Integrating Sustainable Fashion Practices into Dressmaking Instruction: Enhancing Students' Creativity, Technical Competence, and Eco-Conscious Design Skills

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ABSTRACT

The global garment industry's mounting environmental footprint has intensified calls to embed sustainability at every level of fashion and design education, yet dressmaking instruction in Technical-Vocational Education and Training (TVET) programs continues to privilege measurement accuracy, pattern drafting, and construction techniques, with little deliberate attention to ecological literacy. This paper develops and proposes a pedagogical framework for integrating sustainable fashion practices into dressmaking instruction, examining how such integration can strengthen students' creativity, technical competence, and eco-conscious design skills without compromising competency-based training outcomes. Using an integrative literature review and document-analysis methodology, peer-reviewed and Scopus-indexed studies published between 2010 and 2025 on sustainable fashion pedagogy, circular-economy education, and vocational apparel-making competence were thematically synthesized alongside the Philippine Technical Education and Skills Development Authority (TESDA) Training Regulations for Dressmaking NC II. The synthesis yielded the Creativity–Competence–Consciousness (3C) Framework, which organizes instruction around three interlocking pillars: creativity cultivation through upcycling and zero-waste design tasks, technical-competence anchoring that retains TESDA-prescribed core competencies while adding waste-conscious performance criteria, and eco-conscious design literacy built on circular-economy concepts, materials awareness, and livelihood-oriented entrepreneurship. The framework is structured for progressive implementation from beginner to advanced competency levels, offering TVET institutions a practice-ready, standards-aligned model for curricular reform. The study contributes a conceptual bridge between the largely higher-education-oriented sustainable fashion literature and the vocational, competency-based context of dressmaking instruction, and it lays the groundwork for future empirical validation through pilot implementation and outcome measurement. Its significance lies in equipping TVET graduates with skills that are simultaneously technically sound, creatively developed, and responsive to a fashion industry undergoing rapid sustainability-driven transformation.

Keywords: sustainable fashion education; dressmaking instruction; TVET curriculum; eco-conscious design; technical competence; creativity

INTRODUCTION

The global fashion and textile industry is among the most resource-intensive sectors in the world economy, and the accelerating demand for environmentally responsible production has placed sustainability education at the center of curricular reform across design disciplines (Khar, 2025; Zabidi & Jamaludin, 2024). In the Philippines, Technical-Vocational Education and Training (TVET) occupies a strategic position in this reform agenda: it is mandated under Republic Act No. 7796 (the TESDA Act) to produce a skilled and adaptive workforce, and it operates within the Philippine Qualifications Framework (RA 10968) and CMO 79, s. 2017, which together emphasize competency, quality assurance, and responsiveness to industry and community needs. Dressmaking,

offered as a National Certificate II (NC II) qualification and embedded in the Technology and Livelihood Education (TLE) track of Philippine basic and technical-vocational education, remains one of the most widely accessed livelihood-oriented programs, particularly among out-of-school youth, 4Ps beneficiaries, and community-based learners served through DSWD-partnered extension initiatives.

Despite this strategic position, dressmaking instruction in most TVET settings continues to be organized around the traditional sequence of measurement, pattern drafting, cutting, sewing, and finishing, with limited or no deliberate integration of sustainability concepts such as fabric-waste reduction, materials life-cycle awareness, or circular-economy thinking. This is notable given that sustainability integration has advanced considerably in higher-education fashion design curricula, where systematic reviews document a growing repertoire of experience-based and project-based pedagogical approaches for teaching sustainable fashion (Zabidi & Jamaludin, 2024; Khar, 2025). The vocational, competency-based level of instruction — where training regulations, time allotments, and assessment tools are far more rigid than in university design programs — has not received comparable attention.

Statement of the Problem

The central problem this paper addresses is the absence of a practice-ready framework for embedding sustainable fashion practices into competency-based dressmaking instruction. Existing sustainability-in-fashion-education literature is concentrated in higher-education and industrial-design contexts (Watkins et al., 2021; Faludi & Gilbert, 2019; Wood et al., 2023), where curricular flexibility allows for elective modules, semester-long design studios, and open-ended creative briefs. TVET dressmaking programs, by contrast, must deliver fixed, TESDA-prescribed competencies within limited training hours, leaving instructors with little precedent for incorporating sustainability content without displacing mandatory technical outcomes. This creates a gap between the sustainability imperative recognized by the broader design-education field and the practical reality faced by TVET dressmaking instructors.

This gap matters because TVET graduates enter an industry and consumer market that increasingly expect environmentally responsible practices, from small-scale dressmaking enterprises to large garment manufacturing supply chains. Graduates who are technically proficient but unfamiliar with sustainable materials handling, waste-conscious cutting, or circular-economy business models may be less competitive and less prepared to contribute to the industry's sustainability transition. Addressing this gap also responds to the broader Education for Sustainable Development agenda, which has already reshaped fashion curricula at the tertiary level (Zabidi & Jamaludin, 2024), and extends its reach to the vocational sector, where the impact on livelihoods is most immediate for marginalized learners.

Research Questions and Objectives

This paper is guided by the following research questions:

- RQ1: What pedagogical and curricular elements from existing literature on sustainable fashion and circular-economy education align with the structure of competency-based dressmaking instruction?
- RQ2: How can creativity-based instructional strategies be integrated into dressmaking modules without compromising the attainment of TESDA-prescribed technical competencies?
- RQ3: What eco-conscious design skills can realistically be embedded within existing dressmaking training hours and resources?
- RQ4: What framework structure would allow dressmaking instructors to implement sustainability integration progressively across beginner-to-advanced competency levels?

The general objective of this paper is to develop and propose an integrative framework for embedding sustainable fashion practices into dressmaking instruction that strengthens creativity, technical competence, and eco-conscious design skills. Specifically, the paper aims to: (1) synthesize literature-derived pedagogical elements relevant to competency-based dressmaking instruction; (2) identify creativity-based strategies compatible with

TESDA competency standards; (3) delineate eco-conscious design skills suited to the dressmaking training context; and (4) structure these elements into a progressive, level-appropriate instructional framework. Collectively, these objectives respond directly to the research problem by translating a body of higher-education-oriented sustainability literature into a form usable within the constraints of vocational, competency-based dressmaking training.

METHODOLOGY

This paper adopts a qualitative, conceptual research approach employing an integrative literature review and document analysis, rather than primary data collection from human respondents. This approach was selected because the study's aim is framework development, synthesizing dispersed pedagogical knowledge into a coherent, implementable model, rather than testing a predefined hypothesis, a purpose for which conceptual and integrative review methodologies are well established in sustainability education research (Khar, 2025; Zabidi & Jamaludin, 2024).

Research Design

This study adopted an integrative literature review design complemented by document analysis of Philippine TVET policy instruments. The integrative review approach was chosen because it allows the synthesis of diverse forms of evidence—empirical studies, conceptual models, and policy documents—into a unified analytic framework. Unlike traditional narrative reviews, integrative reviews emphasize systematic inclusion criteria and thematic synthesis, thereby enhancing both rigor and applicability.

The literature review component drew from peer-reviewed, Scopus-indexed publications and systematic reviews on sustainable fashion pedagogy, circular-economy education, and vocational training. This ensured that the framework was grounded in global scholarly discourse. The document analysis component focused on the TESDA Training Regulations for Dressmaking NC II, the Philippine Qualifications Framework (RA 10968), and CHED Memorandum Orders, which provided the regulatory and competency benchmarks necessary to contextualize sustainability within Philippine vocational education.

This dual design is consistent with methodologies employed in recent systematic reviews of sustainable fashion pedagogy that combine database review with thematic synthesis (Khar, 2025; Zabidi & Jamaludin, 2024). Critically, the integration of policy analysis distinguishes this study from purely academic reviews by situating sustainability pedagogy within the structural and competency constraints of Philippine TVET programs. This strengthens the framework's relevance for actual curriculum development and competency-based assessment.

By merging scholarly evidence with regulatory standards, the research design not only identifies recurring instructional strategies (e.g., upcycling, zero-waste pattern cutting, collaborative project-based learning) but also ensures these practices align with TESDA's competency architecture. This alignment enhances the framework's feasibility for adoption in vocational institutions and underscores its potential contribution to both national policy reform and global sustainability discourse.

Data Sources and Selection Criteria

Two principal categories of sources were systematically examined to ensure both scholarly rigor and contextual relevance. The first category comprised peer-reviewed, Scopus-indexed journal articles, conference proceedings, and systematic reviews published between 2010 and 2025.

These works addressed themes such as sustainable fashion pedagogy, circular-economy education, project-based learning in design disciplines, and the development of creativity and competence in vocational apparel-making. Selection criteria emphasized relevance to fashion, textile, or vocational design education, peer-reviewed status, and substantive engagement with curriculum, pedagogy, or competency constructs.

The second category consisted of Philippine policy and regulatory documents, notably the TESDA Training Regulations for Dressmaking NC II, the Philippine Qualifications Framework (RA 10968), and CHED Memorandum Order No. 79, s. 2017. These documents were reviewed to establish the competency standards,

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curricular structures, and regulatory constraints within which any proposed instructional framework must operate. By integrating international scholarly discourse with national competency-based regulations, the study ensured that the resulting framework is both globally informed and locally grounded in the Philippine vocational education context.

Literature Identification and Thematic Coding

The literature base was identified through targeted searches of academic databases and citation trails from recent systematic reviews in the field, with priority given to studies indexed in Scopus or published in Scopus-indexed journals. This ensured methodological rigor and the inclusion of high-quality, peer-reviewed scholarship. Each retrieved source was read in full or in relevant part, then subjected to thematic coding to capture recurring constructs. From this inductive process, three provisional domains emerged: creativity, technical competence, and ecological/sustainability consciousness. These domains reflect the dominant pedagogical emphases across sustainable fashion and vocational design education literature. Importantly, the inductive emergence of these categories underscores the convergence of global scholarship around the need to balance innovation, skill mastery, and ecological responsibility in vocational training.

To ensure contextual relevance, these domains were then cross-checked against the competency units and performance criteria specified in the TESDA Dressmaking NC II Training Regulation. This step was critical for identifying both points of compatibility—where sustainability practices can be seamlessly integrated into existing competencies—and points of tension, where sustainability content risks displacing or complicating established technical requirements. Such tensions highlight the structural challenges of embedding sustainability into competency-based TVET systems, which traditionally prioritize measurable technical outputs over broader ecological or creative literacies.

By juxtaposing inductively derived domains with TESDA's competency architecture, the study not only mapped areas of pedagogical alignment but also surfaced gaps and contradictions that require curricular innovation. This dual process strengthens the analytic framework by ensuring that it is simultaneously grounded in international scholarship and responsive to national regulatory standards, thereby enhancing its feasibility for adoption in Philippine vocational education.

Data Analysis

The study employed thematic and content analysis to systematically organize literature-derived concepts within three major domains of sustainable dressmaking instruction. This analytical approach enabled the identification of recurring pedagogical strategies—such as upcycling projects, zero-waste pattern cutting, and collaborative project-based learning—that appeared consistently across multiple scholarly and institutional sources. Through this synthesis, patterns were distilled into coherent themes that reflect the integration of creativity, technical competence, and eco-conscious design principles.

The resulting framework, presented in the Results section, represents the culmination of this thematic synthesis. It aligns each instructional element with the corresponding TESDA competency reference points, ensuring that sustainability-oriented teaching practices are grounded in nationally recognized technical standards. This alignment reinforces the relevance of sustainable dressmaking pedagogy within the broader context of vocational education and competency-based training.

Trustworthiness

Trustworthiness was supported through source triangulation, drawing on multiple independent systematic reviews and empirical studies rather than a single source for each thematic claim, and through direct comparison of proposed framework elements against the explicit wording of TESDA competency standards to ensure structural compatibility rather than aspirational mismatch.

Ethical Considerations

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As a conceptual, document-based study, this paper did not involve human respondents and therefore did not require informed consent procedures. Where the proposed framework is subsequently piloted with actual dressmaking learners, the author recommends that future empirical work observe standard research-ethics protocols, including informed consent, voluntary participation, and confidentiality safeguards consistent with CHED and institutional research ethics requirements, particularly given the framework's relevance to vulnerable learner groups such as 4Ps beneficiaries and out-of-school youth.

RESULTS

The thematic synthesis of the reviewed literature and TESDA competency documents produced the Creativity–Competence–Consciousness (3C) Framework for Sustainable Dressmaking Instruction, organized around three interlocking pillars that map directly onto the study's three constructs of interest.

The 3C Framework for Sustainable Dressmaking provides a structured approach to integrating creativity, technical proficiency, and environmental awareness in dressmaking education. It emphasizes developing holistic competencies that prepare learners to address design challenges, strengthen core skills, and engage in sustainable income-generating practices. This framework serves as a guide for aligning instructional strategies with sustainability goals in the fashion and garment sector.

Figure 1. 3C Framework for Sustainable Dressmaking

As illustrated in Figure 1, the framework highlights three essential pillars: **Creativity Cultivation**, **Technical Competence Anchoring**, and **Eco-Conscious Design Literacy**—each contributing to advancing sustainable dressmaking instruction. Together, these pillars foster innovation, skill mastery, and environmental responsibility, enabling learners to transform creative ideas into economically viable and ecologically sound outcomes. This model underscores the importance of integrating sustainability principles into technical education and vocational training programs.

Sustainable dressmaking instruction requires a structured integration of creativity, technical mastery, and ecological responsibility. To capture these dimensions, the framework is organized into three pedagogical pillars that collectively address the competencies prescribed by TESDA while embedding sustainability-oriented practices. This structure ensures that learners acquire not only the technical skills necessary for garment production but also the creative and eco-conscious mindset essential for 21st-century vocational education.

Pillar 1: Creativity Cultivation

This pillar draws on evidence that structured, project-based creative tasks measurably contribute to student creativity in apparel-making contexts (Aisyah et al., 2018) and that project-based learning more broadly develops the applied problem-solving skills associated with 21st-century creative competence (Bell, 2010). Within dressmaking instruction, this translates into design challenges built around fabric remnants and pre-loved garments, deconstruction-reconstruction exercises, and design-thinking or mood-board activities that treat textile waste as a creative constraint rather than a limitation.

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Pillar 2: Technical Competence Anchoring

This pillar preserves the full sequence of TESDA-prescribed core competencies for Dressmaking NC II, measuring, pattern drafting, cutting, sewing, and finishing, while embedding waste-conscious techniques (for example, efficient pattern layout and marker-making to minimize fabric loss) as an additional performance indicator within the existing assessment criteria. This approach is consistent with findings that collaborative, competency-oriented project structures enable the absorption of sustainability content without displacing core technical learning outcomes (González-Domínguez et al., 2020).

Pillar 3: Eco-Conscious Design Literacy

This pillar introduces circular-economy vocabulary, materials life-cycle awareness, and sustainable sourcing concepts, following the pedagogical models documented for textile and materials-innovation education (Wood et al., 2023) and for green invention and design education more broadly (Faludi & Gilbert, 2019). For TVET learners served through DSWD-partnered livelihood programs, this pillar is extended to include entrepreneurship on upcycled or repurposed garments, linking eco-conscious design literacy directly to income-generation potential for out-of-school youth and 4Ps beneficiaries.

Pillar	Sample Instructional Activity	TESDA Competency Alignment	Assessment Indicator
Creativity Cultivation	Upcycled garment redesign using fabric remnants; deconstruction-reconstruction exercises	Design interpretation and creative pattern adaptation competencies	Originality and design-rationale rubric
Technical Competence Anchoring	Marker-making and layout practice for minimal fabric wastage	Measuring, pattern drafting, and cutting competencies (Dressmaking NC II)	Material-yield and precision checklist
Eco-Conscious Design Literacy	Materials life-cycle mapping, upcycled-product costing, and micro-enterprise planning	Entrepreneurship and work-readiness competencies	Sustainability-literacy checklist and business-plan output

Sustainable dressmaking instruction integrates environmental awareness with technical and creative competencies to prepare learners for responsible garment production. It emphasizes the balance between innovation, skill mastery, and ecological mindfulness, ensuring that future professionals contribute to sustainability goals within the fashion and textile industry. The following framework outlines the core pillars underpinning sustainable dressmaking instruction.

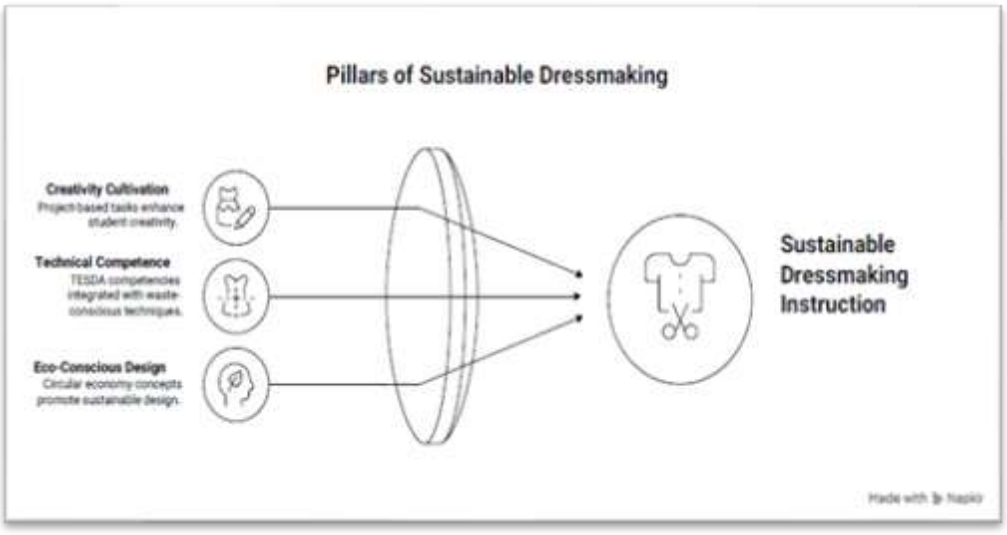

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Figure 2. Pillars of Sustainable Dressmaking

As shown in Figure 2, sustainable dressmaking instruction is anchored on three interconnected pillars: **creativity cultivation**, **technical competence**, and **eco-conscious design**. Together, these elements foster a holistic learning environment where students develop not only craftsmanship but also a deep understanding of sustainability principles. This integration supports the advancement of green skills aligned with TESDA standards and the circular economy, promoting responsible innovation in dressmaking education.

Sustainability literacy is a multidimensional process that enables organizations to integrate environmental, social, and economic considerations into their operations. It involves developing awareness, strategies, and measurable actions that lead to long-term sustainable outcomes. The framework presented below outlines a systematic approach for achieving sustainability literacy, beginning with the assessment of current practices and culminating in the attainment of sustainable business operations.

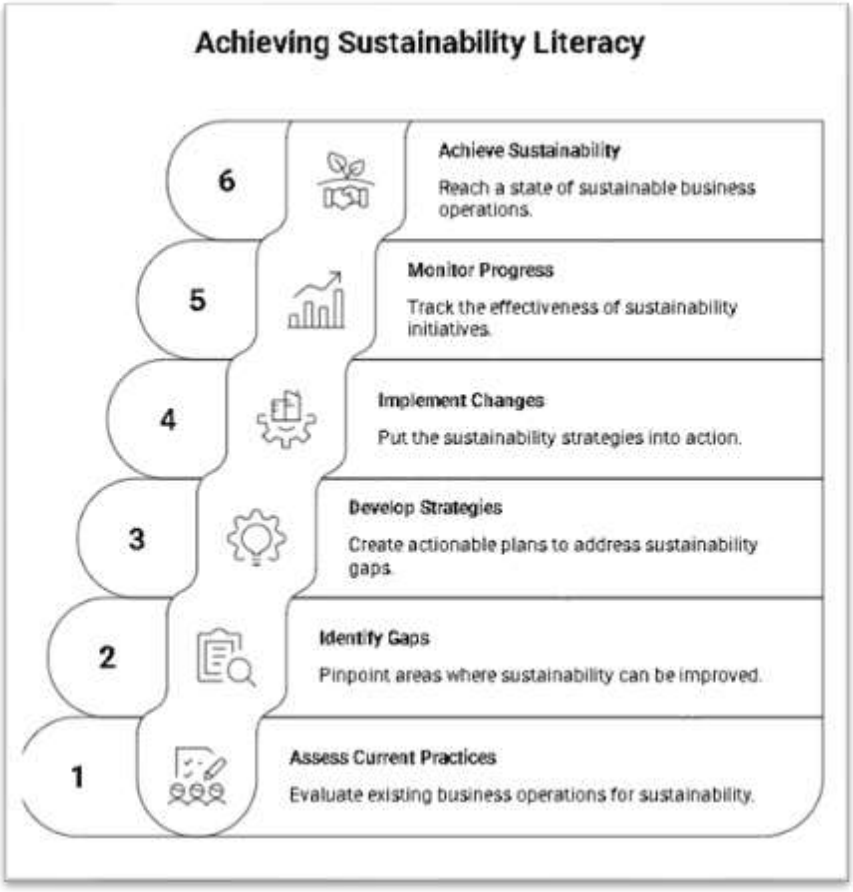

Figure 3. Achieving the Sustainability Literacy Framework

As shown in Figure 3, achieving sustainability literacy involves six sequential stages, beginning with assessing current practices and culminating in achieving sustainability.

Progressive Implementation Across Competency Levels

The framework is structured for phased implementation so that sustainability content deepens as learners advance through the Dressmaking NC II competency sequence, rather than being introduced as a single stand-alone unit.

Level	**Instructional Focus**	**Sample Eco-Integration Activity**

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Beginner (Basic measuring and pattern drafting)	Introduce sustainability vocabulary and fabric-waste awareness alongside foundational skills	Fabric-scrap sorting and simple patchwork exercise
Intermediate (Cutting and construction)	Apply waste-conscious layout and construction techniques within standard competency tasks	Zero-waste or low-waste marker-making exercise
Advanced (Finishing and entrepreneurship)	Integrate circular-economy business thinking into finished-product planning	Upcycled-garment micro-enterprise project with costing and pricing plan

DISCUSSION

Summary of Findings

The synthesis indicates that sustainable fashion practices can be integrated into dressmaking instruction through three mutually reinforcing pillars: creativity cultivation, technical competence anchoring, and eco-conscious design literacy, structured for progressive delivery across competency levels. These findings directly address the paper's research questions by identifying literature-derived pedagogical elements compatible with competency-based instruction (RQ1), specifying creativity strategies that do not displace technical outcomes (RQ2), delineating realistic eco-conscious design skills for the dressmaking context (RQ3), and organizing these elements into a level-appropriate implementation sequence (RQ4).

Alignment with Existing Literature

The proposed framework is consistent with evidence that collaborative, project-based structures increase learners' valuation of sustainability knowledge and its relevance to professional practice (González-Domínguez et al., 2020; Schoch et al., 2024), and it extends the finding that vocational competence learning contributes significantly to creativity in apparel-making (Aisyah et al., 2018) by explicitly incorporating an ecological dimension into that creativity construct. It also responds to the call, evident in recent systematic reviews of sustainable fashion pedagogy, for continued exploration of instructional approaches beyond those already documented in higher-education settings (Zabidi & Jamaludin, 2024; Khar, 2025).

Points of Divergence from Prior Work

A notable divergence from much of the reviewed literature is context: studies such as Watkins et al. (2021), Faludi and Gilbert (2019), and Wood et al. (2023) are situated predominantly in higher-education design programs with greater curricular flexibility than TVET settings permit. The framework proposed here addresses this divergence directly by anchoring each pillar to specific TESDA competency units rather than treating sustainability as an elective addition, which represents this paper's principal departure from and contribution to the existing body of work.

Theoretical and Practical Implications

Theoretically, the framework suggests that sustainability can function as a cross-cutting competency dimension layered onto existing technical and creative domains in competency-based education, rather than requiring a wholly separate curricular strand. Practically, the framework offers TESDA program implementers and dressmaking instructors a starting model for embedding waste-conscious and circular-economy content into existing lesson plans and assessment tools. For DSWD-partnered livelihood programs serving 4Ps beneficiaries and out-of-school youth, the entrepreneurship-oriented eco-conscious design pillar additionally offers a pathway that links sustainability learning to income-generation opportunity, reinforcing the social-equity dimension of TVET's mandate.

Contribution to the Field

This paper provides a conceptual bridge between the sustainable fashion education literature, which has largely

developed within higher-education and industrial-design contexts, and the competency-based, standards-constrained environment of TVET dressmaking instruction. It offers a structured, TESDA-aligned starting framework rather than a generic sustainability appeal, addressing a specific and previously underexamined segment of fashion and design education.

CONCLUSION

This study advances the Creativity–Competence–Consciousness (3C) Framework as a structured pedagogical model for embedding sustainable fashion practices into dressmaking instruction within Technical–Vocational Education and Training (TVET) programs. Grounded in an integrative review of literature on sustainable fashion, circular economy, and vocational education, and cross-referenced with TESDA competency standards, the framework demonstrates how sustainability content can be anchored to existing technical competencies rather than treated as supplementary. This approach provides a practicable pathway for TVET institutions to respond to the sustainability imperative reshaping the global fashion and design industry.

As a conceptual contribution, the framework underscores the potential of aligning creativity cultivation, technical competence anchoring, and eco-conscious design literacy with national competency benchmarks. The next critical step is empirical validation: future research should pilot the 3C Framework with dressmaking learners using quasi-experimental or mixed-methods designs to measure pre- and post-implementation changes in creativity, technical proficiency, and sustainability literacy. Classroom-based evidence will allow refinement of instructional activities and assessment tools, thereby strengthening the framework's applicability.

Ultimately, such validation would enrich the evidence base for integrating sustainability into vocational education and support TESDA's ongoing review of Training Regulations, ensuring that Philippine TVET programs remain responsive to the evolving demands of a sustainability-conscious garment industry.

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