

## **AC 2007-1153: WEPAN HISTORY AND CURRENT UPDATE**

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### **INTRODUCTION**

Women in Engineering Programs & Advocates Network (WEPAN), the Women in Engineering Division of the American Society of Engineering Educators (WIED ASEE), the Society of Women Engineers (SWE) and all focus their work on women in engineering, and each offers different programs and activities to specific constituent groups. In addition, there is tangency, some overlap and resulting opportunities for collaboration, and cooperation between the members of the three organizations, and the larger engineering and engineering diversity community. This paper provides a brief history of WEPAN accomplishments and a summary of its plans for the coming three-to-five year period. It is intended to provide information about WEPAN to ASEE WIED members and further to enhance and support dialog and collaboration between WEPAN and ASEE.

### **WEPAN HISTORY 1990-2002**

In 1990 there were fewer than 10 formally organized Women in Engineering programs in the United States. While future projections for the employment of engineers was strong there were markedly fewer graduates in engineering, primarily white males, than there had been a decade before. This prompted industry and engineering programs to reconsider the demographics of engineering programs nationwide. Thus those Women in Engineering programs which were already in place were inundated with requests for assistance for developing new programs. Women in Engineering Program directors from Purdue University, Stevens Institute of Technology and the University of Washington joined together to address these needs in a national conference held in Washington, D.C. in 1990. This conference, sponsored by the Directorate of Engineering and the Directorate of Education and Human Resources at the National Science Foundation marked the inception of the Women in Engineering Programs and Advocates Network (WEPAN) organization.

Since it was founded, WEPAN's purpose has been to be a catalyst for change that enhances the success of women in the engineering professions. Key strategies to accomplish this mission include education, training, research, collaboration, leadership, diversity, advocacy, networking, sustainability, accountability and volunteerism. While the mission of WEPAN has expanded its scope over the years, increasing the participation of women in engineering by sharing successful program ideas among institutions and providing training and mentoring for women in engineering program directors is a primary component for the success of the organization. Many of the achievements of WEPAN are based on the collaborative efforts of its members partnering to effect both national and institutional change. Major grants from NSF, FIPSE, the Alfred P. Sloan Foundation, the AT&T Foundation, the Alcoa Foundation and corporations have enabled WEPAN to mentor hundreds of faculty and staff from engineering schools throughout the US and abroad as they initiated or expanded Women in Engineering Programs. The results of the efforts by WEPAN over its first 12 years are measurable as there are now more than 85 Women in Engineering Programs in colleges and universities in the United States working to increase the representation of women of all ethnicities in engineering. Through the extended WEPAN network of mentoring and training activities, institutional change has taken place with thousands of women students benefiting.

WEPAN's accomplishments from 1990-2002 were concentrated in four areas of focus and impact:

- 1) Providing education, training and mentoring for Women in Engineering/Science Program Directors from engineering schools
- 2) Mentoring women faculty and prospective women faculty
- 3) Mentoring undergraduate and graduate students
- 4) Mentoring students in K-12 through WEPAN projects"

WEPAN's accomplishments from 1990 to 2002 in each of these areas is summarized here. Many of the publications and resources are available through WEPAN's web site at [www.wepan.org](http://www.wepan.org).

### **Women in Engineering/Science Program Directors**

- WEPAN's training curriculum was published in 1996, "*Increasing Access for Women in Engineering*", funded by the U.S. Department of Education, Fund for the Improvement of Postsecondary Education. The curriculum was distributed to every engineering school in the country and evaluated by Campbell-Kibler Associates. Although it cannot be attributed to chapter use alone, over the two years that the sites tested the chapters, overall number of activities focused on women in engineering and science done at 8 sites increased from 60 to 104. By the end of the project period, test sites also clarified and expanded the number of goals for their Women in Engineering/Science Programs. Many universities that were just beginning programs did not have their own written materials.
- *WEPAN Pilot Climate Survey*, 1998, disseminated to over 29,000 students at 29 WEPAN member institutions. This national pilot survey was designed by WEPAN and funded by the Engineering Information Foundation. The primary purpose was to develop a method to assess male and female engineering student perceptions of the educational climate at colleges and universities in the U.S. The survey focused on 7 major areas: quality of teaching; quality of teaching assistants; quality of labs; quality of departmental assistance; general questions about engineering; levels of self confidence in academic courses; and demographic data. Pilot sites were able to add several questions that could be tailored to their institution. Analyses of the data, from over 8000 responses, focused particularly on differences between male and female students suggesting some interesting issues. Perhaps the most important implication from this pilot survey is that institutions need to identify why women and men perceive the undergraduate engineering experience differently, particularly in areas that relate to self-confidence, with women identifying lower self confidence in participating in engineering than their male counterparts.
- *WEPAN National Conference*: WEPAN has annually provided a forum for program administrators, faculty, industrial representatives and both graduate and undergraduate students to interact in a collegial environment. Between 1990 and 2001 1,566 different individuals representing 570 different organizations, institutions and corporations have attended the WEPAN National Conferences
- *WEPAN Conference Proceedings* have been published every year since 1990 to provide copies of the papers presented at the conferences

- *WEPAN on the Web* , WEPAN's website ([www.wepan.org](http://www.wepan.org)) was developed in 1998 as a comprehensive resource of programs and services and information related to women in engineering programs.
- *National Evaluation of Women in Engineering Programs* is a compilation of 1994 data.
- *Evaluation Resource Book* lists evaluators and Women in Engineering Programs that are evaluated.
- *Working Paper Series* is a refereed publication that periodically presents significant research and analysis of current issues. Current publications include:
  - *Factors in the Underrepresentation of Women in Science and Engineering*
  - *College Classroom Climate Resources*

### **Supporting Future Faculty**

- *Achieving Success in Academia*. WEPAN hosted this conference June 27-29, 1997 in Arlington, Virginia, to begin to address the low representation of female faculty in engineering in the U.S. Funded by the National Science Foundation, this conference offered non-tenured, tenure track female faculty and graduate students, strategies to enhance their careers in academia and provide insight into successfully navigating the tenure track. Participants included 34 non-tenured, tenure track female engineering faculty and 28 female engineering graduate students interested in a career in academe. The graduate students who attended did so accompanied by a faculty member from their institution to help initiate or maintain a mentoring relationship. Twenty-eight (28) colleges and universities were represented

### **Undergraduate and Graduate Students**

A lack of interest in the topic of engineering and the lack of a supportive network are often cited as reasons for women leaving the study of engineering. Mentoring support provides students with an opportunity to learn about the direct applications of the coursework they are pursuing as well as learn first hand about employment opportunities. Recognizing the importance of these connections, both peer mentoring and student/professional mentoring programs have increased in schools with Women in Engineering Programs. Training in the development of mentoring programs has been offered by WEPAN through its National Conferences, Training Seminars and support from the WEPAN Centers. Program directors who responded to the WEPAN Training Seminar follow-up surveys identified 30 different mentoring programs that were being implemented or expanded following their participation.

- *Curriculum for Training Mentors and Mentees* In 1998 WEPAN collaborated with the University of Washington in the development of this curriculum, that includes an administrator's guide, handbooks for participants, a bibliography of resources, an evaluation module, a video of scenarios depicting mentoring relationships, and a guidebook for facilitating group discussions. This curriculum was offered to participants attending the WEPAN Training Seminars and WEPAN continues to be responsible for the dissemination of the Curriculum.

- *MentorNet* In 1997, WEPAN served as an incubator for MentorNet, a national industrial electronic mentoring program for women in engineering and science students. For three years, prior to MentorNet's incorporation, the commitment of WEPAN's leadership and its membership contributed to the success of MentorNet. WEPAN continues to partner with MentorNet and provided support for the Partners Forums that were held in 2001 and 2002.
- *Faculty for the Future* Funded by a grant from the GE Fund, WEPAN and Penn State University developed new initiatives to increase the number of female and under-represented minorities in faculty positions in engineering and science. Through Faculty for the Future, universities have the ability to post jobs for faculty and research positions, post docs, graduate school fellowships, and undergraduate summer research opportunities. In addition, Undergraduate and graduate students can submit and update their resumes and send their resumes to universities seeking candidates.

### **Mentoring Students in K-12**

In response to stated needs of members, WEPAN developed and implemented programs and materials to introduce girls (grades 3-12) to engineering and science. Projects developed and managed by WEPAN through external grants have supported member universities to provide summer programs to middle school girls, and introduce girls and students of color to engineering through the use of engineering-based hands-on curriculum presented in the classroom, all of which are undertaken by WIE programs.

- *EXITE* Exploring Interest in Technology and Engineering (EXITE) is a week-long summer program designed to expose middle-school girls to engineering and computer science. The pilot project, supported by IBM and managed by WEPAN took place at six U.S. universities during the summer of 2000. Women engineers from IBM, university professors and graduate students served as project teachers, speakers and mentors.

EXITE had 219 students ranging from 5<sup>th</sup> to 8<sup>th</sup> grades participating in the summer program. Students attending included 51% Caucasian, 22% Hispanic, 16% African American and 11% other.

Each program's format was similar but tailored to highlight a participating university's areas of expertise. Among the subjects covered in seminars were teamwork, problem solving, decision-making, and communicating effectively. Laboratory experiences included animated web-page design, computer-chip design, laser optics, computer hardware and more. WEPAN member universities which participated in the pilot project were Purdue University, West Lafayette, IN.; University of Puerto Rico, Mayaguez; The University of Texas at Austin; University of Michigan, Ann Arbor; Binghamton University, NY; and Georgia Institute of Technology, Atlanta. EXITE is now an ongoing program offered by IBM across the country every year.

- *Making the Connection* In 2000 WEPAN was awarded a grant from the Lucent Technologies Foundation, for a three-year program to develop materials to help change engineers' public image among those who matter most, the engineers of the future. The goal of Making the Connection is to create an awareness and interest about engineering among students,

particularly girls/young women and under-represented minorities, in grades 3-12. A series of 15 hands-on engineering-based activities, a presenter's guide, and five age-appropriate newsletters have been developed by experts for 5 educational levels including: middle elementary, upper elementary, middle school, early high school and late high school. The curriculum is designed to highlight the contributions engineers make to improve the quality of our lives; dispel stereotypes of engineering as a field for "white males"; make the connection between students' math and science courses and engineering; and explore the skills and interests needed to become an engineer. The activities focus on three topic areas which are of particular interest to girls: environment, sports, and communication

- *What Do Engineers Do?* A book of demonstrations, laboratories and research projects designed to introduce students in grades 7-12 to engineering.
- *Careers Encounters: Women in Engineering Video.* This video has reached millions of students, parents and educators through national cable television networks seeking to introduce the daily lives of women in engineering.

#### **WEPAN GROWTH AND CHANGE 2002-2004**

In 2002, after 12 twelve years of program development and implementation, WEPAN's founders and the organization's Advisory Board determined that changes in organizational structure and operation were important to WEPAN's future.

- Established organizational processes for electing and appointing a 13-member Board of Directors
- Chartered and Organized 10 standing committees
- Conducted a search process and hired a full time Executive Director

#### **WEPAN Strategic Plan 2006-2008**

Building on several earlier strategic plans, in the Summer and Fall of 2005 WEPAN's Board of Directors redirected the organization's strategy to proactively focus the work of the organization. The new plan marks a shift for WEPAN: it focuses much of WEPAN's energy on effecting change within institutions of higher education, as well as continuing its emphasis on acting as a leading resource for women in engineering initiatives. The plan moves WEPAN away from conducting outreach activities for K-12 students because numerous other organizations are active in that arena.

Below are WEPAN's Vision, Mission, Positioning Statement, Overall Strategy and Goals scheduled for implementation from 2006 through 2008.

- *Vision* To achieve the full participation of women in engineering.
- *Mission* WEPAN's mission is to be a catalyst, advocate, and leading resource for institutional and national change that enables the success of all women in engineering.
- *Positioning Statement* WEPAN is dedicated to improving the climate for and success of all women in engineering. By transforming environments in institutions of higher learning, a

diverse population of aspiring engineers can succeed. Catalyzing change within institutions and WEPAN's advancement of relevant research, programs and expertise distinguish it from other engineering diversity organizations.

- *Overall Strategy* WEPAN's strategy is to focus on higher education institutional transformation. WEPAN will leverage its information, experience, partnerships, and advocacy to bring about change on institutional and national levels focusing on colleges of engineering and STEM-related disciplines.

WEPAN will continue to be the leading resource and advocate for women in engineering by providing information, trends and best practices to all interested in advancing women in STEM fields.

- *Goal: Institutional Change* WEPAN will be a catalyst for significant institutional change so that leaders of engineering programs are engaged in and committed to improving the climate and success for all women in engineering.
- *Goal: Resource and Advocacy* WEPAN will be a leading resource for women in engineering and women in engineering programs.
- *Goal: WEPAN Vitality* WEPAN will be a fiscally strong and effective organization.

### **WEPAN Current Projects 2006-2007**

Three current projects are described below: WEPAN Knowledge Center, WEPAN Slide Portfolio, and Webinar Series. All three fall in the Resource and Advocacy Goal.

- *WEPAN Knowledge Center (WKC)* will provide a unique, web-based resource for practice and research that synthesizes, targets and creates key information. The objectives of the WKC are to create an Internet knowledge center that:
  - Creates knowledge and provides leadership in key policy areas and information on issues related to increasing women's participation in engineering;
  - Collects and offers access to research, best practices, lessons learned, data and information;
  - Provides capacity building tools, including webinars and blogs;
  - Provides a platform to test and disseminate a new toolkit for creating information resources that will support the work of researchers and practitioners.

The WKC will use new technologies such as harvesting mechanisms to bring together the many resources available but scattered among a wide variety of programs and universities. It will make them readily accessible to stakeholders who need this information to develop policies, intervention activities and research programs related to WIE issues. WKC will provide new views of national statistics, analyses and policy summaries and improve access to research, educational models and approaches.

To build national capacity among education practitioners and educators, WKC will offer a series of white papers written by experts in engineering programs and human resources

research, and offer unified access to bibliographies and annotated literature reviews, related organizations and experts, job postings and resume banks, directories of women-in-engineering programs, and leadership development. In addition to white papers on key issues, WKC will develop status reports, fact sheets and briefing materials on key topics and an e-newsletter; offer webinars and blogs; and facilitate navigation to significant relevant resources on other sites, such as assessment tools for educational programs.

Identified collaborators that will bring complementary expertise, are: Commission on Professionals in Science and Technology (CPST), American Society for Engineering Education (ASEE), and American Association for the Advancement of Science's Center for Advancing Science & Engineering Capacity (AAAS/CASEC). The process of developing the WKC for effectiveness is based on substantial input from the field, careful planning, and building the right team. WEPAN will identify gaps among current statistical reports, current information needs on trends in policy and practice, and produce new summary reports for the benefit of people for whom this is not a primary activity, but for whom credibility, quality, and brevity is important.

- *Engaging America's Intellectual Talent: The Status of Women and Minorities in Engineering*  
The "WEPAN Slide Portfolio" was funded by Lockheed Martin and the National Science Foundation Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring. It is a specially-developed series of more than 80 PowerPoint slides that detail the status of women and minorities in engineering. Broken into sections such as K-8; 9-12; undergraduate; graduate; faculty; and workforce, the portfolio is a ready-made source of current presentation slides aimed at increasing awareness and generating support for programs that enhance the success of all women and under-represented groups in STEM fields. Each slide contains a set of bulleted talking points to assist users in preparing and presenting.

WEPAN worked with the Commission on Professionals in Science and Technology to develop and prepare the slide portfolio. The slide portfolio is already available to WEPAN members on WEPAN's Web site.

- *WEPAN Webinar Series* The Webinar Series was developed in response to research on WEPAN member needs and preferences conducted in March 2005. The survey indicated a strong demand for professional development related to exchange of best practices (ranked very important or important by 87% of respondents). Four topics out of 14 were scored very important: Current and previous research in Women in Science and Engineering (WISE) that would facilitate quick knowledge transfer; Research-based information on WISE targeted for Deans or other Administrators; Funding opportunities for WISE programs; and Best practices for new WISE professionals. A total of 63% of the respondents indicated they would participate in webinars and indicated a frequency preference ranging from monthly to quarterly. WEPAN's Strategic Plan recognizes the importance of such professional development and calls for increased, targeted, professional development and services to WEPAN members and corporate partners, as well as institutions without WISE programs. The objective is to offer 4 webinars in 2007. Preliminary topics include:



- Optimizing the benefits for women in engineering through NSF Criterion 2 (Broader Impacts);
- Best practices in programming ideas for WISE, pre-college, outreach/recruitment summer programs;
- WISE Research (specific topic to be selected);
- Developing corporate support for WISE programs.

The audience for the Webinar Series includes WEPAN members; Faculty, Department Chairs, and Deans; members of the Minorities in Engineering community; and the colleagues and counterparts of all these groups from the corporate sector. We are planning for 30 participating sites per webinar, and the technology can handle up to 1000 sites. A nominal registration fee will be collected to encourage registrants to fulfill their reservations. Webinars will be recorded and rebroadcast several times before they are archived. Archived webinars will be available as long as they are relevant and current.

## **CONCLUSION**

WEPAN's commitment to enhancing the success of women in the engineering profession is supported by all of the activities identified above. WEPAN will continue serving its members by providing the most comprehensive and successful programs to support their goals of increasing women of all ethnicities in engineering and science. We look forward to collaborating with ASEE WIED to accomplish our mission and vision.

## **REFERENCES**

WEPAN application to NSF for the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring, 2002.

WEPAN Strategic Plan 2006-2008.

WEPAN Knowledge Center Brochure, 2007.

WEPAN Webinar Plan, 2007.

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