

A MODEL PARTNERSHIP TO RECRUIT AND TO RETAIN UNDERREPRESENTED ENGINEERING STUDENTS

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INTRODUCTION

The underrepresentation and attrition of women, African American, Hispanic, and Native American engineering students is a concern of the College of Engineering and Applied Sciences (CEAS) at Arizona State University (ASU). This concern of the CEAS for diversity is in alignment with the purposes and values of ASU. ASU President Lattie Coor has stated: "We believe that diversity must be one of the core purposes and values of this institution, in the same way that excellent teaching, leading-edge research, and meaningful service to the community define us [1]." In addition, ASU is striving to serve as a model for the metropolitan research university for the next century according to the vision of President Coor. The CEAS Dean Peter Crouch believes that nowhere is this "metropolitanism" more evident than in the CEAS. Dean Crouch states, "With our diverse student population, partnerships with global industries, and continued commitment to the creation and sharing of ideas, this metropolitanism helps make us able to provide our students with the engineering education they need to succeed in an increasingly complex working world [2]." At the same time, this "metropolitanism" means that over 80% of the ASU students are commuters and over half of the freshmen engineering students work, both proven factors for high attrition. In addition, students, on average, are older. The average age of students surveyed in an Introduction to Engineering Design class was over 20 [3]. "Metropolitanism" in the CEAS also means a large number of transfer students each year from the neighboring community colleges. For example, last fall, roughly 40% of the students new to the CEAS were transfer students and approximately 60% were first-time, full-time freshman.

"Located in 'silicon desert,' CEAS enjoys tremendous support and partnership opportunities from local high technology corporations [2]." In this metropolitan area of 2.7 million people, many high-tech companies, are looking to the CEAS to help provide them with an adequate, diverse workforce. These industries, as well as others across the nation, are emphasizing their need to recruit from a diverse student body. Their message is clear: (1) A diverse group of engineers will come to a better solution than a group that thinks and acts alike; (2) More women and minorities are needed in order to meet the demands for the engineering workforce; and (3) A diverse engineering workforce is needed for the global market that includes customers from around the world, as well as industry plants located off shore. Recently Roberta W. Gutman, Vice President and Motorola Director of Global Diversity, spoke at ASU on "Motorola's Business Case for Diversity." Ms. Gutman stated that on a team of three engineers who all look alike and think alike, two people on that team are not needed [4]. With US industry becoming more aware of quality and effective management, many companies are limiting their primary recruitment and research partnerships to "key institutions." The availability of a diverse engineering student body is usually a lead factor in their selection of a "key institution."

ASU is the fourth largest university in the nation, with over 44,000 students on its Main Campus. The CEAS has over 5,400 students, with over 3600 undergraduates and nearly 1,800 graduate students. The College consists of six engineering departments and the Del E. Webb School of Construction. The engineering departments are Chemical, Bio & Materials; Civil and Environmental; Computer Sciences &

Engineering; Electrical; Industrial & Management Systems; and Mechanical & Aerospace. A little over 19% of the undergraduate students are women and 16% of the undergraduates are underrepresented minority (African American, Hispanic, and Native American) students. As a college, we must make account to the University and the Arizona Board of Regents for our retention of students, particularly first-time freshmen.

OFFICE OF STUDENT AFFAIRS HISTORY

In the summer of 1993, Dean David Chang of the CEAS appointed an Associate Dean (AD) of Student Affairs and Business, the first female Associate Dean in the history of the college. This position included the responsibility for space for the College, as well as the Engineering Lab Services, a "Machine / Structural shop" in support of the College. However, a primary charge for the holder of this office was to establish a Program for Women Engineering students. An Office of Minority Engineering Programs (OMEP) had existed for many years, but for most of those years was not effective. A new OMEP Director had been hired in 1992. He brought with him the central and northern Arizona Mathematics, Engineering, and Science Achievement (MESA) Program, a middle and high school outreach program. An Office of Recruitment also existed that worked primarily with K-12 students. Recruitment efforts focused primarily on speaking engagements in classrooms and bringing students to campus to acquaint them with the CEAS.

A Women in Applied Sciences and Engineering (WISE) Program, with a Director, was begun in Summer and Fall 1993. This Director was also the director of Recruitment. Support from the Dean's Office, through the Associate Dean, enabled space to be provided for offices and a student room to be dedicated for each of the two programs, OMEP and WISE. The student room for WISE also is a headquarters for the Society of Women Engineers (SWE) student organization. The student room associated with the OMEP Office is called the "CEMS" (pronounced seams) room. "CEMS" designates the Coalition of Engineering Minority Societies: American Indian Science and Engineering Society (AISES), the Society of Professional Hispanic Engineers (SHPE), and the National Society of Black Engineers (NSBE). The organizations in CEMS collaborate regularly; for example, they jointly put on a CEMS banquet each spring.

In the Fall of 1995, Peter E. Crouch was named as Dean of the CEAS. In order to provide more direct student support, he changed the role of the Associate Dean of Student Affairs and Business to that of the Associate Dean of Student Affairs and Special Programs. As a result, the areas of business, space, and the Engineering Lab Services were no longer a responsibility of this office. In the fall of 1997, the Director of OMEP, who had over 18 years experience in industry, was named Student Support Liaison Officer. In this position, she is 25% Director of OMEP and MESA and 75% support for OMEP and WISE, as well as the K-12 recruitment outreach lead for the Dean's Office. An Internship and Co-op Program is also being developed for student support within the Office of Student Affairs. The "Special Programs" part of the Associate Dean title includes Graduate Engineering Minority (GEM) representative for ASU, keeper of the statistics for the college for the required internal metrics, including those for the Arizona Board of Regents, and representing the Dean at various student functions.

OFFICE OF STUDENT AFFAIRS ADMINISTRATION

This paper will now concentrate on the administration and functions of the Office of Student Affairs. The Office of Student Affairs currently consists of the OMEP, WISE, an Office of Recruitment, and an Internship and Co-op Program. The OMEP has a Program Coordinator, Senior to assist the Director, an Administrative Assistance, a Program Coordinator for MESA, and additional graduate and undergraduate students to assist. In addition to helping in the office, some of the students are tutors, others assist with an Academic Excellence Program, and still others are liaisons with the MESA schools. A Director and a Program Coordinator run the WISE Program. WISE and the Office of Recruitment share an administrative assistant. Currently, graduate students coordinate two WISE programs funded by grants.

In addition, the office employs several undergraduate students. The Program Coordinator, Senior of the Office of Recruitment has two undergraduate students who assist her in school visits and on-campus recruitment programs. See Figure 1.

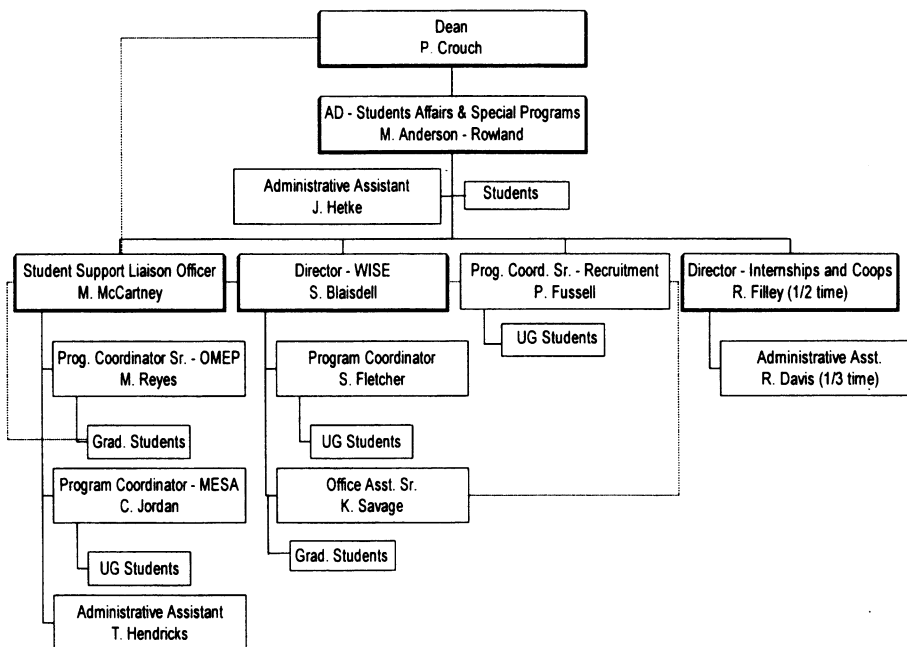


Figure 1: Office of Student Affairs Administration

In addition, a Director of Internships and Co-ops reports to this Associate Dean for 50% of his assignment. (For the other 50%, he runs a Corporate Leaders Program and reports to the AD of Academic Affairs.) This director has an administrative assistant who reports to him relative to internships. The AD of Student Affairs has run an Internship Program for Graduate Career Change students since 1982. Since 1993, she has run an Internship/Scholarship Program including all disciplines in the CEAS for both undergraduates and graduates. She is now in the process of creating a CEAS Internship/Co-op Office with a separate director. Due to the large number of high-tech industries situated in the proximity of ASU, many students are able to intern half time during the school year while attending classes in the CEAS.

All offices of the programs administered by the Office of Student Affairs are conveniently located in the same building. The AD, an administrative assistant, and students are located on the first floor of the building with the rest of the Dean's Office. Telephone, Meeting Maker, and a shared file in the Dean's Office connect all the programs supported by the Office of Student Affairs. These communication links greatly enhance the operation of the Office. Meetings are usually held each Monday from 10 a.m. -12:00 p.m. The first Monday of the month includes all of the Program Coordinators and above. The following Mondays are set aside for each of the programs, Recruitment, WISE, and OMEP to meet with the Associate Dean. The fifth Monday is reserved for an additional meeting, if needed. Separate meetings are held with the Internship and Co-op staff. Any of the Office personnel can request additional meetings as needed. At least once per year a retreat is held for the staff of the Recruitment, OMEP, and WISE offices.

INFORMAL PARTNERSHIPS

The informal partnerships that occur between the programs are of benefit to the whole Office. Due to the joint meetings, as well as the retreat, there is a lively exchange of updates and information. In addition, the expertise represented by the various offices and the personnel in the Office of Student Affairs create a dynamic synergism. There is collaboration of thoughts and ideas in regard to event presentations, event formats, and the tailoring of the events to the particular student need. Brainstorming often occurs and leads to better solutions than could be formulated by just one program. Knowledge of university practices and procedures is also shared. For example, Recruitment works closely with ASU Undergraduate Admissions, as well as the Honors College. Often, knowledge about that relationship is useful for the other programs.

The physical facilities and office supplies are shared among the programs as needed and include a poster maker and a digital camera. For example, the Office of Recruitment often uses the CEMS room or the WISE room during student and high school class visits, when no other classroom is available during the day.

The programs also share resources. For example, OMEP and WISE use the database maintained by the Office of Recruitment that includes students, teachers, and school personnel. The collaboration among the programs also helps each program extend their academic and industry contacts. The programs within Student Affairs often share staff for event coordination and presentation such as driving a van, arranging a laboratory or campus tour, or providing a speaker for an event. The students who are supported by WISE and OMEP are a great source of volunteers (student speakers or tour guides, for example) for the Office of Recruitment when they hold such events as EAS Day, Orientation, and Junior or Senior Day. The programs also, on occasion, share office staff when there are absences and an office needs to be covered.

An additional program run by the Associate Dean helps provide student volunteers for all of the CEAS events. The AD of Student Affairs helps student organizations finance student projects or travel to regional or national meetings. This support money is often matched by the appropriate department. In return, the students "volunteer" to help with CEAS events at the rate of \$8/hr to pay off the debt. The students may volunteer in this way for any approved event run by Recruitment, WISE, or the OMEP. This program is a strong support of retention and at the same time enables the Office of Student Affairs to put on many programs. For more details, see [5].

FORMAL PARTNERSHIPS

Diversity Evening with Industry

In the past two years, CEMS worked closely with SWE, co-hosting events such as the Diversity Evening with Industry, previously a SWE event. After a year in which industry interest in such an event seemed very low, the four student organizations teamed to co-host the event. The first year of working together was a learning experience for all. The event was successfully held, but there was no profit for the organizations. The primary reason for this was that each organization was allowed the discretion of how much they charged for the tickets for their members. When one organization gave the tickets away, all profit margins vanished. During the second year, the evening was executed with a contract. Each organization was responsible for planning and executing various duties for the function. Ticket prices were uniform and the four organizations shared the profits (for conference travel and housing) equally.

Equipment Grant

Hewlett Packard is one of the leaders in valuing diversity. Over ten years ago, they were one of the first

companies to establish minority employee support groups. Two years ago, the AD of Student Affairs and the Director of the Minority Engineering Programs were invited to attend a two day diversity focused program at HP, Roseville, joining ten other universities. This led to a valuable relationship between the HP, CEAS, and CEAS students. Several CEAS students have been selected as summer interns for HP, Roseville and have subsequently been hired by them. This year, WISE and OMEP submitted a joint proposal to the HP Diversity Grant program for university programs. The proposal was for HP equipment that would be utilized in the WISE and CEMS student study areas. The proposal, co-written by the WISE and OMEP directors, requested \$15,000 in HP equipment including 6 computers, 3 printers, and a digital camera. Feedback from the review committee indicated that the grant was funded mainly due to its collaborative nature, which was reflective of their strategic plan for diversity. It was one of the few that HP received that demonstrated cooperation between two diversity programs.

Leadership Retreat

Historically, OMEP has offered a leadership retreat for the student associations of CEMS. The two-day retreat, held in northern Arizona, provides outgoing and incoming officers and members an opportunity to exchange information and to learn how to run effective organizations. SWE was invited to attend the 1997 CEMS Leadership Retreat in order to further these collaborative efforts. The WISE Program Coordinator also attended the 1997 retreat. In an effort to fund the 1998 CEMS/SWE Leadership Retreat, and to extend the collaboration between these student associations to include additional outreach to pre-college students, the OMEP and WISE Program Coordinators co-wrote a grant to the ASU Campus Environmental Team. Six organizations (OMEP, WISE, SWE, and the three CEMS organizations) successfully developed a comprehensive yearlong program that included three elements: 1) Leadership Retreat, 2) Seminar Series, 3) Recruiting/Outreach. The grant, funded for \$3,633, covered the costs of the April, 1998 retreat and will provide funds for a one-day outreach activity for participants who attended one of the nine summer outreach programs conducted by the Office of Student Affairs.

The *leadership retreats* are held at ASU's Camp Tontozona to help set an environment with few distractions and maximum opportunity to dialogue amongst the groups. The total number of participants from student groups was 40. The *seminar series* will begin in Fall 1998. Discussion panels will be developed to bring current and relevant topics to student members that will assist them as they move through both their professional and academic careers. Such topics as "Diversity and Engineering", "Implementing Effective Outreach Programs to Diverse Populations" and "Continuing Leadership" will be included. The students will have a large part in coordinating industry, legal counsel, and other professionals as seminar presenters to share their expertise. The final aspect of the proposal is the *recruiting/outreach* element. This particular effort has lead to one of the most impressive support structures to middle and high school students who might not be aware of the many programs available to minorities and women at ASU. ASU engineering students serve as advocates, role models, and information disseminators about what to expect once they arrive on our large campus. By having the four student groups travel together to many of these remote locations, middle and high schools learn that diversity is celebrated and encouraged. Through the ASU students, they learn of summer programs, financial support, what life on a campus is like, what to expect from faculty, and how to manage academic schedules. As a result of these efforts, the numbers of minorities and women are showing an increased enrollment.

OMEP/WISE/Recruitment Shared Staff

At the retreat held two years ago, the students learned of common goals such as outreach to women and minority students at middle and high school levels. One of the results of the retreat was the hiring of students to work jointly for OMEP and WISE summer programs. This year there are nine K-12 outreach summer programs offered by the Office of Student Affairs. The OMEP and WISE will share three engineering students to help facilitate these programs. This arrangement is more conducive to students

who want to be continuously employed throughout the summer. The arrangement also cut down on time normally invested in recruiting and hiring summer staff for both OMEP and WISE.

As time has passed, students supported from the OMEP, WISE and Recruitment centers are recommending their peers for not only paid positions, but also for volunteer programs that demonstrate that they are a team of engineers prepared to enter the workforce that values diversity. The OMEP, WISE and Recruitment Program Coordinators are working closely together to share best practices to ensure the program deliverables to students encourage communication, cooperation, and collaboration.

FINANCIAL CHALLENGES

As the programs in the Office of Student Affairs have worked closely together, there have been two main financial challenges. One involves the individual budgets for the programs and second, the hiring of students. This year considerable time was spent analyzing the operating budgets of the individual programs within the Office of Student Affairs to make sure that the programs were being treated equitably and properly for the functions required of each program. An advantage of this was the one-time transfer of funds from one program to another for the common good. This was a new exercise for the staff, since up to this time each program's budget had been autonomous. A second challenge that occurred in the decision to hire summer students jointly since the programs had previously paid their student assistants at different rates. The barrier was overcome by compromising and establishing College-wide standards for student salaries for summer outreach programs. These standards are now also being used as we hire student staff throughout the academic year.

CONCLUSIONS

The Office of Student Affairs is a model partnership to recruit and to retain underrepresented engineering students. The ultimate support for the Office comes from the Dean. The Office is directed by a dedicated Associate Dean, ensuring financial and moral support, as well as leadership. The staff within the Office are a dedicated, congenial and synergistic group. The sharing of ideas and resources, including staff, enhances the outputs of the Office. In Fall 1997, the undergraduate enrollment of women in engineering increased by nearly 13% and the undergraduate enrollment of minority students increased by nearly 16%. Over half of the increase in enrollment in the CEAS for Fall '97 was due to the increase of women and minority students. Retention of first-time, full-time freshman in the CEAS increased from 54% to over 66%. We believe that the efforts of the Office of Student Affairs helped to accomplish these increases.

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