

CHAPTER NINE

PROGRAM EVALUATION

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INTRODUCTION

In previous chapters, we described key characteristics of a CDIO program. First, we addressed *what* we should teach: learning outcomes that address disciplinary content, as well as personal and interpersonal skills, and process, product, and system building skills. We went on to discuss *how* we should teach: an integrated curriculum; a sequence of design-implement experiences in workspaces specifically designed to support them; integrated teaching, learning, and student assessment. In Chapter Eight, we presented approaches to enhance faculty competence in these skills and in teaching methods. We now address three key questions dealing with the effectiveness of our approach:

- *How do we determine if programs are successfully implementing a CDIO approach?*
- *How can we improve programs that are not up to standard?*
- *What is the impact of implementing a CDIO program?*

These are the general questions of program evaluation. We define program evaluation as a process for judging the overall effectiveness of a program based on evidence of progress toward attaining its goals. The specific approach to program evaluation can take a variety of forms, depending on the conceptual framework and rationale for the evaluation. Evaluation of CDIO programs follows primarily a judgment model, based on inputs, processes, and outputs. *Inputs* include feedback from personnel, use and usability of facilities, and use and availability of resources; *processes* include teaching, assessment, evaluation methods; and, *outputs* are the intended learning outcomes for students and overall program outcomes.

We evaluate a program by judging its overall quality based on indications of its progress toward reaching its goals. One way to judge this overall quality is to focus on a program's progress toward implementation of the 12 CDIO Standards described throughout this book. Because the Standards address inputs, processes, outcomes, and to a limited extent, impact, program evaluation based on the CDIO Standards can provide program leaders with

data upon which to determine whether programs are achieving their goals, operating effectively, allocating resources appropriately, and making a difference overall.

We use the term *standards-based program evaluation* to describe the approach we use with CDIO programs. This approach is consistent with a judgment model of program evaluation. A standard, in this context, is a criterion or characteristic that defines a program. Evidence of progress toward implementation of a CDIO approach is collected from multiple sources, using a variety of quantitative and qualitative methods. When this evidence is regularly reported back to faculty, students, program administrators, alumni, and other key stakeholders, the feedback forms the basis for making decisions about the program and its continuous improvement.

Standards-based program evaluation, using the 12 CDIO Standards, is consistent with accreditation models and other national evaluation approaches. This consistency is based on similar purposes. Both approaches set criteria, collect evidence of compliance with the criteria, and require plans to improve programs. However, national accreditation criteria often establish minimum levels of acceptable program performance. We have deliberately set the CDIO Standards high, so that all programs—even those of the highest quality—can use them as the basis of continuous improvement.

In this chapter, we discuss the purpose and value of a standards-based approach to program evaluation as a way to determine if programs are successfully implementing a CDIO approach. In doing so, we identify key evaluation questions aligned with the Standards, and examine a variety of methods to collect data to answer the evaluation questions. We give examples of data collection and analysis in representative programs. We make connections of program evaluation results with the process of continuous improvement and give suggestions for improving programs that are not up to standard. Finally, we summarize results that give evidence of the impact of CDIO programs overall.

CHAPTER OBJECTIVES

This chapter is designed so that you can

- recognize the characteristics of a standards-based approach to program evaluation
- identify key questions that guide program evaluation and align them with the CDIO Standards
- describe a variety of methods that provide evidence of program quality
- give examples of standards-based program evaluation
- emphasize the connection between program evaluation and continuous program improvement
- evaluate the overall impact of programs that have implemented a CDIO approach