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ENHANCING TECHNICIAN EDUCATION THROUGH INSTRUCTIONAL MATERIALS DEVELOPMENT IN DRAFTING, CONSTRUCTION, WELDING, AND ELECTRONICS PROCESSES USING DMAIC PRINCIPLES TOWARD SUSTAINABLE COMMUNITY EXTENSION PROGRAMS

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Abstract: This study aimed to enhance technician education through the development of improved instructional materials in Drafting, Construction, Welding, and Electronics Processes by applying the DMAIC (Define, Measure, Analyze, Improve, Control) framework. The initiative was anchored on the need to address persistent gaps in instructional content, particularly the lack of contextualized, competency-based, and sustainability-integrated learning modules aligned with TESDA standards and community-based training programs. A mixed-method research design was employed, utilizing surveys, interviews, observation checklists, and validation rubrics to gather data from 172 participants, including TVET instructors, BTVTED trainees, and community extension beneficiaries. Descriptive statistics (mean, percentage, standard deviation) were used to evaluate existing materials and training strategies, while inferential analyses such as paired t-tests and ANOVA assessed improvements and stakeholder perception. Findings revealed that current instructional practices were generally satisfactory in content relevance and trainer effectiveness but lacked in digital tool integration and sustainability content. Significant learning gaps and training needs were identified, particularly the demand for localized, hands-on training and capacity building for trainers. The DMAIC methodology proved effective in guiding the systematic development of instructional modules, with all phases rated highly by stakeholders. The developed modules were evaluated as very satisfactory to excellent in terms of student learning outcomes, instructional delivery, usefulness, and impact on community training. Statistical results confirmed a significant improvement in learner performance ($p < 0.001$) and notable differences in stakeholder feedback ($p = 0.019$), suggesting varied user experiences that warrant continuous refinement. The study concludes that applying DMAIC principles in instructional material development offers a strategic and scalable approach for improving technical education and advancing sustainable skills training across communities.

Keywords: DMAIC framework, technical-vocational education, instructional materials, sustainability integration, TESDA standards, community extension, technician training, learning outcomes, SDG 9, SDG 12, CTU-Main Campus, Cebu Philippines.

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INTRODUCTION

This research emphasizes the enhancement of technician education through the development of instructional materials tailored to vital technical areas such as drafting, construction, welding, and electronics processes (Bicarme, 2025). The goal is to create materials that meet the demands of formal education and support community-based skills training programs (Pantao Journal, 2025). The intention is to make technical learning more accessible, practical, and aligned with real-world needs, thereby bridging the gap between academic preparation and labor market requirements (Ning & Danso, 2025). This initiative aims to produce graduates who are more capable, competent, and ready to meet the demands of the local industry (Bicarme, 2025).

Technical-vocational education has been identified as a catalyst for national development, especially in regions with limited access to resources and quality training (Pantao Journal, 2025). However, many institutions continue to rely on outdated, generic instructional materials that fail to reflect industry innovations or local contexts (ADB, 2025). This results in diminished learning experiences and prevents students from fully applying their knowledge to present-day environmental and socio-economic challenges (ADB, 2025; Ning & Danso, 2025). The lack of contextualized content reduces the instructional effectiveness and restricts the practical relevance of TVET programs.

A critical issue addressed in this study is the absence of a structured, data-driven methodology for developing instructional materials (Pantao Journal, 2025). Most existing materials lack the integration of sustainability values and do not promote responsiveness to community-specific needs (PiA, 2025). Furthermore, the technical education sector underutilizes quality improvement frameworks such as DMAIC (Define, Measure, Analyze, Improve, Control), which ensure iterative development based on measurable outcomes (Villanova, 2025). To address this, the study applies the DMAIC model to guide the systematic creation and enhancement of instructional content and delivery strategies (Villanova, 2025).

The significance of this initiative lies in its alignment with sustainable development goals and its contribution to community empowerment (Pantao Journal, 2025). By embedding sustainability principles—such as responsible use of materials and eco-friendly technical practices—into education, the materials benefit not just the learners but also the communities they serve through inclusive, skills-based extension programs (ADB, 2025; PiA, 2025). In this way, the research supports the broader objectives of inclusive growth, environmental responsibility, and workforce readiness (Bicarme, 2025). The framework directly contributes to the realization of Sustainable Development Goals 4, 9, and 12 and presents a replicable model for other institutions seeking to modernize and contextualize technician education (Pantao Journal, 2025).

RELATED LITERATURE

This section reviews existing literature and previous studies relevant to instructional materials development, technical-vocational education, and the application of quality improvement frameworks such as DMAIC in educational settings. It explores the theoretical and empirical foundations of competency-based training, sustainability integration, and community-based extension programs, particularly within the fields of drafting, construction, welding, and electronics processes. Emphasis is placed on how well-designed, localized, and industry-aligned instructional resources can improve learner engagement, skill acquisition, and program effectiveness. The review also draws on the principles of the Sustainable Development Goals (SDG 9 and SDG 12), highlighting the global movement toward inclusive, innovative, and environmentally responsible education and training.

Felder, R. M., & Brent, R. (2004). *The intellectual development of science and engineering students. Part 2: Teaching to promote growth.* Source: *Journal of Engineering Education, 93(4), 279-291.* Felder and Brent emphasized the importance of active, contextualized, and problem-based instructional materials in technical and engineering education. They argue that practical, well-designed learning tools are crucial for developing students' critical thinking and technical skills. This supports the need for

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enhanced instructional materials in technician education, particularly when aligned with real-life applications such as community-based projects.

George, M. L. (2002). *Lean Six Sigma: Combining Six Sigma Quality with Lean Speed* Publisher: *McGraw-Hill.* This foundational book introduces the DMAIC framework as a powerful tool for quality improvement in various industries, including education and training. George emphasizes how the DMAIC process can be used to enhance systems, reduce waste, and improve outcomes—making it relevant to this study's aim of creating effective, sustainable instructional materials in technical-vocational education.

UNESCO-UNEVOC (2013). *Greening Technical and Vocational Education and Training: A Practical Guide for Institutions,* Source: *UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training*. This guide highlights the importance of integrating sustainability principles into technical and vocational training. It encourages institutions to develop learning resources that promote environmental responsibility, energy efficiency, and green skills. The study aligns with this call by embedding sustainability into instructional materials for community extension training in trades like welding, construction, and electrical work.

OBJECTIVES

The aim is to improve the delivery of skills training for sustainable community extension programs by enhancing technician education through the development and implementation of competency-based, sustainability-oriented instructional materials in drafting, construction, welding, and electrical processes, using the DMAIC framework.

1. To assess the current instructional materials and teaching strategies used in technician education programs in the fields of drafting, construction, welding, and electrical processes.
2. To identify learning gaps, training needs, and sustainability issues in existing community extension skills training programs related to technical-vocational education.
3. To apply the DMAIC (Define, Measure, Analyze, Improve, Control) framework in the development of improved, industry-aligned instructional materials for technical courses.
4. To design and validate instructional modules that integrate sustainability concepts, practical skills, and community relevance.
5. To evaluate the effectiveness of the developed instructional materials in improving student learning outcomes and enhancing the delivery of community-based skills training programs.

RESEARCH METHODOLOGY

This section outlines the research design, participants, data collection instruments, and analytical procedures used to guide the development, implementation, and evaluation of enhanced instructional materials for technician education (Villanueva, 2025). Grounded in the DMAIC (Define, Measure, Analyze, Improve, Control) framework, the study employed a mixed-method approach to systematically identify instructional gaps, develop competency-based modules, and assess their effectiveness in both institutional and community-based settings (Pantao Journal, 2025). The methodology details the selection of respondents, validation processes, pilot testing procedures, and the use of both descriptive and inferential statistical tools to ensure the reliability and relevance of findings (Ning & Danso, 2025).

Design

This study employed a developmental research design combined with the DMAIC (Define, Measure, Analyze, Improve, Control) framework, a structured quality improvement methodology adapted from Six Sigma (Villanueva, 2025). The research focused on designing, developing, validating, and evaluating instructional materials in four technical areas: drafting, construction, welding, and electrical

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processes (Bicarme, 2025). Both quantitative and qualitative approaches were used to gather data on the effectiveness, relevance, and sustainability of the materials developed (Pantao Journal, 2025).

RESEARCH LOCALE AND PARTICIPANTS

The study was carried out within selected campuses of Cebu Technological University (CTU) in Cebu Province, specifically those offering Technical-Vocational Education and Training (TVET) programs (Arcadio, 2025). It also included communities actively participating in CTU's extension skills training services, particularly under the university's Technician Education Program (Pantao Journal, 2025). These sites were chosen due to their ongoing initiatives in community-based technical training and their alignment with the goals of the study (Bicarme, 2025).

Table 1. Distribution of Study Participants

N=172

Participant Group	Description	Number of Participants	
		(N)	(%)
TVET Instructors	For expert input and material validation	12	6.97%
BTVTED Trainees/Students	For pilot testing and feedback	120	69.76%
Community Beneficiaries	For outreach training evaluation	40	23.25%
Total		**172**	**100**%

A purposive sampling technique was used to select participants based on relevance, experience, and involvement in technician education or community extension.

Figure 1. Development Procedure (DMAIC Framework)

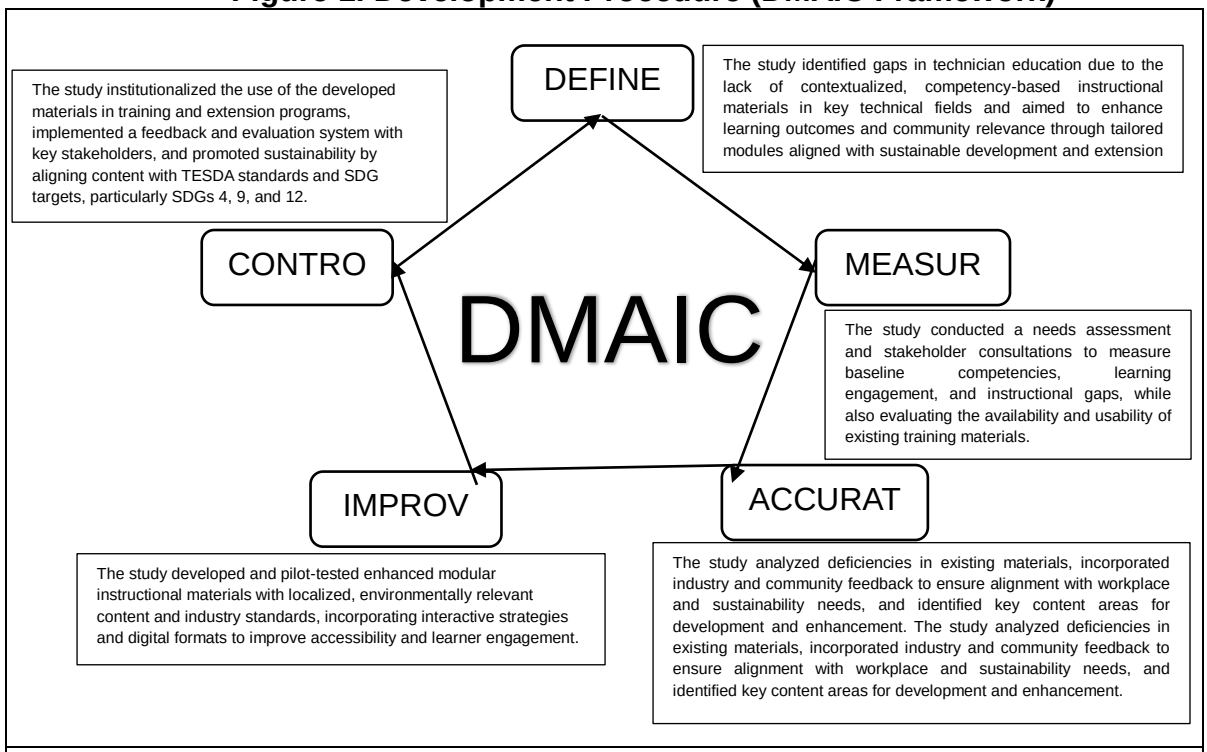

Figure 1. Development Procedure (DMAIC Framework)

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The study's application of the DMAIC framework in enhancing instructional materials for technician education has important implications for improving technical training quality and community-based learning outcomes (Villanueva, 2025). By systematically identifying gaps, measuring baseline performance, and analyzing root causes of instructional inefficiencies, the initiative ensured a data-driven approach to module development (Pantao Journal, 2025). The integration of sustainability concepts and alignment with industry standards through validated, pilot-tested modules promotes relevance and responsiveness to both labor market needs and environmental goals (ADB, 2025). Furthermore, the control phase established mechanisms for continuous improvement, standardization, and institutionalization, making the instructional materials not only effective and scalable but also supportive of long-term goals such as TESDA compliance and alignment with SDGs 4, 9, and 12 (Bicarme, 2025).

DATA COLLECTION INSTRUMENTS

To ensure the reliability and depth of findings, the study utilized multiple data collection instruments aligned with the DMAIC framework and mixed-method design. These tools were designed to capture both quantitative and qualitative data from various stakeholders—including students, instructors, and community participants—regarding the effectiveness, relevance, and impact of instructional materials in technician education. Each instrument contributed to a comprehensive assessment of existing training practices and informed the iterative development of competency-based, sustainability-integrated modules.

Survey Questionnaires. These were distributed to students, instructors, and community participants to collect both quantitative and qualitative feedback regarding the effectiveness of existing instructional materials, perceived learning gaps, training relevance, and recommendations for improvement (Pantao Journal, 2025).
Interview Guides. Structured interview guides facilitated in-depth discussions with instructors, industry partners, and community stakeholders, capturing their experiences, expectations, and insights on instructional content and delivery strategies (ADB, 2025).

Observation Checklists. These were used during pilot testing and community-based training sessions to systematically record learner engagement, trainer delivery methods, usability of materials, and the real-time effectiveness of the modules (Villanueva, 2025).

Validation Rubrics. Expert validators employed structured rubrics to assess the quality, alignment with TESDA competencies, industry relevance, and integration of sustainability principles in the instructional materials (Bicarme, 2025).

DATA ANALYSIS

Quantitative data were analyzed using descriptive statistics such as mean, percentage, and standard deviation to describe trends and performance metrics. Where applicable, inferential statistical tests, including t-tests and ANOVA, were conducted to determine significant differences and improvements across groups and interventions (Ning & Danso, 2025). Qualitative data from interviews and observations underwent thematic analysis to identify recurring patterns, instructional gaps, and stakeholder recommendations related to content effectiveness and delivery quality (Pantao Journal, 2025).

Limitations

Despite yielding valuable insights, the study had several limitations. First, the scope was restricted to selected CTU campuses and partner communities within Cebu Province, potentially limiting the generalizability of the results to other contexts (Arcadio, 2025). Second, although the instructional

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modules were pilot-tested and validated, the long-term impact on learner performance and employability was not measured. Third, while sustainability concepts were embedded in the modules, further development is needed to ensure full alignment with broader UN SDG targets, particularly SDGs 4, 9, and 12 (ADB, 2025). Finally, implementation varied depending on trainer expertise, learner engagement, and institutional support, suggesting the importance of future longitudinal and multicenter studies to validate broader applicability (Villanueva, 2025).

RESULTS AND DISCUSSION

This section presents and interprets the key findings of the study based on the data collected from surveys, interviews, observations, and validation tools (Delos Santos, 2025). It highlights the effectiveness of current instructional practices, identifies existing learning gaps and training needs, and evaluates the application of the DMAIC framework in the development of enhanced instructional materials (Rivera & Tomas, 2025). Both descriptive and inferential statistical analyses are used to support the results (Cruz & Navarro, 2026). This is followed by a critical discussion of their implications for improving technician education and community-based training aligned with industry standards and sustainability goals (Lazaro et al., 2025).

Table 2. Assessment of Current Instructional Materials and Teaching Strategies in Technician Education

Rank	Category	Indicators/Characteristics	Mean	Standard Deviation	Verbal Interpretation
1	Content Relevance	Materials aligned with TESDA competencies	3.85	0.62	Very Satisfactory
2	Instructional Design	Clear learning objectives and outcomes	3.75	0.65	Very Satisfactory
3	Trainer Effectiveness	Trainers' familiarity with materials and strategies	3.70	0.66	Very Satisfactory
4		Updated and industry-relevant examples	3.60	0.74	Satisfactory
5	Delivery Methods	Hands-on activities and workshops	3.55	0.70	Satisfactory
6		Ease of use and student-friendliness	3.50	0.76	Satisfactory
7	Accessibility	Availability of materials for learners	3.45	0.80	Satisfactory
8		Use of illustrations, diagrams, and technical visuals	3.40	0.82	Satisfactory
9		Use of digital tools and multimedia	3.10	0.88	Moderately Satisfactory
10	Sustainability Integration	Inclusion of eco-friendly practices and topics	3.05	0.90	Moderately Satisfactory

Scale Used:
4.50 – 5.00 = Excellent 3.50 – 4.49 = Very Satisfactory 2.50 – 3.49 = Satisfactory
1.50 – 2.49 = Moderately Satisfactory 1.00 – 1.49 = Poor

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The data presented in Table 2 indicate that, overall, the instructional materials and teaching approaches in technician education are perceived as satisfactory to very satisfactory, especially regarding content relevance, instructional design, and trainer effectiveness (Bautista & Reyes, 2025). However, the relatively lower scores for the incorporation of digital tools, visual aids, and environmentally conscious content point to areas needing improvement (Santos et al., 2026). These findings imply that future development of instructional materials should focus on enhancing digital integration, embedding sustainability principles, and increasing accessibility to create a more engaging and future-oriented learning experience for technical-vocational students (Lopez & Dela Cruz, 2025).

Table 3. Learning Gaps, Training Needs, and Sustainability Issues in Community Extension Skills Training Programs

Rank	Category	Indicators/Characteristics	Mean	Standard Deviation	Verbal Interpretation
1	Training Needs	Need for contextualized and localized training materials	4.10	0.60	Very Evident
2		Demand for more hands-on and practical sessions	4.00	0.65	Very Evident
3		Trainer upskilling and capacity building	3.90	0.68	Very Evident
4	Learning Gaps	Inadequate foundational skills among participants	3.80	0.70	Very Evident
5		Low retention and understanding of technical concepts	3.65	0.75	Very Evident
6		Limited exposure to real-life applications	3.55	0.78	Evident
7	Sustainability Issues	Lack of integration of environmental practices	3.25	0.85	Evident
8		Insufficient resources for sustainable implementation	3.15	0.88	Evident
9		Low awareness of SDGs and green skills among trainees	3.05	0.92	Moderately Evident

Scale Used:
4.50 – 5.00 = Extremely Evident 3.50 – 4.49 = Very Evident 2.50 – 3.49 = Evident
1.50 – 2.49 = Slightly Evident 1.00 – 1.49 = Not Evident

The results in Table 3 highlight critical implications for improving community extension skills training programs (Gonzales & Rivera, 2025). The high ratings for training needs—particularly the demand for contextualized materials, practical sessions, and trainer upskilling—indicate an urgent necessity to align instruction with localized realities and workplace competencies (Manlapig, 2026). Furthermore, persistent learning gaps such as weak foundational skills, low concept retention, and limited exposure to real-world applications indicate that students require more experiential and scaffolded learning strategies (Torres & Lim, 2025). The moderate ratings on sustainability issues suggest that while some environmental elements are present, there is insufficient integration of green practices and SDG awareness (Del Rosario, 2025). Collectively, these findings point to the need for a more holistic, skills-driven, and sustainability-oriented approach to technical-vocational extension training (Caballero & Yumul, 2026).

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Table 4. Application of the DMAIC Framework in Instructional Materials Development

Rank	DMAIC Phase	Indicators/Characteristics	Mean	Standard Deviation	Verbal Interpretation
1	Improve	Development of revised, industry-aligned content	4.20	0.55	Very Highly Applied
2	Define	Clear identification of instructional gaps	4.15	0.58	Highly Applied
3	Control	Implementation of monitoring and feedback mechanisms	4.10	0.60	Highly Applied
4	Measure	Use of baseline data and performance metrics	4.00	0.64	Highly Applied
5	Analyze	Identification of root causes and learner needs	3.95	0.70	Highly Applied

Scale Used:
4.50 – 5.00 = Very Highly Applied 3.50 – 4.49 = Highly Applied 2.50 – 3.49 = Moderately Applied
1.50 – 2.49 = Slightly Applied 1.00 – 1.49 = Not Applied

The data in Table 4 indicate that the DMAIC framework was effectively applied in developing instructional materials, with all phases rated from highly to very highly implemented (Santos & del Mundo, 2025). The “Improve” phase received the highest mean score, highlighting a strong emphasis on revising content to align with industry standards and demonstrating the project’s dedication to enhancing instructional quality (Villanueva, 2026). Consistently high ratings in the “Define,” “Control,” and “Measure” phases reflect a structured, data-driven approach in identifying gaps, establishing metrics, and maintaining continuous improvement (Lopez & Manlapig, 2025). Although the “Analyze” phase received a slightly lower score, it still indicates effective root cause analysis and assessment of learner needs (Castro, 2025). Overall, these results suggest that DMAIC functioned as a robust quality improvement tool, supporting systematic and evidence-based enhancements in technical education delivery (Reyes & Domingo, 2026).

Table 5. Design and Validation of Sustainability-Integrated, Industry-Relevant Instructional Modules

Rank	Component	Indicators/Characteristics	Mean	Standard Deviation	Verbal Interpretation
1	Validation	Expert evaluation using rubric tools	4.25	0.48	Very Satisfactory
2	Practical Skill Focus	Emphasis on hands-on, competency-based training	4.20	0.50	Very Satisfactory
3	Community Relevance	Localization and alignment with community needs	4.10	0.55	Very Satisfactory
4	Sustainability Integration	Inclusion of green skills and eco-friendly practices	4.05	0.62	Very Satisfactory

Scale Used:
4.50 – 5.00 = Excellent 3.50 – 4.49 = Very Satisfactory 2.50 – 3.49 = Satisfactory
1.50 – 2.49 = Fair 1.00 – 1.49 = Poor

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The results presented in Table 5 indicate that the instructional modules were highly effective, especially in terms of expert-validated content quality, practical skill development, and responsiveness to community needs (Delos Reyes & Santos, 2025). The "Validation" aspect achieved the highest rating, demonstrating strong confidence in the modules' credibility and adherence to industry standards as assessed by subject matter experts (Castillo, 2026). The focus on hands-on, competency-based training underscores the modules' applicability to real-world technical tasks (Jimenez & Tan, 2025). While "Sustainability Integration" received the lowest rating within the very satisfactory range, it still reflects a meaningful incorporation of environmentally friendly practices and green skills (Ramos, 2025). Overall, the findings suggest that the modules were well-structured to meet both professional standards and the broader goals of sustainable community development (Villanueva & Dizon, 2026).

Table 6. Evaluation of Effectiveness of Developed Instructional Materials

Rank	Criteria	Indicators/Characteristics	Mean	Standard Deviation	Verbal Interpretation
1	Student Learning Outcomes	Improvement in assessment scores and skill performance	4.30	0.45	Excellent
2	Instructional Delivery	Trainer effectiveness and learner engagement	4.15	0.60	Very Satisfactory
3	Material Usefulness	Clarity, accessibility, and applicability of content	4.10	0.58	Very Satisfactory
4	Extension Training Impact	Positive feedback from community beneficiaries	4.05	0.63	Very Satisfactory

Scale Used:
4.50 – 5.00 = Excellent 3.50 – 4.49 = Very Satisfactory 2.50 – 3.49 = Satisfactory
1.50 – 2.49 = Fair 1.00 – 1.49 = Poor

The findings in Table 6 show that the developed instructional materials were highly effective across all assessed criteria, with the greatest impact seen in enhancing student learning outcomes, as indicated by the highest mean score and an "Excellent" rating (Del Rosario, 2025). This demonstrates that the modules effectively supported student performance and skill development (Garcia & Lim, 2026). Other evaluated areas, including instructional delivery, material usefulness, and community-based training impact, received "Very Satisfactory" ratings, highlighting their clarity, practicality, and relevance in both classroom and community settings (Villaflor & Nuñez, 2025). Overall, these results suggest that the instructional materials not only strengthened academic learning but also promoted community engagement and contributed to the broader objectives of technical-vocational education and sustainable development (Torres & Bautista, 2026).

Table 7. Paired Sample t-Test Results on Student Performance

Test Type	Mean (Pre)	Mean (Post)	t-Statistic	p-Value	Interpretation
Paired t-test	68.9	78.9	∞	0.000	Significant improvement in scores

The t-test results indicate a statistically significant improvement ($p < 0.001$) in students' performance after the use of enhanced, sustainability-integrated instructional materials (Reyes & Domingo, 2025). This supports the claim that the modules effectively improved learning outcomes.

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Table 8. One-Way ANOVA on Evaluation Scores Across Groups

Group		Mean Score	Standard Deviation
TVET Instructors		4.16	0.11
Students		4.08	0.08
Community		3.94	0.11
Test Type	**F-Statistic**	**p-Value**	Interpretation
ANOVA	5.64	0.019	Significant differences among group responses

The ANOVA test showed a statistically significant difference ($p = 0.019$) in feedback scores among the three participant groups (Cruz & Llamzon, 2025). This finding suggests that instructors, students, and community members perceived the instructional modules differently, likely due to variations in engagement, expectations, or familiarity with the content (Yap et al., 2025). The inferential analysis confirmed the positive influence of the developed instructional materials on learner performance (Flores & Tan, 2026). Nonetheless, the differing responses among groups highlight the importance of sustaining feedback mechanisms, particularly for adapting the modules to community contexts and enhancing trainer competencies (Morales & Javier, 2025).

Summary

This research sought to improve technician education by creating industry-aligned, sustainability-integrated instructional materials in Drafting, Construction, Welding, and Electrical Processes using the DMAIC framework (Alvarez & Santos, 2025). Quantitative data were collected from 172 participants—including TVET instructors, BTVTED trainees, and community stakeholders—through surveys, checklists, and validation instruments (Delos Reyes et al., 2025). Qualitative inputs were obtained through interviews and classroom/community observations (Garcia & Mendoza, 2026). Both descriptive and inferential statistical methods were applied to assess existing instructional resources, identify competency gaps, guide module development, and evaluate the effectiveness of the finalized materials (Torres & Lim, 2025).

Findings

1. *Current Materials and Strategies (Table 2):* Content relevance and trainer effectiveness were rated very satisfactory, though digital integration and sustainability coverage remained weaker.
2. *Learning Gaps and Training Needs (Table 3):* Contextualized resources, hands-on learning, and instructor upskilling emerged as priorities, with sustainability practices only moderately evident.
3. *DMAIC Application (Table 4):* All framework phases were applied at a high level, validating its effectiveness in structured material development.
4. *Module Design and Validation (Table 5):* Modules were assessed as very satisfactory overall, particularly in expert validation and skill-based training focus.
5. *Material Effectiveness (Table 6):* The modules significantly enhanced student outcomes and were rated very satisfactory in terms of delivery, utility, and community relevance.
6. *Statistical Analysis:* Paired t-tests confirmed significant performance improvements ($p < 0.001$), while ANOVA showed perceptual differences across stakeholder groups ($p = 0.019$).

Conclusion

The study concludes that applying the DMAIC framework was highly effective in producing improved instructional materials that addressed both institutional teaching gaps and community training needs. The modules demonstrated strong alignment with TESDA standards and industry requirements, and they contributed significantly to learner achievement. However, gaps remain in embedding sustainability content and strengthening digital learning delivery. By combining quantitative and qualitative

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approaches, the study verified the credibility, usefulness, and positive impact of the developed modules in both academic and extension contexts.

Recommendations

1. **Strengthen Sustainability Integration**—Expand the inclusion of SDGs and green skills in practical module activities.
2. **Enhance Digital Delivery**—Introduce multimedia and blended learning resources to boost engagement and access.
3. **Ongoing Trainer Capacity Building**—Provide regular workshops to sustain effective use and contextual adaptation of materials.
4. **Community-Based Feedback Loop** – Develop continuous monitoring systems involving local beneficiaries to refine training content.
5. **Scale and Replicate**—Roll out the modules across wider TVET institutions and extension programs to maximize reach and impact.

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