

## Some Thoughts on Teaching Problem Solving Skills to Engineering Students

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Why bother teaching problem solving skills to engineering students? They'll pick these skills up along the way just like we did as we went through school, right? Well, maybe, then again, maybe not. Problem solving is an acquired skill much as any other skill, like shooting baskets, throwing a baseball or riding a bike. The more we practice, the better we get. If we expect our students to become proficient problem solvers, we need to give them the opportunity to practice... to solve problems. The more different types of problems that we can expose them to, the better solvers they will become. And, if there are some tricks or successful techniques that we have learned or developed along the way, shouldn't we pass those along to the students? That's why I believe that we should include problem solving skills in the engineering curriculum. If you ask employers what skills new graduates should bring to the workplace, heading the list will be communication skills and the ability to solve problems. We will be doing our students a great disservice if we neglect to polish and hone their problem solving skills while they are with us.

Where should we introduce this material in the curriculum? It's already too full, you say. What should we leave out to make room for it? I don't believe that's the correct approach. There is a variety of ways that can (and should, in my opinion) be used to cover these skills in a traditional engineering curriculum. One alternative is as part of an introductory engineering course for freshman. Many schools have decided to move some design activities down into the freshman year courses. Design activities (at the freshman or even at the level of the senior capstone course) provide an ideal vehicle to insert this material into the curriculum. Laboratory courses also are a good time to cover problem solving skills (and the companion troubleshooting skills).

Many problem solving heuristics can be shown to be analogous or a variation on the Scientific Method that our students have drilled into them since grade school<sup>1</sup>.

| <i>Table 1 - Comparison of the Scientific Method and a Problem Solving Heuristic</i> |                              |
|--|------------------------------|
| <b>Problem Solving Heuristic</b>   | <b>Scientific Method</b>     |
| Problem Definition   | Problem Given or Defined     |
| Generation of Alternatives   | Hypothesis                   |
| Deciding the Course of Action  | Gather Data                  |
| Implementation   |                              |
| Evaluation   | Support or Reject Hypothesis |

With this familiar framework to build upon, a problem solving heuristic is not difficult to introduce problem solving skills into the curriculum. In this presentation, I will give some examples of successful ways to integrate the material and some ideas for exercises and assignments to motivate students to practice these skills.

### **Bibliography**

1. "Strategies for Creative Problem Solving", H. S. Fogler and S.E. LeBlanc, Prentice Hall, 1995, 203pgs.

### **Biographical Information**

Steven LeBlanc is Professor and Chairman of Chemical & Environmental Engineering at the University of Toledo. He is the coauthor of the Prentice Hall textbook "Strategies for Creative Problem Solving" with Professor H. Scott Fogler of the University of Michigan. The book won the 1995 Meriam/Wiley Distinguished Author Award from the American Society for Engineering Education.