CDIO AND GEN AI FOR SUSTAINABLE DEVELOPMENT: DESIGN PRINCIPLES AND ENHANCED SELF-EVALUATION

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ABSTRACT

This paper addresses the integration of sustainable development into a program building on earlier effort to integrate key competencies for sustainability to develop students sustainability mindset. The paper provides a high-level coverage of the endeavor looking at both “front end” and “back end” of the process – namely that of designing and delivery of a curriculum integrated with sustainable development; and the evaluation of the effectiveness of implementation via program evaluation. For curriculum design to integrate sustainable development, the paper build on the model that the author and his team developed and shared the 2025 International CDIO Conference, taking into consideration the potential use of generative artificial intelligence (GenAI) assisting the process. The outcome is a set of design principles that guides integration of sustainable development with special focus on areas where application of GenAI is encouraged, as well as other areas where faculty oversight (human-in-the-loop) is recommended. The paper then suggests an enhancement to the CDIO program evaluation when using it to ascertain the level of integration of sustainable development in a given program. It posits that as most programs are still rooted in the “education for sustainable development” paradigm or in the process of transitioning to the preferred “education as sustainable development” paradigm. This paper suggests the use of the current 12 core standards with specific focus on sustainable development guided by the requirements of the additional standard on sustainable development. This is because most programs are still implementing “education for sustainable development” and program owner can use the current approach to program evaluation. This paper suggests the use of guiding questioning targeting integration of sustainable development within the focus area of each core standard. The paper rounds off the program evaluation process with a checklist to aid faculty exercising oversight responsibility to ensure that the design guidelines on GenAI use is followed.

KEYWORDS

Sustainable Development, Design Principles, GenAI, Program Evaluation, Standards: 1-12

INTRODUCTION

This paper presents a comprehensive approach towards integration of sustainable development into a curriculum using the CDIO Framework aided by Generative Artificial Intelligence (GenAI). It builds on the approach towards development of students' sustainability mindset proposed by Cheah *et al* (2025) whereby key competencies for sustainability were systematically integrated, contextualized to the program needs in addressing selected United Nations Sustainable Development Goals (UNSDGs). This is shown in Figure 1 below.

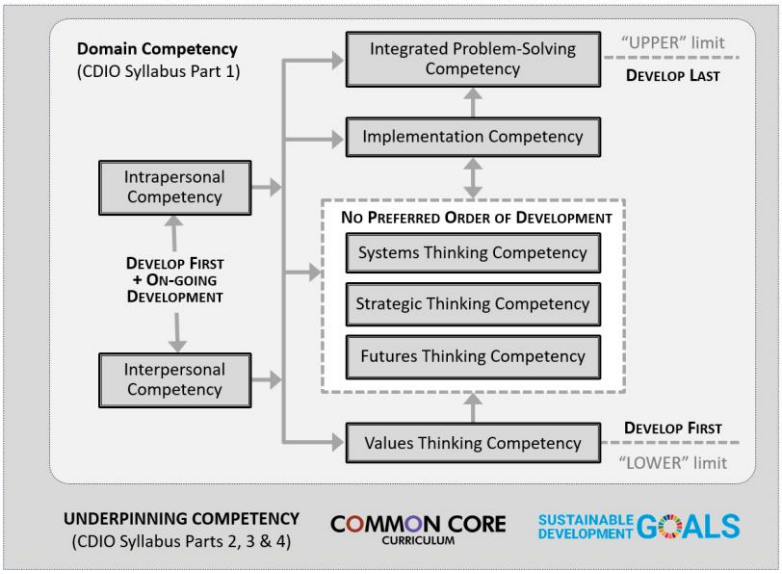

Figure 1. Model for integrating key competencies for sustainability (Cheah *et al*, 2025)

Scope for This Paper

There are 3 main parts to this paper. Part 1 covers the "front end" work by proposing a methodology to design a series of learning tasks in a given program to integrate key competencies for sustainability needed to develop the required sustainability mindset in students. Part 2 closes the loop by providing a methodology at the "back end" to evaluate the curriculum redesign effort after its implementation and identify areas of improvement.

Part 1 of the paper introduces a systematic approach to integrate the key competencies for sustainability within one's program, to aid implementation of the model shown in Figure 1, with additional considerations on impact of GenAI not covered in previous work. It first shares a brief literature review of recent developments in sustainable development vis-à-vis adoption and use of artificial intelligence (AI). This is done by first formulating a set of design principles (Herrington & Reeves, 2011) specifically for sustainability-themed learning tasks. These are then updated for the use of GenAI within the educational sector, informing areas where use of GenAI is advantageous and areas where faculty oversight (human-in-the-loop) is required.

Part 2 of the paper suggests a "special edition" of the self-evaluation process dedicated to sustainable development. This is done by first drawing faculty attention to the Additional Standard for Sustainable Development to understand how each Core Standard is to address sustainability issues. This part first provides a brief historical account of the inclusion of sustainability topics in the CDIO Standards and its evolution to current position; followed by discussions on the challenges faced in carrying out self-evaluation to review integration of sustainable development .

Part 3 of the paper shares an approach to conduct self-evaluation specifically focusing on integration of sustainable development in a program. This provides an alternative to using the Additional Standard for Sustainable Development for program evaluation. This is because many programs in are still very much rooted in the paradigm of "education for sustainable development", with few programs only beginning to transition to the "education as sustainability" paradigm (Gajparia *et al*, 2022). As such, this author opined that a self-evaluation process grounded in the current process of program evaluation sits more comfortably with these programs as opposed to using self-evaluation process for Additional Standard for Sustainable Development. Also, these programs are at varying degrees of integrating other skills needed to support transformative learning where key competencies for sustainability are still being developed. Using the current approach of program evaluation for sustainable development conveyed a sense of familiarity to program owners who are reviewing integration of sustainable development at the same time when they are reviewing integration of other skills and competencies. This section therefore presented a self-evaluation process based on the existing 12 Core Standards, with extra assistance in the form of guiding questions that connects the performance rubrics of each standard to the standard's relation to sustainable development. An added bonus is that we had also included questions on GenAI use to assist faculty in maintaining human oversight on GenAI response should one use them in the application of the core standards vis-à-vis sustainable development.

PART 1: DESIGN PRINCIPLES FOR INTEGRATION OF SUSTAINABLE DEVELOPMENT USING CDIO WITH ASSISTANCE FROM GEN AI

With the advent of AI in general, efforts towards sustainable development had shifted towards leveraging on the power of AI – notably data science – to address the extant challenges. One of the most critical contributions of data science to sustainable development is the handling of big data. Advances in these areas offer unprecedented opportunities to provide actionable insights, drive innovative solutions, and create long-term strategies for sustainable development (Shaddick *et al*, 2025). The descriptive, predictive, and prescriptive analytics from data science can support policy design, optimize resource allocation, and assess environmental impact. Key data science tools like geospatial analysis, machine learning, and big data analytics enable stakeholders to make informed, transparent, and evidence-based decisions (Adepoju *et al*, 2024). Examples of areas where AI-backed data science can be used in addressing sustainability issues include the followings as suggested by Shaddick *et al* (2025):

- Quantification and tracking progress towards the UNSDGs
- Embedding AI technologies to reduce emissions at source, e.g. research into new chemical catalysis, improve agriculture and food production
- Developing systems to increase our resilience to natural hazards, e.g. earthquakes, tsunamis, flooding
- Net Zero and the built environment, e.g. through building retrofitting, digital twins for energy management

Toderas (2025) cautioned that although AI holds transformative potential for achieving sustainability, its widespread implementation is not without inherent challenges and risks. Besides the familiar limitations of AI (inherent bias, infringement of copyright, privacy concerns, etc), AI has its own significant ecological footprint that must be proactively managed. Furthermore, as highlighted by Ren & Wierman (2024), AI's environmental impacts are not evenly distributed – often disadvantaging regions or communities that are already vulnerable to the resulting environmental harms, e.g. water consumption rate for data center heat

rejection. Toderas (2025) suggested 3 categories of risks that need to the addressed as shown in Figure 2.

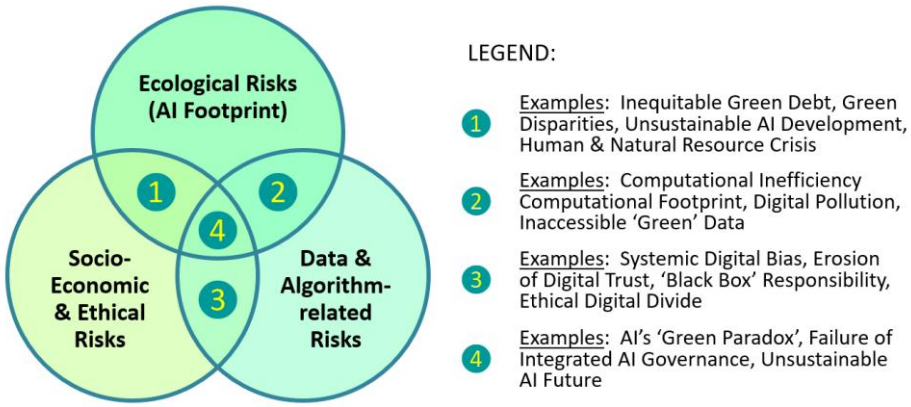

Figure 2. Categories of AI risks in the context of sustainability (Toderas, 2025)

Design Principles to Support Design of Sustainability-themed Learning Tasks

As we moved forward in using CDIO to design curriculum that integrates sustainable development, we need to be cognizant of the rapid development of AI technologies, especially when GenAI and the upcoming Agentic AI are being used in all aspects of teaching and learning. Our CDIO-based approach to curriculum redesign needs to incorporate measures to guard against the unintended consequences arising from these technologies. For the "front end" part of curriculum redesign, we look at the use of design principles to guide our effort.

Design principles had been defined by Herrington & Reeves (2011) as "…considerations that can be used to guide the design and development of learning environments in higher education that are based on sound practical and theoretical principles, and that can promote student engagement through innovative learning tasks". Design principles are not "set in stone". They exist in a range of different contexts, and they enable faculty and instructional designers to use well-researched ideas as guidelines for their own efforts to enhance student engagement and learning outcomes. Herrington & Reeves (2011) suggested that they are best regarded as informed reusable guidelines for others wishing to create their own solutions to educational problems across sectors. With the widespread use of GenAI, this author updated the considerations to include use of GenAI, specifically in the context of education for sustainable development (ESD). This is shown in Table 1. This paper henceforth complement efforts by Cheah (2026a) where he showed that the 12 CDIO Core Standards can be used by faculty acting as human-in-the-loop to provide human oversight when GenAI is used to assist in designing learning tasks that integrates sustainable development.

A set of templates in the form of worksheets had been designed by this author to help program owners integrate key competencies for sustainability as shown in Table 2. There are 6 worksheets that collectively guide faculty in designing CDIO Integrated Learning Experiences to integrate selected key competencies for sustainability into one's courses.

The upper half of the Appendix shows a sample of Template 1 of 6 (Worksheet 1) that sets the context for learning. Note the use of guiding questions (including the use of GenAI) for the worksheet to guide faculty in the design process.

Table 1 . Design principles for integrating sustainable development

Design Principle	Principle	GenAI Role	Human Oversight
Contextual Anchoring	Ground learning tasks in authentic, local sustainability challenges relevant to industry and national strategies.	Generate contextualized sustainability scenarios based on national SDG priorities and industry trends.	Validate GenAI's interpretations of policy and accreditation frameworks to avoid misalignment or misrepresentation.
Constructive Alignment Across Curriculum Layers	Align Program Learning Outcomes (PLOs), Course Learning Outcomes (CLOs), and task-level objectives using Bloom's Taxonomy and key competencies for sustainability.	Draft CLOs and PLOs using progressive cognitive, affective, and psychomotor verbs; suggest mappings to systems thinking and values thinking competencies.	Ensure disciplinary fidelity and progression logic; refine GenAI outputs to reflect institutional mission and learner diversity.
Progressive Scaffolding of Sustainability Competencies	Sequence learning tasks to build proficiency in systems thinking, intrapersonal, interpersonal, and values thinking competencies.	Visualize curriculum progression; suggest activation strategies (e.g., pre-class quizzes, literature prompts); simulate competency development pathways.	Confirm that scaffolding matches actual student readiness and avoids over-generalization or cognitive overload.
Authentic, Real-World Scenario Design	Use plausible workplace scenarios to situate learning within complex sustainability contexts.	Script multi-dimensional scenarios with ecological, economic, and societal tensions; simulate stakeholder perspectives and unintended consequences.	Vet scenarios for realism, ethical sensitivity, local applicability, and disciplinary relevance; avoid bias or oversimplification.
Integrated Learning Across Courses and Years	Design tasks that connect across semesters and disciplines, reinforcing sustainability competencies over time.	Map course interdependencies; suggest cross-course scenario extensions; generate prompts for interdisciplinary synthesis.	Ensure GenAI-generated linkages reflect actual curriculum structure and workload feasibility.
Ethical and Reflective Assessment Design	Assess both product and process, with emphasis on attitudes, values, and systems thinking.	Draft performance rubrics; simulate feedback loops; generate formative assessment variants.	Review rubric criteria for fairness and transparency; ensure feedback is pedagogically sound and context-sensitive.
Student Agency and Meta-cognition	Empower students to co-create, critique, and reflect on their learning journey with GenAI as a cognitive partner.	Prompt reflective journaling; support self-assessment; simulate peer review dialogues.	Guide students in evaluating GenAI outputs critically; scaffold ethical use and authorship boundaries.

PART 2: EVALUATION OF INTEGRATION OF SUSTAINABLE DEVELOPMENT – ENHANCEMENT USING GUIDING QUESTIONS

The CDIO Framework addressed the challenges of sustainable development via revisions to its Syllabus and Standards. In version 3.0 of the CDIO Standards sustainability and sustainable development were referenced in selected core standards (Malmqvist, Edstrom & Rosen, 2020). Additionally, a set of 4 other standards – one of which is sustainable development – was also introduced as "optional" (Malmqvist, et at, 2020). Applying an "optional" standard to a program first requires that the program satisfy all 12 core standards.

The "optional" feature the following criteria (Malmqvist *et al*, 2020):

- Not be sufficiently addressed by interpretation of a core standard
- Reflect ongoing development in several CDIO programs

- Reflect a program-level approach, and not be obtainable by implementation in a single course
- Be assessable by the CDIO standards rubrics

At the 2025 CDIO International Working Meeting in Linkoping, Sweden, it is decided that the word “optional” will be replaced with “additional”.

Table 2. Set of 6 worksheets for integrating sustainable development into curriculum

Worksheet	Focus Areas of Integration	Reference
1	• Select relevant UNSDGs • Identify suitable courses	1 – The Context
2	• Desired outcomes for key competency for sustainability • Increasing proficiency levels	CDIO Syllabus 2 – Learning Outcomes
3	• Progressive development of competency • Other supporting competencies needed	3 – Integrated Curriculum
4	• Real-world workplace scenarios re: sustainability issues • Relationship with other UNSDGs not selected	7 – Integrated Learning Experiences
5	• Increase complexity: Different perspectives on 3 pillars of sustainability	7 – Integrated Learning Experiences (cont’d)
6	• Assessment method, scaffolding & evidence of learning • Constructive alignment	11 – Learning Assessment

The CDIO Syllabus version 3 which featured modifications to existing coverage of sustainable development, along with other updates was introduced 2 years later (Malmqvist *et al*, 2022). A seemingly ironic part of version 3 of the syllabus is the intentional removal of a section dedicated to sustainable development. This is in recognition that the skills and attitudes needed for sustainable development had much in common with other skills and attitudes covered in other areas. As well, skills presented under sustainable development also have utilities for other competencies; so it is better to distribute them in suitable parts in the syllabus. Doing so also requires that faculty using the CDIO syllabus to look through different parts of the syllabus as necessary (e.g. based on the job role or nature of tasks), instead of locking into a limited number of skills and attitudes contained within a specific section of the syllabus.

Challenges in Carrying Out Self-Evaluation for Sustainable Development

Rosen *et al* (2017) had used the optional standard on sustainable development on a wide scale. With some proposed indicators and rubric modifications, the authors concluded that the optional standard is “a useful tool for evaluating, promoting, and guiding, integration of sustainable development, not only in programs with particularly high ambitions regarding sustainable development, but in basically any engineering program. It is recommended that the new standard, with the proposed modifications, is used for setting university-wide goals and for providing teachers and program directors with a framework for enhancing the future relevance of engineering education programs.”

However, the “optional” standard was not commonly used by institutions in the Asia Region. By and large; majority of the programs in CDIO members in Asia are still rooted at the “education for sustainability” stage, whereby transformation towards sustainability had been made by integrating sustainable development into existing curriculum in selected courses;

rather than having programs designed upfront with sustainability as the main focus ("education as sustainability"). They are more likely to be using the current 12 core standards to perform any evaluative work on effectiveness of integration of sustainable development.

As it currently stands, version 3 of the CDIO standards already explicitly mentioned the need to address sustainable development issues in Standards 1, 2, 3, 4, 5, 7, 9 and 11. Clearly, the descriptions for Standard 6, Standard 8, Standard 10 and Standard 12 can easily be amended to mandate considerations of sustainable development issues as well.

This author opined that the challenge for most institutions extend beyond this, based on his experience reviewing applications for CDIO membership from Asian institutions. One of the requirements in the application is the completion of the self-evaluation report. Discussions with applicants indicated that it is the use of the rubrics that is problematic, as the rubrics is meant to be generic for any skills and attitudes integrated and developed within a program. Therefore more guidance will be required for the explicit evaluation of how key competencies for sustainability and sustainability mindset are to be investigated.

PART 3: PROPOSAL FOR CONDUCTING SELF-EVALUATION ON INTEGRATION OF SUSTAINABLE DEVELOPMENT

This author had earlier introduced the use of guiding questions to aid the self-evaluation process for using 12 core standards (Cheah, 2026b) . This can be seen as enhancement for the self-evaluation for integration of any generic skill and/or attitude. The self-evaluation of integration of sustainable development introduced in this paper, can be seen as a "special edition" of the self-evaluation process, with specific guiding questions to aid evaluation of sustainable development vis-à-vis each core standard. To do so, we will tap into the description of the Additional Standard for Sustainable Development.

Understanding the Additional Standard for Sustainable Development

The one-sentence description of Additional Standard for Sustainable Development reads:

"*A program that identifies the ability to contribute to a sustainable development as a key competence of its graduates. The program is rich with sustainability learning experiences, developing the knowledge, skills and attitudes required to address sustainability challenges*."

This is followed by further elaboration on the focus area on sustainable development for each of the 12 Core Standards. Table 3 reproduces such focus area into tabular format as shown.

A set of 12 templates were developed: one for each standard with specific focus on how the standard addresses integration of sustainable development. The format of the template is shown in Table 4 and a sample for CDIO Core Standard 1 The Context is shown in the lower half of the Appendix. It can be seen that the one-sentence description for the standard is shown immediately below the name of the standard. This is followed by "Key Focus on Sustainable Development" which is the text extracted from the description for Additional Standard for Sustainable Development. On the bottom part of the template, one can find on the left side, a list of guiding questions related to sustainable development to be considered under Core Standard 1. Next to the guiding questions, on the right of the template is the same performance rubrics for self-assessment using Core Standard 1. It can also be seen that the guiding questions mirror the performance rubrics but customized for sustainable development.

Table 3. Coverage of sustainable development in 12 core CDIO standards

Standard	Description (as extracted from the write-up for then “Optional” Standard
1	The program emphasizes environmental, social and economic sustainability in the adoption of the CDIO principles as the context for engineering education.
2	Sustainability related knowledge, skills and attitudes, are explicitly addressed in program goals and learning outcomes
3	Aspects of sustainable development are integrated in several mutually supporting disciplinary courses and projects, possibly in combination with specific sustainability courses
4	Concepts of sustainability, potentials and limitations of science and technology and related roles and responsibilities of engineers, are established at an early stage of the education
5	Design-implement experiences provide students with opportunities to apply and contextualize sustainability knowledge, skills and attitudes, both in the development of new technology and in the reuse, redesign, recycling, retirement, etc, of existing technology
6	Physical and digital learning environments enable interdisciplinary and transdisciplinary collaborative learning and interaction with various external stakeholders
7	Sustainability learning experiences are integrated with the learning of disciplinary knowledge, personal and interpersonal skills, and product, process, system and service building skills
8	Active experiential and transformative learning activities develop students’ key competences for sustainability
9, 10	Enhancement of faculty competences for sustainability and related teaching competences is actively promoted
11	Approaches appropriate for assessing sustainability related learning outcomes are implemented
12	The integration of sustainable development is evaluated by students, faculty, industry and societal stakeholders, and in relation to relevant UN and other frameworks

DISCUSSIONS: USE OF GEN AI FOR INTEGRATING SUSTAINABLE DEVELOPMENT

Part 1 shared that GenAI had been used to formulate a set of design principles that guides the integration of sustainable development into a curriculum. Also as mentioned in Part 1, such design principles complements the author’s work that provide guidance of how CDIO Standards can support faculty acting as human-in-the loop, provide oversight on responses produced GenAI (Cheah, 2026a). In a similar intent, human-in-the-loop is required for faculty oversight if GenAI is used for carrying out self-evaluation on integration of sustainable development. This requirement had been added to the list of guiding questions based on the template in Table 4. As an example, it can be seen in the lower part of the Appendix that the use of GenAI had been included as a guiding question for Core Standard 1 The Context.

Parts 2 and 3 shared an approach for conducting self-evaluation specifically on integration of sustainable development in a program. The process is built on a generic approach to elf-evaluation using guiding questions suggested by Cheah (2026b). The self-evaluation for integration of sustainable development made use of focus areas highlighted in the Additional Standard for Sustainable Development, to produce a specific set of guidance questions for each of the 12 Core Standards. The performance rubrics of each core standard is viewed through the lens of sustainable development, and the guiding questions were formulated accordingly.

Table 4. Standard template for evaluating integration of sustainable development

<table>
<tr><th colspan="3">CDIO Core Standard X Name of Standard X</th></tr>
<tr><td colspan="3">One paragraph description of Standard X</td></tr>
<tr><td colspan="3">Key focus on Sustainable Development
Extracted from description for “Additional Standard for Sustainable Development” (see Table 3) that is relevant for Core Standard X</td></tr>
<tr><td rowspan="7">Guidance Questions:
(consider these alongside the rubrics on the right)
• Question 1
• Question 2
• • •
• Which aspects of the work was carried out by GenAI?
• Has the output been validated by faculty?
(Consult checklist for GenAI usage)</td><td colspan="2">Rubrics for Self-Assessment
(Shown here is the generic format applicable to each standard)</td></tr>
<tr><td>5</td><td>Evidence related to the standard is regularly reviewed and used to make improvements.</td></tr>
<tr><td>4</td><td>There is documented evidence of the full implementation and impact of the standard across program components and constituents.</td></tr>
<tr><td>3</td><td>Implementation of the plan to address the standard is underway across the program components and constituents.</td></tr>
<tr><td>2</td><td>There is a plan in place to address the standard.</td></tr>
<tr><td>1</td><td>There is an awareness of need to adopt the standard and a process in place to address it.</td></tr>
<tr><td>0</td><td>There is no documented plan or activity related to the standard.</td></tr>
<tr><td colspan="3">Evidence of Coverage:
(please be detailed)
• Evidence 1
• Evidence 2</td></tr>
</table>

Call for CDIO Members to Adopt/Adapt/Modify the Suggested Approach

The 2 set of templates introduced in this paper were enhancements of the training materials the author used in his past workshops on integrating sustainable development into a program. These 3-hour workshop was delivered as part of faculty professional development within Singapore Polytechnic during the vacation; or to overseas institutions where the author was one on the invited speaker for the institution’s event to talk about ESD. Due to its duration, there was only sufficient time to introduce participants to the templates for using it at their own pace later. Overall responses for the workshops were positive with participants acknowledging the usefulness of the approach, but there was no systematic collection of participant experiences in using the tool.

On reflection, this author decides to leverage on the possible contributions from the CDIO community to obtain feedback and ideas to further improve the templates used. With the advent of GenAI, 2 broad guiding questions were added, to serve as human-in-the-loop check on GenAI use. These questions requires that faculty refer to the checklist in Table 5. This checklist complements the “front end” design principles by ensuring that GenAI contributions in the “back end” self-evaluation process remain pedagogically intentional, ethically sound, and contextually relevant. A notably item in Table 5 is that for “environmental justification”, to critically evaluate solutions proposed by GenAI so that they deliver the desired positive environmental impacts, sustainability benefits, or efficiency gains produced do outweigh the carbon footprint, energy consumption, and water usage required to run it.

However, it is also to be noted that the “broad stroke” of “environmental justification” will not be sufficient given the myriads of risks from AI in the context of sustainability as shown in Figure 2. Again, the collaboration among CDIO community members can be a plausible way moving forward in addressing the ever-changing sustainability and AI landscape.

Together, the guiding questions and checklist provide a dual-layer safeguard: they help faculty critically validate GenAI outputs while reinforcing the integrity of sustainable development integration across curriculum design and evaluation.

Table 5. Checklist for faculty oversight on GenAI use

Pedagogical Alignment

- Confirm GenAI use supports explicit learning outcomes and disciplinary goals.
- Avoid novelty-driven use; embed only where it enhances cognitive or metacognitive engagement.

Authenticity & Complexity

- Validate that GenAI-generated scenarios reflect real-world sustainability challenges.
- Check for ethical sensitivity, local relevance, and multi-stakeholder perspectives.

AI Literacy & Student Agency

- Scaffold students use GenAI progressively, with clear guidance on capabilities and limits.
- Encourage critical evaluation, authorship boundaries, and ethical reflection.

Environmental Justification

- Check that GenAI-suggested solution produces “net positive” gains.
- Ensure that there is alignment to the stated sustainability goal(s).

Transparency of Use

- Require documentation of GenAI’s contributions in student work.
- Make AI involvement visible in rubrics, feedback loops, and evaluation reports.

Assessment Integrity

- Design assessments that demand contextual judgment, process explanation, or personal interpretation.
- Validate GenAI-generated formative materials against learning objectives to prevent plagiarism or misalignment.

CONCLUSIONS

A self-evaluation approach to review the integration of sustainable development in a selected program is shared in this paper. It is meant to assist program owners whose programs are under the paradigm “education for sustainable development” stage of transitioning to “education as sustainability”. This approach maintains a sense of familiarity for program owners as it is the same as what they had been doing for program evaluation using the 12 Core Standards; given the thoroughness and robustness of the approach. The provision of guiding questions – which draw attention to consider responses of GenAI if one is used – can provide greater clarity during the self-evaluation process as a program owner reviews his/her program going through each core standard in turn. It is this author’s opinion that this will be less confusing to newcomers to CDIO who intend to use the framework to address integration of sustainable development into one’s *existing* programs. The author welcomes all CDIO members to try out the approach suggested in this paper, to use the 2 templates within their

own programs, modify as needed; and to share them with other institutions interested in joining CDIO and in using CDIO to address sustainability issues.

ACKNOWLEDGEMENTS

The author received no financial support for this work.

Full Declaration: Table 1, Table 5 and the preceding paragraph had been prepared with the aid of Copilot. The responses were reviewed and edited as appropriate. The prompts used and responses obtained are available for review via the link below and selecting PDF file “109”. https://drive.google.com/drive/folders/1h5gPaRxba899Yjk2GbR5JqJ4jeeqMqLo?usp=sharing

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APPENDIX. SAMPLE WORKSHEETS

For Part 1: Design of Sustainability-themed Learning Tasks – Sample

Worksheet 1 of 6	Designing an Integrated Learning Experiences with Sustainable Development
Context of Learning (CDIO Core Standard 1): Focus area of your Program and related UN SDGs	
Ascertain the context for learning by referring to requirements of key stakeholders for your program with respect to sustainable development and identify several key UN SDGs. Identify suitable courses (across several years of study) in the program with contents that can be related to sustainability issues, so that students can see the relevance of what they can do to address one or more of the selected UN SDGs using knowledge gained from the courses? NOTE: The sustainability issues would preferably be situated in your own country's context.	
Guiding Questions: 1. Identify the industry or industries your program is serving 2. Identify area(s) of Sustainable Development (UN SDGs) that is the focus on the industry 3. How about professional accreditation – any requirements? 4. Narrow the focus down to your country's context, are there some existing strategies, that you can make references to? 5. Did you use GenAI? Did you validate the outputs produced with professional review?	
Your Answers:	

For Part 2: Evaluation of Program's Integration of Sustainable Development – Sample

CDIO Core Standard 1	**The Context**	
Adoption of the principle that sustainable product, process, system and service lifecycle development and deployment - Conceiving, Designing, Implementing and Operating - are the context for engineering education		
Key Focus on Sustainable Development The program emphasizes environmental, social and economic sustainability in the adoption of the CDIO principles as the context for engineering education.		
Guidance Questions: (consider these alongside the rubrics on the right) • To what extent did your program already included coverage of SD, e.g. has it been included in one or more years of the program? • Did program review for continual improvement regularly look for efforts to improve coverage of SD? Had this been documented anywhere in the program? • Which aspects of the work was carried out by GenAI? Has the output been validated by faculty? (Consult checklist for GenAI usage)	Rubrics for Self-Assessment	
	5	Evaluation groups recognize that CDIO is the context of the engineering program and use this principle as a guide for continuous improvement.
	4	There is documented evidence that the CDIO principle is the context of the engineering program and is fully implemented.
	3	CDIO is implemented in one or more years of the program.
	2	There is an explicit plan to transition to a CDIO context for the engineering program.
	1	There is a willingness to adopt to a CDIO context for the engineering program.
	0	There is no plan to adopt the principle that CDIO is the context of engineering education for the program.
Evidence of Coverage: (please be detailed) • •		