Evaluating a B.S. Program in Mechanical Engineering – Six Years of Surveys

R.W. Mayne, A.K. Patra,
R.C. Wetherhold and K.E. Lewis
Department of Mechanical and Aerospace Engineering
University at Buffalo (State University of New York)
Buffalo, NY 14260
USA
Email: mayne@eng.buffalo.edu

This paper describes the continuous evaluation and improvement process that has been applied to the Mechanical Engineering Bachelor of Science Program at the University at Buffalo. This is an update of a study presented at the ICEE Taiwan conference in 2000. It now includes six years of survey data and follows the response of our student body to program revisions made in 2000 and based on initial surveys of graduates and alumni available at that time.

The development of our survey process was based on reaching a set of goals for the "knowledge" and "skills" generally expected of mechanical engineers. The goals were defined through faculty discussions and consensus agreement followed by initial surveying of students and alumni. The set of knowledge goals includes relatively traditional academic areas such as thermodynamics, fluid mechanics, mathematics, dynamic systems, mechanics and the basic sciences. Also included are mechanical design, professionalism and exposure to engineering practice. The set of goals for skills refers to more "practical" factors including product design, communications and the abilities to use engineering judgement, work in teams, and use computer-aided-design tools.

Our surveying process has focused on the knowledge and skill goals and a quantitative approach to measuring the success of our program in achieving those goals. Participants are asked to provide their viewpoint (on a scale of one to five) of the importance of the various knowledge and skill items to their career. They are also asked to rate the importance that they believe we have placed on each of these items within our BSME program. In this way, the survey data indicate the natural importance of our knowledge and skill goals from the viewpoint of the students and our success in meeting that importance level in our program.

At the time we began alumni and student surveys in 2000, the data indicated that "more of everything" was desirable but also that the more traditional sciences and technical areas were best covered. Our coverage of applied areas was seen as less satisfactory in the surveys – areas such as product design, manufacturing and computer-aided-design tools clearly needed more attention. Students particularly appreciated the importance of some of the "softer" areas – the ability to work in teams, to communicate and to have sound judgment were seen as "skills" needing increased attention. While professionalism, ethics and experience in engineering practice were "knowledge" areas found to need improvement. After the surveys in 2000, we revised our program, adding/subtracting material and courses in response to the survey.

At this point, we have data from our alumni and student surveys completed in 2000 and from our continuing survey of graduating seniors from 2001 – 2004. This series of surveys shows quite consistent viewpoints on items of career importance. Those things important to our alumni from as early as 1994 remain just as important to our 2004 graduates. Since our program revision effective in 2001, the continuing survey results also show that students are sensitive to the changes we have made in our curriculum since that time. Improvements in our program coverage are reflected in the data, with increasing emphasis recognized by our students in those areas where we have increased coverage. It is also important to note that the increased coverage in applied/practical areas has been achieved without a perceived reduction in emphasis in the more traditional sciences and technical areas. We have clearly been able to make progress in matching our program coverage to perceived needs. Of course, we still have more to do. But, the results to date give us confidence in the process. Our student customers have been relatively consistent in the perception of their needs and they have been sensitive to our program changes.