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Curriculum, Policy, and Gap Analysis of Green Skills Integration in Technical and Vocational Education and Training in the Philippines

Abstract

The transition toward sustainable development has increased the demand for Technical and Vocational Education and Training (TVET) systems that can equip learners with green skills aligned with workforce and sustainability needs. Guided by Pavlova's Generic Green Skills Framework, this study examined how green skills are embedded within curriculum frameworks and national education policies across the Philippine TVET system. The study covered the trifocal education structure involving the Department of Education (DepEd), the Commission on Higher Education (CHED), and the Technical Education and Skills Development Authority (TESDA). Using content analysis and a four-point coding scheme, curriculum and policy documents were examined across the cognitive, intrapersonal, interpersonal, and systems domains of green skills. Findings revealed moderate integration of green skills across the trifocal system, with CHED teacher education programs demonstrating the strongest integration. National education plans exhibited a strong sustainability orientation; however, a policy-to-curriculum gap remained, particularly in systems-thinking competencies. The findings suggest that sustainability aspirations are more strongly articulated in policy than in curriculum implementation. The study highlights the need for stronger policy alignment, curriculum coherence, and coordinated Green TVET reforms to support workforce development and future sustainability needs in the Philippines.

Keywords: *curriculum analysis, educational policy, green skills, sustainability, TVET*

1 Introduction

The increasing urgency of climate change, environmental degradation, and resource scarcity has intensified global calls for education systems to contribute to sustainable development. Within this context, Technical and Vocational Education and Training (TVET) has emerged as a critical platform for equipping learners with competencies that support green economies and sustainable livelihoods. International organizations such as UNESCO and UNESCO-UNEVOC have advanced the concept of Green TVET, emphasizing the integration of environmental awareness, resource efficiency, sustainable production, and responsible workplace practices into technical and vocational education systems (Albertz & Pilz 2025; Bagale 2026; UNESCO-UNEVOC 2017).

The growing demand for sustainability-oriented competencies is closely linked to the global transition toward green economies and future-oriented labor markets (Napathorn 2021; Thunqvist et al. 2023; Owusu-Agyeman & Aryeh-Adjei 2023). Industries increasingly require workers who are not only technically competent but also capable of applying sustainability principles in workplace operations, resource management, and environmental decision-making. Consequently, education systems are expected to prepare learners with competencies that support innovation, adaptability, ecological responsibility, and systems thinking. Green economic transitions require workforce competencies that combine technical expertise with sustainability-oriented values, environmental literacy, and problem-solving skills (Napathorn 2021; Thunqvist et al. 2023).

Within the Philippine context, the delivery of education is characterized by a trifocal governance structure involving the Department of Education (DepEd), the Commission on Higher Education (CHED), and the Technical Education and Skills Development Authority (TESDA), whose mandates are defined under Republic Act No. 9155, Republic Act No. 7722, and Republic Act No. 7796, respectively. DepEd oversees basic education, including the Technology and Livelihood Education (TLE) curriculum. CHED regulates higher education programs, including teacher education programs related to TVET, while TESDA manages competency-based technical skills training through Training Regulations (TRs) and national skills development frameworks.

While the trifocal education structure supports specialization, it also creates challenges for policy coherence and curriculum alignment in integrating sustainability and green skills. Recent studies highlight systemic fragmentation, curriculum congestion, and mismatches between education and workforce demands, which weaken the integration of sustainability in TVET systems (EDCOM II 2025; Li & Pilz 2023; Klassen 2024).

Recent studies emphasize that policy intentions alone cannot ensure curriculum transformation. Effective Green TVET requires alignment among policies, competencies, learning outcomes, and institutional readiness to support sustainability and green economic development (Li & Pilz 2023; Nielsen et al. 2023; Albertz & Pilz 2025).

Green skills have become central to TVET reforms, encompassing competencies such as critical thinking, adaptability, collaboration, ethical responsibility, and systems thinking for sustainability. Guided by Pavlova's Generic Green Skills Framework, this study examined cognitive, intrapersonal, interpersonal, and systems competencies. However, Green TVET integration in the Philippine trifocal education system remains fragmented due to institutional and policy inconsistencies, highlighting the need for stronger curriculum coordination and alignment (Owusu-Agyeman & Aryeh-Adjei 2023; Albertz & Pilz 2025; Li & Pilz 2023; Thunqvist et al. 2023).

Grounded in curriculum research and policy alignment analysis, this study addresses this gap by examining the integration of green skills within Philippine TVET through a curriculum, policy, and gap analysis across DepEd, CHED, and TESDA. The study contributes to Green

TVET discourse by providing evidence on policy alignment, curriculum coherence, and the integration of sustainability within a developing-country trifocal education system.

1.1 Theoretical and Conceptual Foundation

This study is grounded in curriculum research and policy alignment analysis within the context of Technical and Vocational Education and Training (TVET). Curriculum research emphasizes the relationship among the intended curriculum, policy direction, and actual articulation of competencies within educational systems (Young 2014). In competency-based education systems such as TVET, curriculum documents and policy frameworks serve as critical instruments that shape workforce preparation, instructional priorities, and future-oriented competencies.

The study also draws from the concept of Green TVET advanced by UNESCO-UNEVOC, which positions sustainability as an essential dimension of technical and vocational education (UNESCO-UNEVOC 2017). Green TVET extends beyond environmental awareness by integrating sustainable production, resource efficiency, responsible consumption, and systems thinking into workforce development. Within this perspective, green skills are viewed not only as technical competencies but also as cognitive, behavioral, interpersonal, and systemic capacities necessary for sustainable economic transformation.

To operationalize the analysis, the study adopts Pavlova's Generic Green Skills Framework (2014; 2018), which categorizes green skills into four domains: cognitive, intrapersonal, interpersonal, and systems competencies. The framework provides a structured lens for examining how sustainability competencies are embedded within curriculum standards and national education policies across the Philippine trifocal education system. Through curriculum-policy-gap analysis, the study examines the extent to which sustainability aspirations articulated in national education policies are translated into curriculum implementation and competency standards.

2 Objectives and Scope of the Study

This study aimed to examine the integration of green skills within the Philippine Technical and Vocational Education and Training (TVET) system through a curriculum and policy analysis anchored on the country's trifocal education structure. Specifically, it examined how sustainability-oriented competencies are articulated across key policy instruments and curriculum documents of the Department of Education (DepEd), the Commission on Higher Education (CHED), and the Technical Education and Skills Development Authority (TESDA).

Guided by Pavlova's Generic Green Skills Framework, the study investigated the presence and depth of green skills across cognitive, intrapersonal, interpersonal, and systems domains.

Specifically, the study sought to:

1. examine the extent to which green skills are embedded in key curriculum documents across the trifocal system, including DepEd's Technology and Livelihood Education (TLE) Curriculum Guide, CHED's Policies, Standards, and Guidelines (PSGs) for TVET teacher education programs, and selected TESDA Training Regulations (TRs);
2. analyze the articulation of green skills in major national education policy frameworks, including the EDCOM II National Education Plan, CHED's A.C.H.I.E.V.E. Agenda, and TESDA's National Technical Education and Skills Development Plan (NTESDP); and
3. assess the alignment between policy aspirations and current curriculum implementation.

The scope of the study was limited to document-based analysis of selected national-level policy and curriculum frameworks from DepEd, CHED, and TESDA. It focused on formal policy issuances, curriculum guides, and competency standards that are publicly available and representative of major TVET-related programs. The inclusion of selected TESDA Training Regulations provided a micro-level perspective on how green skills are operationalized within competency-based training. However, the study did not include empirical validation through classroom observations, trainer practices, institutional implementation, or learner outcomes.

3 Methodology

3.1 Research Design

This study employed a qualitative policy and curriculum analysis design to examine the integration of green skills within the Philippine Technical and Vocational Education and Training (TVET) system. The approach is descriptive-analytical, focusing on the systematic examination of policy documents and curriculum frameworks across the trifocal education structure.

A qualitative content analysis approach was employed to identify patterns, themes, and gaps in the representation of green skills. The use of qualitative content analysis is consistent with curriculum research approaches that examine how competencies, values, and policy priorities are represented within formal curriculum and policy documents.

The design enabled an in-depth exploration of how sustainability-oriented competencies are articulated, emphasized, and aligned across DepEd, CHED, and TESDA.

3.2 Data Sources and Document Selection

The study used purposive sampling to select key national-level policy and curriculum documents central to TVET delivery in the Philippines. The selection was guided by relevance, authority, and representativeness within each education sector.

The curriculum documents analyzed, which represent the intended curriculum and formal policy direction within educational systems (Young 2014), include

1. DepEd: Technology and Livelihood Education (TLE) Curriculum Guide;
2. CHED: Policies, Standards, and Guidelines (PSGs) for the Bachelor of Technology and Livelihood Education (BTLEd) and Bachelor of Technical-Vocational Teacher Education (BTVTEd);
3. TESDA: National Technical Education and Skills Development Plan (NTESDP) (TESDA, 2023) and selected Training Regulations (TRs) of top 5 most enrolled sectoral qualifications, namely, (a) Tourism (Cookery NC II, Housekeeping NC II); (b) Agriculture, Forestry, and Fishery (Organic Agriculture Production NC II, Agricultural Crops Production NC II); (c) Social, Community Development & Other Services (Caregiving NC II); (d) Automotive and Land Transportation (Automotive Servicing NC II); and Electrical and Electronics (Electrical Installation and Maintenance NC II).

The selected TESDA Training Regulations represent the five highest-enrolment sectoral qualifications based on TESDA enrolment data and were chosen to capture competency standards from sectors with broad workforce participation. Together with the national policy documents, they provide representative and strategically important cases for examining green skills integration across the Philippine TVET system.

Additional documents were examined for macro-level policy directions:

1. Second Congressional Committee on Education (EDCOM II) National Education Plan (NEP) 2026–2035;
2. CHED ACHIEVE Agenda 2030; and
3. TESDA National Technical Education and Skills Development Plan (NTESDP) 2023–2028.

3.3 Analytical Framework

The study is anchored on Pavlova's Generic Green Skills Framework, which categorizes green skills into four interrelated domains: (1) cognitive, (2) intrapersonal, (3) interpersonal, and (4) systems thinking. This framework provides a structured lens for examining how sustainability competencies are embedded within policy narratives and curriculum content.

The framework was operationalized into a coding guide that identifies indicators of green skills within each domain. These include, but are not limited to, environmental awareness and knowledge (cognitive), values and attitudes toward sustainability (intrapersonal), collaboration and communication for sustainable practices (interpersonal), and a holistic understanding of environmental systems and interdependencies (systems domain).

3.4 Data Analysis Procedure and Presentation

The study employed a structured qualitative content analysis to systematically examine the integration of green skills in selected policy and curriculum documents. Initially, all documents were thoroughly reviewed and familiarized to understand their structure, intent, and key provisions related to skills development and sustainability. This process enabled the identification of relevant sections, such as learning competencies, performance criteria, policy statements, and competency standards, which served as the primary units of analysis.

Subsequently, a coding guide was developed based on Pavlova's Generic Green Skills Framework, translating its four domains—cognitive, intrapersonal, interpersonal, and systems—into specific and observable indicators of green skills. These indicators guided the systematic coding of textual data across all selected documents.

To systematically analyze the extent of green skills integration across the identified curriculum and policy documents in three tiers, a four-point coding scheme was employed. Each unit of analysis was examined and assigned a numerical code based on the level of alignment with the domains of Pavlova's Green Skills Framework. A score of 0 (Not present) was assigned when no evidence of the construct was found; 1 (Implicit/weak mention) when the concept was indirectly suggested or minimally addressed; 2 (Explicit but limited) when the construct was clearly present but not extensively developed; and 3 (Strong and clearly articulated) when the construct was comprehensively and explicitly integrated. This coding approach enabled a structured qualitative-to-quantitative transformation, allowing for comparative analysis across sectors and facilitating the computation of mean scores to determine the overall level of green skills integration. Mean scores were interpreted using the following bands: 2.50–3.00 = Strong Integration; 1.75–2.49 = Moderate Integration; 1.00–1.74 = Limited Integration; and 0.00–0.99 = Minimal or No Integration. These interpretation bands were applied consistently across all tables.

A policy-to-curriculum gap analysis compared the mean green skills scores of policy and curriculum documents. Gap values were computed as Policy Mean − Implementation Mean. Positive values indicate that curriculum implementation falls below policy expectations, while negative values indicate that it meets or exceeds them.

Coding was conducted by a single researcher using the predefined coding guide derived from Pavlova's Generic Green Skills Framework. Each document was reviewed systematically, and coding decisions were based on explicit evidence within competency statements, learning outcomes, performance criteria, and policy provisions. To enhance consistency and reduce subjectivity, the researcher applied the same coding criteria across all documents, maintained an audit trail of coding decisions, and revisited previously coded documents to ensure consistency in score assignment. The coding focused on explicit textual evidence rather than inferred meanings, thereby strengthening the trustworthiness of the analysis.

Following the coding process, the analyzed data were organized into structured matrices for each education agency, namely DepEd, CHED, and TESDA. These matrices facilitated the identification of the presence, frequency, and depth of green skills integration within and across documents. Secondly, a cross-case analysis was conducted to compare findings across the trifocal system, thereby identifying patterns of convergence, fragmentation, and gaps in the integration of green skills. Thirdly, a gap analysis ensured analytical rigor and supported a coherent interpretation of policy and curriculum alignment toward sustainability.

3.5 Limitations of the Study

The study is limited to document-based analysis and does not include empirical validation through field implementation, institutional practices, classroom instruction, or learner outcomes. As such, the findings reflect intended or prescribed curriculum integration rather than actual implementation practices.

Furthermore, the purposive selection of TESDA Training Regulations may not fully represent all occupational sectors. Despite these limitations, the study provides important insights into the policy and curriculum landscape of Green TVET integration within the Philippine education system.

4 Findings and Discussion

This section presents the results of the qualitative content analysis of selected policy and curriculum documents across the Philippine trifocal education system. The findings are interpreted not only in terms of the presence of green skills but also in relation to curriculum coherence and policy alignment across educational sectors. From a curriculum research perspective, the degree of integration reflects how sustainability competencies are translated from national policy aspirations into formal curriculum structures and competency standards.

4.1 Green Skills in Basic Education

The Department of Education (DepEd) is the primary government agency responsible for basic education governance in the Philippines under Republic Act No. 9155 or the Governance of Basic Education Act of 2001. It formulates and implements policies, plans, and programs that promote accessible, inclusive, and quality education. In the context of Technical and Vocational Education and Training (TVET), DepEd delivers foundational technical and vocational competencies through the Technology and Livelihood Education (TLE) curriculum at the secondary level. This role is further reinforced by the EDCOM II National Education Plan, which highlights system reforms, skills alignment, and future-ready competencies. As the entry point of the Philippine trifocal education system, DepEd contributes significantly to learners' early exposure to sustainability concepts and green skills. Through its curriculum and policy directions, it establishes the foundation for the further development of sustainability-oriented competencies in higher education and technical skills training.

Table 1 shows uneven integration of green skills across TLE learning areas. Agri-Fishery Arts has the highest mean score (2.50), indicating strong sustainability integration, followed by Home Economics (2.25) with moderate to strong integration. Industrial Arts (1.75) shows limited integration, while ICT (1.25) records the lowest score, reflecting weak integration of sustainability concepts. Overall, green skills are more evident in practice-oriented areas than in technology-driven domains, particularly in systems thinking.

Table 1: **Green Skills Integration in DepEd TLE Curriculum**

TLE Areas	Cognitive	Intrapersonal	Interpersonal	Systems	Mean Score
Agri-Fishery Arts (AFA)	3	3	2	2	2.50
Home Economics (HE)	2	3	3	1	2.25
Industrial Arts (IA)	2	2	2	1	1.75
Information and Communications Technology (ICT)	1	2	2	0	1.25
Overall Mean	2.00	2.50	2.25	1.00	1.94
Integration Level	Moderate	Strong	Moderate	Limited	Moderate

Note. Scores were assigned using a four-point scale: 0 = not present, 1 = implicit, 2 = explicit but limited, and 3 = strongly articulated. Mean scores were interpreted as follows: 2.50–3.00 = Strong Integration; 1.75–2.49 = Moderate Integration; 1.00–1.74 = Limited Integration; and 0.00–0.99 = Minimal or No Integration.

The findings align with previous Green TVET literature, which emphasizes that sustainability competencies are often more evident in agriculture- and livelihood-related programs than in technology-oriented curricula. This pattern suggests that environmental responsibility is commonly associated with traditional resource-based fields rather than with digital and emerging technologies (Thunqvist et al. 2023; Albertz & Pilz 2025).

4.2 Green Skills in TVET Teacher Education

The Commission on Higher Education (CHED) is the primary government agency responsible for regulating and developing higher education in the Philippines, established through Republic Act No. 7722, or the Higher Education Act of 1994. CHED is mandated to formulate and implement policies, standards, and programs that ensure the quality, relevance, and responsiveness of higher education to national development priorities. Within the context of this study, the focus is specifically on teacher education programs that support Technical-Vocational Education and Training (TVET), particularly the Bachelor of Technology and Livelihood Education (BTLEd) and the Bachelor of Technical-Vocational Teacher Education (BTVTEd). These programs are governed through CHED's Policies, Standards, and Guidelines (PSGs), CHED Memoranda Numbers 78 and 79, series of 2017, respectively, which define curriculum structures, learning outcomes, and competency expectations for future TVET educators. By shaping the preparation of teachers who will deliver technical-

vocational competencies, CHED plays a critical role in embedding emerging priorities, such as sustainability and green skills, within instructional practice, thereby linking higher education to both basic education and skills training within the Philippine trifocal system.

Table 2 shows strong integration of green skills across both teacher education programs under CHED, with BTVTEd and BTLEd each obtaining a mean score of 2.75. The programs demonstrate robust alignment across cognitive, intrapersonal, and interpersonal domains, reflecting the explicit inclusion of critical thinking, values formation, collaboration, and professional responsibility in their program outcomes and curricular structures. However, systems competencies register slightly lower scores, indicating that while elements of systems thinking and sustainability are present, they are not consistently or explicitly articulated as integrated frameworks within the programs. Overall, the findings suggest that CHED teacher education programs are well-positioned to support green skills development, particularly in preparing future educators, but may benefit from a more deliberate and explicit integration of systems-oriented sustainability perspectives.

Table 2: **Green Skills Integration in BTVTEd and BTLEd PSGs**

Program	**Cognitive**	**Intrapersonal**	**Interpersonal**	**Systems**	**Mean Score**
Bachelor of Technical-Vocational Teacher Education (BTVTED)	3	3	3	2	2.75
Bachelor of Technology and Livelihood Education (BTLED)	3	3	3	2	2.75
Overall Mean	3.00	3.00	3.00	2.00	2.75
Integration Level	Strong	Strong	Strong	Moderate	Strong

Note. Scores were assigned using a four-point scale: 0 = not present, 1 = implicit, 2 = explicit but limited, and 3 = strongly articulated. Mean scores were interpreted as follows: 2.50–3.00 = Strong Integration; 1.75–2.49 = Moderate Integration; 1.00–1.74 = Limited Integration; and 0.00–0.99 = Minimal or No Integration.

The strong integration observed in CHED programs may be attributed to outcomes-based education frameworks that provide broader opportunities to embed sustainability across program outcomes, professional courses, and teacher preparation. While critical thinking, collaboration, innovation, and reflective practice support Green TVET, the higher integration

reflects their explicit alignment with sustainability-oriented learning outcomes rather than the presence of these competencies alone (Owusu-Agyeman & Aryeh-Adjei 2023).

4.3 Green Skills in Technical-Vocational Education and Training

The Technical Education and Skills Development Authority (TESDA) is the primary government agency responsible for managing and supervising technical education and skills development in the Philippines, established through Republic Act No. 7796, or the TESDA Act of 1994. TESDA is mandated to formulate policies, develop competency standards, and implement programs to ensure a skilled workforce that is responsive to industry needs and national development goals. Central to its mandate is the development of Training Regulations (TRs), which define competency standards, performance criteria, and assessment requirements for various qualifications, and the implementation of the National Technical Education and Skills Development Plan (NTESDP), which provides strategic direction for the TVET sector. As the implementing arm of skills training within the trifocal education system, TESDA operationalizes competencies at the workplace level, making it a critical platform for embedding green skills in actual occupational standards. Through its competency-based framework, TESDA plays a pivotal role in translating sustainability-oriented policies into measurable skills and practices, thereby linking education and training to the demands of a green and evolving labor market.

Table 3 reveals a moderate overall integration of green skills across the selected technical and vocational qualifications, with an overall mean of 2.04, indicating that sustainability concepts are generally present but not consistently embedded at a deeper level. Among the domains, intrapersonal competencies show the strongest integration, reflecting an emphasis on work ethics, responsibility, and resource efficiency. This suggests that sustainability is often framed as an individual value or behavior rather than as a broader systemic concern. Cognitive and interpersonal domains demonstrate moderate levels of integration, indicating that while technical knowledge and collaboration skills are present, they are not always explicitly linked to sustainability contexts.

In contrast, the systems domain has the lowest mean score, indicating limited development of systems thinking and understanding of environmental interdependencies. This suggests that curricula focus more on operational compliance than on holistic sustainability competencies, despite UNESCO's emphasis on systems thinking as a key component of Education for Sustainable Development (UNESCO 2017; UNESCO-UNEVOC 2022).

Notably, Organic Agriculture Production NC II stands out with strong integration across most domains, illustrating how sustainability can be embedded more explicitly when it is central to the qualification. Meanwhile, other qualifications, particularly in service and industrial sectors, exhibit more implicit or limited integration. Overall, the findings suggest that while green skills are present across curricula, their integration remains uneven and requires stronger alignment toward systemic and transformative sustainability competencies.

Table 3: **Curriculum Analysis of Green Skills Integration in Selected TESDA NC II Training Regulations**

Qualification	Cognitive	Intrapersonal	Interpersonal	Systems	Mean Score
Cookery NC II	2	2	2	1	1.75
Housekeeping NC II	2	2	2	1	1.75
Organic Agriculture Production NC II	3	3	2	3	2.75
Agricultural Crops Production NC II	2	2	2	2	2.00
Caregiving NC II	2	3	3	1	2.25
Automotive Servicing NC II	2	2	1	2	1.75
Electrical Installation and Maintenance NC II	2	2	1	2	1.75
Overall Mean	2.14	2.29	2.00	1.71	2.04
Integration Level	Moderate	Moderate	Moderate	Limited	Moderate

Note. Scores were assigned using a four-point scale: 0 = not present, 1 = implicit, 2 = explicit but limited, and 3 = strongly articulated. Mean scores were interpreted as follows: 2.50–3.00 = Strong Integration; 1.75–2.49 = Moderate Integration; 1.00–1.74 = Limited Integration; and 0.00–0.99 = Minimal or No Integration.

The findings indicate that the integration of sustainability within TESDA remains uneven across occupational sectors. Qualifications directly associated with environmental and agricultural contexts demonstrate stronger articulation of sustainability because their competency standards explicitly address resource conservation and sustainable production, unlike most industrial and service-oriented qualifications (Albertz & Pilz 2025; UNESCO-UNEVOC 2017).

4.4 Cross-Agency Analysis on Green Skills Integration

This presents the results of the qualitative content analysis of selected policy and curriculum documents across the Philippine trifocal education system, focusing on the integration of green skills. The findings are organized according to the cognitive, intrapersonal, interpersonal, and systems domains of green skills. The discussion highlights key patterns of convergence, fragmentation, and gaps in the articulation of sustainability-oriented competencies across policy and curriculum levels.

The trifocal analysis indicates moderate overall integration of green skills (M = 2.24), with the strongest emphasis on intrapersonal competencies and the weakest on systems thinking, highlighting a persistent gap in translating sustainability into systemic and structural dimensions of education and training.

Table 4: **Cross-Agency Comparison on Green Skills Integration**

Agency	**Cognitive**	**Intrapersonal**	**Interpersonal**	**Systems**	**Mean Score**
DepEd	2.00	2.50	2.25	1.00	1.94
CHED	3.00	3.00	3.00	2.00	2.75
TESDA	2.14	2.29	2.00	1.71	2.04
Trifocal Mean	2.38	2.60	2.42	1.57	2.24
Integration Level	Moderate	Strong	Moderate	Limited	Moderate

Note. Scores were assigned using a four-point scale: 0 = not present, 1 = implicit, 2 = explicit but limited, and 3 = strongly articulated. Mean scores were interpreted as follows: 2.50–3.00 = Strong Integration; 1.75–2.49 = Moderate Integration; 1.00–1.74 = Limited Integration; and 0.00–0.99 = Minimal or No Integration.

The results indicate that sustainability competencies are inconsistently articulated in the analyzed curriculum and policy documents. The weak systems-thinking dimension indicates limited integration of holistic sustainability perspectives and underdeveloped systems competencies in curriculum implementation (Albertz & Pilz 2025; Thunqvist et al. 2023).

4.5 Green Skills Integration in Future National Education Agenda

Table 5 reveals that national-level education plans in the Philippines demonstrate generally strong integration of green skills, with mean scores ranging from 2.50 to 2.75. The CHED A.C.H.I.E.V.E. Agenda registers the highest level of integration (2.75), reflecting a

comprehensive alignment with sustainability through its emphasis on SDG-driven research, innovation, and multi-sectoral collaboration. Both the EDCOM II National Education Plan and the TESDA NTESDP show strong integration (2.50), particularly in cognitive and systems domains, as evidenced by their focus on critical thinking, digital skills, workforce readiness, and system-wide coordination across education sectors. However, across all plans, the intrapersonal and interpersonal domains are comparatively underemphasized, indicating that while sustainability is framed at the structural and policy levels, less attention is given to value formation, behavioral change, and the social dimensions of green skills. Overall, the findings suggest that Philippine national education policies are strongly aligned with sustainability at the strategic level, but require deeper integration of human-centered and transformative competencies to fully realize a holistic green skills agenda.

Table 5: **Green Skills Integration in National Education Plans**

Program	**Cognitive**	**Intrapersonal**	**Interpersonal**	**Systems**	**Mean Score**
EDCOM II National Education Plan (2026–2035)	3	2	2	3	2.50
CHED A.C.H.I.E.V.E. Agenda 2030	3	2	3	3	2.75
TESDA NTESDP (2023–2028)	3	2	2	3	2.50
Overall Mean	3.00	2.00	2.33	3.00	2.58
Integration Level	Strong	Moderate	Moderate	Strong	Strong

Note. Scores were assigned using a four-point scale: 0 = not present, 1 = implicit, 2 = explicit but limited, and 3 = strongly articulated. Mean scores were interpreted as follows: 2.50–3.00 = Strong Integration; 1.75–2.49 = Moderate Integration; 1.00–1.74 = Limited Integration; and 0.00–0.99 = Minimal or No Integration.

The findings support the growing recognition of sustainability in education policies, which increasingly promote green skills such as innovation, adaptability, and systems thinking for sustainable workforce development (Pavlova 2018; Albertz & Pilz 2025; Owusu-Agyeman & Aryeh-Adjei 2023).

4.6 Gap Analysis

Table 6 shows a gap between policy aspirations and curriculum implementation of green skills, particularly in the systems domain (1.43), indicating limited integration of systems

thinking in curricula. A moderate gap exists in the cognitive domain (0.62), while intrapersonal (-0.60) and interpersonal (-0.09) domains show closer alignment with policy goals. Overall, the findings suggest that sustainability is more focused on individual behavior than holistic systems competencies, highlighting the need for stronger alignment between policy and curriculum.

Table 6: **Policy-to-Curriculum Gap Analysis of Green Skills Integration**

Program	**Cognitive**	**Intrapersonal**	**Interpersonal**	**Systems**	**Mean Score**
Policy Ideal (National Plans)	3.00	2.00	2.33	3.00	2.58
Implementation Level (Trifocal Education)	2.38	2.60	2.42	1.57	2.24
Gap Values	+0.62	-0.60	-0.09	+1.43	+0.34
Gap Interpretation	Below Policy	Exceeds Policy	Exceeds Policy	Below Policy	Below Policy

Note. Gap values are computed as Policy Ideal minus Implementation Level. Positive values indicate that the current implementation falls short of policy expectations, while negative values indicate that it meets or exceeds them.

The findings suggest that the analyzed documents emphasize individual responsibility more than systems-oriented sustainability competencies. The results further highlight the need for stronger alignment mechanisms to bridge policy aspirations and curriculum implementation.

The findings reveal a gap between sustainability policies and curriculum implementation, particularly in integrating systems thinking competencies (Albertz & Pilz 2025; Thunqvist et al. 2023; UNESCO 2017).

5 Conclusion and Policy Recommendations

This study examined the integration of green skills in the Technical and Vocational Education and Training (TVET) system through curriculum, policy, and gap analyses across the trifocal education structure of DepEd, CHED, and TESDA, guided by Pavlova's Generic Green Skills Framework. Findings show that green skills are present in curricula and policies, but integration remains uneven across sectors and competency domains.

National education plans strongly emphasize sustainability, particularly in cognitive and systems domains; however, curriculum implementation shows only moderate integration, with systems thinking emerging as the weakest area. This indicates that sustainability is often

framed around individual responsibility and operational practices rather than holistic and transformative perspectives.

Among the agencies, CHED teacher education programs demonstrated the strongest integration of green skills, while gaps persisted in selected TESDA Training Regulations and DepEd technology-oriented learning areas. The study also revealed a policy-to-curriculum gap, showing that sustainability goals in national education agendas are not yet fully reflected in curriculum standards and competencies. These findings reflect intended curriculum rather than implementation or learner outcomes.

The findings highlight the need for a more coordinated Green TVET framework across DepEd, CHED, and TESDA through shared green competency benchmarks, cross-agency curriculum mapping, and stronger integration of systems thinking, circular economy principles, sustainable technologies, and environmental problem-solving competencies. Teacher and trainer development programs should also strengthen sustainability pedagogy, while TESDA and DepEd may further embed sustainability competencies across occupational standards and technical learning areas.

Overall, the study contributes to Green TVET discourse by providing a structured curriculum-policy-gap analysis of green skills integration within a developing-country trifocal education system, offering evidence-based insights for curriculum reform and sustainability-oriented policy development in the Philippines and similar contexts.

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