

The Coalition of Minority Engineering Societies and the Society of Women Engineers (CEMSWE): creating, developing and maintaining collaborations between MEP, WISE and the Center for Outreach and Recruitment (COR) Programs

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Abstract – CEMSWE was created in 1998 and operates out of CEDAR. This coalition is composed of the following engineering student societies: AISES, NSBE, SHPE, SWE.

With combined efforts, each society forms an alliance that motivates, prepares and educates all students that fall under this coalition. Workshops and recruiting events have been initiated and executed under student direction. CEMSWE also coordinates a large career fair with industry called *Diversity Evening with Industry* each fall semester and an annual awards banquet for CEMSWE each spring semester. The CEMSWE student leadership works with the Dean's Advisory Council Committee, the Student Affairs Advisory Council comprised of industry to coordinate and sponsor these events and to have representatives present at these events.

This paper will provide a model study of how to create and maintain effective collaborations amongst diverse student organizations, college and university organizations, community groups and industry partners.

Introduction

Retention of engineering students is a major challenge for most universities, especially those with high acceptance rates. This selectivity is inversely proportional to the degree attainment of both minority and non-minority students [1,2]. Nationally, less than half of the students who begin

engineering, graduate in engineering [3]. From 1993 – 1995, less than 59% of College of Engineering and Applied Science (CEAS) freshman engineering students (male and female) at Arizona State University (ASU) were retained in engineering beyond their first year [4]. These retention rates helped to necessitate the establishment of retention programs in the CEAS since overall acceptance rates at ASU are 80%.

Many factors play a part in student attrition including difficulty in the transition from high school to college, lack of understanding about the demands of attaining an engineering degree, financial problems, and problems with time management. Women and minority students are more likely to enter into engineering uninformed about the challenges associated with engineering academics and tend to face additional issues including lack of role models, family problems, and social pressures [5]. Because of these factors, underrepresented students are more prone to change their major or drop out of engineering without seeking support. Students who leave engineering in good standing tend to have lower general impressions of engineering and exhibit lower confidence in their engineering skills (problem solving, creative thinking, and design abilities) and basic engineering knowledge [6].

Further, we know from twenty years of research that students that are involved in student organizations have a higher retention rate than those who are not. The nature of student involvement and the quality of that involvement influences student development and learning. Examples of programs that are effective include programs that students, faculty and staff have a high level of interaction [7].

Therefore, there is a need for student involvement programs that establish an early support network for underrepresented students and foster personal relationships. Key actions for successful retention of underrepresented students include student organizations that create a community and atmosphere that is supportive of diverse populations.

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1

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Program Strategies

The Center for Engineering Diversity and Retention (CEDAR) was created in July 2002 in an effort to better serve the underrepresented students in the College of Engineering and Applied Sciences (CEAS) at ASU. Previously, MEP and the WISE Program both offered retention and recruitment programs. As the programs evolved, it became more apparent that the two programs were overlapping in the services that they provided. In an effort to become more effective, the programs were consolidated in summer 2002. Now, the division designates recruitment and retention efforts between two separate offices. CEDAR was created to work with the retention of underrepresented students once they are accepted to the university. The Center for Outreach and Recruitment was created to work with programs for K-12 populations. Please note that in this paper, "engineering students" refers to all CEAS students, including engineering, computer science, and construction management majors.

CEMSWE is a unique model that streamlines the efforts of four student societies while maintaining individual cultural identities. This partnership has yielded several successful on-going programs targeted at serving all populations represented in the coalition. These programs include:

- CEMSWE Spring, Fall and Mid-year Leadership Retreats
- Diversity Evening with Industry (DEWI)
- CEMSWE Annual Awards Banquet
- Workshops and Study Sessions
- Recruitment Activities sponsored by Intel
- Additional combined funding ventures with Hewlett Packard, Pinnacle West and Boeing
- Collaborations with CEDAR and COR

CEMSWE Leadership Retreats

Each Spring semester, AISES, SHPE, NSBE and SWE elect new executive board members for the coming academic year. Since 1998, CEMSWE has held a leadership retreat to transition from current executive board members to elected executive board members. This retreat is typically held off-campus in a rural setting. Members from all four organizations spend the weekend working together on plans for the coming year. MEP and WISE staff (now CEDAR staff) offer support for the retreat as well as helping student leaders to develop leadership skills. In addition, students review university policies and procedures including policies on student travel, group purchasing and funding. The organizations also spend time reviewing successes and challenges from the previous year and planning a CEMSWE calendar for the coming academic year. Finally, groups work individually on goals and objectives for their respective organizations.

In Spring 2002, the retreat was held in Oak Creek Canyon in Northern Arizona. Students added two essential components new to the CEMSWE Retreat process. First, sponsorship was sought to allow students to stay in individual cabins and to have an industry professional lead in team building activities. Secondly, the groups held a cultural potluck during the retreat featuring dishes from African American, Hispanic American, and Native American cultures. The potluck offers students a chance to interact socially and share cultural values and traditions.

In Spring 2000, student leaders requested a mid-year retreat be developed as a way of formalizing the partnerships even further. In January 2001, the first mid-year CEMSWE Leadership Retreat was held. Since then, mid-year retreats have been held every January. This retreat is a venue for assessing each semester. In doing so, student leaders and staff can readjust programming, networking and meeting schedules to better suit current student needs. This retreat is held in a location close to the ASU main campus for one day and is sponsored by CEDAR and local industry.

In Spring 2002, student leaders requested a follow up retreat at the beginning of the fall semester. The purpose of the retreat is to recapture the excitement and energy of the spring retreat. This retreat allows the students who were newly elected in the spring retreat to come together and work out details for the fall semester. It also allows CEDAR staff to update students on any changes in university policies and procedures. CEMSWE held its first re-retreat in Fall 2002 and will hold another one in Fall 2003.

To date, 181 students have participated in leadership development activities through the various CEMSWE retreats. The chart below details participation by year and organization.

YEAR	98	99	00	01	02	2003
EVENT						
CEMSWE SLR						
--AISES	2	3	3	3	3	TBA
--NSBE	4	5	4	8	8	TBA
--SHPE	4	5	4	10	12	TBA
--SWE	3	3	2	4	10	TBA
TOTAL	13	16	13	25	33	TBA
CEMSWE MYLR						
--AISES	NA	NA	NA	1	1	5
--NSBE			NA	3	4	7
--SHPE			NA	4	2	10
--SWE			NA	2	4	10
TOTAL				10	11	32
CEMSWE FLR						
--AISES	NA	NA	NA	NA	4	TBA
--NSBE	NA	NA	NA	NA	6	TBA
--SHPE	NA	NA	NA	NA	8	TBA
--SWE	NA	NA	NA	NA	10	TBA
TOTAL					28	TBA
TOTAL	13	16	13	35	72	32

NA=NOT AVAILABLE TBA=TO BE ANNOUNCED

SLR=SPRING LEADERSHIP RETREAT MYLR=MID-YEAR
LEADERSHIP RETREAT FLR=FALL LEADERSHIP RETREAT

Diversity Evening with Industry (DEWI)

Although Diversity Evening with Industry had existed previously, the first collaborative CEMSWE DEWI event was held in 1999. The purpose of the event is to introduce current industry to the talent and diversity in CEMSWE. Student leaders from CEMSWE elect two students to chair the CEMSWE Special Events Committee (CSEC). This committee is responsible for DEWI, the CEMSWE Awards Banquet and CEMSWE Social Events. CSEC is chaired by two students who are elected to the positions at the CEMSWE Spring Leadership Retreat. Those two student leaders then recruit two representatives from each organization to serve on the CSEC Committee.

CSEC works collaboratively with the CEDAR staff and the Student Affairs Advisory Committee (SAAC), a sub-committee of the Dean's Advisory Council of CEAS. SAAC members are industry representatives interested in working with the CEAS on diversity issues. Companies pay \$1500 per year to serve as SAAC advisors. The membership includes \$600 for participation in DEWI, \$500 for participation in the Annual Awards Banquet and \$400 for participation in SAAC. Thus, CSEC has a built in fundraising mechanism for DEWI that involves collaboration with CEAS Dean's Office and staff. Current SAAC members include: Intel, Motorola, Salt River Project, Boeing, Lockheed Martin, Medtronic, Honeywell, Ethicon, General Dynamics, Hewlett Packard, Pinnacle West, US Navy, and Raytheon.

In preparation for DEWI, CEMSWE holds a resume workshop to help students prepare to meet industry at the upcoming event. Each organization in CEMSWE invites two professional members to participate in the workshop to offer advice to students on their individual resumes. In Fall 2002, 95 students participated in the workshop. Student then have two weeks to make corrections to their resumes and turn them in to the CEDAR office for publication in the resume book for DEWI.

The DEWI event is a career fair and banquet held in the fall each year in conjunction with the ASU Career Fiesta. By holding DEWI the evening prior to Career Fiesta, the university wide career fair, the companies only need to travel once and they are exposed to our talented, diverse students prior to any other students. CSEC works with SAAC to advertise the event to the companies as well as to the students. Tickets are sold for \$5.00 to students who are members of CEMSWE organizations and \$10 for non-members. On the day of the event, students sign up to sit with the company of their choice. Each table at the banquet has two company representatives and eight students. Companies who participate are given a resume book with resumes for every student who is participating in the event and of those who were not able to attend. In Fall 2002, 150

students participated in DEWI. All aspects of the event are planned and coordinated by students in CEMSWE as CEDAR staff offers guidance only.

CEMSWE Awards Banquet

The CEMSWE Awards Banquet is held in the spring semester each year. It is an opportunity for the leaders in CEMSWE to come together and celebrate their outstanding individual organizational members, outstanding CEMSWE members, outstanding industry and professional support, and outstanding staff support. The Awards Banquet is a function of the CSEC Committee as well. The companies that attended DEWI the previous semester are invited back for a night of celebration. Again, tickets are sold in the CEDAR office to members and non-members of CEMSWE. The banquet is held off campus at a local venue. Students again sign up to sit with their company of choice which allows company representatives one on one interaction with students interested in their companies. The Awards Banquet features a key note speaker, award ceremony, and CEMSWE slide show recapping the year's successes. In 2003, CEMSWE as a whole will be recognized with a special award by SAAC for their outstanding contributions to recruiting and retaining diverse students in CEAS.

Workshops and study sessions

Each semester, CEMSWE sponsors a series of workshops for its members. These range from workshops on business etiquette to how to write a resume. CEMSWE works collaboratively with the CEDAR staff to plan and promote these events. Student employees in the CEDAR office are often active members in CEMSWE and help to facilitate the collaboration. The Director of CEDAR serves as the advisor to CEMSWE to further ensure the collaboration. In Spring 2003, CEMSWE began weekly study session in the CEDAR student room. Every Wednesday from 6-8 p.m., study sessions are held. Each student organization takes turns sponsoring an evening to head up the study session. For Spring 2003, CEMSWE and CEDAR held 93 academic, leadership, and professional development events to support students.

Recruitment Activities sponsored by Intel

In the Fall of 2001, CEMSWE leaders came together to create a joint funding proposal representative of all four organizations. This proposal went through several transformations and was finally completed in the spring of 2002. It was completely written by student leaders and edited by staff. Staff then used the proposal to seek the first ever joint funding for programming. In Spring 2002, CEMSWE was awarded a \$16,000 grant from Intel to hold joint recruitment activities with middle school and high school students. It was agreed that CEMSWE would hold

four recruitment events a semester, one each month, for two semesters and each of the four student organizations would take the lead on coordinating one event per semester. The other three organizations support the events by recruiting volunteers and publicizing the event.

During the event, each organization targets one middle school and one high school. The events are conducted either on-campus or at the chosen school. They involve hands-on engineering activities in teams, explanations of the different types of engineering, a question and answer session, and an engineering project competition with prizes. The budget allows \$2000 per event and remaining funding is used to support the CEMSWE Leadership Retreats. To date, the CEMSWE/Intel recruitment effort has served over 400 middle school and high school students with three events remaining in Spring 2003.

Additional Combined Funding Ventures

In addition to Intel, staff and CEMSWE leaders have submitted proposals to Boeing and Pinnacle West in 2002. Boeing has generously funded the collaborative in the amount of \$3200 for general retention activities in Fall 2002 and has asked for a proposal for Spring 2003. Pinnacle West funded the collaborative for sponsorship of the CEDAR student room for \$4000 for 2002-2003. Finally, Hewlett Packard has invited the CEMSWE collaborative to submit a proposal for equipment for Spring 2003. CEDAR staff and CEMSWE leaders are working to meet those objectives. Clearly, the benefit to working with many diverse groups collaboratively is that industry finds it more convenient to work with one proposal than four and finds CEMSWE highly useful and successful.

Collaborations with CEDAR and COR

One of the core components to the success for the CEMSWE collaborative is the support from the CEDAR office. The Director of CEDAR holds weekly meetings with the Presidents of the CEMSWE organizations. These meetings are a time to work on issues and ideas that affect the entire group as well as share ideas and best practices with each other. Further, administration of the funding for each organization, CEMSWE and CSEC is conducted by CEDAR. All travel for the groups to regional and national conferences is coordinated by CEDAR staff as well. CEMSWE is a major part of the success of CEDAR.

CEMSWE also works collaboratively with the Center for Outreach and Recruitment (COR) on K-12 activities. COR recruits CEMSWE students to serve as volunteers at events throughout the academic year. The organizations then count volunteer hours and receive funding from the Associate Dean for Student Affairs based on their hours of commitment to the college working on recruitment efforts. Further, COR hires CEMSWE students to serve as staff for the CEAS Summer Institute serving K-

12 populations. On average, 360 students participate in summer programs coordinated by COR. In fact, many of the CEMSWE students were first exposed to engineering through a COR summer program. The activities of COR are largely sponsored by industry. COR and CEDAR comprise Student Outreach and Retention Programs (SORP) a division in CEAS.

Participation, Accomplishments and Retention Survey Results

Retentions rates for MEP and WISE students continue to increase. Currently, 20.2% of the CEAS student body is female and 16.8% is minority. Students who participate in the WISE and MEP Bridge programs have an 88% retention rate. Participation in the programs has tripled over the past year in CEMSWE and CEDAR activities. Currently, over 600 students have active memberships in CEDAR. CEMSWE has also seen an increase in membership and participation. A list of CEMSWE goals and individual organizational accomplishments for 2002-2003 are listed below.

Accomplishments 2002-2003

CEMSWE

1. Recruited 240 paid active members
2. Increased overall chapters membership by 28.5%
3. Taken 81 students to national conferences 2003
4. 30% increase in active members from previous year
5. Increased involvement and support of Advisors by 80%
6. Increased involvement and support of Professional chapter by 50%
7. Increased funding for member activities, support, and member retention
8. 80% increase in membership participation in CEMSWE events from previous year.
9. Active representatives in the CEAS College Council
10. Increased cross membership between AISES, NSBE, SHPE, SWE

AISES

1. Named runner up for Best Chapter of the Year from AISES National Conference Committee in 2002.
2. Held successful recruitment events serving over 40 Native American middle school students at ASU.
3. Increased member support through regular social and academic activities
4. ASU representative serving as AISES national student representative
5. Attending regional leadership and chapter conferences providing training to 27 local members
6. Active in several Native American leadership committees and boards at ASU and in the community

NSBE

1. 2 Chapter Members received NSBE Torchbearer awards (recognizes members on a national level for academic achievement)
2. Held 2 successful Feed the Homeless Drives in November
3. Competed in the Academic Technical Bowl for the first time ever at our
4. Fall Regional Conference
5. Have 3 members on the Regional Executive Board
6. Launched a new website with up-to-date events
7. Chartered first NSBE Jr. Chapter at South Mountain High School
8. Participated in a Zone 10 event with U of A
9. Awarded a \$500 Scholarship to a high school senior that will be coming to ASU in engineering.
10. Active involvement in EASCC
11. Active involvement in Black African Coalition

SHPE

1. 1. Won 2nd place in the West Coast Career Expo knowledge bowl 2003
2. Active with community involvement with Phoenix Children's Hospital and local elementary and H.S.
3. Won ACE Funding from SHPE National for Big Brothers Big Sisters Program involvement
4. Increased number of SHPE Scholars - SHPE National Scholarship Recipients, 8 total
5. Active representatives in El Concillio
6. Spread into the H.S. Level with the development of the Sunny Slope High School Jr. Chapter

SWE

1. Won contract to hold 2004 regional SWE conference at ASU
2. President serving on SWE national committee to involve students in SWE National organization
3. Held several successful recruitment events serving 89 middle school female students.
4. Sending 7 members to regional leadership conference.
5. Representatives involved with SWE Phoenix chapter
6. Executive officers serving on CEAS College Council
7. Held several community events

CEMSWE Survey Results

In the spring of 2003, CEDAR staff and CEMSWE leaders developed a leadership survey to determine whether or not students involved in CEMSWE programs had more confidence in their ability to complete their degree and secure employment. Further, the survey sought to prove that students who are involved in CEMSWE programs feel like they have the support they need to be successful while in

CEAS at ASU. The survey was administered by organizational presidents through general organizational meetings. Students rated their experiences on a scale from 1-5, with 1 being "strongly disagree" and 5 being "strongly agree". The preliminary results are averaged and as follow:

Q=Has your involvement in CEMSWE provided you with the opportunity to learn and apply the following professional skills or to learn about opportunities for me:

Leadership	4.1
Team skills	4.0
Work ethic	3.7
Diversity	4
Public speaking	3.8
Networking	4.0
Research	3.2
Internship	3.3
Graduate school	3.2
General support	4.1
Improved GPA	3.8
Campus policies	4.1

The survey was completed by 13% of the eligible students. While the organizations continue to distribute the survey each year, initial response rate is high enough to be statistically significant. The results indicate that while student organizational involvement provides them with many skills, the organizations can work harder in the areas of graduate school, internships and research. Overall, CEMSWE appears to have a strong, positive affect on its members.

Conclusion

In conclusion, CEMSWE has emerged over the past five years as a cohesive organization with a single purpose of supporting diversity in engineering at all levels. Our goals and mission continue to expand as our support from industry, our collaborative partnerships together and our dedicated membership continues to grow. As the diversity organization in CEAS, our reward is to carry the torch of equality for future generations of diverse engineers.

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