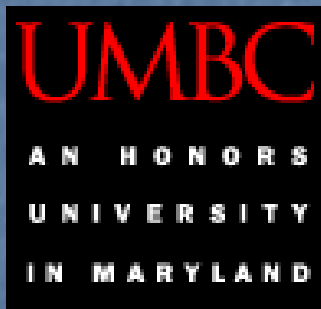


Broadening Participation in Graduate Education



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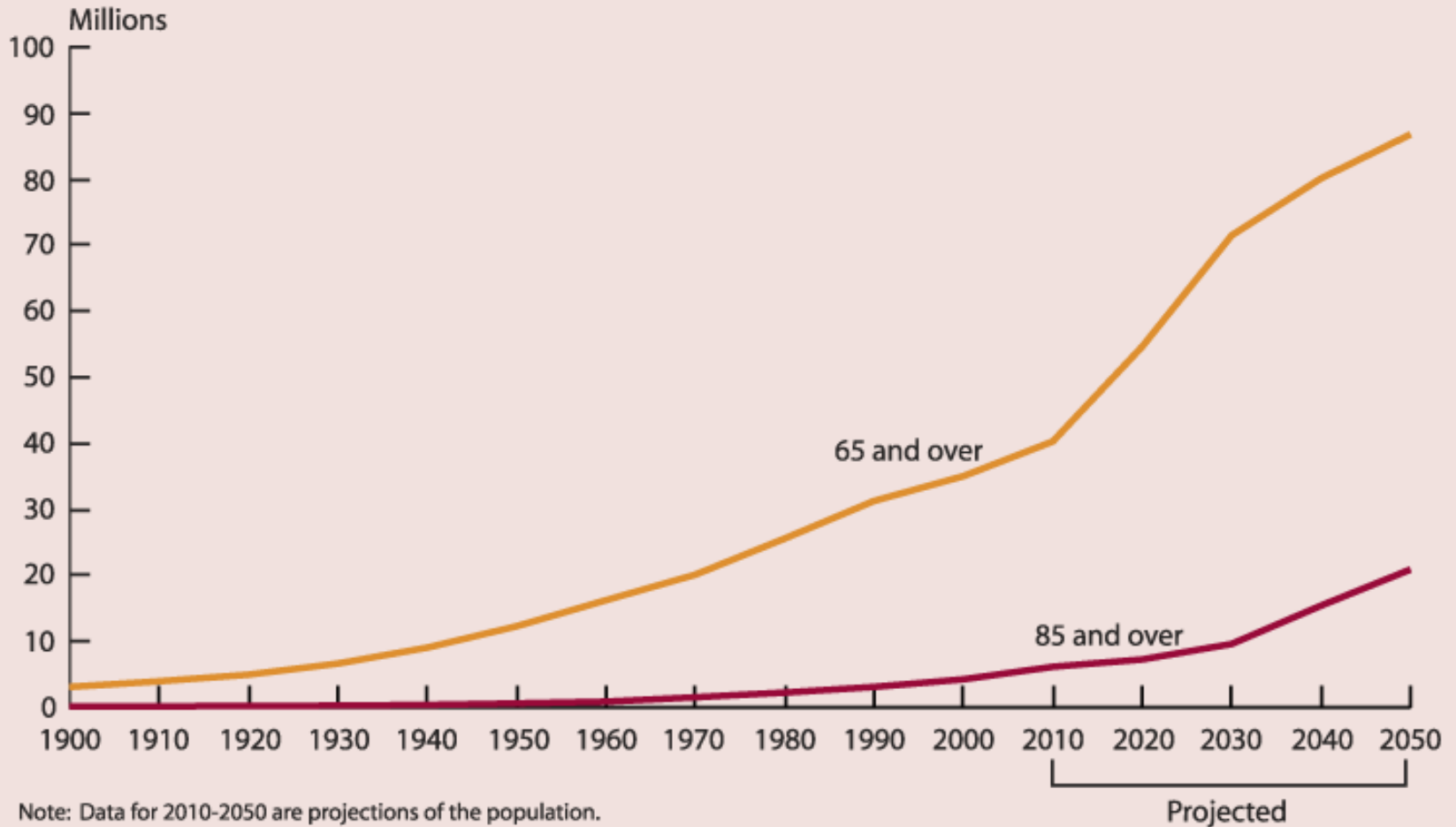
CGS 46th Annual Meeting – December 7, 2006 – Washington, D.C.

Demographic Changes

A. Aging Baby Boom Generation

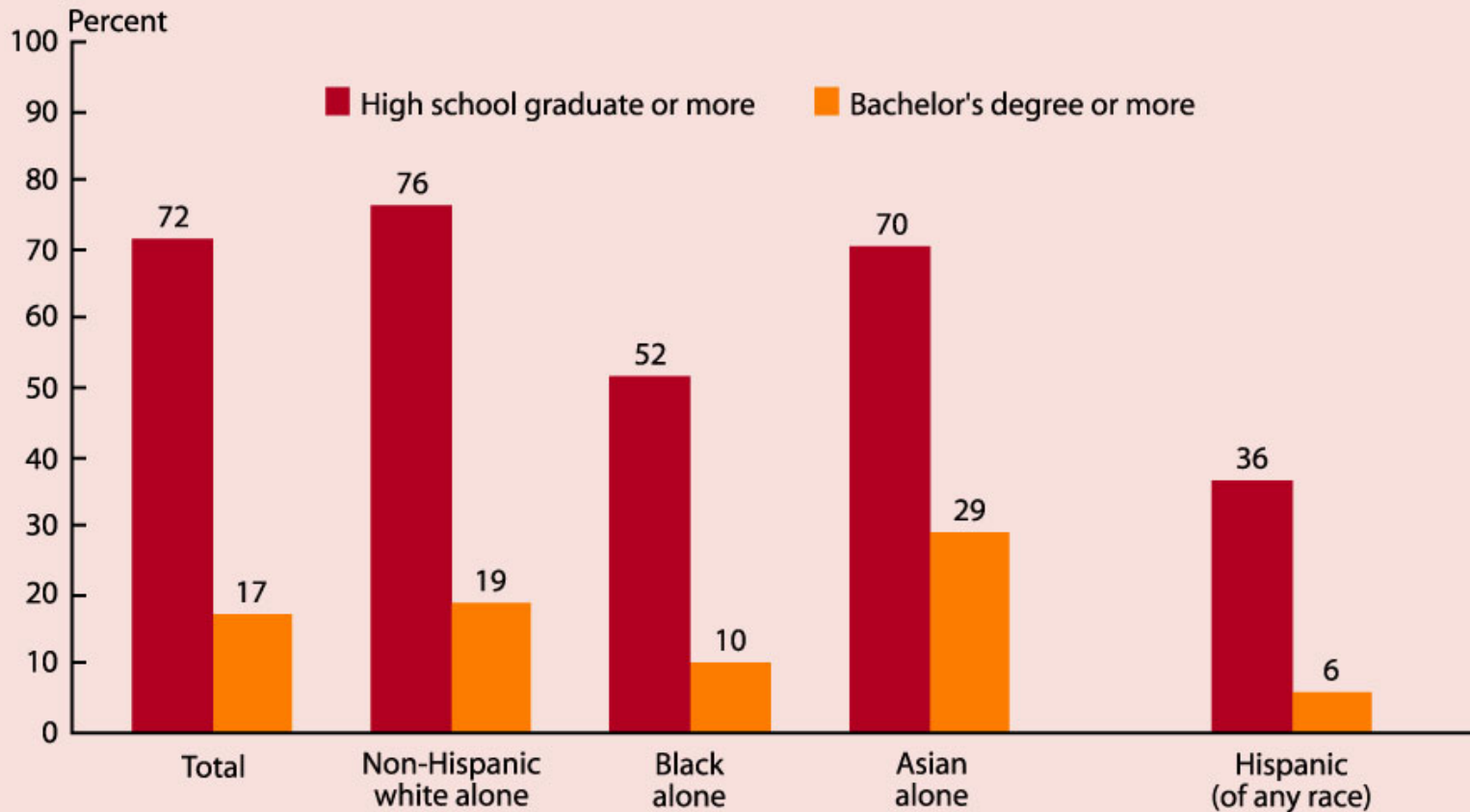
Indicator 1 - Number of Older Americans

Number of people age 65 and over, by age group, selected years 1900-2000 and projected 2010-2050



Note: Data for 2010-2050 are projections of the population.
Reference population: These data refer to the resident population.
Source: U.S. Census Bureau, Decennial Census and Projections.

Educational attainment of the population age 65 and over, by race and Hispanic origin, 2003



Note: The term "non-Hispanic white alone" is used to refer to people who reported being white and no other race and who are not Hispanic. The term "black alone" is used to refer to people who reported being black or African American and no other race, and the term "Asian alone" is used to refer to people who reported only Asian as their race. The use of single-race populations in this report does not imply that this is the preferred method of presenting or analyzing data. The U.S. Census Bureau uses a variety of approaches.

Reference population: These data refer to the civilian noninstitutionalized population.

Source: U.S. Census Bureau, Current Population Survey, Annual Social and Economic Supplement.

Demographic Changes

B. Greater Diversity in Undergraduate Education

- Returning students
- African American students
- Native American students
- Latinos
- Students with families and jobs

Socio-Economic Changes

Employers requiring a better trained and more technologically savvy workforce

- Service economy
- Value in creative thinking

Growth through productivity

- Use of technological tools

Fastest Growing Areas of Higher Education

- Graduate Certificate Programs
- Master's Degrees

National Center for Education Statistics
2006-2016

A 19% increase in graduate student enrollment

Totaling 2.5 million students

Rise of Private-For-Profit Educational Providers

- Low overhead
- Convenient
- Flexible
- Designed for working adults

Adult workers need career-related Education that is flexible

- Time of day
- Food
- Parking
- Part-time
- Efficiently delivered
- Childcare

Desire for On-line Education

- 65% of schools offering graduate face-to-face courses also offer graduate courses online
- Growth in online education enrollments is about 18% per year (360,000 student per year), or 1.98 million students in 2003
2.35 million students in 2004

source: The Sloan Consortium

Special Challenges in Research Universities to Changing Demographics and Socio Economic Transition

- A large international student population
 - In Engineering over 50% of Ph.D.s granted are to international students
- Domestic students have been a shrinking per cent of total STEM doctoral students
- Why reach for domestic students when there is an ample supply of well prepared international students?

Special Challenges

continued

- Faculty at research universities want to prepare scholars like themselves; less interest in preparing Master's students for workforce needs
- Why should faculty invest time in a graduate program that provides little professional reward for tenure-track faculty?

Master's Degrees at Research Universities

- A consolation prize?
- A degree en route to the Ph.D.

Alfred P. Sloan Foundation

- Need a better definition of the Master's degree
- Helped establish the Professional Science Master's Degree
 - A core of advanced disciplinary or interdisciplinary course work
 - An external advisory board of professionals
 - Courses in business ethics, and management

Alfred P. Sloan Foundation

continued

- Culturation of workplace skills such as communications
- A relevant internship
- Team oriented projects in collaboration with industry or government to teach research methods and leadership skills

Case study: UMBC

- Carnegie Classified Research University – High Research Activity
- 40 years old
- Suburban Campus near BWI Airport
- \$85 M in grants and contracts
 - 450 tenure track faculty
- Strong in science, technology, mathematics, and engineering (STEM)

Case study: UMBC

- 12,300 students
 - 10,000 undergraduates
 - 2,300 graduate (700 Ph.D. students)
- Ranked #7 in the U.S. in NASA funding
- 2 NSF Career Awards each year for the past 5 years; 1 Presidential Award in Biology

Case study: UMBC

- After initial reluctance, support for a new Professional Science Master's Degree among leading scientists on campus
- A faculty priority to recruit and train domestic, women and underrepresented minority graduate students in the STEM fields.

Professional Master's Program in Biotechnology

- Strong support from Senior Administration
- Michael Teitelbaum - Sloan Foundation visit
- Leader emerges from Biology Department
- Integrated new courses from Biology, Chemistry, Biochemical Engineering, and Management
- Off-site location with free parking
- All courses in the evening



Meyerhoff Scholarship Program at UMBC

Facts

- Studies indicate that proportionately higher numbers of African Americans aspire initially to STEM undergraduate degrees than do Caucasians.

Source: Elliott et al. (1995), NSF.

- UMBC received more than 1,600 nominations and more than 470 applications (89% from Maryland students) for 50 available positions in the 2006 undergraduate Freshman Meyerhoff Class.

Meyerhoff Scholars History

- Founded in 1988.
- Initially, the program addressed the shortage of African American males pursuing terminal undergraduate degrees in STEM fields.
- First Class of 19 African American males arrived in 1989; women included in 1990.
- Open to all high-achieving high school students in 1996.
- 332 Graduates since 1993.

Major Program Components

- Summer Bridge Program
- Mentoring
- Summer Research Experience
- Monetary Support
 - Including room and board, tuition and fees, and a book allowance
- Cultural Arts
- Academic Advising
- Scientific Conferences
- Graduate and Professional School Placement
- Staff Support

Indicators of Success

- Overall 14-Year Retention rate > 95%
- Average grade point average of 3.53 for all current students
- Broad distribution of majors in science and technology:

Biological Sciences

Biochemistry

Computer Science

Chemical Engineering

Mechanical Engineering

Mathematics

Chemistry

Computer Engineering

Physics

Electrical Engineering

Interdisciplinary Studies

Aero-Space Engineering

Biochemical Engineering

Engineering

Comparison of the Number of Doctoral Recipients in Selected Sciences and Engineering 2004

	<u>Biological Sciences</u>		<u>Chemistry</u>		<u>Computer Science</u>		<u>Physics & Astronomy</u>		<u>Engineering</u>	
		<u>% of Total</u>		<u>% of Total</u>		<u>% of Total</u>		<u>% of Total</u>		<u>% of Total</u>
Total Doctoral Recipients*	5937		1987		949		1351		5776	
Total US Citizens	3955	67%	1110	56%	398	42%	628	46.5%	1941	33.6%
African American	136	2.29%	39	1.96%	15	1.58%	9	.67%	84	1.45%
Latino/Hispanic	174	2.93%	38	1.91%	12	1.26%	18	1.33%	73	1.26%
American Indian	14	0.24%	4	0.20%	2	0.21%	1	0.07%	5	0.09%

**Includes individuals who did not report their citizenship at time of survey.
(Source: Survey of Earned Doctorates Summary Report 2004).*

Ph.D. Production at UMBC

- 75 – 85 Ph.D.s awarded annually in 17 disciplines
- 65% of Engineering Ph.D. students are international
- Small number of Ph.D.s awarded to underrepresented minority students (URMS) in STEM fields prior to 2000

IMSD Graduate Program

- Received MBRS-IMSD* grant from the MORE Division of the NIGMS** in the Spring of 1996 and began program
- Only 2-3 applications per year from 1996-1998
- 1998 - New Program Director
 - Program Modifications
 - **Hired Full-time Program Coordinator**

*Minority Biomedical Research Support Initiative for Minority Student Development

** National Institute for General Medical Sciences

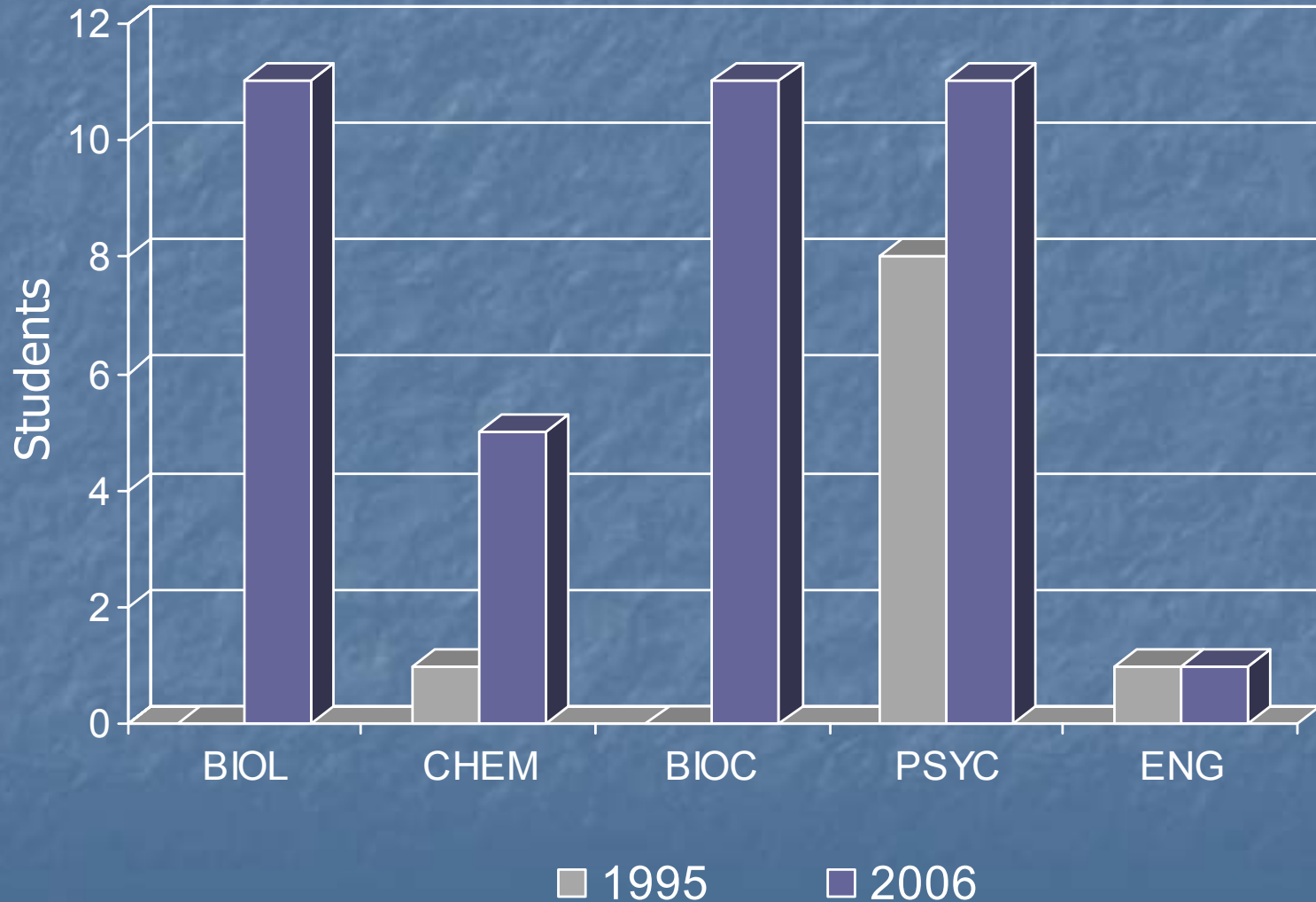
IMSD Graduate Program Components

- **Outreach**
 - Summer Research Program for Undergraduates (non-UMBC)
- **Summer Bridge Program**
 - Ten weeks for first-year students
 - Research rotation
 - Technical Writing Course
 - Social activities
- **Monthly Meetings**
 - Seminars by mentors and guest speakers, especially established underrepresented scientists
- **Annual Weekend Retreat**
- **Student travel to scientific meetings to present thesis research results**
- **Counselor to provide consultation, assistance and support**
- **Undergraduate Summer Biomedical Training Program**

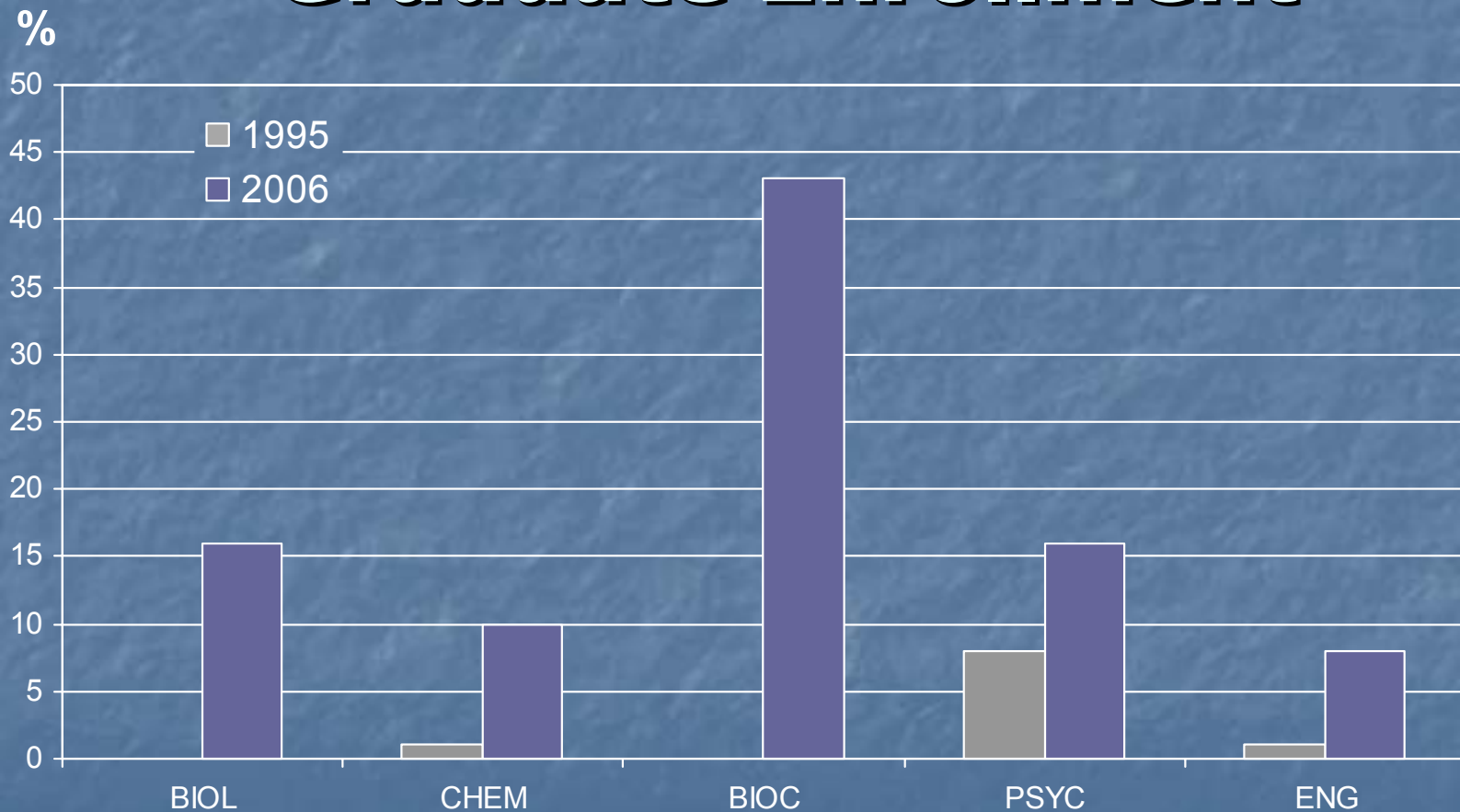
Recruitment

- Graduate Horizons Program (2001)
- Summer Horizons Program (2002)
- Faculty Horizons Program (2004)

Underrepresented Minority Graduate Enrollment by Department

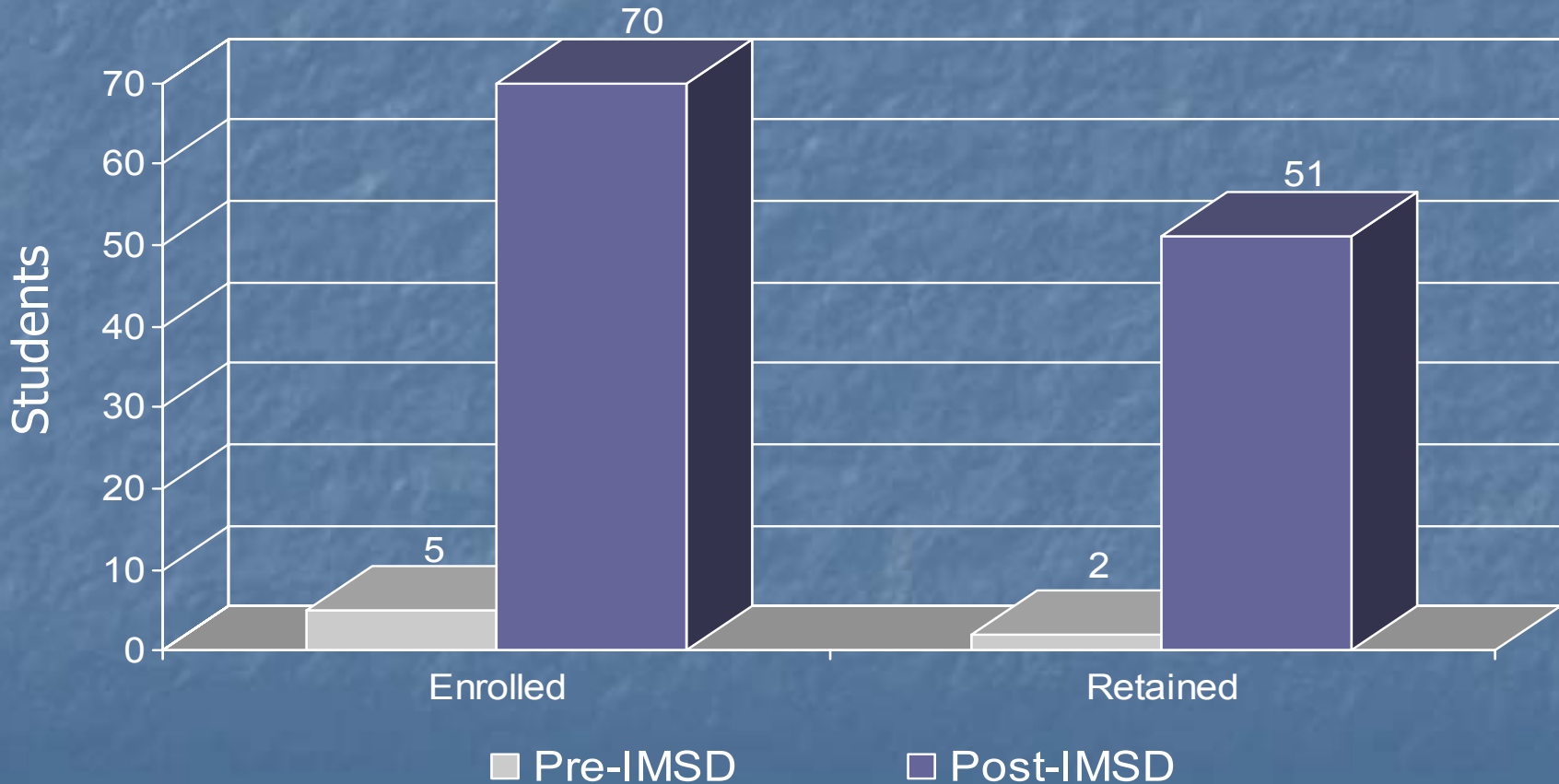


Percentage of Underrepresented Minority Graduate Enrollment



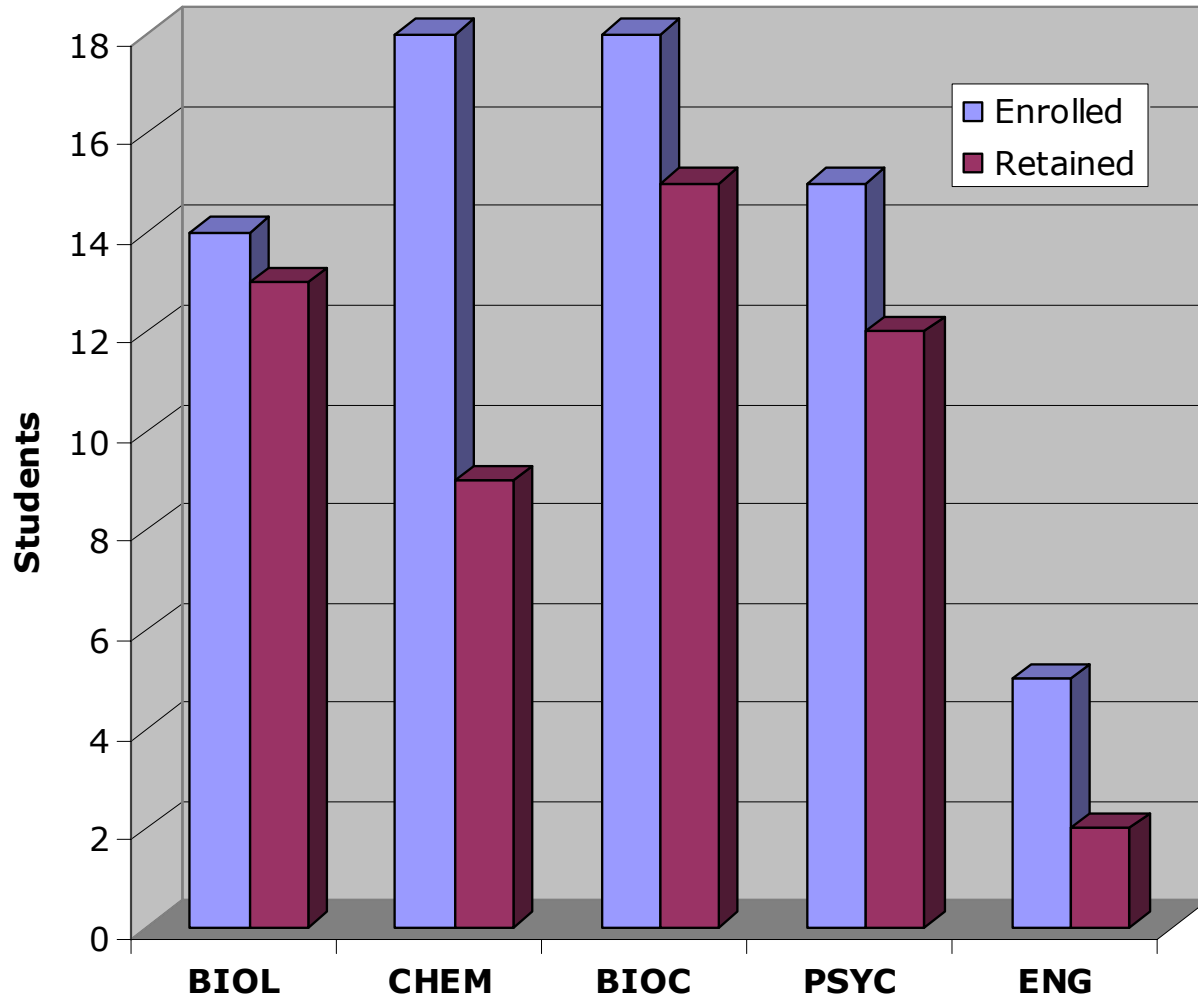
Meyerhoff Graduate Retention

Current Retention 2006



73% Retention Rate (\geq Departmental Averages)

Meyerhoff Initiative for Minority Student Development Program Retention by Major



Additional Funding

- In 2002, UMBC received a \$3M, 5-year, Alliances for Graduate Education and the Professoriate (AGEP) Award from NSF.
- In 2004, received 3 Graduate Assistance in Areas of National Need (GAANN) Awards support.
- In 2006, received Integrative Graduate Education and Research Traineeship (IGERT) program.

Annual Retreat



Key Components of a Comprehensive Approach to Inclusiveness in Doctoral Education

- **Lesson 1: Identify and cultivate the campus leadership—administrative, academic, and intellectual—to assist in developing initiatives that foster student retention and success.**
- **Lesson 2: Work continually to gain faculty and staff engagement, involvement, and ownership in creating a campus atmosphere that fosters student success among an inclusive community of scholars.**
- **Lesson 3: Work with graduate program admissions committees to establish appropriate recruitment strategies and admissions criteria.**

Key Components of a Comprehensive Approach to Inclusiveness in Doctoral Education

- **Lesson 4: Ensure that every graduate program has in place a system that supports a successful mentoring relationship throughout the student's progress.**
- **Lesson 5: Have in place a mechanism for record-keeping and reporting to monitor graduate student and departmental successes and failures.**
- **Lesson 6: Provide an extensive orientation to new graduate students and establish a support system to assist in the transition to the culture of doctoral education and research.**

Key Components of a Comprehensive Approach to Inclusiveness in Doctoral Education

- **Lesson 7: Establish within each program a clearly articulated policy regarding financial support for doctoral students.**
- **Lesson 8: Establish recognition and rewards for students and mentors as they progress over the academic hurdles.**
- **Lesson 9: Recognize that underrepresented minority and women doctoral students are especially vulnerable, and put into place programs and services that foster engagement and minimize potential marginalization.**
- **Lesson 10: Prepare students deliberately and explicitly for the next phase of their lives—life after graduate school.**

