

Bridging the Diversity Gap: Fours Years of Success

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Abstract

Since 2000, the Minority Engineering Program (MEP) in the Ira A. Fulton School of Engineering has held an incoming first year student Bridge program in July. This program has averaged a one-year retention rate of 80% or higher for the past four years. This paper will provide information on the Bridge program such as program components and activities.

The MEP SUMMER BRIDGE PROGRAM (SBP) prepares underrepresented ethnic minority students for success in engineering at ASU. The program offers room and board, classroom materials and supplies, and academic scholarships. There is no registration fee to attend. The academic scholarships help to offset the loss of wages for those students who must take two weeks off from work to attend the Program. This two-week academic program provides students the opportunity to reside on campus and to experience university life while attending classes, tours, and working on a group project in their major. The compact two-week schedule helps the students begin to make the adjustment to university life since it is in sharp contrast to the demands made on them in high school. There are no name tags and by the end of the first week all of the students know each other by name and forge friendships that often last for years.

Further, this paper will provide data on persistence rates and graduation rates of all the Summer Bridge Program participants since 2000. It will also provide data on reasons why some of the student left engineering, on where they went, and on their graduation and persistence rates after leaving engineering at ASU.

Key Words: Freshman Retention Program, Minority Engineering Program, Summer Bridge Program, Underrepresented Minorities

I. Introduction

Minority student achievement has been a focus of many educational ethnographies over the past 30 years. There is much interest in understanding why students of minority backgrounds have difficulty succeeding in school at all levels. In his article, "Research Currents: Cultural-Ecological Influences on Minority School Learning", John Ogbu suggests that one possible solution would be for "teachers and schools to develop programs to enable the children to adopt the more pragmatic model of accommodation without assimilation" [1]. This paper will focus on one such program for minority college students in engineering at Arizona State University.

The interest in engineering as a choice for a major in colleges and universities is at a 30-year low. For all students regardless of gender and ethnicity, major issues that impact first-year retention include difficulty in the transition from high school to college, financial problems, and general misinformation about the engineering curriculum [2]. In addition, first-year engineering students generally have little exposure to engineering. Academically, the first-year curriculum consists primarily of fundamental courses (physics, mathematics, chemistry, english, etc.) that are essential prerequisites to upper divisions engineering courses. Often, these courses fail to motivate students and many potential engineers transfer out of their majors before they experience any engineering [3].

The situation becomes more serious when we factor in student gender and ethnicity. Although the number of women enrolled in engineering has increased each year since 1989 (when women engineering enrollment was at 15.9%), except for a slight dip in 1999, still only 19.7% of the 353,118 students enrolled in engineering in Fall 2001 were women [4]. Minority women are the least represented in engineering, making up only 4.2% of the fall 2000 engineering enrollment [4] and receiving only 2.8% of the Bachelor's degrees in engineering in 1999-2000 [5].

Most of the findings of a National Science Foundation report completed in 1982 are still true today. In 1982, there were a relatively small percentage of women and minorities earning science and engineering degrees. Further, in science and engineering employment, the concentration of women and minorities were in specific fields, higher rates of part-time employment were with women, women and minorities had lower salaries, and there were a low percentage of women and minorities in full professorships [6].

Changes in the last few years show declining numbers and percentages of minorities in engineering, and the higher attrition rate of minorities in undergraduate education [6]. Further, minority students do not feel comfortable in their degree programs initially and feel a lack of contact with their college. Finally, research suggests that for students to have the best chance for achievement, schools must “produce culturally compatible environments and interactions that will serve as internal reasons for compliance and will enable school achievement” [7]. There is much work to be done.

II. Program Overview

The MEP Bridge program is designed to recruit competitive under-represented students to the Ira A. Fulton School of Engineering at Arizona State University. The following is an explanation of the program and its successful retention of undergraduate students in engineering.

The MEP SUMMER BRIDGE PROGRAM prepares underrepresented ethnic minority students for success in engineering at ASU. The program offers room and board, classroom materials and supplies, and academic scholarships. This two-week academic

program provides students the opportunity to reside on campus, experience university life while attending classes, tours and working on a group project in their major.

The targeted pool of potential candidates was limited to students who would be new students to ASU Engineering in the fall of each year. Students had to have a transfer or high school GPA of 2.75 on a 4.0 scale and possess a desire to pursue a baccalaureate degree in engineering or the applied sciences. Students were required to submit the following items in order to apply for program participation.

- Application Form
- Official copy of high school and transfer transcripts
- Copy of their incoming schedule at ASU
- Demographic information

III. Participants:

Letters of invitation were generated to all minority students who had applied for fall admission to ASU Engineering. Additional mailings were directed to ASU K-12 outreach programs such as the Mathematics Engineering, Science Achievement (MESA) program.

Consideration for acceptance into the program was based on an interest in achieving a balance of gender and ethnicity as well as emphasis on who might best benefit from the program. In addition, emphasis was placed on those students who had been previously involved in a k-12 program supported by the School of Engineering in the past.

IV. Personnel and Staff:

The program staff was comprised of:

- Director of the Center for Engineering Diversity and Retention
- Graduate & undergraduate engineering students who served as instructors
- Graduate & undergraduate engineering students who served as residence coordinators
- MEP Program Coordinator

V. Program Curriculum:

The academic activities focused on all the core course work in engineering as well as each of the individual department majors within the School. The goal was to help students acquire skills and experiences to better prepare them for successful completion of freshman coursework in engineering and the applied sciences. This was accomplished by allowing the participants to:

- 1) practice and demonstrate essential engineering design and teamwork elements
- 2) balance time and resource requirements of day-to-day coursework with those of the design project by learning and applying basic time management techniques
- 3) attend review sessions, complete homework and take finals for physics, chemistry, calculus and computer courses

The curriculum was designed in collaboration with Intel Corporation and the Director of CEDAR. The curriculum team was comprised of Dana. C. Newell, M.A., graduate and undergraduate engineering students (including former Summer Bridge participants), and the program coordinator. Each student-instructor was responsible for the development and delivery of an assigned portion of the curriculum. The curriculum began with fundamental elements of team building, introduction to e-mail, and evolved to specific programming functions required for the development of the team projects.

VI. Program Activities

The curriculum team was responsible for the participants' instruction during the day and taught classes from 8 a.m. through 5 p.m. Monday through Saturday. Intermittently throughout the two-week program, the instructors also scheduled computer labs to address special topics and areas of interest.

Students participated in the following activities during their stay in the program

- Classes and seminars in ASU computerized classrooms
- Team building
- MS Office (Excel, Word, and Power Point) classes
- Daily tutoring sessions
- Daily computer lab time
- Library research
- ASU recreation center activities
- Presentations from: Engineering academic advising, scholarship and financial aid offices
- Meetings with representatives of the four under-represented student engineering societies: American Indian Society of Engineering and Sciences (AISES), National Society of Black Engineers (NSBE), Society of Hispanic Professional Engineers (SHPE), and the Society of Women Engineers (SWE) at ASU

VII. CEMSWE Student Interaction

Both the Curriculum and the residence teams were comprised of members from the Coalition of Engineering Minority Societies and the Society of Women Engineers (CEMSWE) which is an umbrella organization made up of members from the following organizations:

- American Indian Science and Engineering Society (AISES)
- National Society of Black Engineers (NSBE)
- Society of Hispanic Professional Engineers (SHPE)
- Society of Women Engineers (SWE)

In addition, members and officers of the CEMSWE organizations participated in a panel discussion to introduce their societies to the participants and answer their questions about “university life”. Most importantly, the students discussed the benefits of becoming an active member of university societies and the importance of networking. In addition,

CEMSWE members were involved with the students on a regular basis during the Bridge through courses, tutoring and other activities. This effort is made in the hopes that the students will see the CEMSWE students as role models and feel at ease in university academic and social settings

VIII. University Resources

In order to give the students an opportunity to “investigate” campus services and take care of university business pertaining to their upcoming semester, one hour of structured “free time” was set aside each day. It was the CEDAR Director’s experience that if the students did not have this time, they would request time away from classes to take care of their business. This solution provided the students with time to take care of activities such as: paying registration fees, campus living accommodations, meeting with advisors and gathering needed information on the university resources.

IX. Project Design

The program included a design competition that encompassed project management, time management, team building, use of Microsoft WORD, EXCEL and PowerPoint. The students completed a project in their actual area of study. Each team of students worked to create a research project, project notebook and team presentation. They prepared a proposal for project which was reviewed by the Director. The Director and the Program Coordinator met with each team to discuss their proposal. The design competition culminated with student written and oral presentations. An independent panel of industry representatives judged the final presentations.

X. Scholarships

A major concern of many entering freshmen is the availability of financial resources. Therefore, an integral part of the MEP Summer Bridge Program has been to provide access to student scholarships. This year, the program was modified to award scholarships on a competitive basis. The awards were given to the top 25% of program participants. Upon program completion, students become eligible for a scholarship contingent upon remaining registered in the ASU Engineering. In addition, students are clustered in their math, science and engineering courses in an effort to continue building community. During the program, students also have the opportunities to compete for additional scholarships through the Fulton School of Engineering at ASU

XI. Program Evaluation 1999-2003

1999 Summer Bridge Participants

Of the 42 students from the 1999 Summer Bridge Program, 39 chose to attend ASU in the fall. One of the students chose not to attend ASU and attended a university closer to his home in Minnesota. The other two students cited financial difficulties as the reason they chose not to attend.

2000 Summer Bridge Participants

Forty-three students began the 2000 Summer Bridge Program and forty-one students completed the program. Two students did not complete the program and opted to leave early for family and academic reasons. All forty one participants who completed the

Summer Bridge Program enrolled in ASE 194: MEP Academic Success Seminar and are officially enrolled in the MEP Academic Excellence Workshops for their Math and Engineering related courses.

2001 Summer Bridge Participants

Sixty-two students began the 2001 Summer Bridge Program and fifty-eight completed the program. Fifty-six participants who completed the Summer Bridge Program enrolled in ASE 194: MEP Academic Success Seminar and enrolled in the MEP Academic Excellence Workshops for their Math and Engineering related courses in Fall 2001.

2002 Summer Bridge Participants

Forty-one students began the 2002 Summer Bridge Program and thirty-nine completed the program. They then were given the opportunity to enroll in ASE 194: MEP Academic Success Seminar and enroll in the MEP Academic Excellence Workshops for their Math and Engineering related courses.

2003 Summer Bridge Participants

Fifty four students completed the program. All fifty four enrolled in engineering at ASU. They were then given the opportunity to enroll in ASE 194: MEP Academic Success Seminar and enroll in the MEP Academic Excellence Workshops for their Math and Engineering related courses as well as the Intel Sponsored CEMSWE 3.0 program..

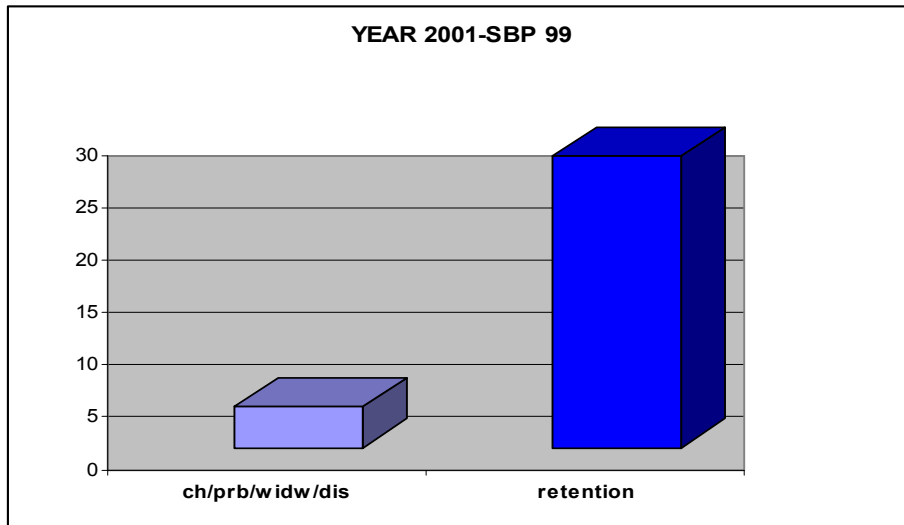
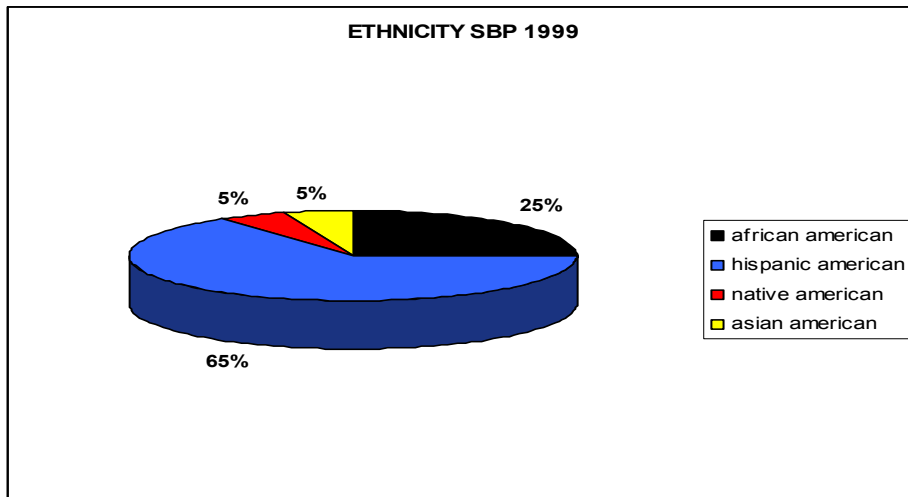
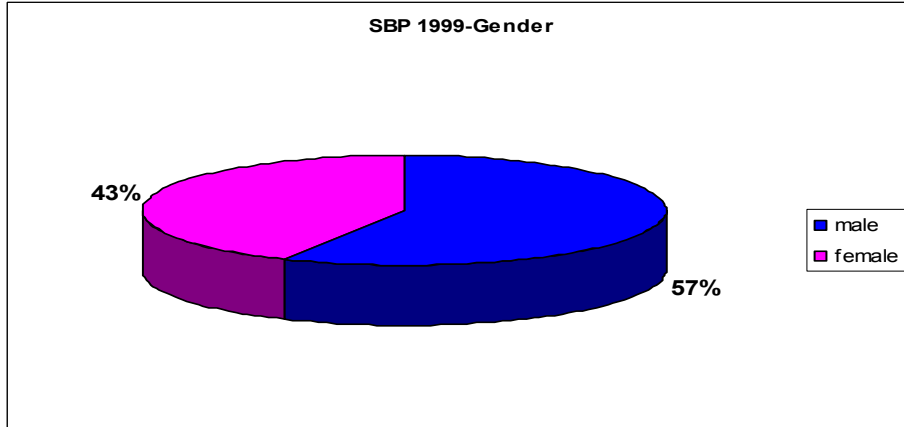
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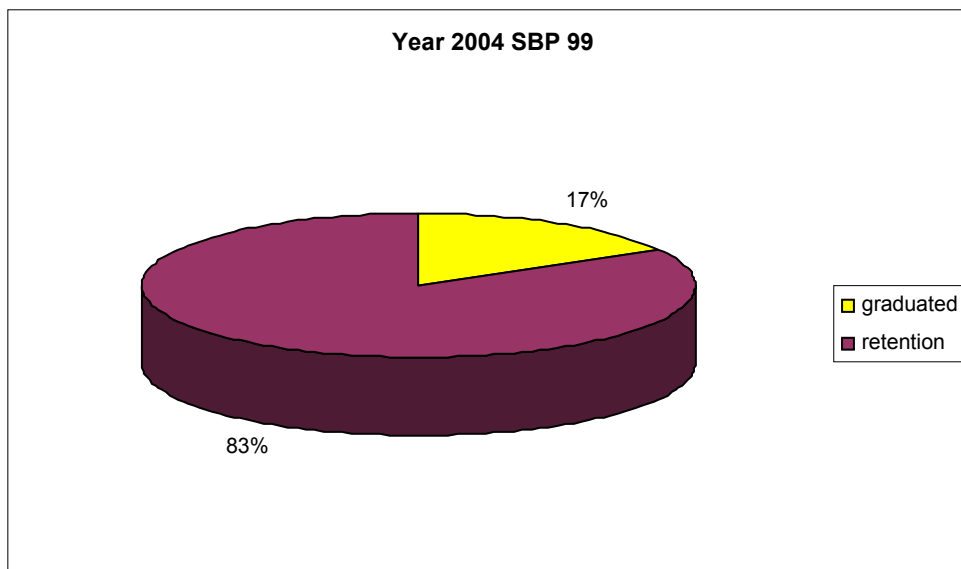
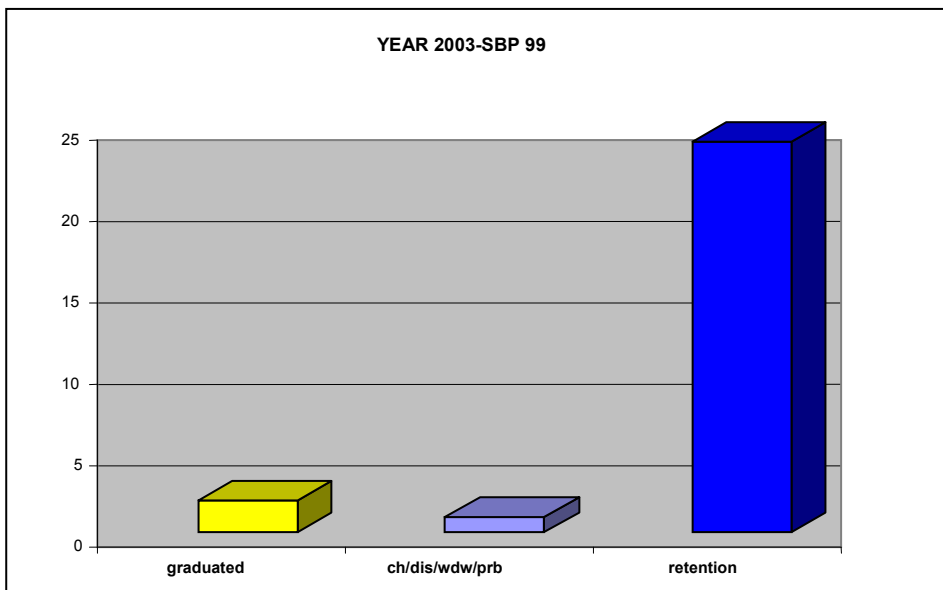
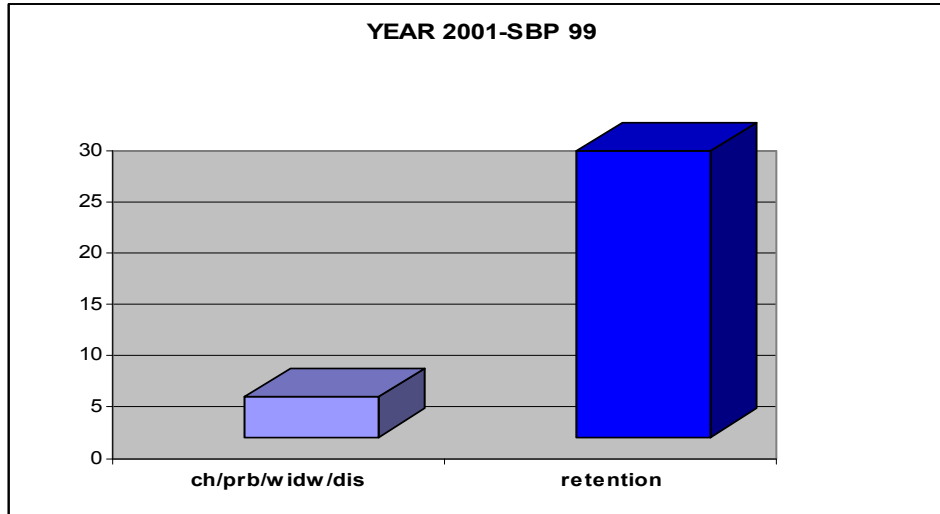
Summer Bridge Program 1999-2003

SBP	GENDER		YEAR									
	M	F	2000		2001		2002		2003		2004	
			w/c/p/d	r	w/c/p/d	r	w/c/p/d	r	w/c/p/d	r	w/c/p/d	r
1999	23	17	8	32	4	28	1	27	1	24		16
									2 GRAD		4 GRAD	
2000	28	13			13	28	4	24	3	21	10	11
2001	29	26					7	48	14	34	7	27
2002	24	16					2	38	13	25	2	23
2003	38	16									17	37

W=withdrawal; C=changed major; P=probation; D=disqualified; R=retained

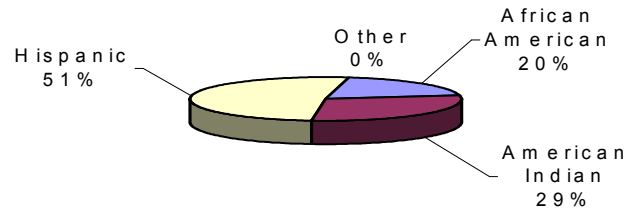
Summer Bridge Program 1999



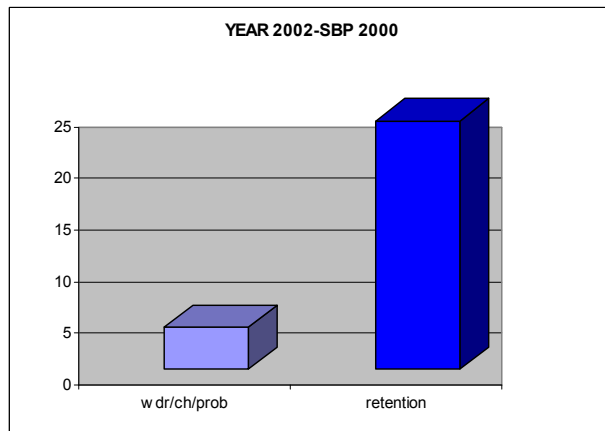
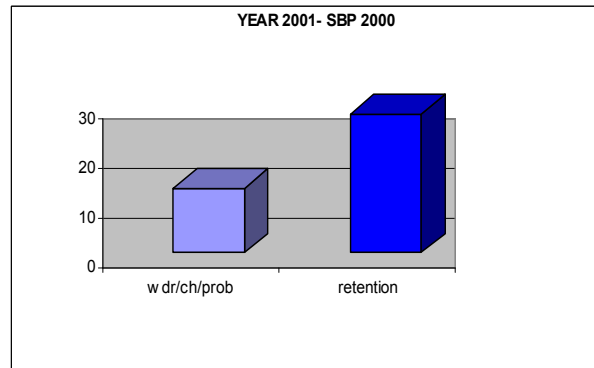
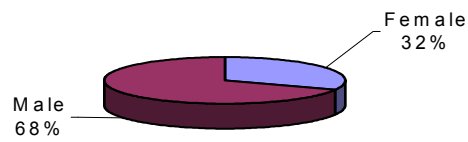


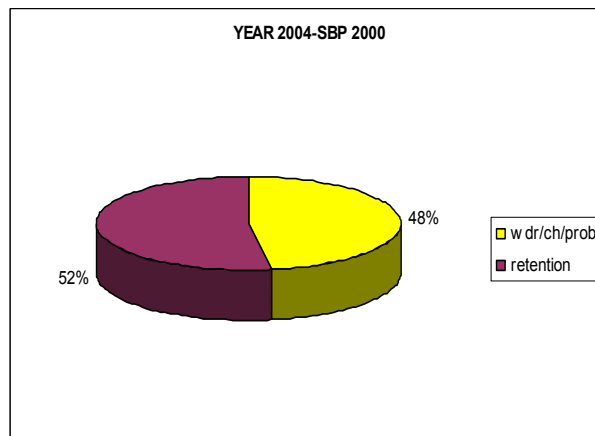
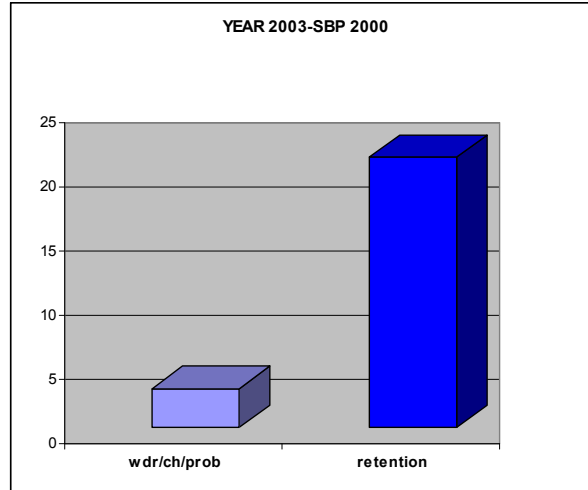
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Ethnicity Distribution



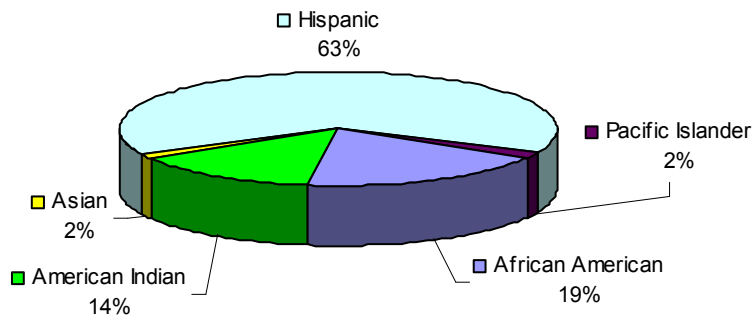
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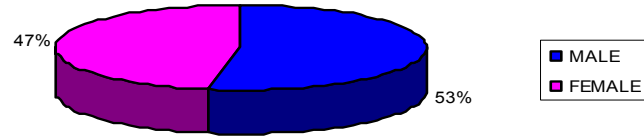


SUMMER BRIDGE PROGRAM 2001

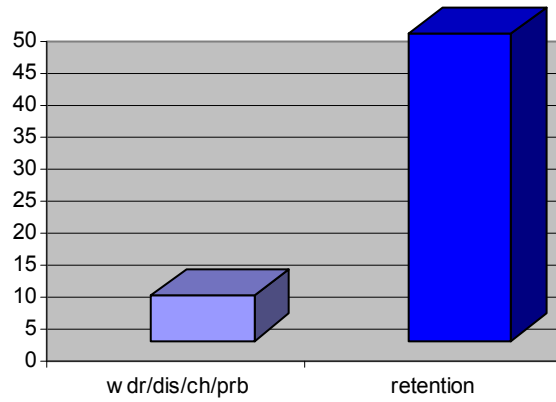
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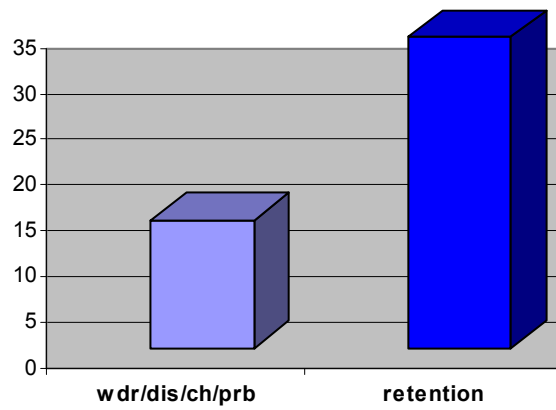
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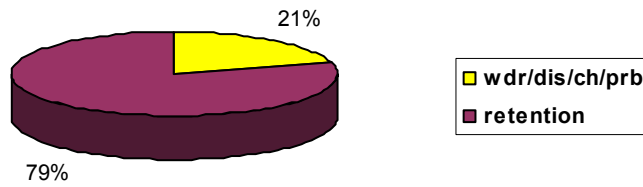
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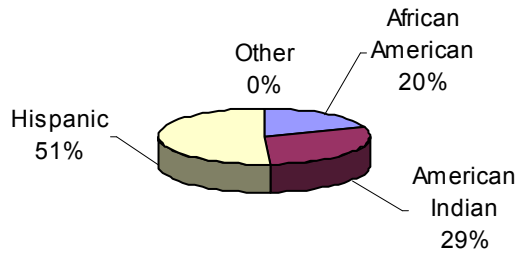


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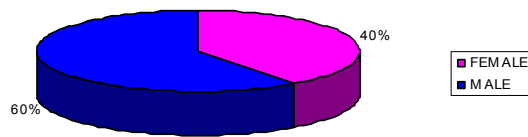


Summer Bridge Program 2002

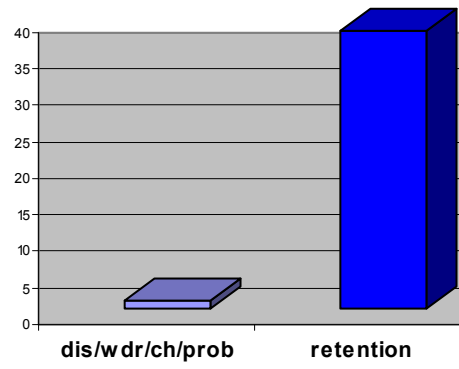
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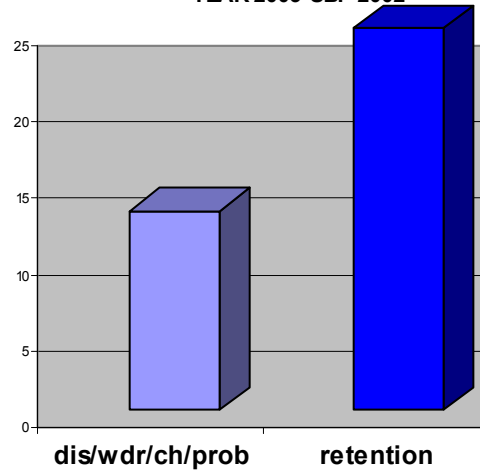
Gender Distribution



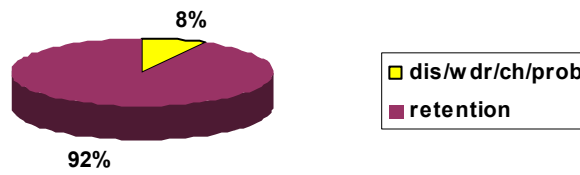
YEAR 2002-SBP 2002



YEAR 2003-SBP 2002

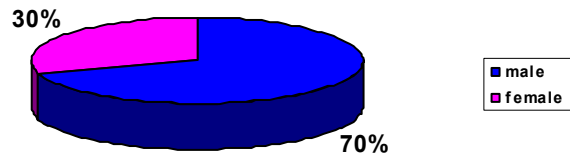


YEAR 2004-SBP 2002

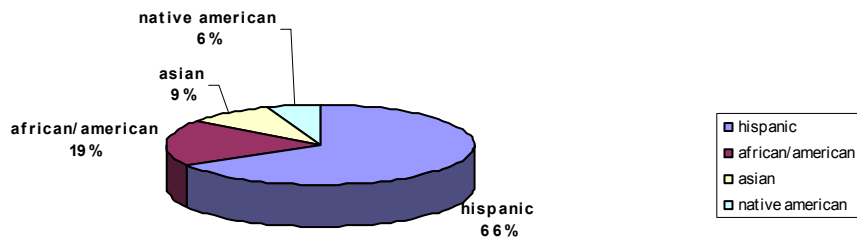


Summer Bridge Program 2003

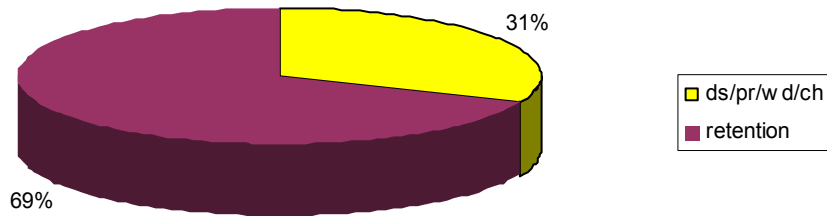
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ETHNICITY SBP 2003



YEAR 2004-SBP 2003



XII. Program Uniqueness

The MEP SBP at ASU provides under-represented students the opportunity to get a jump start on their first year of the engineering experience. The program is unique because:

- it has specific activities for students by their major
- offers a scholarship opportunity, provides a two week residential experience
- facilitates a team and peer support environment
- provides students with the opportunity to meet staff and faculty prior to enrollment
- introduces students in industry members through company tours and team presentations

This combination of activities is only provided in the MEP SBP program in the Fulton School of Engineering.

XIII. Summary

Over the last five years, 231 students have participated in the program. As a recruitment tool the program has shown overwhelming success with 100% of these students enrolling in engineering the fall semester following the program. All of the students were invited to participate in ASE 194, which has been highly successful in allowing the program staff to continue to work with these students on a weekly basis and handle situations as they arise. Having the class as a community has also helped the students as they continue cross-cultural assistance to one another as well as celebrate their individual accomplishments together.

As a retention tool, the program also shows very positive success. Most notable is the one-year retention rate of the minority students that participate in the bridge program compared to the minority students that did not. The SBP has certainly been a factor in the increase in minority students in engineering. Some SBP participants have stated that before the program they were sure they were coming to ASU, but were not sure that engineering was the right major. The SBP convinced them. Other students said that before SBP, they had decided on engineering, but were not sure about ASU as their school. The SBP convinced them as well. Thus, the MEP Summer Bridge Program has been a successful recruitment and retention program for under-represented students in engineering.

XIV. References

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XV. Biographical Information

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