Some 44 years ago, when I was an undergraduate at the University of Michigan, I received an invitation to join Tau Beta Pi. This was the first time that anyone had recognized my potential as an engineering student—I was the first person in my family to go to college—and my folks really weren’t sure that I’d actually graduate and find a job.

In fact, they had insisted that I complete the vocational education program in high school, which would ensure I had the necessary skills to get a “good job.” At the time, a good job was usually found at one of the auto companies near my hometown of Dearborn Heights, MI, and I worked on an assembly line during one college break. While I appreciated the job, the days were long and not particularly interesting, and by the end of the summer I was highly motivated to return to college and work even harder.

Remained Active
So, it was significant when I earned an invitation to join the Engineering Honor Society. My parents were pleasantly surprised and my father even agreed to pay my initiation fee. I became involved in the Michigan Gamma Chapter as a student officer and remained active while I completed graduate studies at U of M. After graduation, I accepted an engineering position at Cooper Tire & Rubber Company. Ultimately, I spent more than three decades working as a scientist and engineer, adapting along the way to the introduction of computers and the increasingly global nature of our workforce. I also continued my association with Tau Beta Pi and had the privilege of working with and learning from very smart engineers from all walks of life. As a student member, I had the opportunity to serve as chapter president and attend several Conventions. Robert H. ‘Bob’ Nagel, P.E., New York Delta ’39, was Secretary-Treasurer of the Association at this time, and he often gave a talk called “What Mother Never Told You about Tau Beta Pi.” Bob covered many of the interesting, but less well-known, aspects of the history of the Association, like why it was significant that “the proposal” was not at once accepted and Irving A. Heikes, Pennsylvania Alpha 1885, decided to return and discuss TBP with Professor Williams before accepting membership.

Cigar Smoke
Bob also talked about early concerns about the Association being “Elitist versus Egalitarian” and shared memories of early Association leadership, like the cloud of cigar smoke that surrounded Robert C. ‘Red’ Matthews’, Illinois Alpha 1902, desk. This talk also recounted the beginnings of the Alumnus Chapters, and the conflicts between Presidents A.D. Moore, Pennsylvania Gamma 1915, and Paul H. Robbins, Ph.D., P.E., New York Beta ’35, over the future direction of the Association.

After hearing Bob’s talk many times over the years, I was inspired to develop a similar account of the history of our Engineering Futures (EF) program. District Director Stephen K. Kramer, Ph.D., Utah Beta ’81, authored “A Brief History of the Futures” for the Fall 1991 edition of The Bent, documenting many of the major decisions and goals of the program. Now, nearly three decades after those efforts to develop training programs for student leaders of TBP, I’d like to share some of the lesser-known aspects of the history of the EF program.

What Mother Never Told You About Engineering Futures
With insights and input from many EF facilitators and TBP volunteers, including Steve Kramer, Mike Peterson, Solange Dao, and Katy Luchini Colbry

By John R. Luchini, Ph.D., P.E., Michigan Gamma ’71 (September 2, 1949—September 27, 2013)
In 1983, I was volunteering as a Director in District 7 (Ohio and Michigan). When that term expired, the Executive Council asked me to serve as Director of District Programs for the Association. This was a new title for a role that had evolved over time: from G. Ronald Ames, Maryland Beta ’69, who served as Director of Chapter Development, through Joseph W. Jimenez, California Delta ’50, who later served as Director of Alumni Affairs.

First Task
In this new role, my first task was to create a training manual for new District Directors. Next, I was asked by Paul Robbins and the Executive Council to help develop training for the student members. At the Convention, we offered Chapter Operations Seminars to help students learn basic principles for running their chapters. The student delegates generated 140 pages of notes during the first Convention, where I helped run the Chapter Operations Seminars. Afterwards, we were amazed to realize that there was “nothing new” in the notes—students were simply encountering the same problems and questions that had been solved by previous chapter officers. Ultimately, we distilled the notes into a "study guide" for the Presidents’ Book to help improve the transfer of knowledge between student officers, and the Chapter Operations Seminars eventually evolved into the Interactive Chapter Exchange, or ICE, program that is currently offered at Convention.

After honing our technique at Convention, we started offering similar chapter leadership seminars at various locations around the country in order to reach students not able to come to Convention. While the “Engineering Futures” curriculum and name would not be introduced until a few years later, by the mid-1980s the Association was regularly offering training to chapter officers and student members in the basic skill sets—strong teamwork, interpersonal communications, effective leadership, creative problem solving—that are still covered in today’s EF program.

Evolution of Program
In addition to understanding how the structure of Engineering Futures evolved through the district programs, it’s important to understand the underlying motivation and goals of the TBPI leaders who championed the development of the program. At least as early as the tenure of G. Ronald Ames, we had been looking for a way to efficiently train chapter leaders. In 1985, the Executive Council led by Paul Robbins conducted a survey of alumni in advance of the Association’s Centennial. Alumni donors were asked about the value of The Association in their careers and specifically why they chose to continue to donate each year. Part of the survey explained the types of skills training that we were offering through the nascent Engineering Futures program. The alumni who completed the survey recognized the importance of training students to fill leadership roles: this was a reason that TBPI was of value to the profession and continued to be worthy of their monetary donations. Indeed, after the survey, donations increased.

Many alumni volunteered to help facilitate the Chapter Operations Seminars and other student training programs we were developing. These alumni provided the benefit of their experiences to younger engineers, thus accelerating the growth in participation and increasing the value of our programs. The alumni facilitators were also able to remain connected to the student chapters and hone their own interpersonal and facilitation skills.

Under the Executive Council leadership of Martha S. Polston, Tennessee Alpha ’79, and James W. Johnson Jr., North Carolina Alpha ’77, a significant focus was formalizing the EF Program as the preferred way to conduct training for chapter officers and student members. A curriculum was developed, facilitators were recruited, and the first official “Engineering Futures” session was conducted at the 1988 Convention in Iowa.

Growing Pains
While there were some growing pains, the overall student response was positive enough that the Executive Council began exploring options for expanding the program nationally. Martha wanted to know how fast we could roll out the program and scale up to offering 200 sessions per year in 200 chapters around the country. I calculated that it could take 8-10 years to recruit enough new facilitators to reach that goal, if we stuck with the ad hoc training process that we had been using. Clearly, we needed a more robust system for preparing new facilitators if we wanted to offer Engineering Futures nationwide.

In 1988, Stephen Kramer was a Director in District 12 and had been extensively involved in the creation of the student training seminars and EF program. As one of the original facilitators, Steve saw first-hand both the
benefits of the program for students, and the potential difficulties of having Tau Beta volunteers create a training program in an area beyond their expertise. So, Steve reached out to a friend, Dr. Kerry Patterson, who was an expert in organizational psychology. At the time, Kerry was co-founding a “start-up” company (Interact Performance Systems) to facilitate interactive people skills training in the workplace, using videos as the mechanism for showing participants how to interact effectively with others. Kerry’s approach was an outgrowth of his own dissertation research, which examined interpersonal relationships in professional settings, and also drew on a wealth of experience in teaching and learning, dating back to Platonic methods of instruction.

Kerry Patterson talked to Steve and Martha about the purpose of Engineering Futures, which the Executive Council had defined in a vision statement: “In order to promote excellence in the engineering community, Tau Beta Pi seeks to provide exemplary leadership and training opportunities to inspire each member.” Ultimately, Kerry offered to create a version of the Interact training materials that were tailored to a student audience. This curriculum included the four original modules of the EF program: People Skills, Team Chartering, Group Process, and Analytical Problem Solving.

Clear Structure
While the new training materials and integrated videos provided a clear structure for the EF program, the deeper value for TBP was that Kerry integrated “facilitation training” right into the curriculum. In order to deploy the Engineering Futures program on a large scale, we needed to recruit and train many volunteer facilitators from among the alumni.

extra copy of the People Skills manual and videotape and have the student facilitate a parallel session in an extra room. That actually worked surprisingly well, and in the early years of the Engineering Futures program new facilitators would “self-train” by first completing the entire EF program, then following the manual to deliver the People Skills session multiple times. Once new facilitators were comfortable with People Skills, they would then receive materials for the Group Process module, and later learn to facilitate Team Chartering and Analytical Problem Solving in the same manner.

Developing Facilitation Skills
In looking back at the early forms of the EF program that Kerry developed, the “facilitation tools” were quite literally written into the manual. For example, Kerry included instructions for preparing and using flip charts to help engage students in the session and prompts for the facilitator to ask different types of questions. By recording students’ answers in “real time” on a flipchart or chalkboard, participants were actively drawn into the conversation—which is an experience that can be lost in the modern use of PowerPoint, when students stop thinking about the question because they know the answer will be revealed on the next slide.

Kerry’s low-tech approach challenged facilitators to help participants realize the answers for themselves. Sometimes the facilitator has to challenge participants by drawing their concerns out into the open; this is not done to ridicule the individual, but instead allows everyone to understand the concern for what it is and the facilitator can then guide the group to come to a resolution together. As EF facilitators gain experience, they become more comfortable letting the group lead the session and mature into the role of the
“guide on the side,” rather than defaulting to the “sage on the stage” that is commonly found in college classrooms. A fundamental lesson for facilitators is to learn to have faith in the group that you’ve assembled: believe that they are so darn smart, they will figure it out for you!

As a facilitator, when I would prepare for a session, I would always think about the mental attitude of the students coming into the class—were they there by choice, or to fulfill a requirement for their initiation or their course? Often, I found that students came into EF sessions with different motivations and interests, and this shaped their perception. For example, in examining an interpersonal problem situation, some students were highly focused on the facts (like the boxes weren’t cleaned up after the shift ended) while others were very focused on the feelings (such as my workers are tired and want to go home instead of clean up). The reality is that if the two groups can’t understand the other perspective, then no true resolution is possible. The best interactions arose when we could get both groups thinking about the other side of the issues—but for this approach to work, the facilitator had to guide the students to the discovery, rather than trying to force ideas onto students. Certainly, this approach led to some uncomfortable moments as new facilitators gained skills and navigated awkward questions, but actively engaging the participants in the seminar also led to remarkable insights and high-energy sessions where students walked away feeling like they had gained valuable skills.

**People Skills**
While the People Skills module was designed to introduce tools for effective interpersonal communications, the Analytical Problem Solving (APS) module was designed as a sort of “master class” that gives students very specific skills for serving as facilitators of problem-solving groups. The APS module reinforces practical skills for working effectively in groups, like separating the facilitation, note taking, and time keeping roles. APS also gives participants tools for drawing ideas out of the group and responding appropriately when the ideas that arise don’t seem to fit the problem at hand. Ideally, students who complete APS with a skilled facilitator should be ready to go facilitate problem-solving groups on their own.

When the Engineering Futures program was initially conceived more than two decades ago, it covered materials and skills that were not included in typical engineering curricula. As our profession has evolved over time, however, more schools are incorporating interpersonal skills training into their coursework and many engineering students take classes in business or other areas where these skills are taught.

**Unique Contribution**

Today, the unique contribution of the EF program is that it offers “training”—with a focus on rehearsing interpersonal and problem solving skills—rather than simply conveying information in a lecture setting. Active facilitation is key to this training approach; although some facilitators prefer to streamline EF sessions to provide students with the basic information (via PowerPoint) as quickly as possible, the most beneficial sessions are those that allow students to take their time with the materials and fully engage in the rehearsal exercises. Thus, the skill and approach of the facilitator directly influences the experience that students have in the EF program. Another key to having a successful session is to make sure...
that the advance “marketing” explains the parameters of the training, including the length of the program and the expectation that students take an active role during the session. When students come to EF sessions expecting something closer to a brief, classroom lecture-style experience they are frequently dissatisfied to find that the session is longer and more involved than a college course. In addition to marketing the program appropriately, it is also preferable for students to participate in the program voluntarily. “Forcing” electees to attend EF sessions often leads to poor session ratings and other unintended consequences, such as giving participants a negative feeling about participating in similar training in the future.

Reflections on the Futures

I’ve been privileged to be a member of Tau Beta Pi for more than 40 years, and in that time I’ve seen many changes to the Association. I attended the first Convention with female voting delegates in 1973 at the University of Florida. I was there when the Convention voted to join Tau Beta Pi and Sigma Tau. In 1985, I was able to attend the Centennial Convention at Lehigh University, which featured talks by Isaac Asimov and Lido A. ‘Lee’ Iacocca, Pennsylvania Alpha ’45, among other dignitaries and leaders of the engineering profession. I have videotape recordings of their talks, which are both amusing and inspiring to watch nearly 30 years later. Iacocca warned the delegates to “watch out” for the very smart women who were finally making their way into the engineering profession in larger numbers, while Asimov talked about his ideas for intelligent robots and the importance of mortality as part of the full, human experience of life.

In recent years, I had the chance to work with many student delegates as the Convention Parliamentarian, and even as the Convention Chair, and one of my favorite tasks was working with the students to help them figure out how to accomplish their goals within the structure of Robert’s Rules of Order and the Convention.

In more than three decades of work as an engineer and research scientist, I’ve learned that teamwork, communication, and problem-solving skills are just as essential to the modern engineer as the more traditional tools of our profession. In order to build a great team, it is important to recognize and value the people around you. I always tried to hire people with great potential and invested time and effort in mentoring those young engineers, and they contributed greatly to my professional success.

Giving Back

I’ve also learned the importance of giving back to your community. While I was still a student officer at Michigan Gamma, Bob Nagel came to Ann Arbor and took my wife, Tamara, and me out to lunch. Bob wanted to talk about how I could stay involved in Tau Beta Pi as an alumnus. Soon after graduation, Bob called and asked me to volunteer—and in the intervening decades I met so many smart, capable, caring people through this Association that, forty years later, I am still saying “yes” to the email requests from TBP Headquarters that have supplanted the phone calls for assistance.

In reflecting on these decades, I’ve come to understand that in order to be a good engineer, it is essential to truly know oneself. For instance, while I love working with people, I enjoy mentoring more than managing, and I was truly happy to be “promoted” out of management and back into a technical role toward the end of my career. I’ve had the privilege of building some exceptional teams, and the challenge of rebuilding as team members were recruited to other positions in the company. I’ve worked with countless engineers, scientists, and Tau Bates over the years, and come to appreciate that “Excellence in Engineering” requires more than just “the knack” for mechanics: true excellence is achieved through the interaction of different types of intelligence.

Thus, the best engineers are those who can integrate their technical skills with an understanding of arts and humanities, or who can build and mentor a team of individuals who think and work differently, but who are united in pursuit of a common goal. Learning to communicate with people, work effectively in teams, and creatively solve problems is the core of Engineering Futures, and in developing this program Tau Beta Pi continues to invest in students and alumni who will embody the principle of “Excellence in Engineering.”

John R. Luchini, Ph.D., P.E., MI ’45, retired in 2011 as Senior Research Scientist and Engineer after 34 years with Cooper Tire and Rubber Company. TBP is grateful for his 44 years of service in many areas. John was a member of Sigma Xi and the Society of Automotive Engineers, and in 2010 was elected as a Fellow of the American Society of Mechanical Engineers. He consulted on a number of engineering and professional projects; served on the Industry Advisory Board for Physics at Kettering University; and regularly conducted classes and seminars for college students, including hundreds of Engineering Futures sessions across the country. Luchini passed away on September 27, 2013.

John designated the Tau Beta Pi Engineering Futures Fund to receive contributions in his memory. Donations may be directed to The Tau Beta Pi Association/Engineering Futures Fund (c/o Curt Gomulinski, Executive Director, P.O. Box 2697, Knoxville TN 37901-2697).