

## **LESSONS LEARNED IN A SUCCESSFUL UNDERREPRESENTED MINORITY RETENTION PROGRAM**

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### Abstract

In the fall of 2003, a National Action Council for Minorities in Engineering (NACME) Academic Scholarship Program was begun with 21 underrepresented students in the Ira A. Fulton School of Engineering at Arizona State University. The students were supported by a scholarship for the academic year and attended a two credit hour Academic Success Workshop in the fall and met for one hour every other week in the spring semester. Due to scheduling problems, the students met in two groups during the spring. The Academic Success Workshop has been described in a previous paper.

The primary goals of the NACME Program are to give assistance and support to retain the students in good stead. The program purposes are to help with the adjustment to being a university freshman and a minority student, to ensure that students know where to turn for assistance when needed, to assist in forming a student support network, to help the students work in a team, to sharpen presentation skills, and to make the program experience enjoyable.

This paper will include a discussion of the spring semester program, an overall evaluation of the first year of the program, and the retention problems encountered with the first group of students. In addition, we will discuss the diversity issues overcome with the selection of the second NACME class for fall 2004, as well as the lessons learned in year one and the student feedback through ongoing evaluation that caused changes in the second year of the program.

**Keywords:** Academic Success Workshop, Freshmen Retention, NACME Program, Scholarship Program, Underrepresented Minorities

### I. Introduction

In the fall of 2003, the National Action Council for Minorities in Engineering (NACME) Academic Scholarship Program was begun in the Ira A. Fulton School of Engineering at Arizona State University with 21 freshmen underrepresented students in engineering or computer science. The students all had a high school GPA of 3.0 or better, had financial need, were U.S. citizens or permanent residents, had completed an application and an essay, and had submitted two letters of recommendation, at least one from an academic instructor. The students were supported by a scholarship up to \$2,500, depending on financial need, for the academic year. The funding for the scholarships came from the \$25K grant block award from NACME was supplemented by

funding available for other Fulton School Scholarships for qualified students. The NACME Scholars were required to attend a two credit hour Academic Success Workshop in the fall and workshops every other week during the spring semester. The fall Academic Success Workshop has been described in a previous paper<sup>1</sup> and was loosely patterned after an Academic Success Class that had been previously taught at ASU.<sup>2</sup>

Of the 21 students, 6 were females and 15 were males. Four of the students were Native American, five were African American, and 12 were Latino, Mexican American, or Puerto Rican. Nine of the students were first generation college students. None of the students had disabilities and none had ever had an internship or research experience.

The primary goals of the NACME Program are to give assistance and support to retain the students in engineering and computer science and to graduate them. The program purposes are to help the students with the adjustment to being a university freshman and a minority student, to ensure that students know where to turn for assistance when needed, to assist in forming a student support network, to help the students work in a team, to sharpen presentation skills, and to make the program experience enjoyable.

## II. Spring Semester Program

After completing the Academic Success Workshop in the fall of 2003, the students met for one hour every other week during the spring semester. All students in Academic Success Workshop were invited to the spring semester meetings, but the NACME students were required to attend. Two Academic Success Workshop students attended several of the meetings, but were not qualified for NACME scholarships because they did not qualify for financial aid. Due to scheduling problems, the students met in two groups in the spring, so each program was duplicated. The spring meetings were held in the comfortable confines of the Center for Engineering Diversity and Retention (CEDAR). A main purpose of the meetings was for the students to meet with each other often for support and encouragement.

Time management was again emphasized for the students, as it had been in the fall. The students were asked to complete a detailed time management schedule for the spring. The fall speaker who had talked to the Scholars about time management was brought back in the spring to give a follow-up session. The students were amazed to see how much time they really had left beyond their scheduled time for attending classes, studying, working, eating, sleeping, commuting, and getting ready time.

A major project for the spring was to have each student write a good resume. This was particularly difficult for freshmen as they tried to focus their resume on college level activities in which they were just beginning to participate. An excellent Career Service representative met the NACME Scholars twice to help them improve their resumes and to give individual help on the resume, including what high school activities should be left on the resume.

At the students' request, a bank representative came and talked to the groups about money management. She emphasized that as engineers they would be earning good salaries and all banks would want their business. She urged the students to compare banks to see which one

would be best for them. She also talked about budgeting and saving early to establish good habits for a lifetime. For two of the meetings, upper class engineering students talked to the NACME scholars about spending a semester in another country and also about internships.

Refreshments were served at all of the meetings to help make the meeting more enjoyable and to treat the NACME Scholars as special students. At each meeting there were exchanges between the students and the students got to know each other quite well since each meeting included around 10 students or less. The NACME Director or the co-instructor from the fall Academic Success class was in attendance at every meeting and so questions and problems were often solved at the meetings with their assistance.

### III. Evaluation of NACME Year One

In April 2004, the NACME students were given a Program Evaluation Survey completed by 18 of the 20 NACME students enrolled in Spring 2004 (one student was on a personal leave from the university). The answers to the first seven questions are summarized in Table I.

No.	Question	Yes	No
1	Did you find the NACME Scholars Program beneficial to you?	17	1
2	Would you recommend the program to others?	17	1
3	Have you participated in a program similar to the NACME program?	6	12
4	Have you made contacts with engineering students in other majors through NACME?	18	0
5	Has the NACME program helped you feel more confident about graduating in engineering?	16	2
6	Are you planning to reapply?	17	1
7	Do you plan to continue in engineering in the Fulton School next fall?	17	1

Table I. General Satisfaction with the NACME Scholars Program

In general, the NACME program was found to be beneficial, helped the students make contacts with engineering students outside of their major, and made them feel more confident about graduating in engineering. The students planned to re-apply and to continue in the Fulton School of Engineering in the fall 2004. The one student who did not plan to re-apply and continue in Fulton in the fall knew that he would transfer after his freshman year and continue engineering in a school closer to home. One student did not find the program beneficial, would not recommend the program to others, and did not feel that the program made him feel more comfortable about graduating. One additional student did not feel more confident about graduating due to the program. Two-thirds of the students had not participated in a similar program.

The students were then asked to identify which NACME program components were helpful to them. No suggestions were given to the students to answer this question. The students gave the following items as helpful to them:

- Time Management
- Classes: The “Academic Success” class and the spring meetings

- “Engineering Success” textbook<sup>3</sup>
- Resume Writing
- Topic meetings in the spring: money, scholarships, resume building
- Study skills
- Individual and team class presentations
- Meeting other engineering students, expanded network
- ‘Where There’s a Will, There’s an A” video series<sup>4</sup>
- Participation requirements
- Hearing how other students dealt with common problems
- Support system/familiar faces
- Closer to other engineers – beneficial

Next the students were asked how strongly they agreed or disagreed with 12 items. Table II show the results:

No.		Ave. Rank
8	Participating in the NACME program has made me more confident about staying in engineering.	4.00
9	Participating in the NACME program helped me with my study skills.	3.83
10	Participating in the NACME program helped me with my time management skills.	3.77
11	Participating in the NACME program has helped me with my test taking skills.	3.61
12	Being in the NACME program helped me be a better student.	4.00
13	Being in the NACME program has helped me network better.	4.11
14	Being in the NACME program has helped me become aware of more resources.	4.44
15	Being involved in the NACME program has increased my knowledge of engineering careers.	4.06
16	Participating in the NACME program has helped me write my resume.	4.33
17	Participating in the NACME program helped me improve my presentation skills.	4.00
18	Participating in the NACME program has helped me make friends in engineering.	4.44
19	I am confident in my overall communication skills.	4.50

Table II. Average Benefits Ranking of NACME Program.

Key: 1= Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

In general, the students agreed with the benefits of the NACME program given in Questions 8-19. It is interesting to note that the highest ranked item was their confidence in their overall communication skills. The three lowest ranked items were also the three hardest skills to acquire: test taking skills, time management, and study skills even though the program emphasized these. It is also difficult for freshmen to accurately determine how much the

program helped since the change from high school to college is very significant and the skill level for these items is much more important in college.

#### IV. Retention of the NACME students

Twenty-one students began the NACME program in the fall of 2003. All of the students were retained into the second semester except one student who took a leave from school to complete a personal mission, with the intent to return to Fulton after two years. The average high school GPA of the entering students was 3.51. The average GPA of the group after one semester was 3.02, ranging from 1.42 to 4.0. The average GPA at the end of the first year of the 20 students remaining in the program was 2.90, ranging from 1.45 to 3.63. Twelve students reapplied and continued in the NACME program for fall 2004. The reasons that eight students did not continue were: three students were not qualified for the program due to low grades, two students did not enroll for fall 2004 although eligible to continue in the program (one of these students is working for a year and considering a transfer to nursing), two students transferred to another school (one to Aeronautical Technology and the other to another Engineering school near home), and one student, who did not see value in the NACME program, did not reapply.

The one-year retention rate for the students continuing in the NACME program is 57.1%. The one-year retention rate for the NACME students within the Fulton College of Engineering is  $14/21=67.7\%$  and the one-year retention rate within ASU is  $16/21=76.2\%$ . These percentages are not as high as desired, but are higher than the average of all other underrepresented minority (URM, including only African American, Native American, and Hispanic) Fulton first-time, full-time freshmen students. From Fall 2003 to Fall 2004, the one-year first-time, full-time retention rate of URM freshmen students not in the NACME program in the Fulton School was  $96/156=61.5\%$  (NACME students = 67.7%) and in ASU was  $115/156=73.7\%$  (NACME students = 76.2%).<sup>5</sup> The real test of the value of the program will be in the percentage of the original NACME students that graduate.

#### V. Recruiting for NACME II

The NACME Director was notified in the spring of 2004 by ASU's legal counsel that the Fulton NACME Program could not continue in its present form. At issue was that the program was restricted to underrepresented minority students as designated by NACME, which includes only African American, Native American, and Hispanic, Latino, or Puerto Ricans. During spring and summer 2004, several meetings were held with the NACME Director, the Fulton School of Engineering Dean, and ASU's Legal Counsel. An agreement was finally reached:

- The web notice for the NACME Scholarship does not restrict applicants to be only African American, American Indian, or Hispanic (URM). However, the notice clearly states that the academic scholarship program is sponsored by NACME. (Legal Counsel approved the NACME web notice.)
- Students who apply for the NACME Scholarship cannot be denied the scholarship based on ethnicity.
- Students accepted for the program who are not URM will be supported by Fulton School of Engineering funds other than NACME funds.

- URM NACME students can receive part of their funding from outside NACME (to leverage NACME funding).

During the summer, acceptance of non-URM students into the NACME program and the use of non-NACME funding for the NACME program was called to a halt for several weeks due to administrative changes. Another meeting with ASU Legal Counsel confirmed the early agreement and the process continued.

Four qualified non-URM students applied for the NACME program for '04-'05: two Caucasian women and two Asian males. Other scholarship funding from the Fulton School of Engineering supports them and the four students were treated as any other student in the NACME program. The Fulton School of Engineering also supports part of the scholarship stipends to the 15 qualified URM students that were accepted into the '04-'05 program.

## VI. Lessons Learned and Assessment

The first lesson learned is that students need to be made aware of the opportunity to become a NACME Scholar. A process in place is that the Student Academic Services part of the Fulton School of Engineering posts the announcement of the NACME scholars on the web with the other scholarships offered by the School. This office also receives the applications and requires the students to sign an acceptance letter and also write a thank you letter to the sponsor. They also take care of the money distribution to the students. We work together very closely as we receive the applications.

Although April 1 was the first deadline date for applications for NACME, applications were accepted until the program was filled at the beginning of the Fall 2004 semester. During the summer, an email about the NACME Scholarship Program was sent to all URM freshmen admitted as freshmen to the Fulton School of Engineering who appeared to qualify. Students in the Fulton School MEP Summer Bridge Program were also encouraged to apply for the NACME Scholarship. Several more students then applied for the scholarship and were admitted to the NACME Program. Next spring, emails will be sent earlier to URM students, perhaps one before the deadline and then additional emails as needed to fill the program.

A second challenge is that some of the students were admitted to the NACME program after they had already registered for the fall semester. Other students did not pay attention to their NACME award letter which stated that to receive the NACME Scholarship; they must enroll in the two credit hour Academic Success Workshop. Most students were able to accommodate the time, set from 4:30-6:30 on Wednesdays. However, three of the students in Fall 2004 and two of the students in Fall 2005 had a conflict of one or both hours and were not able to readjust their schedules. These students met with the co-instructor of the course to make up the class material missed. A partial solution will be to list the course and the time with the notice of the scholarship, so students are aware as soon as possible that they need to schedule the Academic Success class.

A third challenge was that students sometimes refused to listen to advice. For example, a NACME student failed a chemistry class in the fall. The student was advised to repeat the

course to eliminate the E (an E is equivalent to an F for failure) on his record. He refused and signed up for the follow-on course in chemistry. He got an E in that class also. Needless to say, he was disqualified from the School for a very low GPA. Even though we emphasized studying 2-3 or 4 hours for every hour in class, many of the students spent 10 hours or less per week on studying. Time management was heavily emphasized at the beginning of the year for the next NACME class.

A fourth major challenge was finding one time during the second semester when the NACME students could meet. This proved impossible. Therefore the NACME meetings during the spring semester were held twice for each meeting (one hour every other week). This year a time was chosen ahead and the students were advised to keep the time 4:30-5:30pm on Wednesdays open for NACME meetings in the spring. All of the students were able to meet at the same time for Spring 2005. Refreshments were served at each NACME meeting during the spring semester, sponsored by the School of Engineering. These were most appreciated by the students and were continued for the second NACME year.

A fifth major challenge was to retain the NACME students for their second year. We lost several of the 21 students. One student was homesick, moved to home in another state, and attended a local school, and is still studying engineering. One student was disqualified for low grades. Several students had GPAs less than 2.6 and could not be funded under NACME. Students with GPAs 2.6 to less than 3.0 were put on full NACME support since the Fulton Scholarship money required a 3.0 GPA for continued funding. One student did not reapply to NACME, but still enrolled in engineering.

A sixth major challenge was getting the students to write a college resume. A staff member of Career Services met with each of the two groups twice to help them with their resumes during the spring semester. For the second NACME group, resumes were requested in the fall semester.

A seventh lesson learned was to help the students overcome shyness early in the semester. Most of the first cohort students were very shy and did not want to have to speak in class. To help with this, we added an optional assignment of a two-minute speech with props on the student's favorite hobby or interest. The students made the speech (most were 5 minutes or more) after watching tape 4 in the videotape series on presentations. This exercise proved to be very worthwhile. All of the students took part. The talks were quite informal and they all enjoyed talking about their competitive swimming, their horse, scrap booking, magic, or other interesting topics. This exercise helped immensely with their fear of talking to a group and helped them to get to know one another. The personal speeches were repeated this year, but moved up in the schedule so the students could get to know each other better earlier.

Another lesson learned was to allow the students to interact together more early during the fall semester. This year icebreakers were added to the beginning of the first three meetings. The student assistant for the class led the icebreakers for the students. The students enjoyed this additional way to get to know each other.

We noted that among the skills which we wished to improve in the students, items 9, 10, and 11 on Table II were ranked the lowest. These skills in time management, studying, and test taking

are crucial to academic survival and difficult to master. Changes were made in the program to improve these skills during the next academic year.

The first cohort of NACME scholars were asked for suggestions on how to make the first NACME year better for the second cohort of NACME scholars. Their suggestions included:

- Keep the presentations, both individual and team
- Keep stressing time management
- Keep resume writing
- Keep the “Engineering Success” textbook<sup>3</sup>
- Keep the video series, although some students suggested cutting some of the videos (a change of order of the videos the second year was well received)<sup>4</sup>
- Add more guest speakers (more speakers will be added for spring)
- Give more structure to the group presentations (more directions)
- Get students together more for group activities, use ice breakers (done with the second cohort)
- Emphasize working together, keeping tabs on each other, and supporting each other.
- Provide more time in class to talk about other classes
- Emphasize that you get out of the class what you put in!

This advice was taken seriously and incorporated in the program for the second NACME cohort.

## VII. Conclusion and Summary

The Academic Success Workshop class went very well in Fall 2003. The two credit hour class had 21 NACME students and 8 students from the 2003 Fulton MEP Bridge Program. The course was co-taught. This worked well so that the instructors could cover for one another in case of illness or travel. The students all did very well and received an A. Some students upon learning of this were unhappy because they felt that they had worked a lot harder than others. The grading will be reevaluated this semester. Also beginning in Fall 2004, instructors have the option of a “+” or “-“ added to the letter grade, with a different weight given to each grade.

The textbook, “Engineering Success” by Peter Schiavone,<sup>3</sup> was found to be satisfactory for the instructors and the students reported that it was useful. Reading assignments and some homework were assigned from the book. Fulton Minority Engineering Program funds were available to pay for the textbooks in both Fall 2003 and 2004 to spare the students the cost.

In Fall 2003, we piloted the use of the video tape series (6 tapes) “Where There’s a Will, There’s an A”<sup>4</sup> to motivate the students to perform better in class, to better manage their time, and to perform better as students. Although some parts of the series got a little long, the tapes were given a good mark by most students. We used one tape for each of the first six meetings. We used the series again for Fall 2004, but we changed the order. Time management is the fifth tape in the series and waiting until the fifth week of the semester to stress time management was too late. We showed this tape in the second week.

The NACME students were put into teams according to their major and asked to give a formal presentation as a team at the end of the semester. Guidelines and content were given in advance. We held a practice presentation at midterm so the teams could report on how they were doing with the material. This exercise proved to be invaluable: some teams misinterpreted the instructions, one team took much too broad a topic for part of their presentation, and the students needed practice presenting as a team. We repeated the exercise in Fall 2004. The students asked for more structure to the presentation and reports in their evaluation of the program.

Evaluations were done with every NACME meeting throughout the year. These evaluations proved to be valuable since the students were able to express: What did you like most about the meeting? What was the most important item that you learned today? What do you need to know more about? and Suggestions for future meetings (including food). The students were then asked to give an overall rating of the session from 1. Strongly dislike to 5. Excellent. The students were also invited to give comments. Most of the evaluations were 4's and 5's each week. The class instructors responded to the questions and comments at the beginning of the next class. Toward the end of the semester, as their questions were answered, there were fewer and fewer questions on the evaluation sheets.

The NACME fall 2004 class was held in a classroom the entire semester for the second cohort of NACME students. This supported a more formal setting for the class in contrast to meeting in the CEDAR Center, but at the same time this second class seemed to interact and to participate more readily than the first year class. The early introduction of icebreakers and individual presentations may have fostered this response.

The first NACME cohort reported that they liked the following aspects of the program best: receiving help with time management, giving presentations, getting to know other engineering students, learning study skills, hearing presentations from outsiders, learning about resume writing, and hearing how other students dealt with common problems. The fact that the students appreciated receiving this material on the main objectives of the course proved its success. The students also reported that the program helped them to continue in engineering, to become acquainted with more opportunities and resources, by providing enough money to continue going to school, by keeping them focused, by giving them reassurance in their studies, by helping with time management, by improving study skills, by teaching them to network, by giving them good peer pressure to do well, by acquainting them with other people like them who were struggling and had them to lean on, and by improving their confidence in becoming an engineer.

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## Biographical Information

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