

# Developing Professional Skills Through Student Professional Societies

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## Abstract

Employers have identified team skills, project management, communication skills, leadership skills, and organizational effectiveness as important attributes for a young engineer. It is often difficult to develop all of these skills in the engineering curriculum while covering technical material. Student chapters of professional societies provide a setting for developing these non-technical professional skills. The authors are both very active in the Society of Women Engineers at The University of Alabama (UA-SWE), currently serving as faculty advisor and President. This paper describes how various professional skills can be developed through student professional society activities, giving several activities of UA-SWE as examples. Similar activities occur in other student professional societies, including AIAA, ASME, and IIE.

## Introduction

Recruiters and companies that hire new engineering graduates are usually quite pleased with the technical skills of their new employees. In one survey taken in 1991, employers ranked a list of 10 attributes of the baccalaureate-level engineer in terms of each attribute's importance and the level of preparation of new engineers [1]. The results of this survey are presented in Table 1. They show that young engineers do not have the best preparation in the four most important attributes, all non-technical professional skills.

It has been documented in other surveys that companies look for the following characteristics [2-5]:

- ▶ Learning how to learn
- ▶ Listening and oral communication
- ▶ Competence in reading, writing, and computation
- ▶ Creative thinking and problem solving

- ▶ Personal management, including self-esteem, goal setting/motivation, and personal/career development
- ▶ Organizational effectiveness

Table 1. Ten Attributes of the B.S.-level Engineer [1]  
(1 = most; 10 = least)

Attribute	Importance	Preparation
Problem Recognition	1	7
Communication Skills	2	8
Ethics & Professionalism	3	5
Open Mind, Positive Attitude	3	6
Math & Science Proficiency	5	4
Technical Skills	6	2
Motivation for Continued Learning	7	3
Business Skills	8	10
Computer Skills	9	1
World Understanding	10	9

One company's rating form for considering potential employees included the following description of a highly ranked candidate: superior technical competence, outstanding leadership and team skills, adapts to change quickly, achieves more than expected, finds innovative solutions, demonstrates a passion for exceeding customer expectations, communicates exceptionally well.

Therefore, to meet the expectations of industry, young engineers must have more than just technical skills [2-4]. Some of these other skills, such as communication and team leadership, can be developed in the classroom. However, student chapters of

professional societies also provide opportunities to develop many non-technical skills.

By becoming involved in professional societies early in their undergraduate careers, students can choose to develop skills over a period of several semesters while taking on more and more responsibility at their own pace. Students will be more willing to become involved in organizations that have a reputation for providing enjoyable and rewarding activities. Since undergraduate students move through universities in four year cycles, organizations that do not have such a tradition can develop one after only a semester or two. Through patience and careful planning, a student technical society can quickly become an attractive and thriving place for student growth.

Finally, regardless of the results of employer surveys, performance in the classroom is extremely important to a student's future career. While failure in a course may not end a student's quest for an engineering degree, the record of the failure will follow the student throughout his or her lifetime on the academic transcript. This possibility of failure causes many students to avoid the extra responsibilities associated with leadership in the classroom. Student professional societies, however, provide a much safer place for students to attempt new things with less fear of the consequences resulting from failure.

## Skill Development

Depending on the particular activities that a student organization decides to pursue, there will be opportunities for students to develop a variety of skills, including: project management, teaming, written and oral communications, and organizational effectiveness. Leadership skills, such as delegation to and supervision of other students, are developed through offices held within these societies.

There are several organizational models that can be used to structure a student group. UA-SWE has an Executive Council consisting of seven student officers (President, two Vice Presidents, Secretary, Treasurer, and two Engineering Executive Council Representatives) and two faculty advisors. The two Vice Presidents each oversee four to five committees which plan the various activities of the society. Each committee consists of a committee chair and several committee members. Ideally, students become involved in SWE and join committees during their freshman and sophomore years, serve as committee

chairs as sophomores and juniors, and serve as officers as juniors and seniors.

## Project Management and Teaming

Currently UA-SWE is organized into the following nine committees:

Corporate Relations	F.E. Review
Fundraising	Girl Scouts
High School Relations	Newsletter
Publicity	Recruiting
Social	

Each committee organizes one or more projects throughout the year under the direction of a committee chair. For example, the Girl Scout committee organizes a Saturday program called Girl Scout Engineering Day where Girl Scouts in 6<sup>th</sup> and 7<sup>th</sup> grade come to campus and participate in hands-on activities and demonstrations related to several of the engineering disciplines.

The committee chair delegates specific detailed tasks related to publicity, registration, and running of events to committee members as well as students and faculty who are recruited to assist with specific events during the day. Additionally she must coordinate the activity with the local Girl Scout office, work with the College of Engineering's Public Relations Office, and communicate project status to the SWE officers and faculty advisors. Once Girl Scout Engineering Day is past, the committee chair is expected to complete a project report to provide assistance to next year's committee.

For the event to be successful, committee members must act as a team to complete the project. Certain portions of the activity, such as demonstration generation, may require a committee meeting where members can brainstorm. Other tasks, such as making signs or creating a packet of information for the Girl Scout office, may be delegated to an individual. Each team member must complete her assignment in a timely manner for the activity to run smoothly.

Girl Scout Engineering Day certainly provides students with the opportunity to learn a little bit more about the various engineering professions, but for the committee chair it is primarily an opportunity to learn about all of the aspects of organizing and running a project. Committee members are able to develop team skills as they work as a group to complete the project. Activities organized by other committees offer their chairs and members similar opportunities

to learn project management and teaming skills, respectively.

### **Written and Oral Communications**

For nearly 20 years, SWE has held a Technical Presentation Competition (TPC) at its annual National Convention and Student Conference. To enter the competition, students submit a technical paper which is first judged at the regional level. The paper cannot be a literature survey. It must involve some component of work that the student has performed, either research with a faculty member, a senior design project, a co-op project, or a laboratory report. The winners at the regional level are awarded travel money so that they can present their work orally at the National Convention and Student Conference where they compete for additional awards.

Many other student professional societies have similar types of competitions to encourage students to develop their communication skills. Members of the parent societies believe that these activities are an important part of career development. It is recognized that we learn how to compile professional technical reports by writing them, and similar remarks could be made about oral presentations. Generally the quality of presentations at these sessions is greater than those at the regular conference sessions.

Despite the opportunities for travel and financial awards offered through these competitions, students are often reluctant to participate in these valuable learning experiences. Many students feel that they have not done anything important enough to present at these meetings.

In UA-SWE, after the first student was convinced to participate in the TPC, it has been regularly used as a source of travel funds for a student to attend the National Convention and Student Conference. Students who have participated have generally had good to exceptional writing skills, but they have not always been gifted at making oral presentations. However, by practicing for and participating in the TPC or other student competitions, they have all developed a level of quality and confidence in their communication skills that will serve them well in their careers. One measure of their confidence is the other presentations that they have made after the TPC. Some students have chosen to participate in other technical paper competitions and conferences [6-9]. Other students have found it easier to present the research phase of their graduate work [10-13].

### **Leadership**

Due to the organizational structure of UA-SWE, the President accepts an awesome responsibility to be ultimately responsible for everything. She takes on the sometimes undefinable role of leader, and has the task of encouraging and cajoling all of the members to become involved and participate as much as possible.

The only way that it is possible for all of the activities of UA-SWE to be carried out is if the responsibility for overseeing them is appropriately delegated. While there are only six officers that the President directly supervises, if each of the nine committees has on average four members and a chair, she is indirectly supervising 51 of her peers. While everyone hopes that things will run smoothly, with this number of people sooner or later there is going to be some type of conflict. It is the President's responsibility to meet with the faculty advisors to resolve any conflicts among members as rapidly as possible.

In addition to filling leadership positions which become vacant and keeping track of everything that is going on, the President is also responsible with the faculty advisors for communicating the activities of UA-SWE to the university administration. For example, when UA-SWE made a bid to host their regional conference, the President met with the Associate Dean for Academic Programs to gain the administration's support for the activity and to discuss the logistics of holding a career fair during the conference.

The President under the guidance of the faculty advisors is also responsible for reporting the activities of the group to the Student Government Association and to a number of people in the national SWE body. In a way, she has all of the responsibilities of project management that the committee chairs have except that she is juggling a greater number of activities involving more people, and her reporting responsibilities are at a higher level.

Even though the responsibilities of the other officers may not seem as great as those of the President, they are just as significant to the group. Each of the officers recognizes the importance of her role within UA-SWE, or else the group suffers from negligence of the responsibilities associated with each duty. On the other hand, failure by the President or faculty advisors to recognize individuals who do their job well can lead to bad morale within the Executive Council and thus the group as a whole. Motivation of the group is of utmost importance, and so recognition of individual contributions is vital to a

successful professional society. This is no different from industry where successful companies have ways of recognizing and rewarding productive employees. Participation in student professional societies allows students to recognize the value of acknowledgment, as well as accepting appreciation for a job well done.

Whether a student is an officer, a committee chair, or a committee member, the importance of their leadership role within UA-SWE is evident to all. With these responsibilities, students develop their self esteem and motivation to levels where they feel more confident of being in control of any situation. This confidence carries over to the classroom and the boardroom.

### Organizational Effectiveness

UA-SWE operates under a complex structure, and it provides students with an opportunity to learn how organizations function. Like other engineering societies, the national body of SWE has a complex operational structure. Students who participate actively as officers get a glimpse of how the larger society functions, and they begin to learn how organizations can run effectively. They learn that planning is crucial whether it is planning for an individual event or planning the budget for the academic year. They also learn the importance of communicating information to all members of the organization.

### Discussion

Through example, it has been shown how students who participate in their professional societies can develop skills in project management, teaming, communications, leadership, and organizational effectiveness. Employers have identified these skills as being important, but they are difficult to develop in the classroom. Student professional societies can play a major role by allowing students to grow and develop semester after semester throughout their undergraduate careers. The societies allow students to stretch themselves with minimal consequences if they fail to meet their goals.

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Dr. Beth Todd graduated from Penn State University with a BS degree in engineering science in 1981. Before attending graduate school, she worked in nuclear reactor core performance at Bettis Atomic Power Laboratory. She earned an MS degree in applied mechanics in 1986 and a Ph.D. in mechanical and aerospace engineering in 1992 from the University of Virginia. She is interested in applying mechanical analysis to problems of the human body. She has completed biomechanics research projects for NASA and the US Air Force. Prior to her current position as an Assistant Professor in Mechanical Engineering at the University of Alabama, Dr. Todd was an instructor at GMI Engineering & Management Institute in Flint, Michigan.

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Tanya Cole is currently a senior in mechanical engineering at The University of Alabama. She is interested in career paths in biomedical engineering, design, and/or engineering education. She has held summer internships at Vulcraft, Parker Hannifin IVD, and NASA Johnson Space Center. Currently she is participating in a NASA research project to further the understanding of bone mineral density; loss during space flight. Tanya is author or co-author of five refereed conference papers. In addition to being President of the Society of Women Engineers, she is an officer in ASME, a member of Pi Tau Sigma, and an Ambassador for the College of Engineering at The University of Alabama.