

## **Internal and External Challenges for Minority Engineering Programs**

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### **Abstract**

The Office of Minority Engineering Programs (OMEP) in the College of Engineering and Applied Sciences (CEAS) at Arizona State University (ASU) is a growing support system for underrepresented minority students and others. Nearly 500, approximately 14%, of the undergraduate students in the CEAS are underrepresented minorities (African Americans, Hispanics, and Native Americans). During the Fall 1995 semester, the OMEP served over 300 students, including 13.5% non-minority. The OMEP is composed of a Director, Minority Engineering Program (MEP) Coordinator, Mathematics, Engineering, Science Achievement (MESA) Program Coordinator, an Administrative Assistant, a half-time graduate assistant, and two undergraduate part-time students, as well as student tutors and MESA liaisons. The OMEP reports to and is strongly supported by the CEAS Associate Dean of Student Affairs and Special Programs.

None the less, there are internal challenges for the survival of the OMEP. The MEP, along with the Women in Applied Science and Engineering (WISE) Program, has been asked by the University for an accounting of its program and whom they serve. The OMEP budget is continually reviewed to “prove” that the program is making a difference. Not all are convinced that colleges should be funding K-12 educational support programs such as MESA. The Arizona Board of Regents (ABOR) has proposed eliminating scholarship funding for minority students. The ABOR has also discussed the necessity for and legality of diversity programs during public hearings over the past two years.

The external challenges for the survival of the MEP come primarily from the national review of affirmative action policies associated with presumed preferential treatment of minority students. Perceptions that a great amount of resources are designated to only a few selective students needs close review if minority support programs are to survive. Since the CEAS works very closely with industry, the OMEP must keep pace with the changing work force needs of the future if we are to remain a competitive resource for strengthening the economy.

ASU is making progress towards increasing diversity and quality through campus wide efforts that are based on twenty recommendations made by a 1994 task force. ASU recognizes that campus diversity is needed for an educated citizenry and for international competitiveness. ASU is dedicated to developing and to supporting additional programs to improve student preparation for university success. ASU recognizes that any such programs must be outcome based and have commitment from top management. The OMEP model strongly aligns with the diversity objectives and strategies of the university.

This paper discusses how the OMEP at ASU is answering the internal and external challenges through an expansion of their services to make a positive impact.

## **Introduction**

The Office of Minority Engineering Programs (OMEP) in the College of Engineering and Applied Sciences (CEAS) at Arizona State University (ASU) is a growing support system for underrepresented minority students and others. Nearly 500, approximately 14%, of the undergraduate students in the CEAS are underrepresented minorities (African American, Hispanic, and Native American). During the Fall 1995 semester, the OMEP served over 300 students, including 13.5% non-minority. The OMEP is composed of a Director, Minority Engineering Program (MEP) Coordinator, Mathematics, Engineering, Science Achievement (MESA) Program Coordinator, an Administrative Assistant, a half-time graduate assistant, and two undergraduate part-time students, as well as student tutors and MESA liaisons. The OMEP reports to and is strongly supported by the CEAS Associate Dean of Student Affairs and Special Programs.

In 1995, ASU was ranked the 5<sup>th</sup> largest university in the United States with a student population of 43,000. During that period, underrepresented minority students included 1.9% Native Americans, 2.7% African Americans, and 8.9% Hispanics. In Fall 1996, the university enrollment figures grew to 47,000 students, placing it as the 4<sup>th</sup> largest university in the United States. In 1996, the total undergraduate population at ASU reached 31,859 including 681 (2.1%) Native American, 928 (2.9%) African American, and 3,259 (10.2%) Hispanic students. Within the CEAS, the Fall 1996 enrollment of undergraduate engineering students was up 2.9% (3,422) with the graduate level up 2.1% (1,766) constituting an overall 2.6% (5,188) growth in enrollment. During this same period, the minority undergraduate engineering enrollment grew by 14.8% (to 500 students, representing 13.9% of the undergraduate engineering students) and by 20.0% (to 96 minority graduate students, representing 5.4%) at the graduate level<sup>1</sup>.

In the 1996 *Hispanic* magazine, ASU was named one of the top 25 colleges in the United States for Hispanic students. The magazine looked at colleges with a large percentage of Hispanic students and overall excellence as an institution. The magazine's 1996 guide noted that top schools "make Hispanic students feel welcome by offering specialized programs, student organizations and fields of study. Each also graduates large numbers of Hispanics"<sup>2</sup>.

## **Arizona Demographics**

The state of Arizona is considered to be a conservative state with one of the most rapid population growths in the country. The current minority populations includes 18% Hispanic, 5% Native American, and 3% African American. The Hispanic population has shown the largest increase at 67.7% in the last 10 years<sup>3</sup>. The Native American population is composed of 21 tribes, 13 of which represent over 160,000 Native Americans. Native Americans own 24.8 million acres of Arizona land (34%)<sup>4</sup>, therefore, tribal leadership, Navajo, Hopi, and Apache in particular, is a very important factor in Arizona life and politics.

The Phoenix/Metro area is projected to be the fifth most rapidly growing population in the nation, 1995-2005 (up 538,960) and is also projected to have the fifth largest number of jobs created in the same time period, 289,030 - one new job for every two persons moving into

Arizona. As the population increases, so will the number of minorities, including new immigrants. Arizona is predicted to become a “minority majority” population by 2020<sup>5</sup>. Arizona gets increasingly more diverse, with the biggest increases being in the youngest population.

### **Internal Challenges**

The CEAS is dedicated to the recruitment and retention of students, including special efforts for women and underrepresented minorities. The CEAS Dean has appointed an Associate Dean of Student Affairs and Special Programs, whose primary task is to oversee the OMEP, a Women in Applied Sciences and Engineering Program (WISE), a Recruitment Office, and the student organizations. Despite the impressive growth of the minority population in CEAS and the full support of this Associate Dean, the OMEP still expends much effort protecting and trying to expand the resources that have led to the successful increase in CEAS minority students. With the significant increase in overall population of ASU and CEAS, competition for space is a pressing issue. The CEAS provides space for a study center for minority students which serves as a hub for critical student support programs such as tutoring, academic excellence workshops, minority engineering student chapter meetings with industry, and computer technology resources. In fact, the room has been named the CEMS room (pronounced “seams”), by the Coalition of Engineering Minorities Societies, which includes AISES (American Indian Science and Engineering Society), NSBE (National Society of Black Engineers), and SHPE (Society of Hispanic Professional Engineers). The CEMS room represents a “seam” pulling together different pieces of “cloth” to make one product. The concept of community building within this room has been the cornerstone for our positive retention efforts. The three minority student organizations each also have a designated office within the CEAS. The OMEP office with its staff is situated directly across the hall from the student study room, thereby encouraging immediate access to student advisement, financial aid opportunities, resume writing assistance, industry internship positions, etc. Over the past three years, the room has been scrutinized to ensure that it has optimal use. The subject of converting it into a lab or classroom space continues to surface on a regular basis.

Over the past two years, an additional on-going issue was that of adequate staffing for OMEP. A staff expansion was needed to accommodate our recruiting efforts as well as to protect against any potential reduction in quality of existing services to students. Funding for the MESA Program Coordinator position terminated in 1993 at the conclusion of a grant. This led to two years without adequate staffing to support over 500 middle and high school MESA students in twelve schools across nine school districts throughout Arizona. The position was added as a line item in the 96-97 budget by the Dean of CEAS. A MESA coordinator was reinstated after demonstrating that the MESA program was in fact an effective vehicle to recruit minority students, particularly Native American students. The position was filled in November 1996. This action of support for a permanent MESA position has established the K-12 outreach as an integral part of the CEAS.

This year, on the Navajo Reservation, the first group of MESA Window Rock High School students graduated, impacting the number of Native Americans entering engineering. These MESA students have distinguished themselves by demonstrating less anxiety about entering engineering, by utilizing the MEP services more frequently than their peers, and by taking leadership roles early in their academic careers. The ASU Vice President of Student Affairs has

asked MEP to team with the Native American Achievement Program (NAAP) so that all Native American engineering students will be required to work with the MEP.

Regardless of the many demonstrated results, issues of whom we serve continues to be ever present. The Arizona Board of Regents (ABOR) spent extensive time over the past two years developing committees chartered to review the resources dedicated to minority students. The issue of “set aside” scholarships exclusively for minorities was strongly investigated. In fact, however, an ABOR committee found that only 1% of scholarships are set aside for minority students across all three universities in Arizona. Each college at ASU, with any association to minority services, was required to provide data as to the number of targeted vs. non-targeted students who are currently served by the respective programs. The OMEP is a targeted program, but not restricted as to whom it serves as demonstrated by the 13.5% non-minority students utilizing OMEP services. In fact, ethnicity is not a factor for admission to the ASU or CEAS. While the ABOR has not removed this issue from their agenda, they have reduced their efforts on doing away with all such minority support programs at this point in time.

Other educational institutions have felt similar concerns. Barbara Taliaferro, assistant to the president for human diversity at Kutztown University of Pennsylvania, stated that “when they downsize, they look first to student affairs, where they often find the minority staff on white campuses.”<sup>6</sup>.

### **External Challenges**

Arizona Governor Symington has an initiative currently underway that would eliminate both personal income taxes and property taxes which provides one-third of the income for the state and is the primary source for income to schools. The income tax cut would be equivalent to \$100 million reduction in revenue generated from income tax alone<sup>5</sup>. At present, schools in Arizona are already feeling the strain from previous budget cuts causing salary freezes, elimination of school bus transportation for special events and inadequate technology for schools. The proposed additional tax cuts will only further reduce the quality of education. History may repeat itself. In the 70’s, California’s property tax cut, Proposition 13, caused the elimination of music, after school, and summer programs, etc. The results were devastating to the school system and are still trying to recover.

In the past two years, over 80 new companies have moved to Arizona of which 65% are technical firms. Therefore engineering positions continue to grow. We have been successful in placing nearly 90% of all MEP students in either internships or permanent positions, but we need more students to address the continued employment growth in the state.

On a national level, the 15% of youths who drop out of high school produce 70% of American prisoners at a cost of \$26,000 per prisoner per year compared to \$5,000 per student per year spent by public schools. The state is slightly higher than the national average in the number of people in poverty level. Arizona also has the highest teen pregnancy rate in the nation and the second highest in high school dropout. Systemic reform reviews show that there is a strong correlation between the teen pregnancy rate, lack of education, unemployment and welfare and the impact on the economy. Arizona ranks 46<sup>th</sup> in the nation in the chances that a 19-year old will be going to college, a combined measure of high school graduation rates and those going on immediately

to college. Arizona ranks 42<sup>nd</sup> in high school graduation rates in 1994 and 48<sup>th</sup> in percentages of high school graduates who go directly on to college in their states. The number of minority high school graduates going to four-year public colleges is about 18.5%<sup>7</sup>. With the 1998 stricter admission standards, implemented by the ABOR, we will be challenged to maintain our minority enrollments at ASU.

During a time when K-12 education is going through reform to strengthen its delivery of math and science curriculum, particularly as it impacts minority students, the survival of affirmation action programs across the nation is being challenged. California is being watched closely across the country as a result of the passage of Proposition 209, which sought to end preferences for women and minorities in hiring, contracting, and university admissions. Many have suggested that this is the beginning of a tidal wave that will affect all states in the future.

Ward Connerly, a University of California regent who served as the former chairman of the Proposition 209, has publicly stated that he will establish a non-profit organization intended to spread the message of Proposition 209 through speeches and research to other states and the federal government. Connerly said organizers in Florida, Oregon, Colorado, and Washington, D.C. have already asked for help in promoting the issue<sup>8</sup>. As a neighboring state, Arizona is hopeful of retaining its identity as an equitable state with student support systems that will strengthen its economy.

Perceptions of California's proposition 209 impact on existing affirmative action programs is causing confusion among universities across the country. Some have suggested that support of minority students in any format is "illegal". Concerns have arisen that it could lead to the elimination and reduction of all minority programs. As they continue to debate the constitutionality of Proposition 209 in California, the debate will continue across the country. Even if proposition 209 is determined to be legal, it needs to be understood or emphasized that this proposition has to do with preferential admissions and not with the legality of minority support programs.

### **University Commitment**

Dr. Lattie Coor, President of ASU, has a strong commitment to diversity within the campus environment. ASU has pursued an effort of weaving diversity "into the very fabric of our teaching, our research and our service to the larger community," President Coor said in a recent report<sup>9</sup>. The President's Progress Report on Quality and Diversity outlines the twenty recommendations made by a task force in 1994 and the steps ASU is taking to fulfill the recommendations. In addition, ASU worked out a series of agreements with Students Against Discrimination to improve diversity efforts, entered into a partnership with the Greater Phoenix Leadership to improve the preparation of youth in middle and high schools, hosted a series of nations (Native American) schools on diversity issues and made efforts to coordinate and evaluate students support programs<sup>10</sup>.

OMEP is well on its way in supporting the leadership of ASU. For example, Recommendation 1 reads:

ASU must broaden the strategic reasons for increasing campus diversity. Historically, the rationale focused almost exclusively on social justice. The educational imperatives and

leadership development created by the need for an educated citizenry and the need to regain international competitiveness are increasingly important and should be added to assess strategic objectives related to diversity<sup>9</sup>.

The CEAS and OMEP recognizes:

- diversified engineering teams produce more comprehensive solutions
- local high tech industry is demanding a more diverse engineering workforce
- from an economic view, underrepresented minorities and women are the source for an increased engineering enrollment demanded by the university and industry
- CEAS funding is positively correlated with the student enrollment

Recommendation 2 reads:

ASU must accept that students come to campus with varying levels of readiness for a university education. ASU must develop and support additional programs to improve student preparation for university success. Of the twenty recommendations made by the diversity committee, OMEP aligns well with the objectives from providing summer bridge programs to K-12 outreach efforts.

The OMEP provides the following programs and facilities:

- Minority bridge program for incoming freshman engineering students to ASU
- Minority summer institutes for high school students
- Special orientation sessions for new minority CEAS students
- Academic Excellence workshops
- Peer Tutoring Program
- Academic Success seminar course
- CEMS room
- Support for the student organizations, AISES, NSBE, and SHPE
- CEMS/SWE Leadership Retreat
- Diversity Evening with Industry
- Industry sponsored awards banquets
- MESA staff development training
- MESA Day Competition (host biannually)
- MESA student liaisons

In addition, the Dean's office provides \$1500 operating funds for each of the minority societies. Through a Service Learning program, the organizations receive up to \$6,000 in additional funding for national conference travel<sup>11</sup>. The students "earn" the money through active participation in various CEAS programs. In particular, the students have been active in the CEAS recruitment efforts. CEMS students travel to their former high schools during their Christmas and Spring breaks to encourage other minorities to pursue careers in math and science. Locations that have been visited are Window Rock, Yuma, Nogales, Globe, and Miami.

The university recommendation strongly suggests that partnerships must be established with industry, university and youth preparation programs. The OMEP provides support to approximately 500 students through the MESA program. OMEP has established two business/education partnerships: one between the Society of American Military Engineers (SAME) and two MESA high schools and the other between Honeywell, Inc., and an additional MESA high school. The MESA program is supported both financially and through in-kind

donations from industries throughout Arizona. An industry board, who is seeking to hire a diverse engineering workforce, serves to guide the MESA Program in directions that provide success for the students we serve.

### **Discussion**

It is quite apparent that different public sectors such as education, industry, labor and government must all work in collaboration to establish common, not conflicting, goals to encourage economic growth. For over two decades, the nation has recognized that the largest labor pool will come from minorities and women, yet we as a nation are challenging the basic foundation that has increased the number of underrepresented groups in our colleges and universities. We must partner to develop clear directions for placing education back in a global competitive position. We must acknowledge the diverse talent that we have, which is being demanded by foreign countries, who are doing business with the United States.

During this critical time in history, we are potentially closing the doors of opportunity for a growing segment of children that will come through the education pipeline. The approaches that we have found to be successful tools for recruitment and retention are under threat. Institutions of higher learning must demand clear evaluations of progress being made through minority student support programs. We must challenge ourselves to develop only “results oriented program”. We must work with faculty, who are predominately non-minority, in their approaches in working with targeted minority students. We must develop funding patterns and strategies that are not “here one day and gone tomorrow”. Long term results are difficult to obtain if funding is not equalized and sustained. We must institutionalize minority student support programs within universities so that they are viewed as an integral part of academic units.

### **Conclusions**

During the last 10 years, nearly two-thirds of all public institutions have received less state funding. In the same period, however, nearly eight in 10 colleges have increased their overall enrollment<sup>12</sup>. This means that the potential for minorities to get lost in the institutional maze could be compounded due to the stretching of resources. MEPs across the nation should have assessment plans that demonstrate their value to the overall success of students. Each should have specific achievable goals by which to measure success. MEPs must have a strong sense of identity as to what they bring to an educational institution from mapping the national and state goals to aligning with the university goals for quality education. MEPs must be able to prove that they have “value add” to the department goals. Equally important, we must help the graduates who leave us to go on to industry and business to develop a sense of understanding that they will be impacting the economy. We encourage them to come back to higher education to serve as role models for students and others joining industry. In addition, we urge them to give feedback to our institutions regarding their preparedness for the technical fields they have chosen.

ASU and the CEAS cannot afford to be passive regarding the potential threat to minority support programs. We must team with other organizations and institutions that are positioning themselves for protection of these services. Affirmative action is no longer “just the right thing to do”, it is the foundation for strengthening the national economy. We need to educate our peers and the public that special support programs for underrepresented groups in engineering is

legal and necessary for good engineering, an informed citizenry, and international competitiveness.

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### MARY ANN MCCARTNEY

Mary Ann McCartney serves as the Director of the Office of Minority Engineering Programs in the CEAS at ASU. Prior to joining ASU, she spent 18 years at IBM serving her last five years as Program Manager Academic and Community Relations. For two years she served as corporate liaison between IBM and the headquarters of the Mathematics, Engineering, Science Achievement Program at UC Berkeley.

### MARIA A. REYES

Maria A. Reyes is a graduate of the Minority Engineering Program (MEP) at ASU, where she obtained a BS in Civil Engineering and is pursuing a Masters degree in Geotechnical Engineering. She spent two years as a staff engineer at a local consulting firm. Currently, she serves as the MEP Coordinator at ASU which has given her the opportunity to develop and teach a seminar course for entering minority students.

### MARY R. ANDERSON-ROWLAND

Mary Anderson-Rowland is the Associate Dean of Student Affairs and Special Programs for the College of Engineering and Applied Sciences at ASU. Her responsibilities include the Women In Applied Science and Engineering Program, the Office Of Minority Engineering Programs, and Recruitment, and Student Organizations. With a Ph.D. in Applied Statistics from the University of Iowa, she does research in the Area of Quality Control.