenance at Tablon NHS contrast outcomes. Batch 1 (2022–2023) had a 100% pass rate with six certified. Batch 2 (2023–2024) had no participation, likely due to systemic issues. Batch 3 (2024–2025) declined, with 3 of 7 students (42.9%) passing. Across all cohorts, 13 takers – 9 passed, 4 failed – achieving a 69.2% rate. Most succeed, but low participation limits impact. Variability across cohorts indicates inconsistent outcomes, affected by preparedness, access, confidence, and institutional readiness.

At a policy level, the overall 69.23% passing rate across all cohorts is promising but still below the ideal standards for employability in an increasingly competitive labor market. Studies have shown that certification outcomes are highly sensitive to learners' socio-economic background, with disadvantaged students often facing barriers in confidence, preparation, and access to supplementary resources (Philippine Institute for Development Studies, 2024).

Certification outcomes reveal ongoing gaps between classroom training and TESDA standards. Studies cite issues such as limited access to equipment, insufficient hands-on practice, and misalignment between instruction and assessment, which harm learner performance (Pascua & Molina, 2021). Institutional issues, including shortages of qualified trainers and weak industry links, worsen these problems (Sanchez, 2019). Learner factors such as study habits, self-efficacy, and readiness also impact certification success (Dizon & Elbinas, 2020). National data show significant dropout between TVL completion and certification, driven by misaligned school-based training and assessment requirements (Abao et al., 2025).

### **Learner-Related Factors**

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Referring to Table 2, the learner-related factors of the three cohorts at Tablon NHS reveal consistent demographic and academic patterns, with notable differences in program participation. The average age across cohorts ranged from 18 to 19 years, reflecting the expected age of senior high school graduates. The gender distribution was highly skewed, indicating that the EIM program remains male-dominated. In terms of academic performance, the average TLE grade was relatively high, indicating that learners generally performed well on school-based requirements.

Participation in support programs varied widely. The Joint Delivery Voucher Program (JDVP) saw strong engagement in Batch 1 (11 learners) and especially in Batch 3 (20 learners), but none in Batch 2. This uneven participation mirrors the fluctuations in assessment outcomes noted earlier. Meanwhile, Pantawid Pamilyang Pilipino Program (4Ps) participation was more evenly distributed, with 11 learners identified as beneficiaries across cohorts.

**Table 2**

*Learner-Related Factors of EIM Students by Cohort*

Learner Factor	Batch 1 (2022–2023)	Batch 2 (2023–2024)	Batch 3 (2024–2025)
Average Age	18.83	18.54	18.05
Sex (M/F)	16/2	10/1	17/3
Average Final Grade in TLE-EIM	93.17	89.00	91.50
JDVP Participation	11	0	20
4Ps Participation	3	5	3

Learner-related factors highlight structural and socio-cultural factors that affect TESDA assessment outcomes. Male dominance in EIM reflects deep-rooted gender norms within technical-vocational tracks, with female learners underrepresented in trades such as electrical installation (UNESCO-UNEVOC, 2020). This gender gap aligns with broader Philippine TVET trends that often channel women into caregiving or service roles, thereby limiting their access to higher-paying technical fields (Brillantes & Ramos, 2019).

While learners' academic performance in TLE-EIM was high, uneven participation in certification shows that strong grades do not always mean assessment readiness. Dizon and Elbinas (2020) say that socio-emotional factors, such as confidence and test anxiety, impact certification. Similarly, Agaton and Cueto (2021) note that socio-economic disruptions, such as household duties or limited resources, can prevent learners from certifying. These findings match the gaps between TLE results and TESDA outcomes at Tablon NHS.

### **Institutional Factors**

Table 3 presents the quantitative indicators of institutional support and resources as reported by EIM students at Tablon NHS. The results show that access to real work settings is the most consistently available form of support, placing it in the highly available category. Such opportunities closely mirror actual workplace conditions, thereby enhancing learners' readiness and employability (Hebron-Ariston, 2024). Specifically, students are given chances to engage in hands-on activities, practice their skills using authentic tools and equipment, and observe standard industry procedures in a realistic environment. These experiences not only reinforce classroom learning but also help students develop professional habits, adaptability, and confidence as they transition to the labor market.

In contrast, thirty-two students (65.3%) reported that in-class one-on-one coaching is only moderately available, indicating that while this support is present, it is not consistently or regularly provided to all learners.

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Personalized guidance is essential for building confidence, deepening understanding, and refining technical skills in technical-vocational programs, especially for students who may need additional assistance or remediation.

When teachers provide individualized feedback, demonstrate complex procedures step-by-step, and address specific learner difficulties, students are more likely to meet competency standards and perform well in both assessments and real-world tasks. However, the moderate availability of one-on-one coaching suggests potential gaps in instructional support, possibly due to large class sizes, limited teacher time, or competing academic responsibilities. Increasing the frequency and consistency of personalized coaching may help close performance gaps, promote competency mastery, and ensure that all learners are adequately prepared for workplace demands (Dizon & Elbinas, 2020).

**Table 3**

*Institutional Support and Resources as Reported by the Students*

Support and Resources	f	%	Interpretation*
In-class simulations	27	55.1%	Moderately Available
In-class one-on-one coaching	32	65.3%	Moderately Available
Access to real work settings	48	98.0%	Highly Available

*\*Legend:*

*Highly Available* :  $\geq 80\%$  of students reported availability  
*Moderately Available* : 50% – 79% of students reported availability  
*Limited* : 20% – 49% of students reported availability  
*Very Limited* :  $< 20\%$  of students reported availability

While 55.1% reported in-class simulations, indicating moderate availability. Over half experienced structured practice using tools or simulated environments. This suggests room for improvement in providing ample practice before TESDA certification. Simulation training is a cost-effective way to address equipment shortages and enhance skills transfer (Rosales, 2022).

Real-world immersion was readily available, and shortages of EIM tools and inefficient scheduling surfaced as recurring issues that reduced practice opportunities and heightened learner anxiety. Providing snacks and meals during assessments was valued as a form of psychosocial support that helped reduce stress. However, the lack of strong narratives about transportation support suggests this remains a gap in institutional support.

### Qualitative Report on Learner-Related and Institutional Factors

Table 5's FGD results reveal that students face challenges such as difficult assessment content, many test items, and pressure, reflecting broader issues of test anxiety and readiness in TVL tracks (Dizon & Elbinas, 2020). However, students also demonstrated resilience through peer collaboration and self-study, underscoring the importance of support and motivation in preparing for assessments.

**Table 5**

*Summary of FGDs on Learner-Related and Institutional Factors*

Dimension	Learner-Related Factors	Institutional Factors
Challenges Identified	<ul style="list-style-type: none"> <li>▪ Difficulty understanding many questions in the assessment</li> <li>▪ Test anxiety and pressure due to the difficulty level</li> <li>▪ Waiting time during assessment</li> </ul>	<ul style="list-style-type: none"> <li>▪ Lack of materials</li> <li>▪ Insufficient tools</li> <li>▪ Physical discomfort during assessment (heat, waiting time)</li> </ul>

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Enablers / Strengths	<ul style="list-style-type: none"> <li>▪ Peer support and teamwork</li> <li>▪ Individual preparation and self-study</li> </ul>	<ul style="list-style-type: none"> <li>▪ Access to tools and equipment during practice (though limited, still beneficial)</li> <li>▪ Exposure to safety standards</li> </ul>
Suggested Improvements	<ul style="list-style-type: none"> <li>▪ More review opportunities before assessment</li> <li>▪ More confidence-building activities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Provide adequate materials and functional tools</li> <li>▪ Improve testing environment (ventilation, comfort)</li> <li>▪ Organize a fairer system to reduce waiting time</li> </ul>

Participants reported shortages of tools and materials, where simulations and coaching were only moderately available. Environmental issues such as heat and wait times hindered performance, exposing logistical gaps. However, positive influences included students valuing safety lessons and access to basic tools, aligning with TESDA’s focus on safety and accuracy (TESDA, 2022).

Tablon NHS faces dual challenges of academic and socio-economic vulnerability, with many students from households participating in the Pantawid Familyang Pilipino Program (4Ps). Economic pressures often clash with educational needs, compounded by limited tools and review opportunities, leading to test anxiety and low confidence.

Nonetheless, students show resilience through peer support and independent study, highlighting a strong culture of perseverance. Support measures, such as providing snacks during assessments, foster a sense of care and belonging, boosting motivation. Yet, a lack of systematic transportation support remains a gap, especially for students commuting from nearby areas.



### **Identified Attrition Points**

The results presented in the preceding sections reveal that certification outcomes in the Electrical Installation and Maintenance (EIM) program are shaped not by a single deficiency but by a series of attrition points along the certification pathway, as shown in Figure 2.

The first attrition occurs between program enrollment and the TESDA assessment. While enrollment remained stable, many learners did not proceed to the assessment. This shows that enrollment alone does not ensure certification.

The second attrition point arises between TESDA assessment participation and certification success. Passing rates varied across cohorts, reflecting differences in readiness, access to tools, simulation opportunities, and coaching. Learners are motivated, but institutional limitations and uneven instruction hinder mastery.

A third attrition point affects cohorts, as seen in changing certification outcomes year to year. The better performance of earlier groups and the drop in later ones indicate that success depends on cohort-specific factors rather than stable systems. Without standardized prep, consistent resources, and support, improvements in one cohort do not last.

### **Competency-Based Improvement Framework for EIM**

Figure 3 presents the Competency-Based Improvement Framework (CBIF) for Electrical Installation and Maintenance (EIM), which identifies two interrelated domains shaping learning outcomes: institutional factors and learner-related factors.

The framework shows that personal and structural factors in education are interconnected. For example, having institutional tools like labs helps learners practice, boosting their confidence. Likewise, motivated learners with prior prep make supports like coaching more effective. This interaction reflects interdependent systems where outcomes result from these combined factors. The CBIF integrates these into a single model, offering a

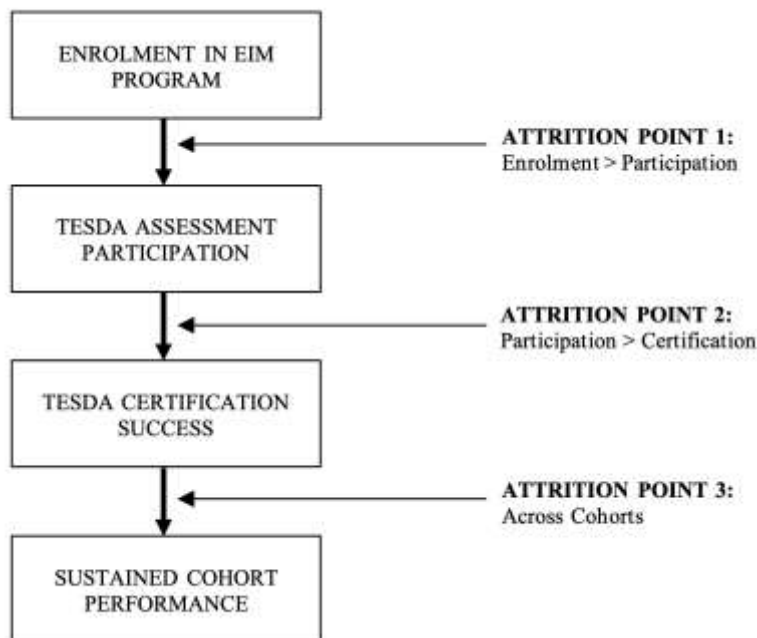
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simplified, holistic view of the complex system influencing TESDA assessment results.

**Figure 2**

*Attrition Points in the EIM Certification Pathway*

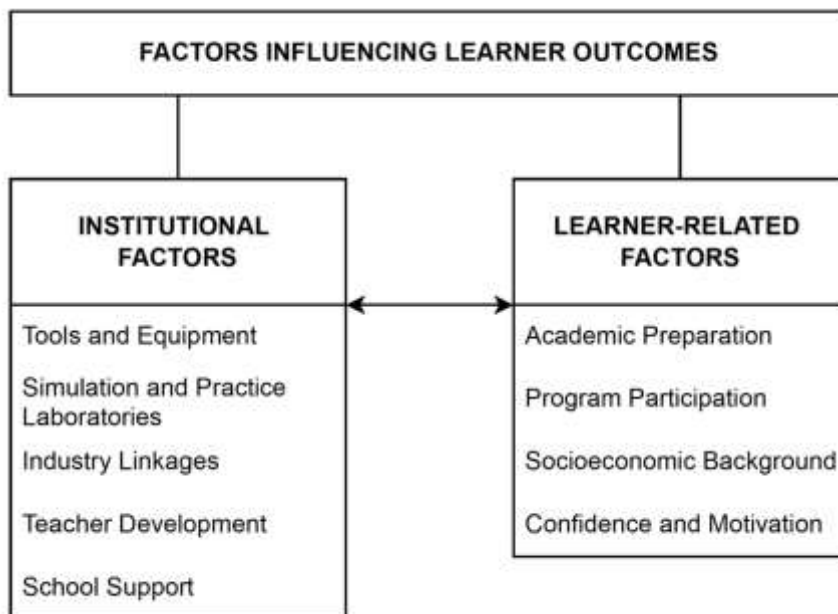


Within the Institutional Factors, the provision of tools and equipment is central to competency attainment. Adequate and industry-standard tools enable learners to practice technical skills in conditions that approximate certification tasks, thereby improving mastery and transferability of competencies (Rosales, 2022). Complementing this, simulation and practice labs create structured environments for authentic and repetitive skill application. Evidence suggests that schools with functional practice labs

produce learners who are better prepared for national certification due to their familiarity with task-based training (Ferrer, 2022).

**Figure 3**

*Competency-Based Improvement Framework (CBIF) for EIM*



Strengthened industry linkages further contextualize classroom instruction by embedding real-world applications of competencies, which aligns with TESDA’s emphasis on workplace relevance (TESDA, 2022). Teacher development remains foundational, as instructors with up-to-date training in both pedagogy and technical competencies are better able to align instruction with the TESDA Training Regulations (Sanchez, 2019). Finally, school support—such as transportation, snacks, and extended coaching—addresses logistical barriers that often undermine learner participation and



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focus. Support mechanisms ensure that instructional gains translate into improved certification readiness (Pascua & Molina, 2021).

Equally critical are the Learner-Related Factors. Academic preparation in foundational subjects, particularly mathematics and science, underpins learners' ability to engage with complex EIM tasks. Studies affirm that higher achievement in related subjects correlates positively with certification performance (Dizon & Elbinas, 2020). Program participation, such as engagement in the Joint Delivery Voucher Program (JDVP), expands access to enhanced facilities and practical immersion, offering supplementary exposure that reinforces school-based training (Malipot, 2022).

Learners' socio-economic background also influences performance, with disadvantaged learners facing challenges in sustaining participation due to financial constraints. Addressing these barriers through contextualized, low-cost, or community-based projects fosters equity and continuity in learning (Philippine Institute for Development Studies [PIDS], 2024). Lastly, confidence and motivation play a decisive role. Learners who receive structured feedback, peer mentoring, and opportunities for incremental success are more likely to overcome test anxiety and approach assessments with greater resilience (Hebron-Ariston, 2024).

#### **D. Conclusion**

This study highlights the identified critical attrition points affecting certification success in the Senior High School TVL track. Learner and institutional factors drive these points. Learners had adequate academic prep but faced socio-economic issues, test anxiety, and limited support.

Along with this, the study developed a Competency-Based Improvement Framework (CBIF) targeting each attrition point, focusing on learner support, curriculum alignment, simulations, coaching, and institutional planning. The CBIF offers a systematic approach to stabilize

certification outcomes, moving beyond isolated interventions to a competency-based system. It guides schools in aligning instruction, resources, and engagement with TESDA standards. It is poised that the framework can benefit other public schools offering SHS TVL programs, helping reduce skills certification gaps and ensuring graduates are workforce-ready.

DepEd and TESDA could collaborate more to streamline curriculum and assessment structures, establish learner-support programs, and create feedback systems that link assessment results to school planning, enhancing TVL programs based on student performance.

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