

Skills for Success in Engineering and Beyond: The Future of Engineering Futures

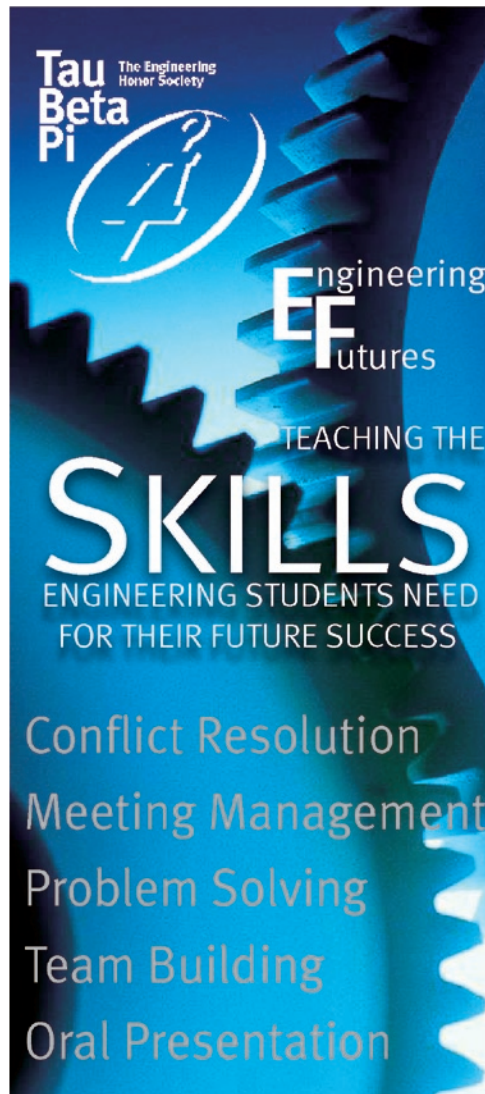
by Michael L. Peterson, Iowa Alpha '89

We are celebrating the 20th anniversary of the formal Convention rollout of the Tau Beta Pi Engineering Futures Program. In October 1989, a team of 11 trained Facilitators presented the program to non-voting delegates at the National Convention in Columbia, SC. (For more details regarding the formation of the program, see the excellent article by Dr. Stephen K. Kramer, *UT B '81*, "A Brief History of the Futures," in the Fall 1991 issue of *THE BENT*.) Since that time, the program has successfully grown both in terms of structure and outreach to become an important established component of Tau Beta Pi. Today, the program reaches 2,500 students a year through approximately 200 sessions at chapter campuses, the Convention, and District conferences around the country.

As in business, whenever a program like this celebrates a major anniversary, it's important not just to look backwards but to look forward as well. Over the years, improvements have been made to the materials and the training of facilitators, but the fundamental purpose and approach of the program has remained the same: expose students to the leadership, interpersonal, and group dynamic skills they will need to tap their potential more fully as engineers during their careers. While this purpose has stayed the same, the world around us has continued to change in many ways.

When we look at engineering and business in 1989 versus today, there have been many interesting changes; here are just a sample:

- 1) **More diverse workplaces (gender, ethnicity, etc.);**
- 2) **Team members scattered across more countries and time zones;**
- 3) **People across more "business boundaries" needing to work together (multiple divisions of a**



large company, customers and suppliers, etc.);

4) **Increasing complexity and speed of business (global competition, more regulations, faster and more complex downturns and upturns in business cycles, growth of new technologies, more complex products); and**

5) **New communication technologies and the expectations that everyone be proficient in them with little or no training time (instant messaging, phone conferencing, web conferences, online collaborative workspaces, and much more).**

Depending on your mindset, these changes can be seen either as frustrations and annoyances or as opportunities to do things in a new and different way. In fact, this "half empty, half full" perspective is one of the guiding principles behind the Engineering Futures Program. When the initial research was done by Kerry Patterson, the original author of the materials that became the Engineering Futures Program, he searched for the factors that would best determine which engineers would be successful in their careers, versus which were more likely to face frustration and disappointment. He found that the best indicator of future success boiled down to how people answered the following question: "What do you think of the politics in your work-

place?" The answers fell along two general lines. Many interviewees, in response to this question, would complain about how hard it was to get things done, how management didn't really care, how *they* are out for themselves, and so on. On the other hand, a second group would instead say things like:

- "Yeah, that's a challenge, but I see my workplace as a team of great people doing their best. I do what I can to help, and it seems to work well."
- "I focus on what I can do to make a difference, and I let what's outside my control get cared for by others."

- “What politics? It’s not about politics. It’s about solving problems and tapping into each other’s potential, and that’s exciting to me.”

You can probably see where this is headed; the first group, the “glass-half-empty” crowd, was far more likely to be less effective, and to be *seen* as less effective, in the workplace. The second group, the “glass-half-full” crowd, on the other hand, was far more likely to be successful, able to go further in their careers, and to feel better about themselves as well.

After the importance of that mindset is realized, the next question involves what tools and key skills are critical for success. There are hundreds of books and speakers who will offer different perspectives. The key skills that Engineering Futures chooses to emphasize are ones that anyone (from interns to full-time employees and business leaders) can use anywhere (at work, in volunteer organizations, even at home) to make a difference. Engineering Futures offers 24 hours of training in these skills (which would take more space to describe than we have for this article!), but they boil down to these key areas and skills:

- 1) Conflict resolution** (People Skills module—PS)
 - a. Solving issues of motivation and ability,
 - b. Defining clear action plans and next steps, and
 - c. Dealing with emergent issues during problem-solving (emotions, complicated responses).

- 2) Meeting management** (Group Process module—GP)
 - a. Ensuring that meetings have a clear purpose and include the right people,
 - b. Defining roles of participants (facilitating, note taking, time keeping), and
 - c. Keeping meetings on track.

- 3) Problem solving** (Analytical Problem Solving module—APS)
 - a. Problem-solving processes,
 - b. How to increase the quantity and variety of ideas, and
 - c. Taking a large list and narrowing it to the best ideas.

- 4) Team building** (Team Chartering module—TC)
 - a. When teams make sense,
 - b. Stages of team growth (form, storm, norm, & perform), and
 - c. Getting a team to a good start (icebreakers, defining what to address).



5) Oral presentation (Effective Presentation Skills modules—EPS)

- a. Defining your message,
- b. Using clear visuals, and
- c. Communicating effectively to groups.

From a “glass-half-empty” perspective, you may ask “These needs have been important for decades; doesn’t everyone know them by now?” From a “glass-half-full” perspective, though, these skills:

- Are not hard to understand,
- Are not hard to implement, and
- Are incredibly important and helpful when used.

So why does Engineering Futures still teach these? Well because these skills are not hard, they often get a lower priority in engineering students’ (and many engineers’) minds, and in course curricula—compared to everything else that needs to be learned to get that undergrad degree. In addition, these skills are hard to measure, so people tend to focus naturally on other areas that may be easier in which to measure their success. Finally, it’s not enough just to read about the skills; they have to be practiced over and over to become a natural part of how we operate. While most people don’t have a problem with practicing in general, practicing agendas, motivation, and team building sometimes doesn’t have the appeal of practicing golf, basketball, or video games!

Returning to the changes in business mentioned earlier, the skills of Engineering Futures have not become any less relevant. In fact, they are even more important and more critical to making a business, a project, a team, or any individual successful. Here’s just a sampling of what it takes to survive and thrive during these types of changes. (Some tips and where to find them in the Engineering Futures curriculum are also noted.)

1) More diverse workplaces:

- Getting the team to know each other may take a little more time, but the effort is well worth it. More perspectives and ideas can be tapped to develop products and processes that will be successful in more parts of the world (forming teams—TC, effective brainstorming—APS).

• Communicating priorities may be more of a challenge, but understanding people’s concerns and communicating consequences are universal principles that apply around the world (PS).

2) Team members scattered across more countries and time zones:

The Tau Beta Pi Engineering Futures Program, established in 1988, received the American Society for Engineering Education Corporate Member Council’s 2007 Excellence in Engineering Education Collaboration Award.

For those of you who have participated in the Engineering Futures Program as a Facilitator or student, we would greatly appreciate hearing your feedback on how the program has helped you in your personal and professional lives.

- Sharing information clearly and in a well-structured manner is critical, so that people not only understand the information, but can buy into it and share it within their own teams around the world (clear and focused presentations—EPS).
- Successful long-distance meetings become critical; ensure that these meetings are effective, not distracting (clear agendas, keeping meetings on track—GP).

3) Working across business boundaries:

- Understanding motivations and each other's perspective becomes even more important, to get to answers that are truly the best (explain problems clearly—PS).
- Provide people a chance to share their views, but ensure enough guidance and process to turn all those perspectives into solutions that work (facilitating, keeping meetings effective—GP, narrowing down potential ideas—APS).

4) Increasing complexity of business:

- Teaching and educating one another becomes essential; formal education *expires* sooner than ever, so on-the-job learning becomes even more important (explaining problems and solutions—PS).
- Much more information needs to be communicated in much less time; meetings have to be far more effective than in the past (effective meetings—GP).

5) New communication technologies:

- In live conversations, nonverbal language communicates more than verbal, but the new technologies often take this away (facial expressions, body language). Clear written and spoken communications become even more essential (strong presentation skills—EPS, explaining problems and solutions logically—PS).
- Pre-planning is even more important; gathering a group of people and discussing whatever comes up doesn't work as well when materials need to be visible remotely (clear agendas—GP, clear and documented action plans—PS).

So, as you can see, the changes in business during the last 20 years have made the materials in this program not less important, but even *more* important.

Michael L. Peterson, Iowa Alpha '89, has been an Engineering Futures Facilitator since 1989, Chair of the EF Program Committee, and served as a District 7 Director. He earned a B.S.E.E. from Iowa State University in 1989 and his master's degrees in mechanical engineering and management from MIT in 1994. Mike is the Global Business Manager for the Global Paint & Polymers Center at General Motors. Email: mlpeterson5@aol.com.



Finally, as mentioned earlier, it's one thing to know these skills and understand their importance, but that's only the first step. If you stop there, it's like reading a book about soccer and understanding it, but never going on the field and trying it. Putting these skills into practice regularly is necessary, in order to get better at them. Here are some thought starters for how you can take your effectiveness to the next level when it comes to these sorts of skills:

- *Be observant.* Listen for *half-empty* comments from yourself and others. In your mind, take the next step with them—"How could this get better?" "What really is going on here?" "What can I do to make a difference?" Don't settle for just blaming *them* and missing an opportunity to make things better.
- *Be proactive.* Don't let problems go unresolved, whether they're between you and one other person, or within a large group. Don't jump to conclusions about how to fix things, but take a little time before you start the conversation to think about why a solution is important, what will happen if the problem continues, and what you can offer to help. Approach the problem solving like a scientist working to find a solution, not like a judge looking to convict the guilty.
- *Be involved.* Take an active role in the meetings you attend, whether you have a lead role in the meeting or not. If you see opportunities for improvement, talk to the organizer afterward and make constructive suggestions (send agenda ahead of time, send pre-read materials, test equipment before the meeting start), or better yet, offer to fill some of the gaps that would improve the meeting (be a time keeper or note taker, or coordinate the agenda). If a meeting starts to go off track, suggest to the group what should be happening, rather than what is happening (refer to the agenda, remind people of the topic at hand), and help steer things back on course.
- *Be reflective.* Take the time to learn from your interactions with others; ask for and collect feedback (and make it clear you want constructive as well as positive ideas), and never stop learning. Using great people skills is not a cookbook process; every person and every relationship is different, so recognize that you can always do things better, and seek to improve your capabilities with every interaction you have.

We hope that this summary of Engineering Futures and this look toward the future encourages you to take seriously the opportunities to grow your interpersonal and teamwork skills and to take the steps to move your capabilities to the next level. For those of you who have participated in the Engineering Futures Program either as a facilitator or student, we would greatly appreciate hearing your feedback on how the EF Program has helped you in your personal, and professional lives. Please feel free to drop us a line using the Engineering Futures link on the Tau Beta Pi website: www.tbp.org.