

Building Bridges: Providing Special Programs for Minority Retention

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Abstract – Minority students face multiple barriers in higher education which contribute to their higher rates of attrition. These barriers may include insufficient academic preparation, lack of financial assistance, inadequate support services, and deficient role modeling. Special assistance is often needed if minorities are to succeed. The focus of this presentation is on one such assistance program and how it has impacted the advancement of minority engineering students.

Keywords: Minority, special programs, retention, engineering, attrition.

BARRIERS TO MINORITY ENGINEERING STUDENTS

Since the landmark case of *Brown v. Board of Education*, 1954, minority students have overcome many barriers to obtain equal access to education within the United States. However, despite persistence and advancements within these groups, many barriers and factors still contribute to the discrepancies in attainment between minority groups and the majority population [Scott-Harris, 8]. Salient issues that affect minority students include inadequate academic preparation, substandard educational resources, mismatched social and academic expectations, inadequate encouragement, psychological intimidation, unstable familial and financial circumstances, inadequate peer support, and a lack of role modeling or mentoring [Lee, 3; Reichert, 5; Stromei, 10]. Additionally, various student and institutional variables impact student access and success within institutions of higher education. These include cultural characteristics such as ethnic background and social background; institutional characteristics including campus site, regional location, selectivity, and curriculum; and institutional climate such as student-faculty interactions or student activities [Stovall, 9; Zamani, 13].

For many students the first year of college is a critical period of transition. Tinto [11,12] indicated that student persistence is strongly influenced by the interactions students encounter during the first six months or year of college. For many minority students attending predominantly White institutions, the transition during this time includes managing and modifying aspects of their individual culture to resemble the culture of the dominant majority [Lee, 3]. Special assistance is often needed if minorities are to succeed. The focus of this presentation is on one such assistance program and how it has impacted the advancement of minority engineering students.

MINORITY ENGINEERING PROGRAM AT AUBURN UNIVERSITY

The Minority Engineering Program (MEP) at Auburn University was initiated in 1996 in response to an ongoing retention study of African American engineering students. The performance of engineering students was evaluated in this study and key factors that predict student success or failure in engineering were identified [Halpin, 2].

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The program components were primarily designed to provide students with academic and psychosocial support the students' transitioning from high school to college. The objective of the program was to meet the College of Engineering's retention goal for African-American engineering students through the use of a multifaceted approach that includes the following components:

Interactive Learning Lab

The Interactive Learning Laboratory incorporates a variety of approaches to learning, including one-on-one tutoring, collaborative (peer) learning and interactive software. The laboratory consists of nine computer workstations where students can use interactive software to enhance classroom learning. The lab also includes resources to help students outside the classroom, such as the TimeMaps® financial literacy interactive module, which helps students develop money management skills and financial literacy that are essential for students while in school, as well as after graduation.

Collaborative Learning Groups

Students are also encouraged to participate in Collaborative Learning Groups, which are designed to foster collaborative and peer learning in key mathematics, science, and computer programming courses. Freshman engineering students are organized into study groups based on common technical courses. Each group is facilitated by upper-class students proficient in the subject matter, who provide structure to the session and ensure that problem solving progresses at a reasonable pace. Students work in groups solving homework problems and working through course material during the sessions. While facilitators are encouraged to promote critical thinking in the freshman students, they do assist the students when they cannot find solutions to the problems. Problems are recorded and filed as reference for future use by the students. These collaborative learning groups have broader impact since shared learning can create an inclusive learning environment for minority students [Sanchez, 7], which supports cohort development.

Sunday Evening Tutorial

The Sunday Evening Tutorial sessions allow students to receive additional academic help. The tutorial sessions are facilitated by upper-level students. As indicated by [Roueche, 6] many students lack preparation and study strategies necessary for success in higher education. In addition to the tutorial sessions, a segment of the time allocated on Sunday evening is devoted to Academic Excellence Workshops. These workshops are presented by volunteer corporate sponsors, alumni, and upper-level students. The topics include study strategies, time management, dealing with diversity, financial management and success strategies for transitioning into the work place. The purpose of having the tutorials on Sunday evening is that oftentimes students go home for the weekend and fail to return to campus until a weekday morning. The weekend tutoring program brings the students back to campus at a reasonable time and assists them in preparing for the upcoming week's exams and assignments.

Mentoring Program

Engineering students have indicated that networking with upper-class mentors eases the transition of freshman students into the university environment [Good, 1] so the Mentoring Program has been established to assist pre-engineering students in making a smooth transition into the college environment. The program enlists upper-class students who have successfully moved into their major to serve as mentors to assist incoming freshman students and sophomore students in managing their academic schedule, sharing study strategies, participating in proactive mentoring and helping students navigate through the campus milieu. Because of a lack of understanding of the engineering culture, many minorities use ineffective approaches to and hold unrealistic expectations about studying engineering. Mentors are vital because they not only inspire, but also assist students in setting and reaching realistic goals. They broaden students' horizons, assist students in locating university resources and combat student isolation [NSF, 4].

Institutions that are successful in building settings that educate their students are successful in retaining their students. The mentoring program is a key factor in providing a pathway for retention and academic success for minority students. The mentoring program, in addition to the other MEP programs, has proven that a supportive, nurturing environment provides transitioning students with success strategies not only to move into their major but

also to graduate. The students who have graduated are paving the way for career opportunities for the students who have not yet graduated.

An expansion, then, of the mentoring program for undergraduates is another component, Mentorship Beyond the Classroom. This program was initiated because alumni had a desire to give back to the program that was such a benefit to them. Many students in the program begin internships and cooperative work during their junior year. When students are in the preparation stage of their intern or cooperative work assignment, an alumnus that lives and works in the city where the student will be located is notified. A match is made with this person who graduated from the university, was a participant in the program, and works at the company where the student will be employed. The alumnus becomes a mentor and helps the student acclimate to the city. The mentor initiates a reception to make sure the student has an opportunity to meet other alumni who graduated from the university and were participants in the Minority Engineering Program. The purpose of Mentorship Beyond the Classroom is to lessen the feeling of isolation a young person feels when in a large, unfamiliar city for the first time. As [Stromei, 10] noted, providing students with a mentor at both school and work increases the likelihood of success at both locations and contributes to a smooth transition to the postsecondary environment and eventually to the workplace.

Academic Resource Library

The Academic Resource Library includes a collection of books, video tapes, textbooks, software, and periodicals for students' use during their academic career. The library also accommodates a computer bank of old test files to aid students in preparing for exams. Students often use the resource materials in areas where software programs, tutorials, or learning groups are deficient. Another facet of the library is the textbook loan program. At the beginning of each semester, textbooks are loaned to students with the greatest financial need. This helps to minimize some of the financial burden students incur while at Auburn University.

The MEP program components combine to create an environment that fosters student success. Such multifaceted approaches provide assistance for minority students that contribute to creation of a diverse and inclusive workforce to meet the needs of the developing technological and globally competitive environment.

IMPACT OF MEP PROGRAMS

Prior to establishment of the MEP program, the retention rate of minority students was much lower than that of non-minority students. However, the retention rate for students participating in MEP activities is at or above the college average. Most students who leave the engineering programs do so in the first year, so one measure of retention is the percentage of students who successfully transition out of the freshman pre-engineering program. At Auburn University engineering students matriculate into a pre-engineering program, but must transition to their major within four semesters. This transition requires completing two semesters of calculus, two semesters of a science course, one introduction to engineering course, one computer programming course, and an engineering orientation course, while maintaining a 2.2 cumulative GPA. The MEP targets this transition by providing students with a structured learning environment with supplemental instruction in mathematics, chemistry, physics, computer programming and critical thinking. As a result, 62% of students participating in MEP activities from fall 2005 to fall 2007 have successfully transitioned from pre-engineering into their chosen major engineering discipline. Table 1 depicts the number of students who successfully transitioned into their major.

Table 1. Status of students enrolled in Fall 2005

≥ 2.2 GPA	Successfully moved into major	<i>N</i> = 48	62%
≥ 2.2 GPA	Met engineering requirements, but voluntarily changed major	<i>N</i> = 4	6%
< 2.2 GPA	Involuntarily moved into another major	<i>N</i> = 22	32%

The initial emphasis of the MEP program was on retention rather than recruitment. However, increased retention increases graduation rates and the MEP activities increased the number of graduates, such that according to the

2006 American Society for Engineering Education, Auburn University is 20th in the nation for engineering bachelor's degrees awarded to African-Americans. Once the quality support system was established, the recruiting efforts could be increased and have lead to increases in the enrollment of minority students.

Figure 1 show that the enrollment of minority engineering students at Auburn University has increased by about 22% over the last three years. With this increase, approximately 10% of engineering undergraduate students, N = 3665, are from minority groups, N = 360.

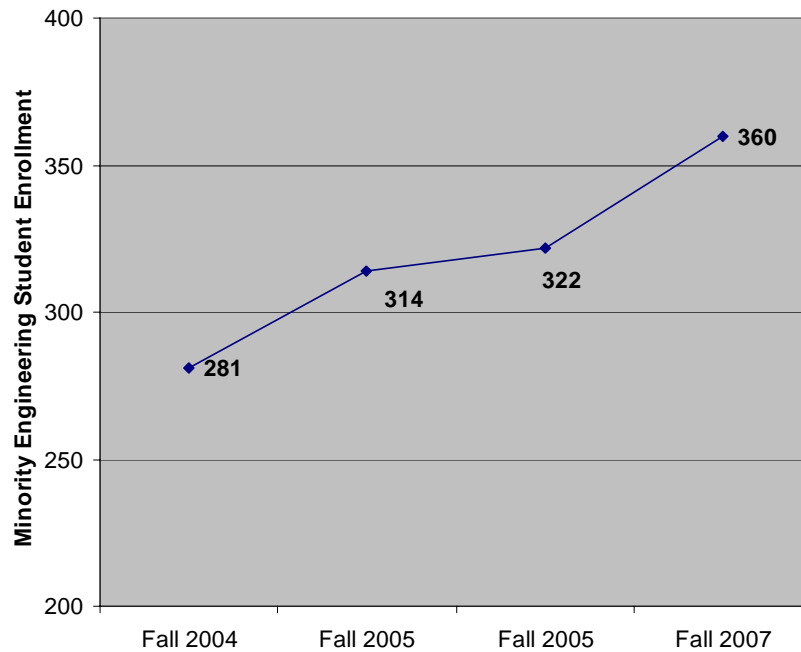


Figure 1. Enrollment of minority students in the Samuel Ginn College of Engineering

CONCLUSIONS

Representation of minority students in engineering has been increasing, but special programs are still needed to ensure that these improvements continue, so that the engineering workforce will be of adequate size and diversity to meet the growing needs in industry. Retention of minority students in engineering is requisite for producing qualified minority engineers for the workforce. Through a shared learning environment and academic resources, the program is positioned to target the multiple barriers which research demonstrates have contributed to the gaps in minority students' attainment. Most significant through this program is the creation of a validating, friendly, learning environment designed to provide the academic support needed to assist students in transitioning into a highly competitive work force.

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BIOGRAPHICAL SKETCHES

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