

CHAPTER ELEVEN

OUTLOOK

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INTRODUCTION

The CDIO Initiative responds in an integrated and pragmatic way to the historical context in which engineering education finds itself and to the challenges that lie in the future. The Initiative began with four universities in two countries, and has expanded rapidly in terms of scope and participating universities. The initial programs were typically within the domains of mechanical, vehicular and electronic engineering, but the CDIO approach has now been implemented in programs in chemical engineering, material science and engineering, and bioengineering. The model has been applied to reform initiatives affecting all engineering programs at a university, and as a template for national initiatives and evaluation schemes. The number of universities has now expanded to more than 22 universities in 12 countries on nearly every continent. Development is underway at universities characterized as research-intensive or teaching-focused; large or small; private or public; or historically focused on minority and underrepresented populations. Regional CDIO Centers in North America, the Nordic countries, the United Kingdom and Ireland, and Southern Africa, have been established to provide opportunities for the exchange of ideas and support for implementation in local regions. A number of vehicles, tools, and forums for disseminating and developing the CDIO approach have been created, including the website and the annual international conferences.

The CDIO approach is likely to evolve and be adapted and implemented in an even wider variety of settings—in engineering disciplines not already covered, in graduate education, and in education beyond engineering. It has been designed to be flexible and adaptable, with the ability to respond to the forces driving engineering education in the near future. We look forward to working with others in this evolutionary process. This chapter highlights what we see as future challenges for engineering education, and outlines ways in which a CDIO approach can be developed to address these challenges.

CHAPTER OBJECTIVES

This chapter is designed so that you can

- recognize the factors that continue to drive change in engineering education and ways in which the CDIO Initiative relates to them
- discuss the potential for development and broader application of the CDIO approach

DRIVERS FOR CHANGE IN ENGINEERING EDUCATION

The major goal of engineering education is to serve society and engineering students by providing up-to-date, high-quality learning opportunities, organized as programs. Maintaining and improving quality requires an awareness of the key environmental factors that drive change in engineering education. The most important drivers for change in engineering education include:

- Scientific breakthroughs and technological developments
- Internationalization, student mobility and flexibility
- Skills and attitudes of beginning engineering students
- Issues of gender and broadening participation
- Governmental and multilateral policies and initiatives

It is important to have good mechanisms in place for maintaining awareness of the factors that drive change and to have effective methods to plan and implement changes in engineering programs. Chapter Eight suggests methods for implementing program change, and Chapter Nine gives examples of tools and techniques for program evaluation and improvement. The CDIO Syllabus, itself, discussed in Chapter Three, can also be a useful tool for monitoring some of the drivers.

Scientific breakthroughs and technological developments

Scientific and technological evolution is an obvious driver for the development and improvement of engineering education. Existing subjects in the curriculum have to be updated according to the progress within the discipline, and new fields of study need to be incorporated into the curriculum. There are several ways to keep a curriculum current and relevant. One way is to see to it that faculty have sufficient resources for research within their disciplines. Relevant research results can then be introduced into the educational program. A second way is to assure that adequate mechanisms exist for bringing developments in industry into the engineering education program. We can achieve closer ties with industry by hiring faculty and research staff with industrial experience and by involving people from industry in program implementation and management.