

# **WEPAN, NAMEPA, and Underrepresented Student Organizations:**

## **We Need To Help Each Other**

**Dr. Mary R. Anderson-Rowland**

**Arizona State University**

### **Abstract**

The importance of diversity and the encouragement of women and underrepresented minority students in engineering and computer science is well documented. As interest in engineering by U.S. citizens is dwindling, support for these underrepresented student groups is more important than ever. Many universities have established Women in Engineering Programs, as well as Minority Engineering Programs, alongside the student organizations of SWE, AISES, MAES, NSBE, and SHPE.

The organizational chart of how these programs and organizations interact varies greatly from university to university. In general, the administration of the Women and Minority Programs are permanent staff, part of a Dean's Office giving stability to the programs. On the other hand, although advisors for the student organizations may be stable, they may not be connected to the Dean's office, and the major student leaders come and go every couple of years. Especially for underrepresented engineering and computer science students, with their challenging academic loads, a good collaboration between the Women and Minority Programs and the underrepresented student organizations is vital for the strength of the organizations and their financial welfare, as well as good student support.

This paper will discuss several different possible organizational charts, as well as modes of cooperation that are possible. Also discussed will be the causes of possible problems and solutions for these problems between the underrepresented student organizations and the diversity programs. The Programs and the organizations can be stronger and more effective by working together.

### **I. Introduction**

It is well known that even though the United States and the world are becoming more and more technical, the interest of US students in engineering and computer science remains low. In 2007 and 2008 The Survey of American Freshman, National Norms, showed that for most racial/ethnic groups, only about 6-10% planned to major in engineering and only 1-2% in the computer sciences. More Asians planned to major in engineering: 14% (Sax, L.J. et al. 2008, 2009). In recent years the percentage of all students who intend to major in computer science has dropped and fewer students actually graduate in engineering than first plan to major in engineering (Science and Engineering Indicators 2010). In 2007-2008, the number of undergraduate and graduate foreign students increased by 7% in engineering and 4% in computer science over the previous year. After several years of declining numbers of undergraduate engineering degrees, the increased numbers of degrees shown in 2007 are the highest since 1982.

According to the Engineering Workforce Commission, the percentage of women enrolled in engineering in 2006 was 17.2%, which is the same as the 2005 percentage, but lower than every year from 1995-2004 (Engineering Workforce Commission 2007). The largest untapped resource for more US engineers still lies among the underrepresented minority students in engineering: women, African Americans, American Natives, and Hispanics. Diversity support organizations such as women in engineering programs, minority engineering programs, and student organizations focused on these groups have done much to assist in the recruitment and retention of underrepresented students in engineering and computer science. From this point on in this paper, the term “engineering” shall mean both “engineering and computer science”.

Some years ago the author visited a research university in order to do a site visit evaluation of a Women in Engineering Program (WIEP) that had recently begun. The author was pleased to see that although the program was small, it was vital, it was making a difference for the women engineering students, and it had strong support from the engineering dean’s office. As the day and the interviews progressed, the author finally came across the key to this successful program: a passionate, supportive, woman Associate Dean for Engineering to whom the WIEP director reported. The author noted that having a passionate, supportive person in the Dean’s Office responsible for a WIEP was instrumental in assuring that encouragement and support for such a program would continue. One of the problems for WIEPs at that time was that there were not many women in Engineering Dean’s Office’s; let alone deans who were passionate about and supportive of women’s or diversity programs. A parallel argument could be made for the advantage of a passionate, supportive Associate Dean for Minority Engineering Programs.

Surprisingly, a few years later, the author found herself in a position to be a similar support person. She accepted the position of Associate Dean becoming the first woman in the Engineering Dean’s Office at her university. Among the charges for this office were to start a WIEP and to support student organizations in the college. She also inherited a low profile Minority Engineering Program (MEP). For many years she had also been the faculty advisor for the student Society of Women Engineers (SWE) Section. During her 11 years as Associate Dean a strong WIEP was developed, the MEP was reorganized and strengthened, and the student organizations thrived, especially the student SWE section, the American Indian Science and Engineering Society (AISES) student chapter, a student chapter of the Society of Hispanic Professional Engineers (SHPE), and the National Society of Black Engineers (NSBE) student chapter. All four of these organizations became active at the national level (students attended the national conferences of their organization) and won awards for best student chapter or section. Somewhat later a student section of the Mexican-American Engineering Society (MAES) was also created. The Engineering Student Council for all engineering organizations also became prominent at the national level.

An innovative creation during these years was the establishment of the CEMSWE organization – a combination of CEMS (Coalition of Engineering Minority Societies: AISES, NSBE, and SHPE) (Reyes et al. 1996) and SWE (Reyes et al. 2000). The presidents of these four underrepresented student organizations worked together. SWE invited CEMS to join with them in their fall Diversity Evening with Industry (DEWI) and CEMS invited SWE to join them in their Spring Banquet. DEWI included a career fair followed by a banquet. Students were encouraged to bring their resumes to the Spring Banquet as they sat at corporate-sponsored tables and honored students from each organization for their work during the past year. A CEMSWE

council planned the events giving the participating students ownership of their events while learning leadership skills at the same time. Also the CEMSWE council sponsored leadership retreats each year for the officers of the four diversity organizations. Industry was generous in providing speakers and leaders for the retreat. The students not only learned leadership skills at the retreat, but handed off the responsibilities of their office to their replacement for the next year. The organizations shared in the profits from the events and were able to send more of their students to the national conferences. The fact that the author was responsible for both the WIEP and MEP programs as well as the SWE student section, facilitated collaborative fund raising and event planning.

The organizational structure that includes SWE, WIEPs, and MEPs can vary greatly. For example, the structure described above was at Arizona State University (ASU) (Anderson-Rowland et al. 1999). A second example of this organizational structure can be found at the University of Washington. Their structure is similar to that of ASU, although the SWE faculty advisor is not a part of the Dean's Office. The Office of Academic Affairs, headed by a woman associate dean, "provides academic support, recruits engineering students, and enriches their educational experiences" (U of Washington 2010). SWE and the other student organizations are listed as part of the Office of Academic Affairs, as is the director of the Women in Science and Engineering program and Minority Engineering Program.

Ohio State provides a third example. "The Women in Engineering program (WiE) at the Ohio State University was established in 1979 in order to increase the participation of women within the engineering profession. The program concentrates on recruiting, retaining, and advising women, as well as establishing close relationships with industry" (The Ohio State University 2010). Ohio State has both a Women in Engineering Program and a Minority Engineering Program. These programs are under the oversight of a female Senior Assistant Dean of Diversity & Outreach, who is also responsible for K-12 Outreach. The student organizations are the responsibility of a male Associate Dean of Undergraduate Education and Student Services.

For a fourth example consider the University of Michigan. Its Women in Science and Engineering (WISE) Program has staff members who work with women in engineering, while other staff members work with women in science, and still others work with the women's science and engineering residential program (University of Michigan 2010). The WISE director and the director of Multicultural Engineering Programs Office report to the Associate Dean for Undergraduate Education. The Dean's Office has an Office of Student Affairs that is headed by a person who is not an Associate Dean. The Office responsibilities include student leadership and organizations (including SWE), as well as recruitment and admissions, an engineering learning center, a career resource center, academic advising, room scheduling, and scholarships. In this case, the WISE director and the SWE organization are supported by two different offices under the dean.

The actual organization structure housing a WIEP and SWE can vary greatly. The office or person under which each entity falls is not as important as each group having an advocate that takes responsibility for them and has the ability and the power/authority to help them.

## II. The Problem

Although this paper will focus on WIEPs and SWE student organizations, the general thoughts expressed can equally apply to MEPs, NACME, AISES, NSBE, and SHPE. This paper is being written in response to SWE student requests. The author is serving a one year term on the national SWE Board as the Director of Special Services: Women in Academia. Through this appointment, SWE national is seeking to determine how it can best serve and include women in academia. Most women in academia who participate in SWE do so because of their passion for helping engineering students and, in particular, women engineering students. Women in Academia who attend SWE regional and national conferences give presentations on graduate school and an academic career to encourage more women to go to graduate school and to choose an engineering academic career. As a part of the study to determine how engineering women in academia can best interact with SWE, both its professional and student members, many discussions have been held during the past year. Two main questions have been asked: How can we all work together better in SWE? and How can engineering women faculty help students and vice versa? When SWE student leadership was asked how the SWE Women in Academia could help them, one issue was at the top of the list: What can be done so that WIEPs and the SWE student sections can work together and be on the same team instead of competitors? Examples of competitive issues include a “Dean’s Office” determining that funding sources that used to go to SWE must now go half to the WIEP and that SWE is told they cannot go to certain companies for travel support for national conferences, while WIEP may solicit funding from them. A follow-on question was: “How can we get more support from our Dean’s Office”?

Although a WIEP and a student SWE section have much in common, there are fundamental differences. In general, the administrators of the Women and Minority Programs are permanent staff reporting to an Associate Dean giving support and stability to the programs. Because of this, WIEP and MEP programs usually are given office space. On the other hand, although the faculty advisor and the industry sponsor for the SWE student chapter may be stable, the major student leaders come and go every couple of years. Especially for engineering and computer science students, with their challenging academic loads, a good collaboration between the Programs and the SWE student organization is vital for the strength of the organization and its financial welfare. Sometimes student leadership is strong; sometimes it is weak. It is good to have an advisor(s) that is able to help stabilize the student organization. In recognition of this, some engineering schools pay SWE faculty advisors, either part-time or full-time for that very reason.

WIEPs usually have one main function: retention. The WIEP programming is usually done by the WIEP staff with some help from student workers. Since women engineering students only make up about 18% of engineering students, they do not comprise a “critical mass” which might help women feel comfortable, encouraged, accepted, and capable. WIEPs can create a designated “Women in Engineering Center”, where women engineering students feel welcome to stop by and study, make friends, network, socialize, eat lunch, or relax. A WIEP can also help women through programs such as a Bridge Program for new freshmen just before school starts, mentoring by a woman engineer in industry, a Big Sister – Little Sister program, study skills, providing student positions helping in a center, and informal mentoring.

Since the offices of the WIEP staff are usually close to the “Women in Engineering Center”, the students often come in contact with staff and are more likely to ask for help from them rather

than go to a counselor across campus. Since the staff members are usually passionate, caring women, the students may be willing to talk over problems with them, especially if the problems relate to a professor, who is usually male, or with peers, who are usually male. At the same time, some women students do not want to be associated with such a center. They feel that they have already been singled out as different (female) and do not want to associate with anything which further points out this difference.

Although the WIEP is usually focused on retention, if it has its own space carved out, it is de facto a recruitment tool as well. When a young prospective woman engineering student and her parents walk through an engineering building and see a Center for Women, they will be impressed and conclude that the engineering school is supportive of women and that she has a place of refuge if she needs one. Of course, some WIEPs also work with their Recruitment Offices and do outreach to middle and high schools or may run engineering summer programs for middle school or high school girls to encourage them to consider an engineering career. Other common programs run by WIEPs are summer or fall bridge programs for new freshmen engineering women.

Many of the directors of WIEPs are members of WEPAN. WEPAN, begun in 1990, now has 600 members. According to their website: "WEPAN works to transform culture in engineering education to attract, retain, and graduate women. With a clear focus on research-based issues and solutions, WEPAN helps its members develop a highly prepared, diverse engineering workforce for tomorrow...WEPAN's network of members on 150 college and university campuses reaches 42,890 female engineering students or 60% of the female engineering students through campus-based programs and initiatives (WEPAN membership data and American Society of Engineering Educators [ASEE] Data Management System data). WEPAN's Institutional Members have an average 15% higher enrollment of women in engineering, than non-member campuses" (WEPAN 2010).

The Society of Women Engineers (SWE), founded in 1950, "is a not-for-profit educational and service organization. SWE is the driving force that establishes engineering as a highly desirable career aspiration for women. SWE empowers women to succeed and advance in those aspirations and be recognized for their life-changing contributions and achievements as engineers and leaders" (SWE 2010). Growing stronger and stronger after nearly 60 years, SWE's membership is open to men, but is predominantly women. SWE has close to 21,000 members: over 9,000 professional members and close to 12,000 collegiate members. There are approximately 400 SWE Student Sections.

The SWE student sections exist primarily as an organization to bring women engineers together for networking and to develop their leadership skills. SWE students have an opportunity to attend regional conferences to develop leadership skills and to participate in career fairs for an internship or job. By participating in the SWE National Conference, SWE members have the opportunity to meet with many professional women engineers, as well as many other women engineering students. Again, the students can participate in many workshops available to help develop their leadership and professional skills, as well as participate in a large career fair. Most SWE student sections do both recruitment and retention activities and many sections compete for section awards and so sponsor many activities throughout the academic year. Since many sections have sizeable leadership boards, many women are given the opportunity to develop their

leadership skills. Research has shown that participation in organizations is a positive retention activity for women (Goodman 2002). As with WIEPs, some women engineering students do not want to be associated with an all-women's student organization, but if WIEP and SWE work together, they may attract more women engineering students.

### **III. The Solution: Work Together for a Win-Win Situation**

The differences in the organization and the purposes of WIEPs and SWE student sections actually make them ideally suited to work together. Their overall goals are the same: to recruit and to retain more engineering women. Each organization has strengths: WIEPs are managed by permanent staff and SWE student sections are managed by students. Most SWE student sections are dormant during the summer while their members are going to summer school or participating in internships. WIEPs, with their permanent year-round staff and with most students gone during the summer, can concentrate on recruitment programs. Since recruitment is best done by someone close to the age of the person being recruited, SWE members are perfect role models to visit schools during the academic year either with the WIEP or Recruitment staff or as their own project. For example, it is fun for SWE engineering students to revisit their local middle school or high school and to work with the students doing engineering projects. SWE members can also work with their Engineering School to make visits to local community colleges to encourage students to consider engineering or to continue with engineering. If the SWE member transferred from that community college, their message will be all the more relevant. The SWE student outreach coordinator can work with the Girl Scouts, WIEP, the Dean's Office or University recruitment office, or other engineering organizations doing recruitment.

A Dean's Office will usually support activities that bring faculty and students together. "Dinner with a Professor" is an evening event held each semester or each year by some SWE sections. A good way to get the Dean's Office to recognize and to support a SWE student section is for the SWE student section to ask the Dean's Office if they would provide the financial support for such a dinner while the students organize and conduct the event. A related event is an auction for the right to have dinner with a professor. Students, or groups of students, bid for a particular professor, and the group with the winning bid has dinner with that professor. The profits from the evening are used to send more students to the SWE national conference. The faculty that are to be auctioned often help contribute to the fund raising. They give money to students to bid on them, so their bid will be "respectable"!

Industry is known to help groups and activities that have to do with diversity. Often companies have specific pots of money to invest in local colleges or universities to aid diversity. WIEPs often have their staff funded by their school, but in order to run very many programs, they need assistance from industry. Sometimes industry wants to only give money directly to the students so they can have a direct impact. In order for WIEP and SWE to work well together, it is desirable for industry to support both the WIEP and the SWE student section and often industry will have different funding sources for these two entities. Sometimes an industry representative may request that a joint proposal for support come from the diversity program(s) and the underrepresented student organizations.

The Dean's Office should make sure that both their WIEP and the SWE student section are adequately funded. Although it is not always done, the SWE student section, as well as the underrepresented minority student groups, may be funded directly by the Dean's Office. Assuring that these student organizations are healthy should lead to more diversity and thus better engineering at the engineering school. In some cases, the Dean's Office sets aside funding for all student organizations and individual student organizations make proposals to receive money (such as for transportation for students to a national conference) and in turn pledge to "pay off" the funding in approved volunteer work for the engineering school at a certain rate per hour. This is a good business proposition for an Engineering Dean's Office. The students' time may be used at mixers when entertaining prospective engineering students, as helpers at a MESA (Mathematics, Engineering and Science Achievement) Day, for recruitment trips back to their home high schools which are some distance from the college or university, or as guides on high school visitation day or an orientation day. This is a win-win situation for the student organization and for the college.

If a Dean's Office is not doing any of the above or similar activities and the SWE (or other underrepresented student organization) student section is not receiving Dean's Office support, financially or in terms of encouragement, then the student leaders should approach the Dean's Office, usually through the Associate Dean in charge of students. The students should propose that they work together. It would be even better if the WIEP director worked with the students in their approach with the Dean.

The SWE faculty adviser could be a key person in the support that a SWE section receives. If the faculty adviser is not already connected with the WIEP, it would be good to have that faculty adviser as a part of the Internal Advisory Board for the WIEP. It is good to exchange meeting calendars, or better yet for the WIEP, the MEP, SWE, AISES, MAES, NSBE, and SHPE to plan their meeting calendars together. We also urge the WIEP Director to advocate for the SWE faculty adviser. In one case, the WIEP Director was instrumental in gaining summer salary for the SWE faculty adviser.

#### **IV. Conclusions**

The purpose of this paper is to advocate that WIEP and MEP directors actively seek to collaborate with their respective underrepresented student organizations and their advisors. If all of the WIEP directors on the 150 college and university campuses affiliated with WEPAN collaborated with their SWE student sections, certainly more would be accomplished for women engineering students. WIEP and MEP directors should seek out the leadership and the advisor of the student organization and lead the way for collaboration. The WIEP and MEP directors should also be advocates for the minority student organizations with the Dean's Office whenever possible. These collaborative efforts will also be good leadership models for our students.

## References

Anderson-Rowland, M.R., Blaisdell, S., Fletcher, S., Fussell, P., McCartney, M., Reyes, M., and White, M.A., "A Collaborative Effort to Recruit and Retain Underrepresented Engineering Students," *Journal of Women and Minorities in Science and Engineering*, vol. 5, pp. 323-349, 1999.

Engineering Workforce Commission, *Engineering & Technology Enrollments, Fall 2006* Washington, DC, 2007.  
<http://www.nsf.gov/statistics/wmpd/pdf/tabb-9.pdf> Accessed 2/16/10.

Goodman, I.F., et al, "Final Report of the Women's Experiences in College Engineering (WECE) Project," Goodman Research Group, Inc., Cambridge, MA, April 2002.

Reyes, M.A., McCartney, M.A., and Anderson-Rowland, M.R., "Developing Collaboration and Leadership within Minority Engineering Societies," *Proceedings of the American Engineering Education Annual Conference*, Washington, DC, June, 1996, 5 pages. <http://soa.asee.org/paper/conference/paper-view.cfm?id=12585>

Reyes, M.A., Anderson-Rowland, M.R., Fletcher, S.L., and McCartney, M.A., "Model Collaboration within Minority Engineering Societies," *Proceedings of the American Engineering Education Annual Conference*, St. Louis, Missouri, June, 2000, 8 pages. <http://soa.asee.org/paper/conference/paper-view.cfm?id=15182>

Sax, L.J, Hurtado, S., Lindholm, J. A., Astin, A.W., Korn, W. S., and Mahoney, K.M., *The American Freshman: National Norms For Fall 2007*, Cooperative Institutional Research Program, Higher Education Research Institute, University of California, Los Angeles, CA., 2008.

Sax, L.J, Hurtado, S., Lindholm, J. A., Astin, A.W., Korn, W. S., and Mahoney, K.M., *The American Freshman: National Norms For Fall 2008*, Cooperative Institutional Research Program, Higher Education Research Institute, University of California, Los Angeles, CA., 2009.

*Science and Engineering Indicators 2010*, <http://www.nsf.gov/statistics/seind10/pdf/c02.pdf> accessed 2/16/10

SWE: <http://societyofwomenengineers.swe.org/> Accessed 1/14/10.

The Ohio State University: <http://wie.eng.ohio-state.edu/> Accessed 1/16/10

University of Michigan: <http://www.wise.umich.edu/about-us/#staff> Accessed 1/16/10

University of Washington: <http://www.engr.washington.edu/about/officedean.html> Accessed 1/16/10

WEPAN: <http://www.wepan.org/displaycommon.cfm?an=4> Accessed 1/14/10