# AC 2007-2751: CHANGES IN PHDS AWARDED AND IN NEW ENROLLEES IN STEM GRADUATE PROGRAMS BY GENDER AND RACE/ETHNICITY

**Yolanda George, AAAS**

Yolanda Scott George is Deputy Director and Program Director, Education and Human Resources Programs, American Association for the Advancement of Science (AAAS). She has served as Director of Development, Association of Science-Technology Centers, Washington, DC; Director, Professional Development Program, University of California, Berkeley, CA, a precollege academic enrichment, university retention, and pre-graduate school program in SMT for minorities and women; and as a research biologist at Lawrence Livermore Laboratory, Livermore, CA involved in cell cycle studies using flow cytometer and cell sorters.

George conducts evaluations, project and program reviews, and evaluation workshops for both the National Institutes of Health and National Science Foundation, as well as reviews SMT proposals for private foundation and public agencies, including the Sloan Foundation, the Carnegie Corporation of New York, the Ford Foundation and the European Commission. She develops and coordinates conferences and workshops related to recruitment and retention of minorities, women, and persons with disabilities in SMT. She works with UNIFEM, UNESCO, and non-governmental organizations on gender, science, and technology initiatives related to college and university recruitment and retention and women leadership in SMT.

Over the last 25 years she has raised over $70 million for a variety of SMT education initiatives for colleges and universities, associations, and community-based groups. She currently serves as PI or Co-PI on six grants related to developing evaluation capacity of PIs, project directors and evaluators for the NSF Alliance for Graduate Education and the Professoriate (AGEP); development of a digital library for biology educators in undergraduate, graduate and professional schools; HBCUs; and international gender, science, and technology.

She serves on the board of the International Women in Science and Engineering Network (INWES); American Institute of Biological Sciences (AIBS), Education Committee; Award Advisory Committee, Maria Mitchell Women in Science Award; and the South Dakota Biomedical Research Network Advisory Committee. George has authored or co-authored over 50 papers, pamphlets, and hands-on science manuals. She received her B.S. and M.S. from Xavier University of Louisiana and Atlanta University in Georgia, respectively.

**Patricia B. Campbell, Campbell-Kibler Associates, Inc.**

Patricia B. Campbell, PhD, President of Campbell-Kibler Associates, Inc, has been involved in educational research and evaluation with a focus on formal and informal science, technology, engineering and mathematics (STEM) education and issues of race/ethnicity, gender and disability since the mid 1970's. Her BS, from LeMoyne College is in Mathematics, her MS, from Syracuse University, is in Instructional Technology and her PhD, also from Syracuse University, is in Teacher Education.

Dr. Campbell, formerly a professor of research, measurement and statistics at Georgia State University, has authored more than 100 publications including co-authoring Engagement, Capacity and Continuity: A Trilogy for Student Success and Upping the Numbers: Using Research-Based Decision Making to Increase Diversity in the Quantitative Sciences with Eric Jolly and Lesley Perlman. She also is a co-author, with Beatriz Chu Clewell, of What Do We Know?: Seeking Effective Math and Science Education and Defying Demographics: Creating Good Schools in Challenging Neighborhoods.

Dr. Campbell's professional activities have been diverse ranging from doing training in educational evaluation and research in South Africa and Uganda to serving as an expert witness in the sex discrimination case brought against the Citadel. She was a member of the US Department

of Education's Impact Review Panel and was part of the team involved in the development of the National Science Foundation publication Infusing Equity in Systemic Reform: An Implementation Scheme. She received the Betty Vetter Research Award from Women and Engineering Program Advocates Network (WEPAN) and the Willystine Goodsell Award from the American Educational Research Association.

**Tom R. Kibler, Campbell-Kibler Associates, Inc**

Tom R. Kibler, Vice President for Systems at Campbell-Kibler Associates, Inc., has been a computer professional for over 30 years. He was formerly Vice President of Symmetrix with primary responsibility for advanced systems architecture, technical recruiting and technical innovation for both Symmetrix and corporate clients.

**Rosa Carson, Campbell-Kibler Associates, Inc.**

Rosa Carson, Research Associate at Campbell-Kibler Associates Inc. is a coauthor of "What Do We Know? Seeking Effective Math and Science Instruction," and "Adding Courses: Increasing Options," from the Lessons from GE Foundation's Math Excellence. Ms. Carson previously worked at the Harvard School of Public Health, focusing on the impact of race/ethnicity, gender and socioeconomic strata on public health. She also served as a liaison and interpreter at the Proyecto Lingüistico Quetzalteco de Español in Quetzaltenango, Guatemala, where she aided in transitioning international students into an immersive language-homestay program and interpreted political lectures from Spanish to English.

**Shirley M. Malcom, AAAS**

Shirley Malcom is Head of Education and Human Resources Programs of the American Association for the Advancement of Science (AAAS). The directorate includes AAAS programs in education, activities for underrepresented groups, and public understanding of science and technology. Dr. Malcom was head of the AAAS Office of Opportunities in Science from 1979 to 1989. Between 1977 and 1979, she served as program officer in the Science Education Directorate of the National Science Foundation (NSF). Prior to this, she held the rank of assistant professor of biology, University of North Carolina, Wilmington, and for two years was a high school science teacher.

Dr. Malcom received her doctorate in ecology from The Pennsylvania State University; master's degree in zoology from the University of California, Los Angeles; and bachelor's degree with distinction in zoology from the University of Washington. In addition she holds thirteen honorary degrees.

Dr. Malcom serves on several boards, including the Howard Heinz Endowment. She is an honorary trustee of the American Museum of Natural History, a Regent of Morgan State University, and a trustee of Caltech. She has chaired a number of national committees addressing education reform and access to scientific and technical education, careers and literacy. Dr. Malcom is a former trustee of the Carnegie Corporation of New York and a fellow of the AAAS and the American Academy of Arts and Sciences. In 2003, she received the Public Welfare Medal of the National Academy of Sciences, the highest award bestowed by the Academy.

Dr. Malcom was a member of the National Park System Advisory Board from 1999-2003. She served on the National Science Board, the policymaking body of the National Science Foundation from 1994 to 1998, and from 1994-2001 served on the President's Committee of Advisors on Science and Technology.

# Changes in PhDs Awarded and in New Enrollees in STEM Graduate Programs by Gender and Race/Ethnicity

One of the goals of the National Science Foundation (NSF) Alliances for Graduate Education and the Professoriate (AGEP) Program, which began in 1998, is to increase the number of underrepresented minorities (URM) receiving PhD degrees in Science, Technology, Engineering and Mathematics (STEM) (See program description at bottom of page)[1]. As part of this effort, participating institutions submitted data on their students, including PhD recipients and new enrollees in graduate programs, by gender and by race/ethnicity[2]. The following is an overview of the results-to-date.

## Summary

- An analysis of the number of PhDs awarded to URM from 1997/98 to 2004/05 at 62 AGEP institutions[3] indicates that the annual overall number of PhDs awarded to URM in STEM fields increased from 559 to 613 or by 54. This change represents an increase of 9.7%. During the same period, the annual overall number and percent of STEM PhDs for all other U.S. citizens or permanent residents (non-URM) decreased from 5,774 to 5,424 (-350) or -6.1% (Table 1).

- An analysis of the number of PhDs awarded to URM from 1997/98 to 2004/05 at 61 AGEP institutions indicates that the annual overall number of PhDs awarded to URM in the Natural Sciences & Engineering (NS&E) fields increased from 350 to 397 or by 47. This change represents an increase of 13.4%. During the same period, the annual overall number and percent of PhDs awarded in NS&E to all other U.S. citizens or permanent residents (non-URM) decreased from 4,266 to 4,084 (-182) or -4.3% (Table 2).

- Changes in the annual overall number and percent of NS&E PhDs awarded to URM from 1997/98 to 2004/05 at 61 AGEP institutions were mostly due to increases in the number of PhDs awarded to Hispanic females (26 more or 40%) (Table 2 and Figures 1 and 2). These changes in the annual number and percent of PhDs awarded to Hispanic females were

[1] Program Description: The goal of the National Science Foundation (NSF) Alliance for Graduate Education and the Professoriate (AGEP) Program is to increase the number of underrepresented minority students pursuing advanced study, obtaining doctoral degrees, and entering the professoriate in STEM disciplines (including Social Sciences). Alliances participating in this program are expected to engage in comprehensive institutional cultural changes that will lead to sustained increases in the conferral of STEM doctoral degrees significantly exceeding historic levels of performance. Specific objectives of AGEP are: (1) to develop and implement innovative models for recruiting, mentoring, and advancing minority students in STEM doctoral programs, and (2) to develop effective strategies for identifying and supporting underrepresented minorities who want to pursue academic careers.

[2] To reduce the volatility of annual "PhD-awarded" data, the data were grouped into three categories: the Pre-AGEP Years (1997/98 to 1999/00); the Early AGEP Years (2000/01 to 2002/03); and the Mid-AGEP years (2003/04 to 2004/05). Underrepresented minorities (URM) include African Americans, Hispanic Americans, American Indian/Native Alaskans, and Native Hawaiian/Pacific Islanders. Also note that the numbers of URM may be lower because many institutions combine Pacific Islanders with Asian Americans.

[3] The number of institutions reporting data by a broad STEM category may change throughout the document. As can been noted in the tables, not all 62 institutions had data for all of the categories.

primarily due to increases in the Physical Sciences (16 more or 114%) and Engineering and Computer Sciences (6 more or 75%) (Tables 6 and 4).

- Changes in the annual overall number and percent of STEM PhDs awarded from 1997/98 to 2004/05 at 62 AGEP institutions for all other female U.S. citizens or permanent residents (non-URM) were due to increases in the Biological/Agricultural Sciences (124 more or 19.3%) and in the Physical Sciences (31 more or 9.9%) (Tables 3 and 6). The annual number and percent of STEM PhDs awarded to all other male U.S. citizens or permanent residents (non-URM) decreased in all STEM fields, except in the Biological/Agricultural Sciences (Tables 3 – 8 and Figures 1 and 2).

- There was no change in the number and percent of PhDs awarded from 1997/98 to 2004/05 at 57 AGEP institutions to URM in Engineering and Computer Sciences (remains at 119). However, female URM gained in the number and percent of Engineering and Computer Sciences PhDs awarded (14 more or 48.3%), while male URM decreased (-14 or -15.6%). For all other U.S. citizens or permanent residents (non-URM), the number and percent of PhDs awarded from 1997/98 to 2004/05 at 57 AGEP institutions in Engineering and Computer Sciences decreased (-218 or -14.9%) (Table 4).

This analysis of the annual number and percent of PhDs awarded to URM represents changes six years after the implementation of the AGEP Program. Given that time-to-PhD degree can be as long as seven years in some STEM fields, most of the increases in the annual number of PhDs awarded to URM could be due to increased retention of URM in STEM PhD programs.

- The overall number and percent change in new enrollee URM in graduate programs in NS&E fields at 61 AGEP institutions from 1997/98 to 2005/06 increased by 25.1% or 361 (from 1,434 to 1,795), while the number and percent change in all other U.S. citizens or permanent residents (non-URM) increased by only 15.6% or 1,792 (from 11,506 to 13,298). Except for Native Hawaiian/Pacific Islander females, percent gains in overall new enrollees in NS&E were higher for females than males (Table 10 and Figure 3).

- The number and percent of new enrollee URM in Engineering and Computer Sciences graduate programs at 59 AGEP institutions from 1997/98 to 2005/06 increased by 25.6% or 178 (from 695 to 873), while the number and percent change for all other U.S. citizen or permanent residents (non-URM) increased by only 16.1% or 886 (from 5,514 to 6.400). Changes in the number and percent of new enrollees in Engineering and Computer Sciences graduate programs at the 59 AGEP institutions from 1997/98 to 2005/06 were higher for male URM (147 more or 31.1%) than for female URM (31 more or 14%) (Table 12).

**PhD Recipient Findings**

As indicated in Table 1, for 2003/04 to 2004/05:

- Of 6,037 STEM PhDs awarded to U.S. citizens or permanent residents at 62 AGEP institutions, 613 or 10.2% were awarded to URM. Of the 613 STEM PhDs awarded to URM, 302 or 49.3% were awarded to female URM and 311 or 50.7% were awarded to male URM.

- Of the 302 PhDs awarded to female URM at 62 AGEP institutions, 47.7% were awarded to African American females, 46% were awarded to Hispanic American females, and 6.3% were awarded to American Indian/Native Alaskan and Native Hawaiian/Pacific Islander females. Of the 311 STEM PhDs awarded to male URM at 62 AGEP institutions, 51.4% were awarded to Hispanic American males, 42.1% were awarded to African American males, and 6.4% were awarded to American Indian/Native Alaskan and Native Hawaiian/Pacific Islander males.

- Of 5,424 STEM PhDs awarded to all other U.S. citizens or permanent residents (non-URM) at 62 AGEP institutions, females received 2,154 or 39.7% of the PhDs awarded and males received 3,270 or 60.3%.

- Of 2,456 STEM PhDs awarded to all female U.S. citizens or permanent residents at 62 AGEP institutions, 302 or 12.3% were awarded to female URM. Of 3,581 STEM PhDs awarded to all male U.S. citizens or permanent residents at 62 AGEP institutions, 311 or 8.7% were awarded to male URM.

An analysis of the number of PhDs awarded to URM from 1997/98 to 2004/05 at 62 AGEP institutions[4] indicates that the annual overall number of PhDs awarded to URM in STEM fields increased from 559 to 613 or by 54 or 9.7%. During the same period, the annual overall number and percent of STEM PhDs for all other U.S. citizens or permanent residents (non-URM) decreased from 5,774 to 5,424 (-350) or -6.1% (Table 1).

The increase in number of PhDs awarded to URM from 1997/98 to 2004/05 at 62 AGEP institutions was mostly due to an increase in the overall number of STEM PhDs awarded to female URM. The annual percent and overall number of STEM PhDs awarded to female URM increased by 47 or 18.4%, while the overall number of STEM PhDs awarded to male URM increased by only 7 or 2.3%. The gains for female URM were due to increases in NS&E PhDs awarded to Hispanic American females (40% increase or 26 more) (Figures 1 and Table 2). Hispanic females had high percent gains in the Physical Sciences (114% increase or 16 more); in Engineering and Computer Sciences (75% increase or 6 more); and in the Social Sciences (50% increase or 10 more) (Tables 6, 4 and 8).

However, changes in the number and percent of PhDs awarded were higher for male URM in the Biological/Agricultural Sciences (41.5% increase or 22 more) than for female URM in Biological/Agricultural Sciences (15.1% increase or 11 more) at the 62 AGEP institutions. In the Biological/Agricultural Sciences, gains in PhDs awarded to male URM were due to African American males (55.6% increase or 10 more), and gains for female URM were due to Hispanic American females (21.1% increase or 8 more) (Table 3). Also, changes in the number and percent of PhDs awarded at the 62 AGEP institutions increased for male URM in Mathematics (100% increase or 6 more) and decreased for female URM in Mathematics (50% decrease or 2 fewer) (Table 5).

[4] The number of institutions reporting data by a broad STEM category may change throughout the document. As can been noted in the tables, not all 62 institutions had data for all of the categories.

For all other U.S. citizens or permanent residents (non-URM), the gains in STEM PhDs were driven by females. The overall number of STEM PhDs awarded to females from 1997/98 to 2004/05 at 62 AGEP institutions increased by 79 or 3.8%, while the number of STEM PhDs awarded to males decreased by -429 or -11.6% (Table 1). Changes in the annual number of PhDs awarded in NS&E for all other female U.S. citizens or permanent residents (non-URM) increased from 1,279 to 1,406 (127 more) and decreased from 2,987 to 2,678 (-309) for all other male U.S. citizens or permanent residents (non-URM) (Figure 2 and Table 2).

Changes in the annual overall number and percent of STEM PhDs awarded at 62 AGEP institutions to all other female U.S. citizens or permanent residents were due to increases in the Biological/Agricultural Sciences (19.3% increase or 124 more) and in the Physical Sciences (9.9% or 31 more) (Tables 3 and 6). At the 62 AGEP institutions, the annual number and percent of STEM PhDs awarded to all other male U.S. citizen or permanent residents (non-URM) decreased in all STEM fields, except in the Biological/Agricultural Sciences (Tables 3-8).

As Table 4 indicates, for 2003/04 to 2004/05:

- Of the 1,363 PhDs awarded in Engineering and Computer Sciences to U.S. citizens or permanent residents at 57 AGEP institutions, 119 or 8.7% were awarded to URM.

- Of the 119 PhDs awarded in Engineering and Computer Sciences to URM at 57 AGEP institutions, 43 or 36.1% were awarded to female URM and 76 or 63.9% were awarded to male URM. Of the 43 PhDs awarded to female URM, 60.5% were awarded to African Americans, 32.5% were awarded to Hispanic Americans, and 7% were awarded to American Indians/Native Alaskans and Native Hawaiians/Pacific Islanders. Of the 76 PhDs awarded in Engineering and Computer Sciences PhDs to male URM at 57 AGEP institutions, 52.6% were awarded to Hispanic Americans, 44.7% were awarded to African Americans, and 2.6% were awarded to American Indians/Native Alaskans and Native Hawaiians/Pacific Islanders.

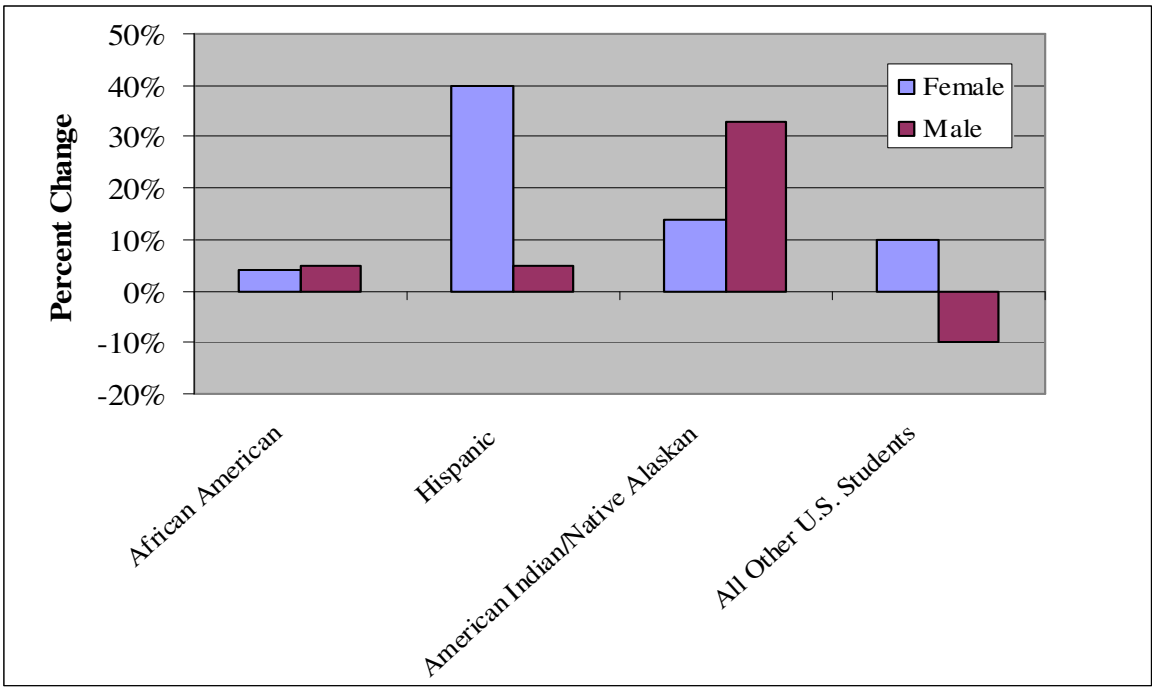
- Of the 1,244 PhDs awarded in Engineering and Computer Sciences to all other U.S. citizens or permanent residents (non-URM) at 57 AGEP institutions, 246 or 19.8% were awarded to females, and 80.2% or 998 were awarded to males.

- Of the 289 PhDs awarded in Engineering and Computer Sciences to all female U.S. citizens or permanent residents at 57 AGEP institutions, female URM received 43 or 14.9%.

- Of the 1,074 PhDs awarded in Engineering and Computer Sciences to all male U.S. citizens or permanent residents at 57 AGEP institutions, male URM received 76 or 7.1%.

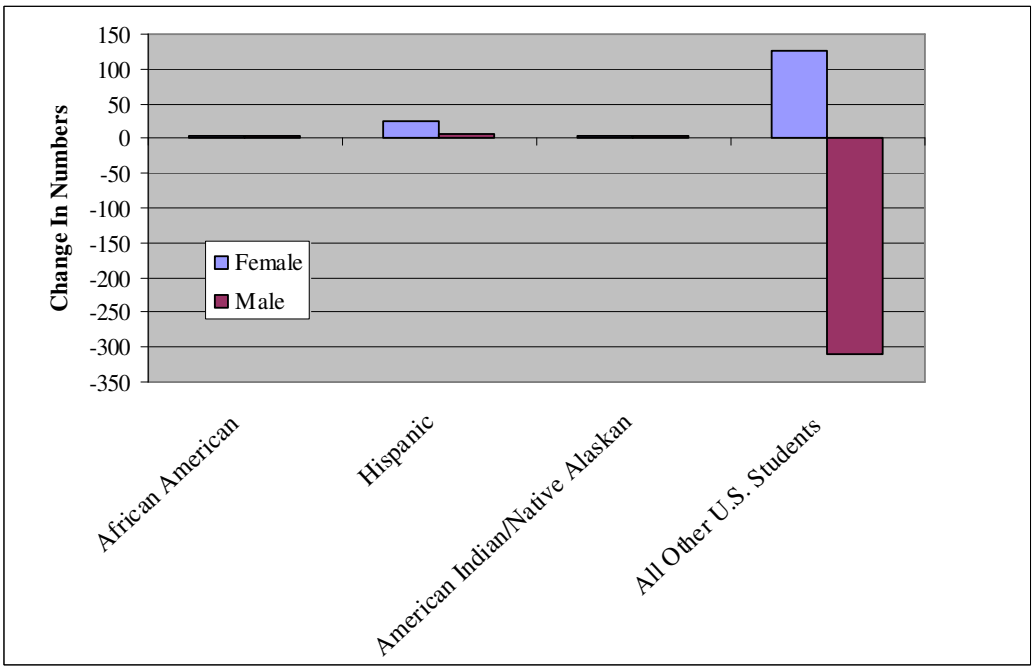
From 1997/98 to 2004/05, there was no change in the number and percent of PhDs awarded to URM in Engineering and Computer Sciences (remains at 119) at the 57 AGEP Institutions (Table 4). However, female URM gained in the number and percent of Engineering and Computer Sciences PhDs awarded (48.3% increase or 14 more), while all other groups decreased (Table 4).

**Figure 1: Changes in the Percent of PhDs Awarded in All Natural Sciences and Engineering in AGEP Institutions by Race/Ethnicity and Gender between Pre-AGEP (1997/98-1999/00) and Mid-AGEP (2003/04-2004/05) (N=61 Institutions)***




*See Table 2 for percentages.

**Figure 2: Changes in the Numbers of PhDs Awarded in All Natural Sciences and Engineering in AGEP Institutions by Race/Ethnicity and Gender between Pre-AGEP (1997/98-1999/00) and Mid-AGEP (2003/04-2004/05) (N=61 Institutions)***




*See Table 2 for numbers.

**Table 1 -- Changes in the Average Annual Number and Percent of PhDs Awarded in All STEM Fields from 1997/98 to 2004/05 (N=62 Institutions)**

| | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2004/05 | | Pre/Mid Years Number (Percent) Change | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 133 | 132 | 144 | 133 | 144 | 131 | 11 (8.2%) | -1 (-0.8%) |
| Hispanic American | 106 | 154 | 129 | 141 | 139 | 160 | 33 (31.1%) | 6 (3.9%) |
| American Indian/Native Alaskan | 15 | 14 | 20 | 13 | 16 | 14 | 1 (6.7%) | 0 (N/A) |
| Native Hawaiian/Pacific Islander | 1 | 4 | 3 | 2 | 3 | 6 | 2 (200%) | 2 (50%) |
| All URM | 255 | 304 | 296 | 289 | 302 | 311 | 47 (18.4%) | 7 (2.3%) |
| All Other U.S. | 2075 | 3699 | 2035 | 3238 | 2154 | 3270 | 79 (3.8%) | -429 (-11.6%) |

**Table 2 -- Changes in the Average Annual Number and Percent of PhDs Awarded in All Natural Sciences and Engineering from 1997/98 to 2004/05 (N=61 Institutions)**

| | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2004/05 | | Pre/Mid Year Number (Percent) Change | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 70 | 84 | 64 | 90 | 73 | 88 | 3 (4.3%) | 4 (4.8%) |
| Hispanic American | 65 | 110 | 68 | 103 | 91 | 116 | 26 (40%) | 6 (5.5%) |
| American Indian/Native Alaskan | 7 | 9 | 8 | 8 | 8 | 12 | 1 (14.3%) | 3 (33.3%) |
| Native Hawaiian/Pacific Islander* | 1 | 4 | 3 | 2 | 3 | 6 | 2 (200%) | 2 (50.0%) |
| All URM | 143 | 207 | 143 | 203 | 175 | 222 | 32 (22.4%) | 15 (7.3%) |
| All Other U.S. | 1279 | 2987 | 1270 | 2585 | 1406 | 2678 | 127 (9.9%) | -309 (-10.3%) |

**Table 3 -- Changes in the Average Annual Number and Percent of PhDs Awarded in Biological/Agricultural Sciences from 1997/98 to 2004/05 (N=50 Institutions)**

| | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2004/05 | | Pre/Mid Years Number (Percent) Change | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 30 | 18 | 27 | 22 | 32 | 28 | 2 (6.7%) | 10 (55.6%) |
| Hispanic American | 38 | 33 | 32 | 29 | 46 | 37 | 8 (21.1%) | 4 (12.1%) |
| American Indian/Native Alaskan | 4 | 0 | 3 | 2 | 6 | 6 | 2 (50%) | 6 (N/A) |
| Native Hawaiian/Pacific Islander | 1 | 2 | 1 | 0 | 0 | 4 | -1 (-100%) | 2 (100%) |
| ALL URM | 73 | 53 | 63 | 53 | 84 | 75 | 11 (15.1%) | 22 (41.5%) |
| All Other U.S. | 642 | 784 | 645 | 730 | 766 | 796 | 124 (19.3%) | 12 (1.5%) |

**Table 4 -- Changes in the Average Annual Number and Percent of PhDs Awarded in Engineering and Computer Sciences from 1997/98 to 2004/05 (N=57 Institutions)**

| | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2004/05 | | Pre/Mid Years Number (Percent) Change | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 20 | 42 | 17 | 37 | 26 | 34 | 6 (30%) | -8 (-19%) |
| Hispanic American | 8 | 43 | 14 | 34 | 14 | 40 | 6 (75%) | -3 (-7.0%) |
| American Indian/Native Alaskan | 1 | 5 | 2 | 4 | 1 | 1 | 0 | -4 (-80%) |
| Native Hawaiian/Pacific Islander | 0 | 0 | 0 | 1 | 2 | 1 | 2 (N/A) | 1 (N/A) |
| All URM | 29 | 90 | 33 | 76 | 43 | 76 | 14 (48.3%) | -14 (-15.6%) |
| All Other U.S. | 252 | 1210 | 232 | 935 | 246 | 998 | -6 (-2.4%) | -212 (-17.5%) |

**Table 5 -- Changes in the Average Annual Number and Percent of PhDs Awarded in Mathematics from 1997/98 to 2004/05 (N=49 Institutions)**

| | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2004/05 | | Pre/Mid Years Number (Percent) Change | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 2 | 1 | 4 | 5 | 2 | 4 | 0 (N/A) | 3 (300%) |
| Hispanic American | 4 | 5 | 1 | 3 | 2 | 8 | -2 (-50%) | 3 (60%) |
| American Indian/Native Alaskan | 0 | 0 | 0 | 0 | 0 | 0 | 0 (N/A) | 0 (N/A) |
| Native Hawaiian/Pacific Islander | 0 | 0 | 0 | 0 | 0 | 0 | 0 (N/A) | 0 (N/A) |
| All URM | 6 | 6 | 5 | 8 | 4 | 12 | -2 (-50%) | 6 (100%) |
| All Other U.S. | 72 | 160 | 50 | 128 | 48 | 137 | -24(-33.3%) | -23(-14.4%) |

**Table 6 -- Changes in the Average Annual Number and Percent of PhDs Awarded in the Physical Sciences from 1997/98 to 2004/05 (N=54 Institutions)**

| | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2004/05 | | Pre/Mid Years Number (Percent) Change | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 17 | 22 | 16 | 26 | 14 | 23 | -3 (-17.6%) | 1 (4.5%) |
| Hispanic American | 14 | 29 | 21 | 38 | 30 | 32 | 16 (114.3%) | 3 (10.3%) |
| American Indian/Native Alaskan | 1 | 4 | 3 | 2 | 1 | 5 | 0 | 1 (25%) |
| Native Hawaiian/Pacific Islander | 0 | 2 | 2 | 1 | 1 | 0 | 1 (N/A) | -2 (-100%) |
| All URM | 32 | 57 | 42 | 67 | 46 | 60 | 14 (43.8%) | 3 (5.3%) |
| All Other U.S. | 313 | 833 | 342 | 792 | 344 | 748 | 31 (9.9%) | -85 (-10.2%) |

**Table 7 -- Changes in the Average Annual Number and Percent of PhDs Awarded in Psychology from 1997/98 to 2004/05 (N=46 Institutions)**

| | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2004/05 | | Pre/Mid Years Number (Percent) Change | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 31 | 12 | 30 | 11 | 30 | 11 | -1 (-3.2%) | -1 (-8.3%) |
| Hispanic American | 21 | 12 | 24 | 10 | 18 | 14 | -3 (-14.3%) | 2 (16.7%) |
| American Indian/Native Alaskan | 2 | 3 | 2 | 2 | 2 | 1 | 0 | -2 (-66.7%) |
| Native Hawaiian/Pacific Islander | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| All URM | 59 | 69 | 97 | 63 | 78 | 64 | 19 (32%) | -5 (-7.2%) |
| All Other U.S. | 306 | 170 | 294 | 164 | 300 | 142 | -6 (-1.9%) | -28 (-16.5%) |

**Table 8 -- Changes in the Average Annual Number and Percent of PhDs Awarded in the Social Sciences from 1997/98 to 2004/05 (N=45 Institutions)**

| | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2004/05 | | Pre/Mid Years Number (Percent) Change | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 33 | 35 | 50 | 32 | 40 | 32 | 7 (21.2%) | -3 (-8.6%) |
| Hispanic American | 20 | 31 | 37 | 28 | 30 | 30 | 10 (50%) | -1 (-3.2%) |
| American Indian/Native Alaskan | 6 | 3 | 10 | 3 | 8 | 2 | 2 (33.3%) | -1 (-33.3%) |
| Native Hawaiian/Pacific Islander | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| All URM | 59 | 69 | 97 | 63 | 78 | 64 | 19 (32.2%) | -5 (-7.2%) |
| All Other U.S. | 490 | 542 | 471 | 489 | 448 | 450 | -42 (-8.6%) | -92 (-17.0%) |

**New Enrollee Findings**

Another goal of the AGEP Program is to increase the number of URM pursuing graduate degrees in STEM. Analyses of new enrollee data from AGEP institutions indicate that the AGEP Program is achieving this goal. The overall number and percent change in new enrollee URM in graduate programs in STEM fields at 61 AGEP institutions from 1997/98 to 2005/06 increased by 26.1% or 558 (from 2,135 to 2,693), while the number and percent change for all other U.S. citizens or permanent residents (non-URM) increased by only 16.9% or 2,584 (from 15,278 to 17,862) (Table 9).

Of 20,555 new enrollees in overall STEM fields (including Psychology and the Social Sciences) from 2003/04 to 2005/06 at 61 AGEP institutions, 13.1% or 2,693 were URM (Table 9).

Of the 20,555 new enrollees in overall STEM fields, 15,093 or about 73% were in NS&E fields. As indicated in Table 10, which includes data on new enrollees in NS&E graduate programs at 61 AGEP institutions from 2003/04 to 2005/06:

- Of 15,093 new enrollees in NS&E graduate programs at 61 AGEP institutions from 2003/04 to 2005/06, 11.9% or 1,795 are URM.

- Of 1,795 URM new enrollees in NS&E graduate programs at 61 AGEP institutions from 2003/04 to 2005/06, 999 or 55.7% were males and 796 or 44.3% were females. Of all female URM, 48.4% were African Americans, 46.7% were Hispanic Americans, and 4.9% are American Indians/Alaskan Natives and Native Hawaiian/Pacific Islander. Of all male URM, 54.7% are Hispanic Americans, 39.4% are African Americans, and 5.8% are American Indians/Alaskan Natives/Pacific Islanders.

- Of 13,298 new enrollees in NS&E graduate programs at 61 AGEP institutions from 2003/04 to 2005/06 who were U.S. citizens or permanent residents (non-URM), 36.8% or 4,889 were females and 63.2% or 8,409 were males.

- Of all female new enrollees in NS&E graduate programs at 61 AGEP institutions who were U.S. citizens or permanent residents, female URM were 14% (796 of 5,685).

- Of all male new enrollees in NS&E graduate programs at 61 AGEP institutions who were U.S. citizens or permanent residents, male URM were 10.6% (999 of 9,408)

The overall number and percent change in new enrollee URM in graduate programs in NS&E fields at 61 AGEP institutions from 1997/98 to 2005/06 increased by 25.1% or 361 (from 1,434 to 1,795), while the number and percent change in all other U.S. citizens or permanent residents (non-URM) increased by only 15.6% or 1,792 (from 11,506 to 13,298). Except for Native Hawaiian/Pacific Islander females, percent gains in overall new enrollees in NS&E were higher for females than males (Table 10 and Figure 3). Further analyses of new enrollees in overall NS&E graduate programs at 61 AGEP institutions from 1997/98 to 2005/06 indicate the following:

- While the largest number of new enrollees in overall NS&E graduate programs at 61 AGEP institutions from 1997/98 to 2005/06 were male U.S. citizens or permanent residents (non-URM) (8,409), the percent gain for this group (13.2% or 892 more) was lower than the overall percent gain for all male URM (24.3% or 195 more). The percent gains in new enrollees in overall NS&E graduate programs at 61 AGEP institutions from 1997/98 to 2005/06 for male African Americans and male U.S. citizens or permanent residents (non-URM) were about the same (13.9% and 13.2%, respectively). However while the numbers were lower, the percent gains for Native Hawaiian/Pacific Islander males (5 more or 166.7%), American Indian/Native Alaskan males (15 more or 42.9%), and Hispanic American males (127 more or 30.2%) were much higher than the percent gain for male U.S. citizens or permanent residents (non-URM) (892 more or 13.2%) (Figure 3 and Table 10).

- The percent gain for new enrollees in overall NS&E graduate programs at 61 AGEP institutions from 1997/98 to 2005/06 for female U.S. citizens or permanent residents (non-URM) (19.9% or 810) was lower than the percent gain for all female URM (26.3% or 166). While the number was lower, the percent gain for new enrollees in overall NS&E graduate programs at 61 AGEP institutions from 1997/98 to 2005/06 for American Indian/Native Alaskan females (54.2% or 13 more) was higher than the percent gain for Hispanic American females (31.9% or 90) and African American females (20.3% or 65). The percent change and number in new enrollees in overall NS&E graduate programs at 61 AGEP institutions from 1997/98 to 2005/06 for Native Hawaiian/Pacific Islander females decreased (-50% and -2) (Figure 3 and Table 10).

Table 12 provides data on new enrollees in Engineering and Computer Sciences graduate programs at 59 AGEP institutions from 1997/98 to 2005/06. Data from Table 12 indicate the following:

- Of 7,273 new enrollees in Engineering and Computer Sciences graduate programs at 59 AGEP institutions for 2003/04 to 2005/06, 873 or 12% were URM.

- Of the 873 URM new enrollees in Engineering and Computer Sciences graduate programs at 59 AGEP institutions for 2003/04 to 2005/06, 253 or 28.9% were female URM. Of the 253 female URM who were new enrollees in Computer Sciences and Engineering graduate programs for 2003/04 to 2005/06, 136 or 53.8% were African American females, 108 or 42.6% were Hispanic American females, and 9 or 3.6% were American Indian/Native Alaskan and Native Hawaiian/Pacific Islander females.

- Of the 620 male URM who were new enrollees in Engineering and Computer Sciences graduate programs at 59 AGEP institutions for 2003/04 to 2005/06, 308 or 49.7% were Hispanic American males, 278 or 44.8% were African American males, and 34 or 5.5% were American Indian/Alaskan Native and Native Hawaiian/Pacific Islander males.

- Of 6,400 new enrollees in Engineering and Computer Sciences graduate programs at 59 AGEP institutions for 2003/04 to 2005/06 who were U.S. citizens or permanent residents (non-URM) 1,489 or 23.2% were female and 4,911 or 76.7% were males.

- Of 1,742 female U.S. citizen or permanent residents who were new enrollees in Engineering and Computer Sciences graduate programs at 59 AGEP institutions for 2003/04 to 2005/06, 253 or 14.5% were female URM.

- Of 5,531 male U.S. citizens or permanent residents who were new enrollees in Engineering and Computer Sciences at the 59 AGEP institutions for 2003/04 to 2005/06, 620 or 11.2% were male URM.

In addition, data from Table 12 indicate:

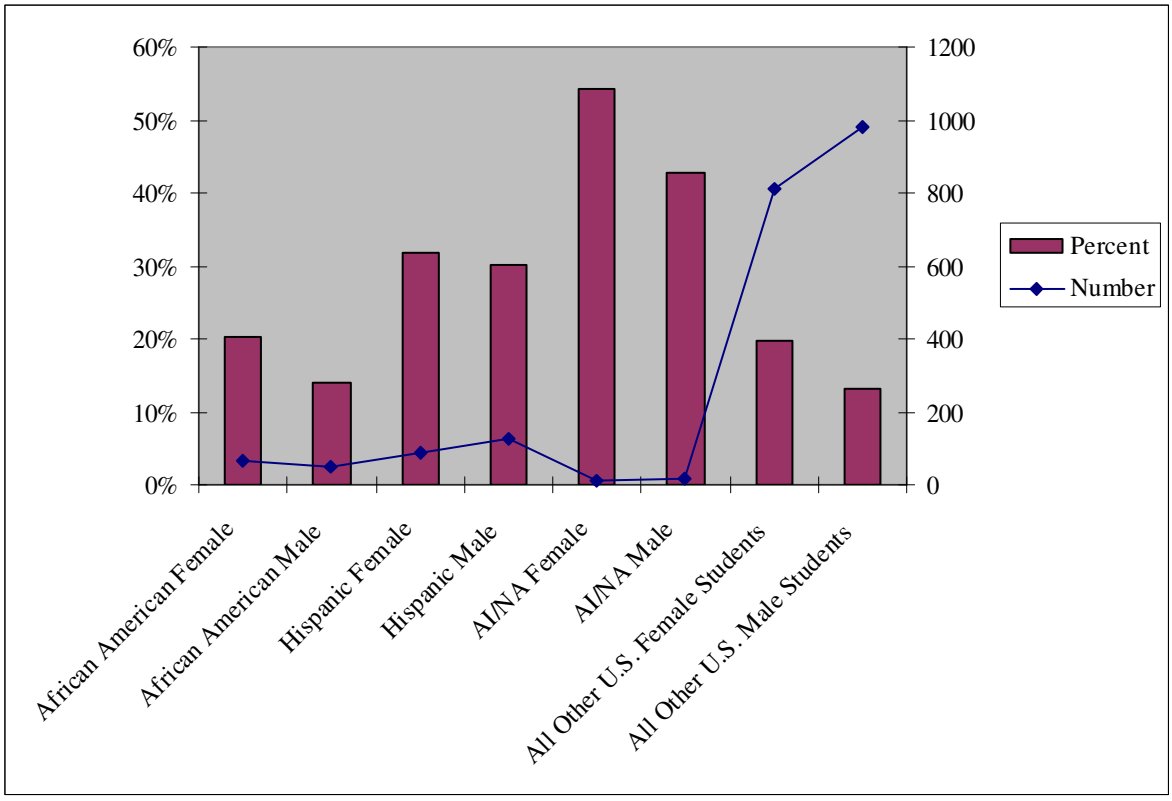
- The number and percent of new enrollee URM in Engineering and Computer Sciences graduate programs at 59 AGEP institutions from 1997/98 to 2005/06 increased by 25.6% or 178 (from 695 to 873), while the number and percent change for all other U.S. citizen or permanent residents (non-URM) increased by only 16.1% or 886 (from 5,514 to 6.400).

- Changes in the number and percent of new enrollees in Engineering and Computer Sciences graduate programs at the 59 AGEP institutions from 1997/98 to 2005/06 were higher for male URM (147 more or 31.1%) than for female URM (31 more or 14%). While their numbers were smaller for new enrollees in Engineering and Computer Sciences, percent gains for Native Hawaiian/Pacific Islander males (5 more or 500%), American Indian/Native Alaskan males (12 more or 75%), and American Indian/Native Alaskan females (3 more or 60%) were higher than percent gains for Hispanic American males (72 more or 30.5% more) and Hispanic American females (28 more or 35%).

- While the number and percent of male African American new enrollees in Engineering and Computer Sciences graduate programs at the 59 AGEP institutions from 1997/98 to 2005/06 increased by 58 or 26.4%, female African Americans made no gains.

- While the percent change in new enrollees in Engineering and Computer Sciences graduate programs at 59 AGEP institutions from 1997/98 to 2005/06 was slightly higher for female Hispanic Americans (35%) than male Hispanic Americans (30.5%), the change in the number of new enrollees was lower for female Hispanic Americans (28 more) than for male Hispanic Americans (72 more).

**Figure 3: Change in the Number and Percent of New Graduate Enrollees in All Natural Sciences and Engineering in AGEP Institutions by Race/Ethnicity and Gender between Pre-AGEP (1997/98-1999/00) and Mid-AGEP (2003/04-2005/06) (N=61 Institutions)[5]***




*See Table 10 for numbers and percentages.

[5] To reduce the volatility of annual new enrollee data, the data were grouped into three categories: the Pre-AGEP Years (1997/98 to 1999/00); the Early AGEP Years (2000/01 to 2002/03); and the Mid-AGEP years (2003/04 to 2005/06).

**Table 9 -- Changes in the Average Annual Number and Percent of New Enrollees in All STEM Fields from 1997/98 to 2005/06 at AGEP Institutions (N=61 Institutions)***

| New Enrollees All STEM Fields (61) | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2005/06 | | Pre/Mid Years Number (Percent) Change | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 574 | 480 | 638 | 529 | 699 | 540 | 125 (21.8%) | 60 (12.5%) |
| Hispanic American | 430 | 545 | 508 | 608 | 603 | 712 | 173 (40.2%) | 167 (30.6%) |
| American Indian/Native Alaskan | 50 | 49 | 59 | 61 | 57 | 68 | 7 (14.0%) | 19 (38.8%) |
| Native Hawaiian/Pacific Islander* | 4 | 3 | 6 | 3 | 4 | 10 | 0 | 7 (233.3%) |
| All URM | 1,058 | 1,077 | 1,211 | 1,201 | 1,363 | 1,330 | 305 (28.8%) | 253 (23.5%) |
| All Other U.S. | 6,163 | 9,115 | 6,882 | 9,462 | 7,485 | 10,377 | 1,322(21.5%) | 1,262(13.8%) |

* These numbers may be underrepresented because many institutions combine Pacific Islanders with Asian Americans.

**Table 10 -- Changes in the Average Annual Number and Percent of New Enrollees in All Natural Sciences and Engineering from 1997/98 to 2005/06 at AGEP Institutions (N=61 Institutions)***

| | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2005/06 | | Pre/Mid Year Number (Percent) Change | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 320 | 346 | 362 | 386 | 385 | 394 | 65 (20.3%) | 48 (13.9%) |
| Hispanic American | 282 | 420 | 317 | 474 | 372 | 547 | 90 (31.9%) | 127 (30.2%) |
| American Indian/Native Alaskan | 24 | 35 | 35 | 45 | 37 | 50 | 13 (54.2%) | 15 (42.9%) |
| Native Hawaiian/Pacific Islander | 4 | 3 | 5 | 3 | 2 | 8 | -2 (-50%) | 5 (166.7%) |
| All URM | 630 | 804 | 719 | 908 | 796 | 999 | 166 (26.3%) | 195 (24.3%) |
| All Other U.S. | 4,079 | 7,427 | 4,612 | 7,806 | 4,889 | 8,409 | 810 (19.9)% | 982 (13.2%) |

**Table 11 -- Changes in the Average Annual Number and Percent of New Enrollees in Biological/Agricultural Sciences from 1997/98 to 2005/06 at AGEP Institutions (N=57 Institutions)**

| New Enrollees Biological/ Agricultural (57) | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2005/06 | | Pre/Mid Years (Percent) Change | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 116 | 58 | 128 | 63 | 142 | 52 | 26 (22.4%) | -6 (-10.3%) |
| Hispanic American | 133 | 78 | 134 | 79 | 164 | 94 | 31 (23.3%) | 16 (20.5%) |
| American Indian/Native Alaskan | 15 | 10 | 19 | 11 | 18 | 11 | 3 (20.0%) | 1 (10.0%) |
| Native Hawaiian/Pacific Islander | 3 | 0 | 2 | 1 | 0 | 1 | -3 (-100.0%) | 1 (NA) |
| All URM | 267 | 146 | 283 | 154 | 324 | 158 | 57 (21.3%) | 12 (8.2%) |
| All Other U.S. | 1,953 | 1,424 | 2,155 | 1,459 | 2,219 | 1,482 | 266 (13.6%) | 58 (4.1%) |

**Table 12 -- Changes in the Average Annual Number and Percent of New Enrollees in Engineering and Computer Sciences from 1997/98 to 2005/06 at AGEP Institutions (N=59 Institutions)**

| | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2005/06 | | Pre/Mid Year Number (Percent) Change | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 137 | 220 | 161 | 250 | 136 | 278 | -1 (0.7%) | 58 (26.4%) |
| Hispanic American | 80 | 236 | 98 | 254 | 108 | 308 | 28 (35%) | 72 (30.5%) |
| American Indian/Native Alaskan | 5 | 16 | 9 | 22 | 8 | 28 | 3 (60%) | 12 (75%) |
| Native Hawaiian/Pacific Islander | 0 | 1 | 2 | 2 | 1 | 6 | 1 (N/A) | 5 (500%) |
| All URM | 222 | 473 | 270 | 528 | 253 | 620 | 31 (14%) | 147 (31.1%) |
| All Other U.S. | 1,200 | 4,314 | 1,397 | 4,528 | 1,489 | 4,911 | 289 (24.1%) | 597 (13.8%) |

**Table 13 -- Changes in the Average Annual Number and Percent of New Enrollees in Mathematics from 1997/98 to 2005/06 at AGEP Institutions (N=56 Institutions)**

| | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2005/06 | | Pre/Mid Years Number (Percent) | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 18 | 25 | 17 | 20 | 30 | 22 | 12 (66.7%) | -3 (-12%) |
| Hispanic American | 18 | 25 | 20 | 34 | 15 | 41 | -3 (-16.7%) | 16 (64%) |
| American Indian/Native Alaskan | 1 | 0 | 1 | 2 | 3 | 3 | 2 (200.0%) | 3 (N/A) |
| Native Hawaiian/Pacific Islander | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| All URM | 37 | 50 | 38 | 56 | 48 | 66 | 11 (29.7%) | 16 (32%) |
| All Other U.S. | 203 | 374 | 224 | 415 | 274 | 495 | 71 (35%) | 121 (32.4%) |

**Table 14 -- Changes in the Average Annual Number and Percent of New Enrollees in the Physical Sciences from 1997/98 to 2005/06 at AGEP Institutions (N=58 Institutions)**

| | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2005/06 | | Pre/Mid Years Number (Percent) Change | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 49 | 44 | 56 | 53 | 78 | 41 | 29 (59.2%) | -3 (-6.8%) |
| Hispanic American | 51 | 80 | 64 | 106 | 84 | 104 | 33 (64.7%) | 24 (30%) |
| American Indian/Native Alaskan | 3 | 8 | 6 | 10 | 8 | 8 | 5 (166.7%) | 0 |
| Native Hawaiian/Pacific Islander | 0 | 1 | 0 | 0 | 1 | 1 | 1 (N/A) | 0 |
| All URM | 103 | 133 | 126 | 169 | 171 | 154 | 68 (66%) | 21 (15.8%) |
| All Other U.S. | 723 | 1315 | 835 | 1,405 | 908 | 1521 | 185 (25.6%) | 206 (15.7%) |

**Table 15 -- Changes in the Average Annual Number and Percent of New Enrollees in Psychology from 1997/98 to 2005/06 at AGEP Institutions (N=48 Institutions)**

| | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2005/06 | | Pre/Mid Years Number (Percent) Change | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 66 | 24 | 73 | 26 | 80 | 22 | 14 (21.2%) | -2 (-8.3%) |
| Hispanic American | 40 | 18 | 55 | 19 | 60 | 27 | 20 (50%) | 9 (50%) |
| American Indian/Native Alaskan | 4 | 2 | 3 | 2 | 5 | 1 | 1 (25%) | -1 (-50%) |
| Native Hawaiian/Pacific Islander | 0 | 0 | 0 | 0 | 2 | 1 | 2 (N/A) | 1 (N/A) |
| All URM | 110 | 44 | 131 | 47 | 147 | 51 | 37 (33.6%) | 7 (15.9%) |
| All Other U.S. | 525 | 250 | 601 | 226 | 712 | 259 | 187 (35.6%) | 9 (3.6%) |

**Table 16 -- Changes in the Average Annual Number and Percent of New Enrollees in the Social Sciences from 1997/98 to 2005/06 at AGEP Institutions (N=50 Institutions)**

| | Pre-AGEP Years 1997/98 to 1999/00 | | Early AGEP Years 2000/01 to 2002/03 | | Mid-AGEP Years 2003/04 to 2005/06 | | Pre/Mid Years Number (Percent) Change | |
|---|---|---|---|---|---|---|---|---|
| | Female | Male | Female | Male | Female | Male | Female | Male |
| African American | 187 | 110 | 203 | 117 | 234 | 124 | 47 (25.1%) | 14 (12.7%) |
| Hispanic American | 108 | 108 | 137 | 115 | 170 | 138 | 62 (57.4%) | 30 (27.8%) |
| American Indian/Native Alaskan | 22 | 12 | 20 | 14 | 15 | 17 | -7 (-31.8%) | 5 (41.7%) |
| Native Hawaiian/Pacific Islander | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| All URM | 317 | 231 | 361 | 246 | 419 | 280 | 102 (32.2%) | 49 (21.2%) |
| All Other U.S. | 1,559 | 1,438 | 1,670 | 1,429 | 1,884 | 1,709 | 325 (20.8%) | 271 (18.8%) |