Thirty Years of Educational Innovation-And a Peek at the Future

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This session is a sort of continuation of Session 2230 at the ASEE meeting in Seattle in June 1998. Attendance and interest at that session were high, and ERM decided to repeat it this year. The session last year was entirely inadequate to discuss all the educational innovations that have rippled through engineering education during the past thirty years. Not only was time a factor, but availability of the prime movers turned out to be a problem. These engineering educators are a bunch of travellin' dudes--getting all of them together in the same place at the same time is impossible!

First, Chuck Roth will fill you in on the Personalized System of Instruction, or PSI, a self-paced system of instruction best known as the Keller Plan. Fred S. Keller developed this method in the 1960s in Brazil, and he and Gil Sherman refined it later at Arizona State University. Billy Koen at the University of Texas first applied it to engineering education in 1969, and his success encouraged Larry Hoberock, Chuck Roth and Gerry Wagner to use the method in their classes. Later, the Alfred P. Sloan Foundation provided a sizable grant to expand this activity, and ultimately, 19 PSI courses were developed at the University of Texas, in a number of different disciplines. Chuck Roth of the Department of Electrical and Computer Engineering will tell us about those times.

I want to give Charlie Yokomoto some time to add to Dendy Sloan's comments of last year about the Myers-Briggs Type Indicator (MBTI). Dendy and Charlie joined forces with Mary McCaulley, Lee Harrisberger and E. S. Godleski to do a study of use of the MBTI in engineering education, and they wrote up their observations in Engineering Education in February 1983. Dendy gave us an interesting presentation last year--Charlie has continued to use the MBTI to help him counsel students, flagellate them when they don't produce, and also help him coach tennis players. He has some observations which should be added to the mix.

Last year, Karl Smith told us about the development of cooperative learning. One of the strengths of that technique is team-building, which involves training students to function as teams with the requirement that group members feel a sense of positive interdependence and individual accountability. They need to be trained in the process to develop the requisite social skills, the ability to engage in group processing, and the knowledge of how to deal with controversy. It turns out that groups of students have been used in laboratory courses and senior design projects for decades before cooperative learning arrived on the scene--not, perhaps, very effectively, but the idea was there. Lately, the idea of "teaming" groups of students has become much more common, not only in courses within a department, but in projects shared among a number of institutions who are members of a consortium. Wally Fowler is here to tell us about his experience with some of these programs.

One of the movements which I have applauded for years is attempts to enhance the problem-solving skills of our students. The conventional wisdom in this area has been that giving students enough problems in the course of their education will eventually turn them into good problem solvers. Wrong. But teaching them problem-solving strategies, and providing them with immediate feedback on how they did, and giving them practice with a variety of different sorts of

problems pays dividends. Don Woods and his colleagues at McMaster University were the first engineering professors I know about to research this area, and many others since have adapted their recommendations. Scott Fogler at Michigan and Steve LeBlanc at Toledo have upped the ante by taking a look at both the analytical and synthetic steps in Bloom's Taxonomy, and have written a book on this topic ("Strategies for Creative Problem Solving"). Steve was going to tell us about this last year, but he wound up in the hospital, and couldn't be with us. Now you get a chance to hear what he has to say!

There are a lot of other projects and studies which have added to our fund of knowledge and experience with the way engineering professors teach and engineering students learn; there is no way we can deal with them all. Another topic which engages the interest of us all is, is there anyone out there who cares? Will anybody provide modest amounts of money to help me pursue my ideas for improving learning/teaching/maturing of engineering students? Well, it turns out there is! In years past, the institution I have in mind has been very conservative, and has shied away from providing grants for promising approaches because those approaches were not conventional, not "the way we have always done things." That attitude seems to be changing.

The institution to which I refer is the National Science Foundation, and it currently is interested in improving both undergraduate science and engineering education. And it now has people who know something about technological education and about the problems in higher education today. One such is Norm Fortenberry, the Director of the Division of Undergraduate Education at NSF. He is going to give us a peek at the future, and tell us about some studies and projects the NSF would like to encourage.

So here are some more descriptions of the hot ideas of the past 30 years in engineering education, together with a look at where we might be going in the near future. It seems a fitting way for us to provide closure for an exciting century in engineering education.

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