

Quality Assurance: Industrial Engineering Capstone Design Project Process Standardization*

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This paper presents a comprehensive overview of the Capstone Design Project (CDP) course guideline developed by an industrial engineering (IE) department at a public university. The ultimate objective is to create a stable reference point for faculty members and students to follow for the CDP. To this end, this paper presents a standardization process model for the CDP through the development of the Capstone Design Project Handbook (CDPH). The developed CDPH includes all of the requirements, details, course outcomes, and specifications necessary to ensure a standardized process and continuous improvement of the CDP experience. The purpose of this paper is to standardize and improve the process from registering for the CDP course to the posting of the grades at the end of the course. The outcome of developing such a document is the enhancement of the quality of the education received by the students. The CDPH will also provide the faculty members and students with deadline dates, assessment forms, evaluation criteria, rubrics, and deliverable requirements for the CDP journey. This study provides evidence related to the significant results experienced by the stakeholders who utilized the CDPH.

Keywords: Capstone Project Handbook; process improvement; process standardization

1. Introduction

Standardization is essential in order to produce good results in research [1]. To this end, education requires rubrics that make grading procedures reliable [2]. In fact, well-defined educational approaches have been shown to improve engineering education quality [3]. A Capstone Design Project (CDP) is an essential part of any engineering student's undergraduate journey and allows him/her to elaborate on and show the accumulated skills and tools that he/she has learned throughout his/her studies [4]. However, several challenges exist that affect faculty members' abilities to manage CDPs [5], including faculty members' inabilities to properly supervise students in the CDP [6], teams' formations and their effectiveness [7, 8], and project suitability and nature [9, 10]. Several studies have proposed assessments and evaluation applications for CDPs using a previous version of the student outcomes presented by the Accreditation Board for Engineering and Technology (ABET) (a–k) [11, 12]. Unlike these studies, the purpose of this paper is to present our experience while developing the Capstone Design Project Handbook (CDPH) for an industrial engineering (IE) department at a public university in Saudi Arabia. The development of the CDPH will lead to standardization and improvement in the CDP process from course registration to the posting of course grades. The CDPH includes all of the requirements, responsibilities, deadlines, specifica-

tions, measurable outcomes, grading rubrics, and assessment criteria for the CDP courses.

The CDP spans two semesters and consists of Capstone Design Project I (CDP1) and Capstone Design Project II (CDP2). Every student in the IE department must complete the CDP courses in order to complete the Bachelor of Science in IE degree. IE students must work in teams to design, build, and test their products/operational processes for the satisfactory completion of these courses. This study explains the CDP process model in terms of identifying the stakeholders, requirements, assessment, and continuous improvement plans to successfully implement and manage the CDP. The implementation section shows the development and usage of the proposed model. Finally, in the results and discussion section, we show the results achieved from using and implementing the proposed model among the stakeholders.

2. CDP Process Model

The CDP process model is divided into four phases. In the first phase, the IE program administrators identified its own CDP stakeholders (e.g., students, faculty members, external reviewers, program advisory boards). It was important to identify the roles and responsibilities for each stakeholder to provide a clear and standardize process for implementing and managing the CDP. These roles and responsibilities included designing, team leading, report developing, supervising, reviewing, and evaluating.

* Accepted 18 March 2021.



Fig. 1. CDP Standardization Process Model.

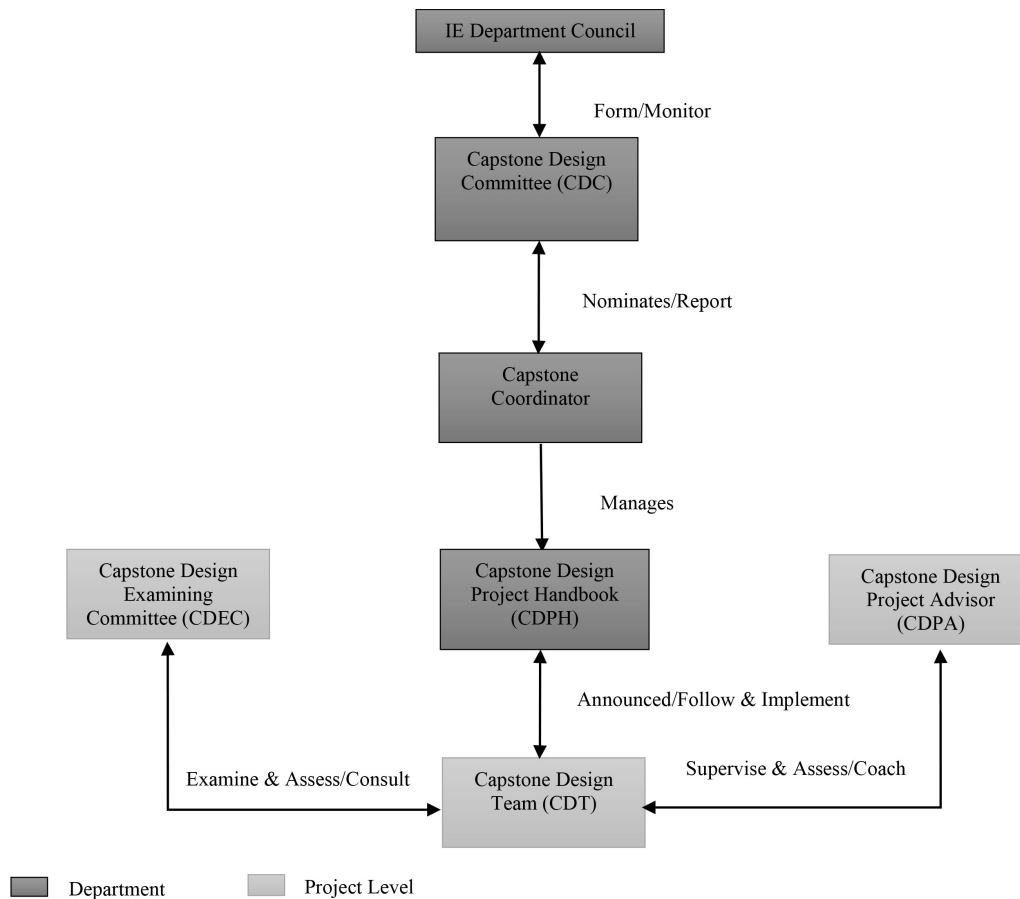


Fig. 2. Relationship Among All Stakeholders.

In the second phase, the requirements for the CDP were identified based on two resources: the ABET and IE curriculum. In this phase, it was important to include the requirements presented by the department's accreditation programs (e.g., ABET, Washington Board of Engineers). In addition, the program curriculum needed to be included to identify the policies and procedures for the CDP courses, including registering, conducting, and completing the courses.

In the third phase, we developed an assessment plan that would allow the department to implement consistent assessments across the courses and projects. Generally, two types of assessment methods exist in the CDP: holistic and analytic. In a holistic assessment, an overall assessment score is given for the CDP deliverables. On the other hand, an analytic assessment often uses a detailed rubric with at least a rating score for each criterion in the deliverables.

In the fourth phase, a continuous improvement plan was created so as to maintain improvement for the CDP experience for all stakeholders. This plan will allow those in charge to better monitor and improve the management and assessment of the CDP, which will ultimately enhance the learning outcomes. The program may define a set of measurements tools to monitor and improve the CDP process (see Section 3.3). These measurements should be reviewed by program administrators periodically for continuous improvement. For each phase, this study will illustrate the tools, techniques, and measurements used to enhance the quality of the CDP education. Fig. (1) shows the CDP standardization process model.

3. Implementation

It is important to achieve satisfactory levels of CDP

experience from the stakeholders, while standardizing the CDP process. A need exists to provide stakeholders with clear processes and procedures for both the delivery and assessment of the CDP. Thus, for proof of concept, the proposed model was applied to the College of Engineering at a public university in Saudi Arabia. The university has over 74,000 students out of which 2,000 are enrolled in the College of Engineering. The college of engineering has around 80 faculty member and consists of five departments. All of the engineering programs are taught in English. The proposed model was used in the IE undergraduate program as a case study. The program has an average of 10 CDPs per semester with three to four students per project. In the following sections, the implementation of the proposed model's four phases is illustrated.

3.1 Identify Capstone Project Stakeholders

3.1.1 Capstone Design Committee (CDC)

The Capstone Design Committee (CDC) is formed yearly during the Fall semester by the IE department to manage the CDPs. The CDC members are nominated by the chairman of the department and assigned by the department council. One of CDC members is nominated as the coordinator of the CDC. The CDC is composed of four to six members from different tracks of the IE department. The major responsibilities of the CDC are to develop capstone course policies, review course practices, and present any changes in the policies to the department council for approval. The responsibilities of the CDC are: (1) the execution of the CDP courses, (2) to collect project proposals and ideas from the industry and/or IE faculty members, (3) to review submitted project proposals by assessing their conformity to the ABET definition of engineering design and assessing the level of complexity of the problem, (4) to approve and announce the final list of projects, (5) to review the course outcomes assessment results, (6) to evaluate the adequacy of the policies and practices to achieve the course learning outcomes, and (7) to propose recommendations/action for continuous improvement.

3.1.2 Capstone Coordinator

The capstone coordinator is nominated by the IE chairman among the faculty members who have the adequate skills and experiences (e.g., design, industrial, advising) necessary for the position. The nomination is approved by the department council. The coordinator serves as the chair of the CDC. The responsibilities of the coordinator are to: (1) ensure that the CDPs are executed as standardized in the process model; (2) setup and execute the CDP calendar; (3) act as the liaison between the depart-

ment and college administration; (4) conduct awareness seminars for the students and faculty members; (5) communicate the course policies, procedures, calendar, and assessment methods to the students and supervisors; (6) conduct and communicate the students' team assignments; (7) confirm, in conjunction with the CDC, that the selected project proposals are relevant to the students' areas of specialization; have academic relevance; are based on accumulated knowledge from previous courses; and will produce learning outcomes relevant to the program; (8) confirm that the selected projects are feasible within the projects' timeframes; (9) assist the Capstone Design Project Advisors (CDPA) to refine the project goals and outcomes as needed; (10) identify and provide any help required for the students to have good starts to their projects; (11) consult with the project sponsor (if relevant) regarding project goals, access to data, confidentiality, and project details; (12) monitor the students' progress on a weekly basis to ensure successful capstone experiences [13]; (13) monitor the students' attendance in the seminars, team meetings, and CPDA meetings; (14) guide/coordinate with the student(s) for poster day; (15) review the teams' logbooks and portfolios on a monthly basis; (16) ensure that the assessment criteria and evaluation forms are met and completed for all of the teams as per the CDPH; (17) compile the CDP course reports and course binders for all of the teams; and (18) create a plagiarism check report for each Capstone Design Team (CDT) and provide it to each CDPA.

3.1.3 Capstone Design Examining Committee (CDEC)

The CDEC monitors and evaluates each CDT and consists of three department faculty members: a CDPA and two additional members nominated by the CDPA and approved by the capstone coordinator. The CDEC is responsible for three aspects of the team's assessment (i.e., reports, presentations, prototype). They are expected to: (1) read, correct, and grade the CDP report before the CDP presentation; (2) read the assessment rubrics carefully before the report assessments, presentations, and prototype evaluations; (3) attend the prototype presentations and assessments; and (4) complete and submit the assessment forms and rubrics on time.

3.1.4 Capstone Design Project Advisor (CDPA)

The CDPA is the primary advisor to the CDT and works with the team to complete the CDP by providing the members with technical and academic support. The responsibilities of the CDPA are to: (1) propose and submit an adequate project statement; (2) ensure that the CDT proposal adheres to

the capstone requirements and core competencies; (3) verify that the selected project is feasible within the timeframe allotted; (4) help refine the project goals and outcomes; (5) identify and provide any help required for the CDT to have a good start to the project; (6) teach the CDT the topics needed to complete their CDP; (7) provide guidance to the CDT regarding codes and standards; (8) review the proposal, abstract, presentations, poster, and reports and verify compliance with department requirements; (9) ensure that the project work submitted is the students' original work; (10) review and return the CDT reports within one week; (11) attend the CDT presentation rehearsal and provide guidance and feedback; (12) submit the project progress report (Appendix 3); and (13) submit the assessment evaluation forms.

3.1.5 Capstone Design Team (CDT)

The CDT consists of three to four students from the IE department. The responsibilities of the CDT are to: (1) review and understand the project timelines, milestones, and deliverables; (2) consult with IE faculty regarding various aspects of the project; (3) schedule periodic meetings among the CDT members and with the CDPA; (4) develop a proposal that defines the scope and schedule of the project in consultation with the CDPA, sponsor, and capstone coordinator; (5) manage tasks, project milestones, budgets, and purchases for the project; (6) track project progress to verify that the CDT is on schedule; (7) keep the CDPA informed in a timely fashion of the project's progress and any roadblocks; (8) keep the capstone coordinator informed of any issues that require the attention or assistance of the department chairman; (9) communicate clearly among the members regarding their assigned work; (10) be responsive to the CDPA and capstone coordinator regarding their communication and requests; (11) report the project progress status to the CDPA continuously throughout the lifecycle of the project; (12) prepare the required materials for the project presentations; (13) gain feedback from the CDPA prior to the presentations; (14) deliver the reports, poster, presentations, and other project deliverables on time; and (15) participate in poster day.

3.2 Identify Program Requirements for Capstone Project

The ABET is responsible for accrediting the IE program and colleges and universities continuously attempt to improve their programs so as to gain/not lose this accreditation. As such, the ABET is considered to be the reference point for educational quality and program requirements for CDPs [14]. The definition of engineering design as presented by

the ABET must be considered when choosing a CDP idea: "a process of devising a system, component, or process to meet desired needs and specifications within constraints" [15].

The first step in creating a CDP is for the team to define a problem. This problem must be suitably complex as defined by the ABET:

"Complex engineering problems include one or more of the following characteristics: involving wide-ranging or conflicting technical issues, having no obvious solution, addressing problems not encompassed by current standards and codes, involving diverse groups of stakeholders, including many component parts or sub-problems, involving multiple disciplines, or having significant consequences in a range of contexts [14]."

Additionally, the ABET has identified seven Student Outcomes (SO) that need to be achieved throughout the program. These outcomes cover a set of measurable skills gained and actions produce by the students. Table 1 shows the link between these (SO) and the CDP courses outcomes.

3.2.1 Course Eligibility

- A student is eligible to register for CDP1 if he/she has successfully completed at least 120 of 166 credit hours, including three junior level courses.
- CDP1 and CDP2 can be taken during the Fall and Spring semesters only (not during the summer semester).
- Students cannot proceed to CDP2 without successful completion of CDP2.

In addition to the ABET requirements discussed above, the IE program has set several requirements to minimize variations in the CDP delivery process. These requirements are listed below.

3.2.2 Steps to Assign a Capstone Project

The topics are usually chosen by the department faculty members, based on the identification of the project's proposal sources, highlighting ideas supported by financial contributions and/or community services, specific requirements, and creative solutions. However, project topics are driven from the following sources:

1. Local industry or building company/partner projects.
 - (a) CDPs are supported by financial contributions to the department.
 - (b) Students are provided opportunities to work on practical design projects and interact with outside engineers and involved institutions.
2. Community service.
 - (a) Improvements to technical systems and functions of public institutions.

Table 1. The Link between the ABET Student Outcome and the Capstone Design Project Course Outcomes

ABET Student Outcome (SO)	Capstone Design Project Course Outcomes
An ability to identify, formulate, and solve complex IE problems by applying principles of engineering, science, and mathematics (ABET 1)	Formulate a problem statement related to IE
An ability to apply an IE design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors (ABET 2)	Evaluate alternative solutions to the capstone project problem
An ability to communicate effectively with a range of audiences (ABET 3)	Communicate effectively with a team related to the proposed capstone project
An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts (ABET 4)	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives (ABET 5)	Work effectively in a team during proposed capstone project
An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (ABET 6)	Propose a methodology that shows an IE technique
An ability to acquire and apply new knowledge as needed, using appropriate learning strategies (ABET 7)	Apply new knowledge as needed related to the capstone project

3. Research partner projects.
 - (a) University research projects that include engineering designs.
 - (b) The students are provided opportunities to work with leading researchers in the university to develop design solutions and prototypes to fulfill specific requirements in ongoing research projects.
4. Student organizations and design competitions.
 - (a) The IE department considers some local and/or international competitions appropriate to the objectives of the program outcomes.

project deliverables’ timeline during the academic semester on a weekly basis. First, formal written proposals should be submitted by Week 9 or 10 and presented formally by Week 13 or 14. Once the CDT proposals have been accepted, the teams are essentially independent throughout the completion of their projects. The CDEC is available when needed, but allows the students as much autonomy as is desired. During the second semester, students are expected to have a formal written thesis submitted by Week 9 or 10. The project defense will take place by Week 13 or 14. The thesis template should be followed by the students.

3.2.3 Capstone Project Process Flow

Each capstone project in the IE program needs to follow the CDP process flow illustrated in Figs. 3 and 4. This requirement was set to standardize the

3.2.4 Develop an Assessment Plan

By the end of the capstone project, each CDT must deliver a project report that includes: (1) an abstract, (2) an introduction to the topic, (3) a

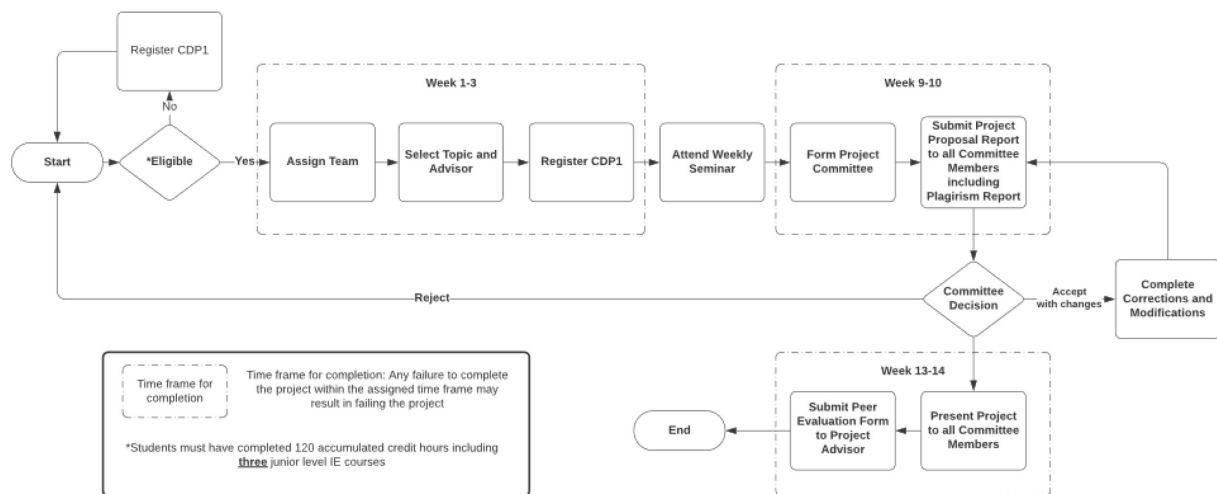


Fig. 3. CDP1 Process Flow.

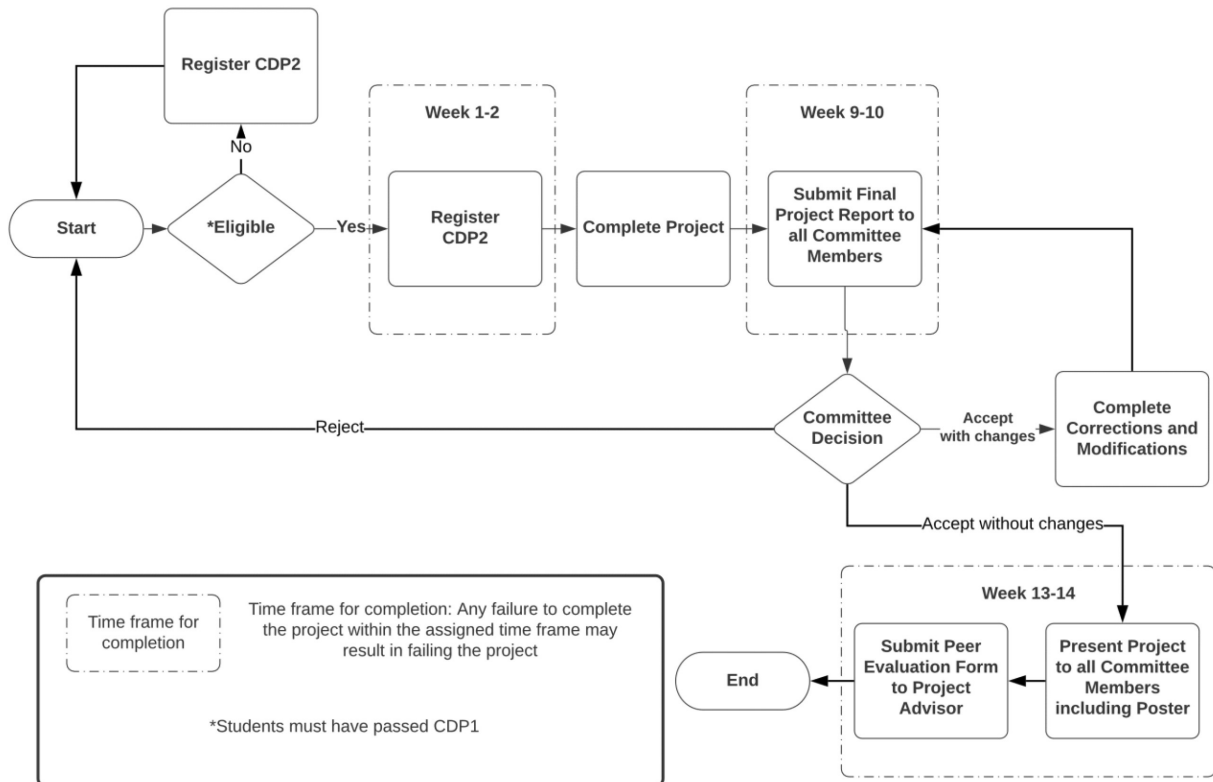


Fig. 4. CDP2 Process Flow.

literature review, (4) a proposed methodology that includes alternative methods used for IE, (5) results, (6) an analysis of the results, (7) a conclusion, and (8) future study opportunities. In addition, CDT must deliver a PowerPoint presentation, and a project poster. See Appendix (12) for the poster formatting guidelines.

3.2.5 Assessment and Evaluation Criteria

The following shows the analytic assessment steps for the CDP:

1. The CDP1 and CDP2 Report Evaluation Forms (see Appendices 4 and 8) need to be submitted by each of the three members of the CDEC. The evaluation criteria for CDP1 are based on: (1) the impact of the IE proposed solution in global, economic, environmental, and social contexts; (2) the problem statement as it is related to IE; (3) the completeness of the literature review; and (4) how well the proposed methodology shows an IE technique and its alternatives. For the CDP2 form, in addition to the evaluation criteria for CDP1, the CDT will be evaluated on: (1) their presentation of alternative solutions for the capstone project problem, (2) how they are able to apply new knowledge as needed related to the capstone project, and (3) their use of their mathematical skills in the derived solutions.
2. The CDP1 and CDP2 Presentation Evaluation Forms (see Appendices 5 and 9) need to be submitted by each of the three members of the CDEC. In these forms, each student in the CDT is evaluated individually. The evaluation criteria are based on: (1) the overall organization of the presentation (e.g., slide flow, content, time frame), (2) technical competency (e.g., problem definition, design, analysis), (3) preparation and appearance (e.g., facing the audience, dressed well), (4) communication skills, and (5) ability to answer questions.
3. The CDP1 and CDP2 Peer Evaluation Forms (See Appendices 6 and 10) need to be submitted by each student of the CDT. Each student evaluates his/her peers throughout the CDP journey. The evaluation criteria are based on: (1) the quality of the technical work, (2) ability to communicate, (3) ability to provide leadership, (4) commitment to the team and project, and (5) demonstrated effectiveness.
4. The CDP1 and CDP2 Final Grade Forms (See Appendices 7 and 11) are used to summarize the marks for each student. They also help the grader know which elements were used to measure the aligned course outcomes.

Table 2 illustrates and summarizes the tasks that need to be accomplished by the IE program faculty

Table 2. List of Tasks and their Due Dates Required for the IE Faculty Members

List of Tasks	Course	Due Date	Owner (Executer)	Submit To
Project Progress Report (1)	CDP1 and CDP2	Week 7	CDPA	CDC
Program Faculty Member Agreement form	CDP1	Week 9	CDPA	CDC
Response from CDEC members to CDT after reviewing project report	CDP1 and CDP2	Week 10	CDEC	CDPA
Project Progress Report (2)	CDP1 and CDP2	Week 12	CDPA	CDC
Each CDPA should submit to the CDC the project title for his/her CDT to confirm the CDT's readiness for their presentation*	CDP1 and CDP2	Week 12	CDPA	CDC
Plagiarism Report	CDP1 only	Week 12	CDC	CDPAs
Capstone Presentation Flyer	CDP1 and CDP2	Week 13	CDC	All IE Faculty
Capstone Presentation Day and Indirect Assessment collection		Week 14 or 15	CDC	All IE Faculty

* Late submissions of readiness will affect the students' grades.

members based on their roles and responsibilities. It also highlights the due date of each task.

3.3 Develop a Continuous Improvement Plan

A continuous improvement plan is essential to maintaining progress in regard to student outcomes attainment and overall CDP experience. This continuous improvement plan will impact stakeholder satisfaction and provide a systematic approach to reviewing and modifying CDP processes and procedures. A flowchart of the continuous improvement cycle is shown in Fig. 5. One of the major learning components through which the IE program's outcomes are implemented is CDP courses. As discussed earlier in the assessment and evaluation criteria, the attainment of student outcomes (SOs) are assessed by the individual instructors through direct assessments by implementing numeric assessment tools. Additionally, indirect assessments are done by the students at the end of the courses to provide their feedback about the course and evaluate their attainment of the SOs using a discrete survey. The direct and indirect assessment data, along with recommendations for continuous improvement from other stakeholders,

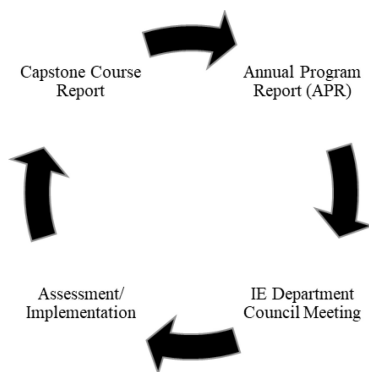


Fig. 5. Continuous Improvement Cycle.

are documented in the course reports. Then, the chairman of the department processes the evaluation data and recommendations so that they can be further discussed in the department council meeting. Additionally, the chairman of the department develops an Annual Program Report (APR) at the end of every academic year. The APR contains a summary of the program courses' assessment results and recommendations for improvements. Moreover, recommendations from alumni surveys, exit surveys, and advisory board meetings are also evaluated and documented in the APR. Finally, the APR is discussed thoroughly in the department council meetings and action plans are approved and finalized. This continuous improvement cycle takes place every academic year to ensure on-going monitoring and improvement of program courses and student attainment.

4. Results and Discussion

The development of the CDPH will aid faculty members and students in fully understanding all of the components of the CDP. The result of having such a document will impact the quality of the students' education by measuring program outcomes, as well as by forcing continuous improvement of the CDP experience to reach extraordinary results. This section presents the direct and indirect assessment results for CDP1 and CDP2 after the implantation of the CDPH. These assessment results are an indicator of the level of CDPH effectiveness and areas of opportunities for future improvements. Table 3 shows the SO using the direct and indirect assessments for CDP1 during Fall 2018 and Fall 2019 and Table 4 shows the SO using the direct and indirect assessments for CDP2 during Spring 2019 and Spring 2020.

Feedback from the stakeholders is essential to ensuring the effectiveness of the CDPH practice. A

Table 3. CDP1 SO Attainment using Direct and Indirect Assessments in Fall 2018 and Fall 2019

Student Outcome	Course Outcome	Assessment Type	Fall 2018 Attainment Percentage	Fall 2019 Attainment Percentage
(ABET 4): An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	Direct	95.75%	92.53%
		Indirect	96.67%	90.29%
(ABET 3): an ability to communicate effectively with a range of audiences	Communicate effectively with a team related to proposed capstone project	Direct	NA	92.05%
		Indirect	NA	94.29%
(ABET 5): an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	Work effectively in a team during proposed capstone project	Direct	92.50%	100%
		Indirect	91.25%	92.86%

Table 4. CDP2 SO Attainment using Direct and Indirect Assessments in Spring 2019 and Spring 2020

Student Outcome	Course Outcome	Assessment Type	Spring 2019 Attainment Percentage	Spring 2020 Attainment Percentage
(ABET 1): An ability to identify, formulate, and solve complex IE problems by applying principles of engineering, science, and mathematics	Formulate a problem statement related to IE	Direct	100%	93.00%
		Indirect	98.75%	96.00%
(ABET 3): an ability to communicate effectively with a range of audiences	Communicate effectively with a team related to proposed capstone project	Direct	93.50%	92.47%
		Indirect	97.50%	94.00%
(ABET 5): an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	Work effectively in a team during proposed capstone project	Direct	NA	100%
		Indirect	NA	94.00%
(ABET 2): An ability to apply an IE design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	Evaluate alternative solutions of capstone project problem	Direct	87.50%	93%
		Indirect	95.00%	96.00%

Table 5. Overall Level of Agreement for the CDPH Elements

Element	Level of Agreement
The stakeholders' roles and responsibilities	73.48%
The requirements and expected deliverables	76.44%
The forms used for evaluation	75.11%
Evaluation criteria	75.11%
Capstone project's timeline and deadlines	72.00%
Capstone project's definition and objectives	77.56%
The capstone courses' learning outcomes	75.33%

survey was used to measure the effectiveness of CDPH based on several elements (see Table 5). A total of 134 responses were collected from the stakeholders. Of these responses, 90 were complete and usable. For each element in the survey, the participants were asked about the extent of their agreement as to whether each element was clearly stated, defined, understandable, and unambiguous.

Table 5 shows the overall level of agreement for each CDPH element:

In terms of the stakeholders' overall level of satisfaction with the CDPH, the collected usable responses reported an average of 72.89% as a satisfaction level. This level of satisfaction indicates that the CDPH has significantly achieved its objective. However, further review of the CDPH could result in enhancements of the students' outcome, as well as streamlining the CDP process.

5. Conclusion

The goal of this study was to develop a standardization process model for the CDP through the development of the CDPH to standardize and improve the CDP's processes and procedures. The model (see Fig. 1) was developed based on four phases to ensure systematic monitoring of student attainment levels and project deliverables, as well as provide a

continuous improvement cycle by which to improve the CDP experience. Furthermore, as a proof of concept, the proposed model was implemented in the IE department of a public university in Saudi Arabia. The results showed that the average of the direct SO assessment across CDP1 and CDP2 in the two years was 94.14%, the average of the indirect SO assessment was 94.55%, and the overall weighted level of stakeholder satisfaction was 72.89%. Thus, the proposed model was successfully implemented as the results showed that the model

provided a systematic approach for tracking SO attainment, as well as provided a method by which to measure stakeholders' feedback for continuous improvement. Future studies could be used to analyze the results to identify which factors had the most impact on improving SO attainment, as well as stakeholders' feedback. In addition, future studies could utilize the proposed model at different universities and in other programs or (e.g., internship courses).

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Appendices

Appendix 1: Capstone Design Examining Committee (CDEC) Member Agreement Form

Link: <https://www.dropbox.com/s/84qhb3h3lh1zj0p/Appendix%20%281%29%20Capstone%20Design%20Examining%20Committee%20%28CDEC%29%20Member%20Agreement%20Form.pdf?dl=0>

Appendix 2: Project Proposal Form

Link: <https://www.dropbox.com/s/2y1503xkccnq90d/Appendix%20%282%29%20Project%20Proposal%20Form.pdf?dl=0>

Appendix 3: Project Progress Report

Link: <https://www.dropbox.com/s/zlb4nb4vbkha3b5/Appendix%20%283%29%20Project%20Progress%20Report.pdf?dl=0>

Appendix 4: Capstone Project Proposal Evaluation Form

Link: <https://www.dropbox.com/s/6y8cqmh6vh68oz5/Appendix%20%284%29%20CDP1%20Report%20Evaluation%20Form.pdf?dl=0>

Appendix 5: Capstone Project Proposal Presentation Evaluation Form

Link: <https://www.dropbox.com/s/aynn6b3jljq3z86/Appendix%20%285%29%20CDP1%20Presentation%20Evaluation%20Form.pdf?dl=0>

Appendix 6: CDP1 Peer Evaluation Form

Link: <https://www.dropbox.com/s/ls9wy2hsywuuv74/Appendix%20%286%29%20CDP1%20Peer%20Evaluation%20Form.pdf?dl=0>

Appendix 7: CDP1 Final Grade Form

Link: <https://www.dropbox.com/s/sjzyazxt0s9hzuof/Appendix%20%287%29%20CDP1%20Final%20Grade%20Form.pdf?dl=0>

Appendix 8: Capstone Project Report Evaluation Form

Link: <https://www.dropbox.com/s/hn52rma9hfo7sf/Appendix%20%288%29%20CDP2%20Report%20Evaluation%20Form.pdf?dl=0>

Appendix 9: Capstone Project Presentation Evaluation Form

Link: <https://www.dropbox.com/s/sjsidg3qf7dbfjkd/Appendix%20%289%29%20CDP2%20Presentation%20Evaluation%20Form.pdf?dl=0>

Appendix 10: CDP2 Peer Evaluation Form

Link: <https://www.dropbox.com/s/9ba5cm8vsz1mje8/Appendix%20%2810%29%20CDP2%20Peer%20Evaluation%20Form.pdf?dl=0>

Appendix 11: CDP2 Final Grade Form

Link: <https://www.dropbox.com/s/43ize59lohn4pa6/Appendix%20%2811%29%20CDP2%20Final%20Grade%20Form.pdf?dl=0>

Appendix 12: Poster Guidelines

Link: <https://www.dropbox.com/s/vmiqjjehqe4dk3c/Appendix%20%2812%29%20Poster%20Guidelines.pdf?dl=0>

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