

CDIO PROGRAM EVALUATION: IMPROVING SELF-EVALUATION PROCESS WITH GUIDELINES AND GUIDING QUESTIONS

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ABSTRACT

This paper presents the author's experience in his capacity as the Co-Leader for CDIO Asia Region in assisting new institutions interested in becoming a CDIO member. The first explains the submission requirements as part of the application process: notably the completion of an application form, and a self-evaluation report; and describe the challenges faced by these potential new members. One recurring theme is the lack of understanding on how to conduct the self-evaluation process; largely due to the lack of in-depth understanding of the CDIO Framework itself. This can be attributed to missed opportunities to get acquainted with CDIO. The author also noted the mismatch between outcomes of the self-evaluation report and the action plans reported in the submitted application form. Therefore a set of 2 documents had been prepared to assist applicants conduct the self-evaluation process to ascertain the current status of a program targeted for revamp. One document provided guidelines for using the CDIO Standards, as it is noted that different faculty can have different administrative responsibilities in the job role (Program Chair, Project Supervisor, etc) besides the academic accountabilities. A summary table highlighting for each standard the key focus areas at the program-level and course-level. Another document complements the first one, by providing guiding questions to aid the interpretation of the scoring rubric on every CDIO Standards. In this manner, this document expanded on the initial set of rubrics to provide greater clarity to all involved in the self-evaluation rating process with a common understanding based on the broad descriptors of scoring (Level 0 to 5) for each standard. Lastly, the paper shares the feedback from institutions that became CDIO members on their experience in using the 2 documents to aid the preparation of the application form and completing the self-evaluation exercise, with particular attention on the formulation of implementable action plans, prioritized based on the results of the self-evaluation exercise, aligned with the objectives of the curriculum revamp that led to the adoption of CDIO in the first place.

KEYWORDS

Self-Evaluation, Guiding Questions, Rubrics, CDIO Standards 1-12

INTRODUCTION

This paper is written as a contribution to the challenge faced by academic institutions in Asia Region who are interested in using CDIO to drive curriculum changes. As required by CDIO Council, to apply for “membership” into the CDIO community, an institution has to submit 2 documents: an application form and a self-evaluation report for the program chosen to adopt CDIO as the basis for its curriculum redesign. The application form is structured like a questionnaire, where applicant had to answer a range of questions ranging from the intent for joining, what curricular changes are to be made, how to contribute back to CDIO, etc. The self-evaluation report is to accompany the application form. Preparing the self-evaluation report is often the biggest challenge faced by the applying institutions because many only have limited understanding of CDIO. This author noted that there is a lack of explanatory notes on how to complete the self-evaluation report, as it was implied that referencing the performance rubrics alone would suffice. This challenge persisted, even after attending at least one CDIO event – be it the international conference or a regional meeting – as conducting self-evaluation workshop are not typically covered at these CDIO events. Another shortcoming noted by the author in the application submission is the apparent “disconnect” between the results of the self-evaluation and the action plans in the application form.

This paper shares the effort by the author, who in the capacity as CDIO Co-Leader for Asia Region, had prepared a set of documents to help institutions prepare the self-evaluation report. These documents should be of use to new members to CDIO too.

CDIO SELF-EVALUATION & USE OF RUBRICS

A review of past papers presented at the International CDIO Conferences showed that work reported on self-evaluation processes fall largely into the following categories: (1) On-going program continual improvement (e.g. Malmqvist *et al*, 2006; Kontio *et al*, 2012; Cheah *et al*, 2013; Cheah & Lee, 2016) to address a new initiative, including non-engineering program (e.g. Thollar & Rian, 2020); (2) “Validating” the application of the CDIO Framework to address changes in an educational institution’s external operating environment (e.g. Cheah & Leong, 2018). It can be said that the outcome of the latter is to support program continual improvement as well, putting forward the argument that the CDIO Framework had remained useful to provide guidance to program owners in carrying out the necessary curriculum revamp to keep the program up-to-date and relevant.

Cheah *et al* (2013) had shown how the CDIO self-evaluation process can be aligned to the institution’s own academic quality management system, as both are based on the same plan-do-check-act (PDCA) continual improvement cycle. Cheah & Lee (2015) went further by positing that since a program is made up of a collection of courses thoughtfully arranged in a meaningful sequence over the program duration to progressively develop students’ competencies desired by key stakeholders, the self-evaluation process can be “cascaded” down for use at the course level. Bennedsen & Schrey-Niemenmaa (2016) reported on a process of cross-sparring collaborative model, whereby two institutions acting as critical friends use self-evaluation to find areas of improvement of both institutions’ programs. This is the “precursor” of subsequent CDIO Peer-to-Peer Support Initiative.

Evolution of the CDIO Self-Evaluation Process

On using the self-evaluation process for continual improvement, Kontio (2008) is probably the first author to suggest improvements to the process itself using an “extended” evaluation

model, which serves to provide valuable information for focusing on the development actions. The extension proposed was based on a study of the innovation process in organizations-model from the diffusion of innovations theory. This study showed that the five ratings in the CDIO self-evaluation model and the five phases of the innovation process are very similar to each other. Hence, the author proposed that combining the innovation process to the analysis of the implementation process would support the interpretation of the evaluation results.

Bennedsen, Georgsson & Kontio (2014) then evaluated the self-evaluation process from the view of a program responsible, asking questions such as: “Are the descriptions understandable”, “Do the descriptions need extensions, clarifications, precisions”, etc. The authors also analyzed each of the rubrics associated to the standards, based on their own experience in doing self-evaluations; and provided proposals for clarifications, precisions and extensions of the rubrics.

Later, Georgsson, Kontio & Bennedsen (2015) sent out a questionnaire survey to all CDIO collaborators and recipients were asked to evaluate each of the 12 standards with respect to understandability and hierarchical consistency of the standards. The respondents were asked to evaluate their proposed changes of the rubrics. The respondents provided very useful comments and arguments for the development of the revised rubrics. Based on the feedback, changes in the rubrics for the 12 standards were proposed. The updated version of the self-evaluation rubric was approved by CDIO Council on 13 November 2015 (Bennedsen, Georgsson & Kontio, 2016)

Challenges in using the Self-Evaluation Process and its Rubrics

Doing a self-evaluation is a major effort towards continual improvement and the use of rubrics is meant to help a program owner reflect on the quality of one's program. In general, the usefulness of the revised rubrics was reported to be more understandable (Georgsson, Kontio & Bennedsen, 2015). It is worth noting that the evaluation of the revised rubrics was done by key users; almost all of which had good knowledge and experience in conducting self-evaluations.

Newcomers to CDIO are unlikely to possess the same level of proficiency. Based on this author's experience, using the self-evaluation process posed challenges to institutions new to CDIO who are interested in joining the community. This is despite them having gotten some exposure to CDIO, for example, by attending a regional meeting, online sharing on CDIO by the author, visitation to the author's affiliation, etc.

More often than not, applicants tend to give high scores to their self-evaluation report. It can be said that since self-evaluation means that the same person carrying out the process will evaluate the findings from the process, there is much uncertainty that surrounded the validity of the findings reached. Carter & Dunning (2008) for example, noted that research increasingly showed that people were not very good at assessing their own competence and character accurately. The authors in fact opined that the extant literature had shown that people often have such erroneous view of their competence because self-evaluation is an intrinsically difficult task, if not an impossible one. Hence it is “unreasonable to expect more than a meager amount of accuracy in self-judgments”. Carter & Dunning (2008) further argued that the information environment in which people provide self-evaluations is too impoverished to allow them to report accurate findings. This means that the data people have available to them as they strive toward some sort of honest evaluation are incomplete to enable the determination of their true level of competence. This author opined indeed this is the case for new applicants. Lack of understanding of CDIO, the number of documents to be referenced in gathering the

evidence needed, underestimation of time needed, all contributed to the less-than-ideal self-evaluation outcome. Flawed self-assessments are therefore a function of an inadequate information environment, and not necessarily a sign of bias, wishful thinking, or foolishness on the part of the individual.

Bennedsen, Georgsson & Kontio (2016) cautioned that the use of rubric with the highest attainment being Level 5, can be misconstrued as having reached the final state, indicating that the work on program revamp is now completed if one scored at this level. These authors reminded that, quite the contrary, continual improvement implied that the self-assessment will never be finished and that one should still systematically use the process to identify any shortcomings in one's program. Furthermore, as reminded by Bennedsen, Georgsson & Kontio (2014), the main benefit of assigning a score for the self-evaluation resides not in the level itself but the insights one gets from doing the self-evaluation in the first place.

A related issue is that of sufficiency of coverage to constitute satisfactorily meeting the description of any given level of attainment in any rubric. Faculty carrying out self-evaluation often grapple with the challenge of how much evidence is needed to justify a score that is to be given. For example, how many courses in a given program must have active learning in the classroom, and how many lessons in a given course (e.g. 5 out of 10 weeks?) must make use of active learning? The current set of rubrics did not provide sufficient clarity on such matters. A score given based on current practices does not necessarily reflect the aggregate of effort expended in meeting the requirement of a given level of performance for a given standard. From a cost-benefit perspective, it may be argued that the extra efforts to drill down to lesson levels may be too time-consuming and did not justify the resulting granularity. "Good enough is just good enough", so the saying goes. However, a different person looking at the overall results, one who did not have the understanding on how a score is derived, can walk away with the misinformed notion about the actual attainment for a given program.

Lastly, it can be said that the self-evaluation process is "not created equal", meaning that its application can cut across a whole spectrum of the endeavor depending on whether the area under evaluation is down to the task-level or stays at the program-level. The key faculty involved is also likely to be different at various scale of review – different levels of complexity. Self-evaluation thus requires participant by different individuals with different levels of job responsibilities, e.g. faculty self-evaluation of a certain learning intervention introduced in one's own classroom (e.g. as part of action research), course coordinator interested in checking the effectiveness (or otherwise) of an intervention to integrate at course-level certain competency (e.g. for addressing sustainable development issues), or a program owner carrying out a continual improvement review to ascertain the adequacy of existing curriculum in meeting new stakeholder requirement. A self-evaluation carried out by the program owner alone is likely not able to produce a well-informed outcome for program improvement.

IMPROVING THE CDIO SELF-EVALUATION PROCESS

We prepared the following 2 documents to help institutions interested in becoming CDIO members conduct the self-evaluation process:

1. Guidance for using CDIO Standards for Self-Evaluation
2. Guiding Questions for Rating during CDIO Self-Evaluation

The main objective is to help the applicant develop a better understanding of the current status of the program to be revamped, to ensure that the CDIO Framework is indeed the means to meet the institution's strategic plans leading to the needs for curriculum redesign. To this end,

the documents suggested a team approach, led by the program owner, to conduct the self-evaluation exercise to ensure everyone is on the same page. Most importantly, it is to ensure that action plans formulated are solidly grounded in the findings of the self-evaluation process, where the scoring using the prescribed set of rubrics is based on consistent interpretation of the criteria therein, resulting in agreeable action plans that are implementation, and prioritized based on the institution's curriculum's redesign objectives and available resources.

Guidance for using CDIO Standards for Self-Evaluation

This first document informs new applicants that the CDIO Standards are “not created equal” and alluded to the involvement of a team of faculty with different job roles and responsibilities to take part in the self-evaluation process. This process acknowledged that faculty did take on other work functions (some administrative in nature) related to teaching and learning. This is illustrated in Table 1, which is based on the practice in SP. Institution carrying out a self-evaluation should first understand how the CDIO Standards are to be used, and can create a similar matrix as shown in Table 1 for its own internal use.

In interpreting the tick (✓) marks, one has to note that the larger number simply means that the standard is of greater importance to the appointment holder and therefore warrants more attention. Other institutions adopting this table should adjust the relative importance based on own's local context and institutional policies etc. A set of guidelines to prepare the team to carry out the self-evaluation exercise is shown in Appendix 1.

Table 1. Application of CDIO core standards to program-level and course-level *

CDIO Core Standard	Program Owner	Course Coordinator	Course Member	Facility In-Charge	Project Supervisor
1. The Context	✓✓✓	✓✓	✓	✓✓	✓✓
2. Learning Outcomes	✓✓✓	✓✓	✓	✓✓	✓✓✓
3. Integrated Curriculum	✓✓✓	✓	✓	✓	✓
4. Introduction to Engineering	✓	✓✓	✓	✓✓	✓✓✓
5. Design-Implement Experiences	✓✓	✓✓	✓	✓✓	✓✓✓
6. Engineering Learning Workspaces	✓	✓	✓	✓✓✓	✓
7. Integrated Learning Experiences	✓	✓✓✓	✓	✓✓	✓
8. Active Learning	✓	✓✓✓	✓	✓✓	✓✓
9. Enhancement of Faculty Competence	✓✓✓	✓✓	✓	✓	✓
10. Enhancement of Faculty Teaching Competence	✓✓✓	✓✓	✓	✓	✓
11. Learning Assessment	✓✓	✓✓✓	✓	✓✓	✓✓✓
12. Program Evaluation	✓✓✓	✓	✓	✓	✓

* In SP's context, we use the word “Course” when referring to a “Program” and the word “Module” when referring to a “Course”). Also, we use “staff” to mean “faculty”. A staff in SP often hold multiple job roles, for example the Program Owner is known as Course Chair and the Course Coordinator is known as a Module Coordinator. The Course Chair can also at the same time be a Module Coordinator for one course, and a Module Member in yet another course. Likewise a Module Coordinator can be a Module Member in one or more courses. Junior staff are often assigned as Module Member only for one or more modules, as part of a teaching team led by a Module Coordinator. A staff can also take on “special” role as project supervisor or in-charge of a facility, such as workshop and/or laboratory.

Table 2 further elaborates on how the CDIO standards can be used at either the program-level by the program owner or at the course-level by a course coordinator. When using Table 2 it is important to note the difference between “CDIO” skills and “C-D-I-O” skills as used in the table. Here “CDIO Skills” refers to skills and attitudes associated with Parts 2 and 3 of the CDIO Syllabus (i.e. the personal, interpersonal and professional dimensions) whereas “C-D-I-O Skills” refers specifically to skills and attitudes associated with the process of conceiving, designing, implementing and operating a product, system, process of service as covered in Part 4 of the CDIO Syllabus. Also note that the entries for Standards 9 and 10 are based on the proposals suggested in this paper. Human-in-the-loop checks are referenced in Standards 9 and 10 instead of repeating across the rest of the standards.

Table 2. Interpretation of CDIO core standards at program-level and course-level

Core Standard	Program-Level	Course-Level
1. The Context	Compulsory for Program Owner: Overall coverage or any change needed in the program to set the direction of development for affected courses	Course Coordinator: Look at possible specific changes to selected aspect of one's own course where applicable, to support overall direction in the program
2. Learning Outcomes	Compulsory for Program Owner: Program-level Learning Outcomes is the focus, alignment to overall program aim(s) which also consider the institution's mission and vision; and how they were cascaded into various Course-Level Learning Outcomes	Course Coordinator: Look at learning outcomes (CDIO and C-D-I-O Skills) in one's own courses, and ensure alignment with overall program outcomes, in particular to peg them at the correct proficiency levels, written using suitable taxonomy (e.g. Bloom)
3. Integrated Curriculum	Compulsory for Program Owner: Sets the approach of how all the courses are to be arranged in meaningful sequence from Year 1 Semester 1 to Year 4 Semester 2 for a 4-year Degree Program; so as to progressively develop the desired CDIO and C-D-I-O skills to the appropriate level of proficiency	Course Coordinator: Be aware of how your course fits into the overall program structure, how it contributes to the development of desired skills and/or attitudes, in particular how to leverage on students' prior learning from courses before your own course; and how your course provide basis of learning later topics in courses after your course
4. Introduction to Engineering	Program Owner: Be aware of coverage in this course (usually Semester 1 Year 1) and how it sets the contexts and contents for studying the chosen field of engineering (or other discipline)	Course Coordinator for this specific course: This is a unique course, so there is a need to ensure that it provides good rationale and motivation to students, often through a basic-level design-implement experience (see Standard 5)
5. Design-Implement Experiences	Program Owner: Ensure appropriate use of projects in selected courses to develop appropriate C-D-I-O Skills – hence there is often a range of such design-implement experiences from basic level to advanced level, often as part of a series of courses that uses project-based learning; and also ensure that CDIO Skills needed for project work are properly developed in other courses and properly sequenced	Course Coordinator for courses that specifically use projects to engage students in developing C-D-I-O Skills, who must also be aware how CDIO Skills are developed in other courses that can be leveraged on in projects (with different combinations of C, D, I and O), as part of the program's integrated curriculum (Note: Often C-D-I-O Skills are used in conjunction with certain CDIO Skills – see Standard 7)
6. Engineering Learning Workspaces	Program Owner: Often work closely with Facility Development (or similarly named department) and selected Course Coordinators, to identify desired configurations of learning workspaces that support learning activities that lead to the development of C-D-I-O Skills and/or CDIO Skills	Course Coordinator for courses that has a laboratory or workshop component for student learning (see Standard 7); and Course Coordinators for courses with projects (see Standard 5): Identify types of learning workspaces and equipment or pilot plants needed to develop the desired C-D-I-O Skills and/or CDIO Skills
7. Integrated Learning Experiences	Program Owner: Ensure the proper “translation” of the integrated curriculum into a series of learning activities for students to develop desired CDIO Skills from laboratory work, workshops and assignments that mimic or reflect real-world workplace scenarios that students may encounter	Course Coordinator: Look at possible specific changes to selected aspect of one's own course where applicable, to design or redesign learning activities that uses knowledge from one's course, to support overall direction in the program to develop desired CDIO Skills at the proper proficiency levels

Table 2. (cont'd)

8. Active Learning	Program Owner: Ensure the proper “translation” of the integrated curriculum into a series of learning moments for students to develop desired CDIO Skills during lectures and tutorials using appropriate active (and preferably experiential) learning strategies	Course Coordinator: Look at possible specific changes to selected aspect of one's own course where applicable, using specific active (and preferably experiential) learning strategies to develop selected skills and attitudes to support overall direction of the program
9. Enhancement of Faculty CDIO Competence (as revised)	Program Owner: Working with course coordinators to ensure that GenAI tools are used in ethical and responsible manner aligning to other CDIO Standards; and working with Academic Resource Manager or Training Manager to ensure needed competencies are in place	Course Coordinator: Identify the CDIO skills and AI competency needed for one's own course, as well as the needs of the teaching team if applicable and liaise with Academic Resource Manager or Training Manager for the necessary training
10. Faculty Professional Development (as newly proposed)	Program Owner: Engage key stakeholders to identify new competencies needed for one's program (including GenAI) and work with Academic Resource or Training Manager to ensure needed competencies are in place	Course Coordinator: Liaise with Academic Resource or Training Manager for the necessary training for self, and teaching team members where applicable
11. Learning Assessment	Program Owner: Ensure meaningful and consistent assessment of development of required CDIO Skills and C-D-I-O Skills at the proper proficiency levels; with a good balance of formative and summative components in all courses	Course Coordinators: Select suitable assessment tools along with relevant evidence of learning and provide timely facilitation and support consistent with students learning needs; and to ensure constructive alignment
12. Program Evaluation	Program Owner: Ensure periodic review of a program using CDIO Self-Evaluation Rubrics by consolidating inputs from all Course Coordinators; and where the institution already has quality assurance framework, to use the CDIO Framework to complement it.	Course Coordinators: Review one's own course and how it contributes to the development of competency needed by key stakeholders; especially in terms of how one's course can support and be supported by other courses in one's program.

Guiding Questions for Rating during CDIO Self-Evaluation

The guiding questions are provided to help Program Owner and/or Course Coordinator review one's curriculum in terms of achievement as compared against the rubrics in each Standard. The guiding questions are formulated more or less in the sequence to start from a low rubric score, and progressively move towards a higher rubric score, although it must be acknowledged that such “transition” is not always clear-cut. In moving from the lower to higher score in the rubrics, it can be seen that the responsibility increasingly moved from that of a Course Coordinator to that for a Program Owner. The onus is on the Program Owner to make an informed decision on the rating given based on best information available.

Table 3 shows the standard format for the guiding questions to be used for all 12 core standards. The “Description” and “Rationale” of the standard were omitted to avoid clutter. An example for Standard 3 Integrated Curriculum is shown in Appendix 2.

DISCUSSIONS: EXPERIENCE FROM NEW CDIO COLLABORATORS

The author had shared the 2 documents with institutions who contacted him and expressed interest in becoming CDIO members. After initial contact (online) where he ascertained that an institution is genuinely interested in adopting the CDIO Framework, he will send them the application form, self-evaluation template, and the 2 documents shared above.

Table 3. Standard format for providing guiding questions for each CDIO standard

Standard Number and Standard Name	
One paragraph description of the standard	
Rubric (scale 0 to 5) for the standard	
5	
4	
3	
2	
1	
0	
Guiding Questions:	
• • • •	

Four institutions had recently been accepted as CDIO members following their presentations at the 2025 CDIO Asia Regional Meeting hosted by Politeknik Negeri Batam in Indonesia in August. A simple survey (see Appendix 4) had been conducted with the institutions to obtain their feedback on using the 2 documents in preparing the application. These are briefly discussed below.

For the document “*Guidance for using CDIO Standards for Self-Evaluation*”, 2 institutions found it “Extremely Useful” (The instructions were comprehensive and very clear, allowing us to carry out the self-evaluation process with clarity and confidence) and 2 others found it “Very Useful” (The instructions were clear and well-structured, giving us a clear picture of how the carry out the self-evaluation process with minimal difficulty). Applicants found the guidelines to be helpful, especially in ascribing different responsibilities of different standards to various appointment holders. What can be done better is to make it clear that upfront that applicant can modify the table to suit their own institution’s faculty job roles, as one applicant noted that it did not use this table. Areas of improvement include making some guidelines clearer and using a flowchart.

For the document “*Guiding Questions for CDIO Self-Evaluation Exercise*”, 2 institutions reported it as “Extremely Useful (The guiding questions were insightful, comprehensive, and provide good clarity in scoring across all standards), one reported as “Very Useful” (The guiding questions were clear, well-structured, and helped us in scoring across most if not all of the standards) and 1 reported as “Moderately Useful” (The guiding questions were generally understandable, but we can benefit more if additional questions are provided). Applicants in general find the guiding questions useful, as they provide greater clarity of what is expected because the descriptors for the rubric can be rather broad. Some areas of improvement include reducing overlapping coverage in more than one standard which can lead to confusion; and providing some examples.

CONCLUSIONS

These documents had been used by the author acting in his capacity as the CDIO Co-Leader for Asia to provide advice to institutions applying to join the CDIO community for the last 3 years. One particular area that warrants special attention is the formulation of action plans by the applying institution. Here the author informed applicants that implementable action plans are one of the major considerations of the application; and suggests applicants prioritize the action plans based on the results of the self-evaluation to clearly articulate how CDIO will be used in driving curriculum change for the program(s) chosen. So far, applications received had been satisfactory as witnessed by the action plans prepared. Anecdotal “evidence” gathered via informal conversations with applicants informed that they found the guidelines and guidance questions useful.

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This paper did not make use of GenAI.

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BIOGRAPHICAL INFORMATION

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APPENDIX 1. Guidelines for Carrying Out CDIO Self-Evaluation

1. The CDIO 12 Core Standards are presented in numerical sequence from 1 to 12. For each standard a short description of the standard is given, followed by a rubric for use in the self-evaluation of that given standard, from a score of “0” to “5”. Note that the rubric is hierarchical, meaning that a higher score will require that the criteria for the scores below it had been met.
2. The purpose of self-evaluation is to ascertain to what extent the skills and attitudes desired by key stakeholders had been attained during the duration of the study program. Recall that the CDIO Syllabus provides guidance on the types of skills and attitudes that key stakeholders required. For the purpose of this document, we will use the term “CDIO Skills” to mean skills and attitudes associated with the personal, interpersonal and professional dimensions as covered in Parts 2 and 3 of the CDIO Syllabus. We will also use the term “C-D-I-O Skills” to specifically means skills and attitudes associated with the process of conceiving, designing, implementing and operating a product, system, process of service as covered in Part 4 of the CDIO Syllabus.
3. The person or persons involved in this process will go through the standards one-by-one, and review the items covered in each standard against what had been done in the chosen program, to ascertain the extent to which the current had implemented part or all of the CDIO recommendations as spelt out in the 12 Core Standards.
4. The self-evaluation process is best led by the Program Owner (or Program Manager, Program Chair, or other similar named position: this is a person who is tasked with managing or running a program) in conjunction with the program team involved in teaching the program. Other team members will include Course Coordinators (persons who is in-charge of a given course, or other similarly named position; who has overall responsibility for a course especially if taught by more than one faculty).
5. Note that the aim here is NOT to score “5” in any or all categories; as the aim of the self-evaluation is to provide the program owner with “as-accurate-as-it-can-get” the most current status of the program as far as adoption of the CDIO Framework is concerned. This then serve as the basis for actionable items to improve the concerned program.
6. The CDIO standards each had a specific focus area, some of which are more applicable at Program-level and hence needs the input from Program Owner; while others can be applicable to all teaching faculty, especially one who assumed a lead role as Course Coordinator. Table 1 provides a simple explanation of which standard(s) are most pertinent to which faculty role in the chosen program and hence should be involved in the self-evaluation process. The greater the number of tick marks (✓) indicated higher importance. Table 2 provides more explanation of how the standards apply to Program Owner and Course Coordinator respectively.
7. Where GenAI is to be used, self-evaluation takes on a different context: it is one that checks for ethical and responsible use of GenAI when it is used in conjunction with a given standard. Here the self-evaluation serves as an oversight function with human-in-the-loop review and sanction the GenAI use.

APPENDIX 2. Sample Guiding Questions for CDIO Self-Evaluation - Standard 3

Standard 3 Integrated Curriculum	
<i>A curriculum designed with mutually supporting disciplinary courses, with an explicit plan to integrate personal and interpersonal skills, and product, process, system, and service building skills.</i>	
Rubrics	
5	Internal and external stakeholders regularly review the integrated curriculum and make recommendations and adjustments as needed.
4	There is evidence that the students have achieved the intended learning outcomes concerning personal, interpersonal, product, process, system, and service building skills.
3	The approved integrated curriculum concerning personal, interpersonal, product, process, system, and service building skills is in use.
2	The curriculum that integrates learning outcomes of personal, interpersonal, product, process, system, and service building skills is approved, and a process has been initiated to implement the curriculum.
1	The need to analyze the curriculum is recognized and initial mapping of disciplinary and skills learning outcomes is underway.
0	There is no integration of skills or mutually supporting disciplines in the program.
Guiding Questions: <i>A common misconception here is that the program had adequately focused on getting students to integrate technical knowledge covered in different courses. In CDIO, the notion of integrated curriculum extend beyond technical knowledge to include integration of skills and attitudes needed to support problem-solving using the domain technical knowledge.</i> <i>Also: there are many skills and attitudes that needs to be integrated. It is not expected that a given program will have addressed ALL of them, as new skills and attitudes will emerge later at one point or another when the external operating environment changes. While there is no number of skills/attitudes specified here, that needs to be addressed, it is reasonable to expect that – regardless of which program one is studying – students are required to possess some skills in teamwork and collaboration, communication, thinking and problem-solving; and positive attitudes such as growth mindset and resourcefulness. See also Standard 5 for C-D-I-O skills – skills developed via project work. Are all these skills and attitudes taught explicitly to students?</i> • Are these skills and attitudes taught explicitly to students? If yes, which are the courses? Are they used – or assessed – even though they were not taught? If so, in which courses are they used? Again, there is no explicit requirement on the number of courses to have a number of skills and attitudes integrated. The position here is that it is reasonable to expect the above-mentioned fundamental skills of teamwork and collaboration, communication, thinking and problem-solving should be covered. • What about other skills and attitudes that had been identified as needed but not yet integrated? Have you ascertained the desired level of proficiency? • Is there a systematic way to develop these skills and attitudes over the duration of the program? Have you identified suitable courses to include these skills? • Is there a plan in place to design an integrated curriculum for a chosen program? • Are the courses logically sequenced to allow progressive development of desired CDIO Skills and C-D-I-O Skills? Is there a need to reconsider the program structure (i.e. the arrangement of the courses that promote the development of these skills)? • As a Course Coordinator, what about your own course(s)? Where is your course located in your program structure? Can you build on outcomes (knowledge, skills, attitudes) from other courses (in earlier stage or same stage of study) to enhance the learning outcomes of your own course? Likewise, what other courses in later stage of study can leverage of what you had covered in your own course? • How would you know that your students had benefited from the integrated curriculum? Do you have activities in your own course such as assignments that require students to make use of skills and attitudes covered in different courses to complete your course assignment? • What are the evidence that demonstrates that students had attained the desired competency in integrating knowledge, skills and attitudes in problem identification and problem solving? • How often do you review the program structure to ensure it remains relevant to develop the desired competency (KSA)? Did you involve your key stakeholders in the review process? • Has GenAI been used in an ethical and responsible manner in the application of this standard?	

APPENDIX 3. Survey Questionnaire for New Members to CDIO Asia Community

For the document “*Guidance for using CDIO Standards for Self-Evaluation*”

Q.1 On a scale of **1** to **5** based on the descriptions below, how do you feel the document “*Guidance for using CDIO Standards for Self-Evaluation*” had helped you in carrying out the self-evaluation process to support your application?

Scale	Meaning	Explanation	Answer (X)
5	Extremely Useful	The instructions were comprehensive and very clear, allowing us to carry out the self-evaluation process with clarity and confidence.	
4	Very Useful	The instructions were clear and well-structured, giving us a clear picture of how to carry out the self-evaluation process with minimal difficulty.	
3	Moderately useful	The instructions were for the most part easy to understand but several areas still require some clarification before carrying out the self-evaluation process.	
2	Slightly Useful	The instructions were somewhat unclear in some areas or lacked detail, so it is quite challenging for us to carry out the self-evaluation process.	
1	Not useful at all	We had difficulty understanding the most parts of the instructions and had much difficulty carrying out the self-evaluation process	

Q.2 Please elaborate on your decision above, and be as specific as possible, e.g. which paragraph(s) is/are unclear or confusing for you.

Q.3 Notwithstanding the above shortcomings elaborated in Q.2 earlier, please share your ideas – if any – to further improve the document.

For the document “*Guiding Questions for CDIO Self-Evaluation Exercise*”

Q.4 On a scale of **1** to **5** based on the descriptions below, how do you feel the document “*Guiding Questions for CDIO Self-Evaluation Exercise*” had helped you in giving a score for each standard during the self-evaluation process?

Scale	Meaning	Explanation	Answer (X)
5	Extremely Useful	The guiding questions were insightful, comprehensive, and provide good clarity in scoring across all standards	
4	Very Useful	The guiding questions were clear, well-structured, and helped us in scoring most if not all of the standards.	
3	Moderately useful	The guiding questions were generally understandable, but we can benefit more if additional questions are provided	
2	Slightly Useful	The guiding questions were somewhat helpful but lacked clarity or alignment with some rubric levels.	
1	Not useful at all	The guiding questions are confusing or irrelevant, and we still had difficulty doing the scoring during self-evaluation.	

Q.5 Please elaborate on your decision above, and be as specific as possible, e.g. which question(s) in which standard(s) is/are unclear or confusing for you.

Q.6 Notwithstanding the above shortcomings elaborated in Q.5 earlier, please share your ideas – if any – to further improve the document.