

## **2006-2323: IMPROVING A UNIVERSITY/COMMUNITY COLLEGE PARTNERSHIP PROGRAM HAVING A REDUCED BUDGET**

### **Mary Anderson-Rowland, Arizona State University**

MARY R. ANDERSON-ROWLAND is an Associate Professor in Industrial Engineering. She was the Associate Dean of Student Affairs in the Fulton School of Engineering at ASU from 1993-2004. She was named the SHPE Educator of the Year 2005 and selected for the National Engineering Award in 2003, the highest honor given by the American Association of Engineering Societies. In 2002 the Society of Women Engineers named her the Distinguished Engineering Educator. She has received many other awards for her support of students. An ASEE Fellow, she is a frequent speaker on the career opportunities in engineering, especially for women and minority students.

### **Caroline VanIngen-Dunn, Arizona State University**

CAROLINE VANINGEN-DUNN is a consultant with CVID Consultants for the past 11 years.. She earned a Bioengineering Degree from the University of Iowa and a Master's degree in Mechanical Engineering from Stanford. She worked as an engineer for 14 years in industry specializing in the design of seats for comfort and support during crashes. She is currently the half-time director of the METS (Maricopa Engineering Transition Scholars) program, overseeing activities both in the Fulton School of Engineering and the Maricopa County Community College District.

### **Debra Banks, Consultant**

DEBRA L. BANKS, METS Evaluator and former Director of Evaluation and Assessment for CRESMET (ASU), is now the Director of Outreach and Operations for Innovative Tailor Made Training and Technology (ITTT) in Berkeley, CA. She has been evaluating major school reform and technical programs for 14 years. She has served as a co-PI for several grants including METS.

# **IMPROVING A UNIVERSITY/COMMUNITY COLLEGE PARTNERSHIP PROGRAM HAVING A REDUCED BUDGET**

## **Abstract**

In fall 2003, collaboration was begun between the Fulton School of Engineering at Arizona State University and five community colleges belonging to the Maricopa County Community College District. Funded by a joint grant from the National Science Foundation, each with their own budget, the collaborators set out to develop a program that would interest and support community college students in engineering, ease their transition to a large university, and continue to support them after the transfer, especially for the first year. The program also was designed to especially encourage and support women and underrepresented minority students. The program is called METS: Maricopa Engineering Transition Scholars. Most of the plans for the project as proposed have been successful, including a METS Center in the Fulton School.

In addition, one of the research areas was to develop a model administration for such collaboration. The administration of the grant, however, has proved to be a challenge. The five community colleges each have their own administration and way of doing things, so the METS administration was much more complicated than just a collaboration of a university and one community college. After a two-year pilot, the major grant ended and the program was continued on an extension, but with a much reduced budget. To continue the program administrative support had to be reduced. This paper will describe how the program is now functioning on a reduced budget and the advantages of the new administrative model.

## **I. Introduction**

In fall 2003, a brave collaboration was begun between the Ira A. Fulton School of Engineering at Arizona State University (ASU) and five community colleges belonging to the Maricopa County Community College District (MCCCD). The low interest in engineering, especially by women and underrepresented minority students is well known: in fall 2004, only 2.4% of freshmen women and 13.9% of freshmen men cited engineering as their “probable career.” If we include those who thought that computer programmer or analyst would be their “probable career,” the numbers remain dismal: 4.4% for freshmen men and only .5% for freshmen women.<sup>1</sup> Engineering enrollments are down nationally.<sup>2</sup> The community college system plays a large role in engineering enrollments. The Congressional Commission on the Advancement of Women and Minorities in Science, Engineering and Technology (SET) Development noted the community colleges enroll close to half of all students that are traditionally underrepresented in SET. The Commission recommends “comprehensive and systemic, institutional changes to strengthen SET education at two-year colleges and to facilitate transition of SET students from two-year colleges into four-year colleges.”<sup>3</sup> These changes are due, especially since nearly half of students who enroll at a two-year college do not return for their second year.<sup>4</sup>

Part of the solution for more U.S. engineers and especially more women and underrepresented engineers lies in working with community colleges to make students aware of the opportunities

afforded by a career in engineering. Research at ASU found that about half of the community college engineering transfer students had only decided on engineering as a career after they had begun studying at the community college.<sup>5</sup> Many academically strong students choose a community college after high school due to the lower tuition, the ability to stay at home to attend classes, the smaller class size, and a lack of direction on which major they wish to choose. Secondly, the community college students who wish to pursue a curriculum in engineering and computer science need encouragement to register for and succeed in the correct classes to take and by role models who have already made the commitment to this curriculum. Thirdly, the engineering and computer science majors at the community college need to be assisted in their transition to a four-year college or university so they can earn a Bachelor's Degree in Engineering or a Bachelor of Science degree in computer science. The support needs to continue as they advance in their studies, especially during adjustments that need to be made during the first year at the college or university.

Funded by a joint grant from the National Science Foundation, each with their own budget, the collaborators set out to develop a program that would interest and support community college students in engineering, ease their transition to a large university, and continue to support them after the transfer, especially for the first year. The program also was designed to especially encourage and support women and underrepresented minority students. The program is called METS: Maricopa Engineering Transition Scholars. The project, begun in fall 2003, has two main goals: the first goal is to increase the interest in engineering and computer science by students (especially women and underrepresented minorities) at the community colleges, to ease the transition of such students from the community college to the university, and to retain and to graduate engineering community college transfer students through events on all six campuses; the second goal is to build a model collaboration between a university and a community college system for engineering students.

The programs that were developed to achieve the first goal include introductory "Be An Engineer" events at the community college, follow-on workshops at the university, a compact bridge/transition workshop, an orientation presentation for transition students, a mentoring program for recent and future transfers, and the establishment of a METS Center in the Fulton School of Engineering to support Fulton community college transfer students with a place to find support, to study, and to network. Additional activities at the community colleges include working with the faculty and going into the upper level math, chemistry, biology, and physics classes to talk with students and encourage them to consider engineering. Modules were developed and pilot tested in classrooms as another tool to encourage students to learn about engineering and to increase interest in engineering as a career. Lessons have been learned in how to contact students for events, how to get information from the students who attend, and how to be flexible with student schedules. Most of these projects have been successful, but the program is continually being updated and fine-tuned, including moving into a new METS Center in the Fulton School during fall 2005.

Achieving the second goal, building a model of joint administration and collaboration, has initially proved to be a challenge. The difficulties of administering the program jointly with different management systems and styles in each of the six institutions in the program were acknowledged in an earlier paper.<sup>5</sup> Lessons have been learned in constructing a functional

management structure, in scheduling faculty and staff from the institutions to participate in the activities, in scheduling professional engineers for panels, and in encouraging students to attend the events. In addition, a reduced budget necessitated major changes. This paper focuses on how we adjusted the administrative aspect of the program to achieve the second goal.

## II. The First Administrative Structure as Ideally Planned

Representatives of the Ira A. Fulton School of Engineering worked in earnest for over six months with leaders of the Maricopa County Community College District (MCCCD) leaders. There was a general history of cooperation between the two entities. For years there has been a published articulation agreement between every community college in Arizona and the three universities in the state: Arizona State University (ASU), the University of Arizona, and the Northern Arizona University. Therefore, any student attending an Arizona community college can easily see if and how a course taken at a community college will be transferred to one of the three universities. One common course that has caused some difficulty is the Introduction to Engineering course taught by the universities and some of the community colleges. This course is restructured periodically, with change in the course content and in the credit hours given the course. Keeping up with the changes and agreeing with the changes has been difficult at times. One of the first results of the ASU-MCCCD dialogue for the writing of the first METS grant was the agreement that a MCCCD representative be a member of the ASU Introduction to Engineering Committee so the community colleges have some input and better information on future course changes. Some dialogue also existed between the advisors of the Fulton School and the MCCCD schools. In addition, there had been a couple of joint faculty picnic gatherings in the past, but none recently. Both parties were aware of a general mistrust of university faculty and administration by community college faculty and staff. This mistrust included a belief that the university would take advantage of the community college if it were possible to do so. However, the MCCCD and the Fulton School were connected by the over 300 transfer students each fall, most of whom came from the MCCCD. For the students' sakes, it was imperative that ASU and MCCCD learn to work together.

Although the collaboration of the Fulton School and the MCCCD on the METS project was initiated and led by ASU, the ASU leader made the decision early that the collaborative project would have equal and separate budgets for Fulton School and the MCCCD. Although this meant less recognition for ASU, the move was made to dispel any feelings that ASU intended to run the project to the detriment of MCCCD. This approach has proved to be a good choice.

The general management plan appeared simple and straight-forward. PI Anderson-Rowland of the Fulton School and Co-PI Vanis of the MCCCD were to oversee the METS project. PI Anderson-Rowland and Co-PI Vanis would work directly with two full-time METS co-directors (the METS team, preferably with engineering degrees), who would also direct the ASU and MCCCD activities. The METS management team consisting of the PI, co-PI, the co-directors, and four community college liaisons were to meet monthly to discuss progress, challenges, and new activities. The METS team was to hold bi-monthly meetings with the MCCCD liaisons. The METS team would call other meetings as necessary. Once a semester, the METS management team was to meet with the Advisory Council. The METS management team was also to meet annually with the Fulton dean, the MCCCD vice-chancellor for academic affairs,

and the deans of the participating colleges. In addition to the above management plan, five activities were planned to further institutionalize the collaboration: an annual meeting of advisement staffs, a bi-annual meeting of Fulton and community college STEM faculties, stimulate ongoing collaborations, create quarterly METS e-news briefs for faculty, and develop awareness of METS among senior administrators at all campuses.

### III. The First Administrative Structure Reality

The plan seemed simple enough and was designed to enable the project to run smoothly and help institutionalize university/community college collaboration, as well as to become a model for other institutions to adopt.

Several factors occurred immediately which acted as deterrents to the well-laid plan of METS Management. The MCCCDCO-PI was gone on a sabbatical for a couple of months at the beginning of the METS program. Administrative staff was designated to take her place while she was gone, but this delegation did not work well. While ASU had a METS director, an engineer with a Master's degree, who had helped write the grant proposal and so had a vision and clear expectations, a permanent METS Director for the MCCCDCO was not in place until the spring semester of 2004. Shortly before the MCCCDCO Director, also with both a Bachelor and Master's degree related to engineering, was selected, the ASU PI became seriously ill for a few months. Throughout the first two years, the district-level leadership pulled back, as they had indicated they would, and placed program management in the hands of assistants and the lead liaison. In addition, since each METS Director answered to a different supervisor whose goals were not the same, collaboration became very difficult.

The five community colleges each have their own administration and way of doing things, so the METS administration was much more complicated than just a collaboration of a university and one community college. After a two-year pilot, the major grant ended and the program was continued on an extension, but with a much reduced budget. To continue the program, administrative support had to be reduced. Wisely, one of the evaluation goals in the METS grant was to run a flexible project that rapidly adapted to student and faculty feedback. This paper will next describe how the program is functioning on a reduced budget and the advantages of the new administrative model.

### IV. A Smaller, More Flexible METS Administration

It was clear after two years of collaboration and several meetings targeted on resolving "administration problems" that a change was necessary. The solution needed to work better than the first administration and be able to run on a smaller budget. The two full-time METS Directors, one for the Fulton School and one for the Community College District, were replaced by one half-time METS Director who oversees both the Fulton School and the District activities. This solution became apparent after discussions on the availability of an experienced project manager consultant, who had worked with both ASU and the MCCCDCO. In addition to being known by both school systems, the person had a Bachelor's Degree in Engineering, as well as a Master's Degree in Engineering. This person seemed the ideal solution to blend the program goals of ASU and the MCCCDCO and to make sure that all were on the same page. In addition, she

was an excellent role model to the transition students on the value of a graduate degree to open career opportunities.

To provide adequate support for the part-time METS Director and to maintain the METS Center, several students were hired. A half-time student assists with the community college side, and three half-time students assist with the university side. One student at each site acts as an office manager. The additional two students in Fulton, both engineering student transfers, are supported by National Science Foundation Research Experience for Undergraduates grants (REUs). One of the REU students is the Mentor Program Coordinator and the other REU student acts as an Assistant Director for the METS Program. A fourth student is located in the METS Office, supported by academic scholarship program grants. Although this student's work is primarily focused on academic scholarship program support, she is in the METS Office to help out once in a while, as needed.

Since the METS Director is part-time, spending only 25% time at each institution, this administrative change has also required more involvement from the METS Faculty Liaisons. Although there has been one from each of the five community colleges from the beginning of the collaboration, the liaisons were not required to do much, since the community college events held on their campus once each semester was directed and coordinated by the MCCC full-time Director. Now since there is no full-time METS Director to plan and to order supplies for the Be An Engineer Events held on their campus, the individual liaisons have had to shoulder this responsibility, with assistance from the ASU METS Office. In fact, several of the liaisons have now brought additional mathematics or science faculty on board with them as liaisons to help. The involvement of the liaisons in management meetings and in their school workshops is excellent for the health of the METS organization as they now take pride and more ownership in the project. The involvement of additional faculty is important as more MCCC mathematics and science faculty send or take their classes to the METS events on their campus, as well as help to pass the word of the events.

As we stated in 2004, "Communication is a challenge in beginning a new project where the team is located in several different locations. It is hard work. It has been difficult establishing the proper lines of communication in order to keep the project a true collaborative. Certainly it is easier at times for any party to make decisions by themselves and to make sure they get done, without deliberation and consensus from the other party. However, we are dedicated to persevering as a collaborative and have already seen changes and progress."<sup>7</sup>

## V. Discussion

Despite the difficulties of the collaboration, the leaders have seen the need and importance of this collaboration for the transitioning students. Fortunately the METS grant included "flexibility" as one of its six program goals. Since this project started as a pilot research program, all of the participants recognized that the program would need to be dynamic and flexible with special attention paid to feedback from the transition students in the program as to what was working, what was not, and what activities should be added to the program. This information was to be acquired through individual conversations, workshops, on-going evaluation of the workshops, and focus groups. In addition, the staff and faculty working with the project were to report their

observations to the METS management team. Although the creators of the METS program did not envision that the management plan itself would need major renovation, the spirit of being willing to be flexible and of being open to suggestions to make the program better served the program well as it developed.

As the METS organization plans for the future, the METS Director, although very experienced and capable in handling large projects, has concluded that to continue to lead the METS project, she will need to expand her position to three-quarter time. This decision is understood and agreed to by the ASU and MCCCC METS faculty. As this organization looks to the future, we realize that we should also add at least one additional half-time transfer student to the METS staff, especially as we are now developing a METS website. There has been a tendency of the METS student staff to put a lot of energy into the METS program, somewhat to the detriment of their own studies. They all enjoy their positions and the opportunity to help others who are in the same position that they were earlier: lonely, scared, unaware of resources, and in need of moral, if not financial support. An additional student staff member could help to ensure that the METS student workers keep their studies a priority.

## VI. Conclusion

This paper has shown that the management plan which seemed ideal for the ASU/MCCCC collaboration to assist transition students into engineering did not, in fact, work well. Forced by a need for change and a reduced project budget, the two METS director positions were collapsed into a one-half time position. It should be noted again, that the person who took this position was a well-qualified engineer project manager with a Master's degree who was known to both parties. The METS Director, as a neutral party, is ideal for leading the management meetings. The liaisons have become empowered and involved in the METS project out of necessity. Although long-term the METS Director position will need to be made three-quarter time, this new lean management team appears to be working well. A large plus of this new management plan is the inclusion of successful, enthusiastic ASU transfer students on the team. These transfer student workers are not only an excellent advertisement for the Center, but in their positions have been given responsibility and growth opportunities that they might not otherwise have experienced. They all profess to love their positions, but must be encouraged to put their own studies first.

## References

1. Sax, L.J. ,Hurtado, S., Lindholm, J.A., Astin, A.W. et al, The American Freshman: National Norms For Fall 2004, Cooperative Institutional Research Program, Higher Education Research Institute, University of California, Los Angeles, December 2004.
2. Engineering Workforce Commission of the American Association of Engineering Societies, Inc., "Engineering & Technology Enrollments," Washington, DC, 2004.
3. "Land of Plenty: Diversity as America's Competitive Edge in Science, Engineering and Technology," Summary of the Report of the Congressional commission on the Advancement of Women and Minorities in Science, Engineering and Technology Development, July 2000.
4. "Freshman-to-Sophomore Persistence, 1983-2001," Postsecondary Education OPPORTUNITY, Number 110, August 2001, 12 pages

5. Anderson-Rowland, M.R., "A First Year Engineering Student Survey to Assist Recruitment and Retention," 1996 Frontiers in Education Conference Proceedings, Salt Lake City, Utah, November 1996, pp. 372-276.
6. Anderson-Rowland, M.R., Vanis, M.I., Guerriero, W., Matar, B.H., Zerby, D.M., Chain, E., and Banks, D.L., "Improving The Transition Success of Engineering Community College Students to a University," Proceedings of the 2005 American Society for Engineering Education Annual Conference & Exposition, Portland, Oregon, CD-ROM.
7. Anderson-Rowland, M.R., Vanis, M., Zerby, D.M., Chain, E.L., Banks, D.L., and Mater, B., "METS Pilot Program: A Community College/University Collaboration to Recruit Underrepresented Minority Students into Engineering," Proceedings of the 2004 American Society for Engineering Education Annual Conference, Salt Lake City, Utah, CD-ROM, 9 pages, 2004.