Education and Training Report

Performance Report—FY 1997

National Aeronautics and
Space Administration
Office of Equal Opportunity Programs
Minority University Research and
Education Division

Acknowledgments

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Foreword

One of the goals of this Nation is that its students attain a level of scientific literacy that will enable them to function well in a technological society. Science and technology are central elements of NASA programs and lie at the heart of achieving the NASA vision and mission. NASA science and technology have provided public inspiration, revealed new worlds, disclosed secrets of the universe, provided vital insights into Earth's environment, helped shape the development of atmospheric flight, and yielded information that has improved life on Earth. In short, NASA science is an investment in America's future.

Even more inspirational is the fact that NASA science and technology are systematically penetrating every aspect of the educational process. The Agency was fortunate to have had the Fiscal Year (FY) 1997 NASA Appropriations Bill provide an increase in funding for "educational programs which expand opportunities and enhance diversity in the NASA sponsored research and education community."

This report summarizes the performance of NASA education and training programs funded through the Office of Equal Opportunity Programs Minority University Research and Education Division, during FY 1997. The projects described are headed by Principal Investigators at Historically Black Colleges and Universities, Hispanic-Serving Institutions, Tribal Colleges and Universities, and other institutions and nonprofit organizations that serve significant populations of socially and economically disadvantaged (hereafter referred to as disadvantaged) and/or disabled students. Projects span the spectrum of the educational enterprise, from kindergarten through postsecondary education and beyond to specialized teacher training. The general aim is to increase the participation and achievement of targeted students in mathematics, science, engineering, and technology disciplines.

The report illustrates the broad array of education and training projects we support. It is our hope that you will find the information useful and enlightening.

George E. Reese
Associate Administrator for
Equal Opportunity Programs

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Overview

During fiscal year 1997, NASA awarded $30,752,629 to nearly 200 colleges, universities, and nonprofit organizations in support of educational projects designed to expose precollege, prefreshman, undergraduate, and graduate students, as well as in-service teachers, to mathematics, science, engineering, and technology (MSET)-based courses, enrichment opportunities, and career options. These students and faculty were specifically targeted as minority and/or disadvantaged (in accordance with legislative mandates to Federal agencies) and/or serving large numbers of minority and/or disadvantaged students. The projects receive sole or partial funding from NASA to meet the following program goals:

- Increase the number of disadvantaged and/or disabled students in public schools, with predominant enrollments of the targeted group, who graduate from high school with the technical skills, knowledge, and interest required to successfully pursue mathematics, science, engineering, and technology study at the undergraduate level

- Improve mathematics, science, and technology literacy among disadvantaged middle and high school students who are enrolled in public schools with predominant enrollments of the targeted group

The following objectives facilitated the above goals:

- Increase the number of students who are fully prepared to enroll in challenging college preparatory MSET courses in secondary school and successfully advance to the next academic level without the need for remediation

- Heighten students' awareness, interest, and understanding of MSET in the world around them, the career options in MSET-based fields, and the academic preparation necessary to pursue these careers

- Expose students to role models, mentors, and a broad range of participatory activities and advanced technology that enhance MSET learning, experimentation, and research

- Increase parental involvement of participating students to enhance participation and support of their children's academic and career decision making processes

A summary of the institutions responding to the survey is shown.

Table I. Award by Type of Program

Type of Program	Number of Awards	Number of Participants	NASA Funding
Precollege	29	14,582	$4,537,148
Bridge	10	413	$778,015
Scholars/ Fellows	99	822	$10,638,297
Teacher Training	17	801	$2,321,770
PACE	17	3,108	$1,567,518
Partnerships	22	1,320	$4,400,000
NRTS	7	23,937	$4,050,000
Other	17	3,450	$2,459,981
Total	**218**	**48,433**	**$30,752,629**

Table II. Award by Type of Institution

Type of Program	Number of Awards	Number of Participants	NASA Funding
HBCU	66	24,685	$15,367,144
OMU	152	23,748	$15,385,485
Total	**218**	**48,433**	**$30,752,629**

Overview

By the close of FY 1997, NASA's investment in HBCU's and OMU's through the Minority University and Research and Education Division totaled $54.8 million for research, education, and training. Of this amount, more than half ($30.7 million) was specifically dedicated to education and training, which is the focus of this report. Both the number of participants and the dollar amount were almost equally divided between HBCU's and OMU's. OMU awards and funding included awards to HSI's, Tribal Colleges and Universities, and other organizations (such as the Southeastern Consortium for Minorities in Engineering), which serve substantial numbers of disadvantaged students.

During the FY 1997 reporting period (Summer 1996 and Academic Year 1996–97), 218 MUREP education and training projects were conducted at HBCU and OMU institutions. Of those projects, 56 institutions conducted precollege, PACE, and bridge programs, 22 education partnerships, 7 Network Resources and Training Sites (NRTS), 17 teacher training, and 99 institutions administered graduate fellows and/or undergraduate scholars programs in addition to approximately 17 other consortiums and associations that spanned precollege through graduate and teacher programs. These programs reached a total of 48,433 students, with the predominant number, 46,810 at the precollege level. Additional outcomes included: 8,422 high school students (grades 9-12) in NASA programs and 6,739 of those students selected college preparatory mathematics, science, engineering and or technology (MSET) courses. Eleven hundred and thirteen (1,113) graduated from high school, 1,260 enrolled in college, and 481 selected MSET majors. There were 966 high school graduates (bridge students) in NASA programs, 253 of whom successfully completed their freshman year. There were 1,063 teachers in teacher programs and 107 teachers received certificates. The preponderance of teacher training was for professional development and capability building rather than certificate granting.
During the reporting period, these projects in support of programs for students and teachers were able to leverage their NASA MUREP funding of $30.7 million to an additional $5.2 million in support from industry, other government agencies and nonprofit organizations.

During the FY 1997 reporting period, 66 MUREP education and training projects were conducted at HBCU institutions. These institutions conducted precollege and bridge programs, education partnerships with other universities, industry and nonprofit organizations, NRTS, teacher training, and graduate fellows and/or undergraduate programs. These programs reached a total of 24,685 participants, with the predominant number at the precollege level. The programs achieved major goals of heightening students' interest and awareness of career opportunities in MSET fields, and exposing students to the NASA mission, research and advanced technology through role models, mentors, and participation in research and other educational activities. Also in FY 1997, NASA continued a very meaningful relationship with the National Association for Equal Opportunity in Higher Education (NAFEO). NAFEO conducts two programs, Faculty Development Workshops and Student Researchers, each linking multiple HBCU's through a variety of educational experiences.

The reported outcomes for HBCU's on the survey were as follows. Grantees reported 4,088 high school students in NASA programs and 3,164 of those students selected college preparatory MSET courses. Seven hundred and sixty-four (764) graduated from high school, 917 enrolled in college, and 282 selected MSET majors. There were 836 high school graduates (bridge students) in NASA programs, 196 of whom successfully completed their freshman year. There were 756 teachers in teacher programs and 59 teachers received certificates. Undergraduate student programs contained 316 students, 54 of whom received degrees, 40 are continuing for the next degree, 7 are employed in a NASA-related field, 43 gave presentations at NASA Installations, and 4 students presented at a national/international conference. Of the 37 graduate students reported in the survey, 17 received Masters degrees, 8 continuing for the next degree, and 3 employed in a NASA-related field. Twenty-two students gave presentations at NASA Installations.

During FY 97, 152 MUREP education and training pro-

Overview

jects were conducted at OMU institutions. The institutions conducted precollege and bridge programs, education partnerships with other universities and industry, NRTS, teacher training, and graduate and/or undergraduate programs. These programs reached a total of 23,748 participants, with the predominant number at the precollege level and achieved major goals of heightening students' interest and awareness of career opportunities in MSET fields, and exposing students to the NASA mission, research and advanced technology through role models, mentors, and participation in research and other educational activities. Also in FY 1997, NASA continued a very meaningful relationship with the Hispanic Association of Colleges and Universities (HACU) through Proyecto Access, a consortium through which HACU links seven HSI's together to conduct 8-week summer programs.

OMU Institutions reported 4,334 high school students in NASA programs and 3,404 of those students selected college preparatory MSET courses. Three hundred and forty-nine (349) graduated from high school, 343 enrolled in college, and 199 selected MSET majors. There were 130 high school graduates (bridge students) in NASA programs, 57 of whom successfully completed their freshman year. There were 307 teachers in teacher programs and 48 teachers received certificates. Of the 389 undergraduate students, 75 received under graduate degrees, and eight students are employed in a NASA-related field.

Of the 80 graduate students reported in the survey; 11 received Masters degrees, 42 continued for their next degree, two received doctoral degrees, and four students are employed in a NASA-related field. Two students gave presentations at a NASA Installation, two students had a publication published, and five students had publications accepted but are not yet published. Eighteen students gave presentations at national/ international conferences, one student participated on a NASA panel, and three students participated on a panel for another agency. Two commercial products are in the development stage.

Precollege Awards

In a recent report issued by the National Science Foundation,[1] the researchers concluded: "The problem of poor retention by underrepresented populations in MSET [mathematics, science, engineering, and technology] undergraduate and graduate study cannot be viewed apart from the troubling fact that inadequate preparation and/or lack of resources in MSET often occurs long before these students reach college age. The programs that demonstrate the most success in improving the participation of underrepresented groups are those that provide early support and bridge one educational level to the next." Clearly, increasing minority participation in MSET fields requires increased intervention in the precollege years.

Precollege awards are funded on an annual basis and range between $10,000 and $1 million. The average award, however, is around $100,000. Recipients are expected to leverage these dollars with funds from other sources to maximize their impact.

Awards are generally for elementary/secondary student support programs that may include structured experiences and curriculum development activities. Overall goals of such programs and enrichment activities are:

- Increase student interest, achievement, and persistence in mathematics, science and technology education
- Cultivate awareness of career opportunities in mathematics, science, and engineering
- Encourage and retain in the pipeline those students already interested in careers in mathematics, science, and engineering
- Increase student achievement and persistence in mathematics and science

During fiscal year 1997, 30 precollege awards were given to the organizations to the right. Twenty-nine of the 30 submitted data for this report.

Alabama A&M University (FAST Program)
Bethune-Cookman College
California State University at Los Angeles (a)
California State University at Los Angeles (b)
California State University at Los Angeles (c)
Capitol College
Cuyahoga Community College
Edward Waters College
Hispanic Association of Colleges and Universities (HACU)
Lincoln University
Midtown Educational Foundation (MEF)
Mount Holyoke College
New Mexico Highlands University
New Mexico MESA, Inc.
Nonprofit Initiatives, Inc.
Norfolk State University
Pasadena Unified School District
Texas A&M University-Kingsville
Trenholm State Technical College
United Cerebral Palsy of Prince George's and Montgomery Counties
University of Central Florida
University of Cincinnati College of Engineering
University of Maryland-Eastern Shore
University of South Florida
University of Texas–Brownsville
University of Texas–Brownsville/Texas Southmost College (a)
University of Texas–Brownsville/Texas Southmost College (b)
University of Texas–San Antonio
University of the District of Columbia
University of Turabo

[1] Division of Research, Evaluation, and Communication, Directorate for Education and Human Resources. *Indicators of Science and Mathematics Education, 1995*. Edited by Larry E. Suter. Arlington, VA: National Science Foundation, 1996 (NSF 96-52).

Precollege Awards

Alabama A&M University
Future Assets Student Talent, Inc.

Ms. Shelvie Miller
c/o Marshall Space Flight Center, Code CE01
Marshall Space Flight Center, Alabama 35812
Telephone: (205) 544-4034
Fax: (205) 544-2411

Program Overview

Future Assets Student Talent, Inc. (FAST), is a high school/high-tech career development program that motivates and prepares students with disabilities to further their education to achieve high-tech and professional careers. The FAST program, which is managed by Government agencies, business, and industry, is modeled after the High School/High-Tech Project started in Los Angeles in 1983. In 1985, through the cooperative efforts of the Alabama Department of Education, the Alabama Department of Rehabilitation Services, and the President's Committee on Employment of People with Disabilities, north central Alabama was chosen as the second "high-tech" community in which to launch this unique program for students with disabilities. The program thrives today because of the cooperative support of Government, businesses, industries, schools, community organizations, and special services from individuals and rehabilitation agencies.

The FAST program targets students with disabilities—of both genders, and all ethnic groups—in grades 7 through 12 with a "C" or above grade point average. This program is available throughout a student's college career if the student is a member before entering college. Therefore, the students must have the potential to pursue higher education to achieve high-tech and professional careers. FAST will evaluate qualifying students with the following conditions:

- Hearing impairment
- Visual impairment
- Multiple sclerosis
- Paraplegia
- Epilepsy
- Muscular dystrophy
- Congenital heart disease
- Cerebral palsy
- Quadriplegia
- Cystic fibrosis
- Learning disabilities
- Other chronic conditions

Referrals may be made by school and/or rehabilitation service representatives (for example, counselor, teacher, or other).

Precollege Awards

Objectives

The program goals and objectives are to offer career exploration opportunities through exposure to high-tech/professional jobs and professional role models, to build self-confidence, to offer opportunities for developing social skills, to motivate students to prepare for professional careers by taking college preparatory courses, to utilize community resources from the private, public, and nonprofit sectors to meet the goals and objectives, and to recruit students throughout the year. Activities for accomplishing these goals and objectives include providing a mentor for each student, professional shadowing, industry tours, scholarships, career and vocational workshops, summer jobs, co-op activities in high-tech businesses, a network for sharing information and services among schools, universities, and service organizations, and programs for heightening public awareness to the needs of individuals with disabilities.

Enrollment Data

FAST enrollment increased from 50 to 75 students during the 1996–97 fiscal year.

Outcomes to Date

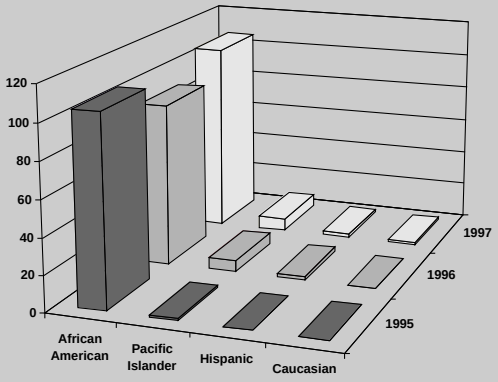
There were four workshops, ranging in topics from career development to assisting technology, presented to students, parents, teachers, business personnel, and others. Several tours and shadowing opportunities were provided for the students. Engineers at NASA's Marshall Space Flight Center conducted these activities in an actual laboratory environment. A paid summer internship program was very successful, with nine students assigned to Marshall and one student assigned to Alabama A&M University for 7 weeks. This was a valuable, hands-on learning experience that provided the students with the information needed to assess their academic and career goals. At the end of the summer internship program, a scholarship was created to be given annually to a college student with a minimum of 2 years of participation in FAST activities. Also, a special award was created for a FAST college student graduate who best demonstrates the ability to overcome obstacles to become successful in life and who is established in a high-tech career. The students received special recognition for their contribution to the NASA and Alabama A&M departments they supported. There are plans to implement a quarterly newsletter designed and written by the students and to establish and maintain a web site.

As a result of participating in the FAST program, many students reported that the program assisted them in their decision to go to college, helped them improve their school grades and refine career goals, increased self-esteem, improved their relationships with teachers and parents, and aided them in getting along with other students.

Bethune-Cookman College Pre-College Readiness Program

Professor Theodore Nicholson, Sr.
Bethune-Cookman College
Dr. Mary McLeod Bethune Boulevard
Daytona Beach, Florida 32114
Telephone: (904) 255-1401
Fax: (904) 257-8316

Bethune-Cookman Enrollment



Number of participants in the Bethune-Cookman Pre-College Readiness Program at the end of fiscal years 1995–97.

Program Overview

This proposal established a Saturday Academy and a summer Pre-College Readiness Program at Bethune-Cookman College for 2 years. The major goal of the program was to increase college preparedness of the number of minorities who graduated from high schools in the Daytona Beach area by 30 percent. Thus, the overall goal of this project was to increase the number of scientists available for the 21st century. To attain this goal, Bethune-Cookman held classes on Saturdays and 5 weeks during the summer months for 100 minority students in grades 6 through 12. The curriculum for the students included physics, chemistry, biology, computer literacy, communications skills, and an integrated science-mathematics-engineering component. The 100 students were selected from four high schools, two middle schools, and two elementary schools. The classes for the various courses offered were at the academic levels of the participants. College students served as tutors during the 5-week summer sessions. The 24 Saturdays of the Saturday Academy assisted the students in keeping up with their normal classes held on Mondays through Fridays as well as acquainted them with various scientific and mathematical concepts and principles from the 5-week summer sessions. Science enrichment trips were designed to motivate the students for careers in science. Volunteer engineers assisted with the science-engineering component.

Objectives

The overall goal of this project is to increase by 30 percent the number of minority high school graduates from the Daytona Beach area who are prepared to enter college in the sciences, engineering, and mathematics. Because this will take 7 years, the evaluative academic indicators for a yearly progression were revised to depict the number of students remaining in the program each year. Also, it is necessary to keep track of the number of students entering the program in the 6th grade as well as the number of students exiting the program at the end of the 12th grade year. The chart to the left shows the number of participants by the end of each fiscal year for 1995–97.

Enrollment Data

The total number of students from 1995 through 1997 in this program is 320.

Precollege Awards

Outcomes to Date

1. Four participants have graduated from the 12th grade since the project began in 1995. All four were admitted to college in the sciences and engineering—one at Morehouse College in engineering, one at Florida State University in engineering, and two at Florida A&M University in the sciences.

2. Parents have served as hall monitors, teacher aides, and chaperones on field trips.

3. The students have taken field trips each year.

4. The hands-on engineering component has provided each student the opportunity to build his or her own motor and to work in groups to assemble robots and rockets.

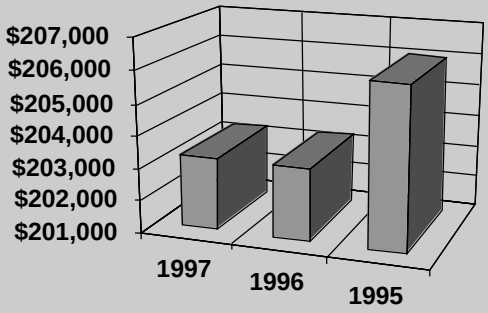
5. All students in the program have continued to increase their grade point average.

6. All students in the program are taking mathematics at least at the algebra level (pre-algebra for the 6th graders).

7. All students have had experiences with the computer using Windows 95 and the Internet.

The community as well as the school district has developed a better relationship with the college. As the students return to school in the fall, the teachers are beginning to know, without being told, which students participated in the NASA/Bethune-Cookman SEMSAP Program. For the 67 slots available for this year, there were more than 200 inquires for participation.

Funding History—Bethune-Cookman



Dr. Milton Randle
California State University at Los Angeles
5151 State University Drive
Los Angeles, California 90032
Telephone: (213) 343-2490

California State University at Los Angeles Math, Engineering, Science Achievement Program

Program Overview

The Math, Engineering, Science Achievement Program (MESA) serves disadvantaged students in math-based fields, with an emphasis on African Americans, Native Americans, Mexican Americans, and other Hispanic Americans. MESA provides a pipeline of services from kindergarten through 12th grade to increase the number of these students who choose college degrees in math, science, and engineering. Serving 17 schools, MESA at California State University at Los Angeles helps students succeed in college prerequisite courses with the assistance of an advisor—a mathematics or science teacher—who provides weekly academic assistance.

Objectives

The program has five objectives: to increase the number of students participating, to enhance hands-on math, science, and engineering experiences, to provide academic support and advising, to provide career exploration, and to provide college advisement.

Enrollment Data

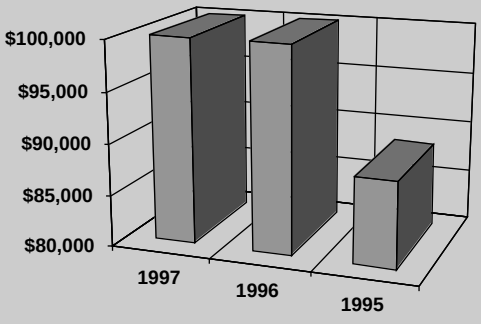
The total number of students impacted has been 5,200 since September 1, 1979. Program enrollment for the past 4 years is shown in Figure 2. The target grade level is K–12. The students targeted by category are as follows: females (37)—African American, Native American, Hispanic, and other; males (24)—African American, Native American Indian, Hispanic, and other.

Program Implementation

Strategies: year-round enrichment; strong academic component; involvement of parents, teachers, school counselors, and administrators; mentoring relationships; academic year component; exposure to career options; summer component; field trip opportunities; Saturday component; SAT/ACT preparation; linkages to the next level; involvement of the community; tutoring; research component; use of technology; hands-on learning; problem-solving; and skill development.

Recruitment Strategies: mailings to students and parents, teacher and counselor recommendations, and one-on-one meetings with students.

Funding History—Cal State



Precollege Awards

Selection Criteria: interest in math or science, expressed teacher recommendation, and completion of algebra by 8th or 9th grade.

Partners: California State University at Los Angeles, TRW, Northrop, MWD, Xerox, and MESA statewide.

Courses Targeted: mathematics, trigonometry, Earth science, pre-algebra, pre-calculus, algebra I, calculus, chemistry, geometry, computer science, physics, algebra II, and physical sciences.

Outcomes to Date

Results: commendation from the Los Angeles Unified School District.

Tracking: name, address, ethnicity, gender, MSET courses taken, SAT/ACT scores, career choice, college entrance, college major, grade point average, and highest academic level.

Lessons Learned: the need to establish concise site agreements or contracts with schools and districts.

Issues/Challenges: continued funding, institutional commitment, and district commitment.

Precollege Awards

California State University at Los Angeles Summer Chemistry Program

Dr. Donald Young
c/o Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, California 91109
Telephone: (818) 354-7442

Program Overview

The proposed project provides minority students an intensive research experience that is enormously important in developing the self-confidence necessary for the successful pursuit of an advanced technical or scientific degree.

Objectives

The objectives are: (1) to encourage underrepresented minority students to undertake careers in chemistry and (2) to demonstrate to the students the importance of the relationship among modeling, laboratory measurements, remote and in-situ field measurements, and data analysis.

Outcomes to Date

During the summers of 1998 and 1999, two students each from California State University at Los Angeles, Los Angeles City College, and Los Angeles Southwest College will actively participate, for a period of 10 weeks, in research programs being conducted at California State University at Los Angeles and the Jet Propulsion Laboratory. The students will be part of the research teams conducting experiments in atmospheric chemistry related to the Earth and to the surface of Mars.

Capitol College
Pre-College Minority Engineering Program

Dr. H. Judith Jarrell
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Laurel, Maryland 20708
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Program Overview

The Capitol College Pre-College Minority Engineering Program has been designed to prepare and motivate minority high school graduates for the rigors demanded by undergraduate studies leading to degrees in the engineering profession. The program upgrades the skills of minority students who have shown an interest in pursuing a bachelor of science degree in electrical engineering. This is done through a comprehensive effort to upgrade academic skills, study skills, and interpersonal skills.

Objectives

The goal is to lay the foundation for the successful completion of the rigorous curriculum leading to a bachelor of science degree in engineering.

Enrollment Data

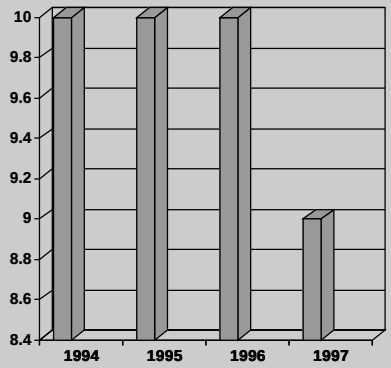
Since 1992, NASA has funded a Pre-College Minority Engineering Program, which is held at the Capitol College campus in Laurel, Maryland. From 1992 to 1996, 10 minority students who had just graduated from high school and wanted to pursue academic degrees in electrical engineering completed the program. During the summer of 1997, this number was decreased to nine students because of a reduction in the overall program budget. Fifty-nine students have graduated from the program. Of these, 33 are now enrolled at Capitol College in one of the engineering programs at the bachelor of science level or have completed their engineering degree requirements at the college.

Outcomes to Date

The program's class of 1997 consisted of nine students: five men and four women. Seven students came from the metropolitan Maryland area, one from Brooklyn, New York, and one from Philadelphia. All hope to obtain electrical engineering degrees at Capitol College or at another accredited engineering college.

Upon conclusion of the program, the results were outstanding. Eight of the nine students are enrolled at Capitol College this fall. All eight students are enrolled in the electrical engineering program and have excellent prospects of graduating with a bachelor of science degree. The ninth student is planning to take courses at a local community college.

Capitol College Enrollment



Precollege Awards

Capitol College
Pre-College Minority
Engineering Program

This was the most academically inclined and enthusiastic Pre-College Minority Engineering Program class ever. One mark of this is that the participants wrote and designed a wonderful magazine that discusses their impressions of the program and what it meant to them. The students were extremely focused on their academics. They have expressed how beneficial they believe the program has been. It has given them a head start on the transition to college, helped them understand their academic and personal strengths and weaknesses, and increased their confidence in their ability to start an academic program.

Every summer, student feedback and program evaluations have shown that the students felt they were better prepared to enter college as a result of the 6 weeks they spent at Capitol College. In addition, comparisons of placement tests (pretests) in English and math with final tests have clearly shown that improvement has been the norm for all students. Detailed evaluations of the results of each program class have been sent to NASA at the conclusion of each session and at the end of each academic semester.

Student Achievements

Since the summer of 1995, four different Pre-College Minority Engineering Program graduates have worked onsite as summer interns at NASA's Goddard Space Flight Center. This has been very successful in providing students with the opportunity to work with NASA engineers to obtain experience within their career field and get additional focus on the work of electrical engineering majors.

During the 1996–97 academic year, 22 of the then 50 program graduates were enrolled in engineering programs at Capitol College. At the end of the year, a major program milestone occurred as the first member of the Pre-College Minority Engineering Program class of 1992 received his bachelor of science degree. He is now working on site at Goddard as a contractor employed by Hughes STX. In addition, three program students received associate in applied science degrees at the 1997 May commencement ceremonies. All three are continuing on for their bachelor of science degrees.

One program student worked onsite at Goddard as an intern during the summer of 1997. She had the opportunity to use her digital design skills while developing a test box for an HRSN Bread Board. This board was designed to support the performance of housekeeping telemetry tasks for the MAP Satellite.

Mai Tran, a NASA-PREP graduate, receives her diploma.

Precollege Awards

Longitudinal Study

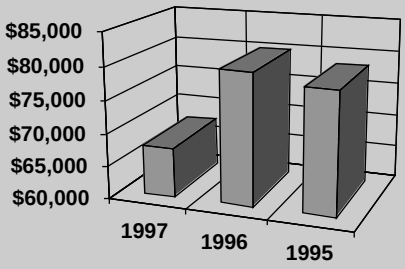
A recently completed longitudinal study of the Pre-College Minority Engineering Program classes of 1992 to 1996 clearly shows the impact of the program. An analysis of retention rates, cumulative grade point averages, and completed credits compared entering freshmen minority students with Pre-College Minority Engineering Program students. The benefits of the program for the students were clear:

- The average number of credits completed by the program students was higher than the average number of credits completed by their peers.
- The average cumulative grade point average of the program students was higher than the average cumulative grade point average of their peers.
- The retention rates for the program students were higher than the retention rates of their peers.
- Two members of the incoming class of 1992 earned bachelor of science degrees. One of the two was a program student.
- All three members of the incoming class of 1993 who earned associate of applied science degrees were program students.

Partnering

Scholarships for Pre-College Minority Engineering Program students have been donated from Litton Industries and the Baltimore-Washington Corridor Chamber of Commerce Foundation annually for the past 4 years. The 1996–97 Litton Scholar is now working at Litton Industries as an engineering aide.

Funding History—Capitol College



Cuyahoga Community College Science, Engineering, Mathematics and Aerospace Academy

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Cleveland, Ohio 44115
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Program Overview

The 1996–97 program year saw considerable achievement and expansion for the Science, Engineering, Mathematics and Aerospace Academy (SEMAA). The program served more than 1,939 students by providing them innovative science and mathematics programs at no cost to the students. In addition, more than 120 parents were involved in various parent seminars, which taught them not only how to better support their children's education but also how to further their own education.

SEMAA was jointly established in September 1993 by Cuyahoga Community College and NASA's Lewis Research Center. Funding for SEMAA was provided by the Office of Equal Opportunity Programs at NASA Headquarters. Classroom and administrative space was provided by Cuyahoga Community College.

Objectives

SEMAA brought together five preexisting youth programs at Cuyahoga Community College. All five of those programs were combined to:

- Increase the participation of underrepresented and underserved groups in science, engineering, mathematics, and technology careers
- Increase the success rates of all students interested in science and mathematics
- Support the continued success of students interested in math and science
- Develop partnerships to recognize and support students interested in these fields

Enrollment Data

The framework for each preexisting program allowed SEMAA to serve a student population ranging from kindergarten through the 12th grade. During the fourth program year, 1,939 students participated in the program—1,379 (71.1 percent) of whom were African-American, 340 (17.5 percent) of whom were Hispanic, 176 (9.1 percent) of whom were Caucasian, and 44 (2.3 percent) of whom were Asian-American or from other ethnic back-

grounds. In addition, more than 120 parents of 5th to 12th grade students were involved in various parent training programs, and several hundred parents of K through 4th grade students participated in classes with their children.

Outcomes to Date

All SEMAA participants were given the opportunity to learn and develop interests through hands-on/minds-on experiences, field trips, speakers, and mentors. All functions were developed to create an interest in and a better knowledge of science, engineering, mathematics, and aerospace for the SEMAA participants.

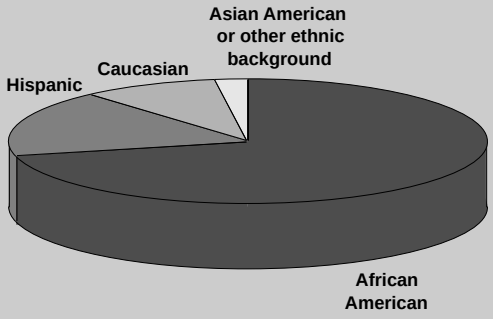
The following institutions were partners with SEMAA in providing various aspects of the SEMAA program:

- Cuyahoga Community College
- Case Western Reserve University
- Cleveland State University
- Lakeland Community College
- Lorain Community College

Summer components were held at the Metropolitan (Metro) and East campuses of Cuyahoga Community College, the El Barrio Community Center, the Esperanza Community Center, and one of the Cleveland public schools, Buhrer School, as well as at Case Western Reserve and Cleveland State Universities. A revised 9th- to 12th-grade summer program was added at Cuyahoga Community College, as was a new summer program in conjunction with Inventure Place, a hands-on children's science museum in Akron, Ohio.

The Mobile Aeronautics Education Laboratory was completed in May 1996 and was used by SEMAA for the 9th- to 12th-grade summer and academic-year programs. The laboratory takes a cutting-edge approach toward teaching math, science, and aerospace topics. The laboratory will continue to be used for 9th- to 12th-grade SEMAA components in the future. SEMAA has been awarded a grant to replicate the Mobile Aeronautics Education Laboratory workstations at Cuyahoga Community College during the 1997–98 academic year.

Cuyahoga College Enrollment



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Edward Waters College Mathematics, Science, and Technology Intervention

Program Overview

The NASA-sponsored math and science academic enrichment program at Edward Waters College provides growth in academic and technical knowledge, self-confidence, and global awareness for minority high school students in the Jacksonville, Florida, community. Using a curriculum designed around an interactive series in physics for grades 9 through college, the program integrates course work in computers, mathematics, physics, and electronics. The program offers conceptual physics and graduated electronic laboratories. Computers are used to access the rich Internet resources to research physics and electronics topics, enhance electronic skills using simulator software, and write computer programs to solve problems from math and physics classes. In addition to reinforcing basic skills in algebra and geometry, math classes focus on such subjects as vectors and number systems.

Objectives

The program's objectives are to:

- Improve the participants' attitude and skills with respect to "hard science" and mathematics courses
- Instill an awareness of the relationships between mathematics and science
- Strengthen the overall support basis through parental and community involvement
- Allow academically gifted students from targeted schools an opportunity to meet with each other in an academically competitive environment

Students working on their computer skills.

Enrollment Data

The total number of students impacted is 248 since May 1, 1994. The target grade level is the 9th through 12 grade. Of the female participants, 14 are African Americans; of the male participants, 9 are African Americans. Program enrollment for the past 4 years is shown in on the next page.

Program Implementation

Strategies: year-round enrichment, strong academic component, summer component, involves school counselors and administrators,

field trip opportunities, Saturday component, linkages to the next level, use of technology, hands-on learning, and skill development.

Recruitment Strategies: ranked 67 prior participants based on recommendations from instructors in four subject areas; invited 30 students to an interest meeting with parents, presented program, and signed commitment statements; surveyed by phone remaining students to ascertain availability; repeated step 2 for the next block of 10 available students; recruited from 8th grade class at local engineering magnet school and Black Male Explorer Program.

Selection Criteria: limited participation of 20 students and 3 alternates and recruitment pool was a group of 67 who participated in the same program during the spring of 1997 and public school students entering 9th grade in the fall of 1997.

Partner: Continental Cablevision.

Courses Targeted: pre-algebra, algebra I, geometry, computer science, and physics.

Outcomes to Date

Results: Posttest scores increased an average of 69.5 percent and above for the 5-week summer program. Excellent attendance was attained, with only two excused absences. An interdisciplinary mathematics, physics, and computer curriculum was successfully implemented. Overall, the participants rated the quality of exams as “excellent” (20 percent) and “good” (60 percent), the quality of lectures as “excellent” (19 percent) and “good” (57 percent), and the quality of textbooks and materials as “excellent” (50 percent) and “good” (32 percent).

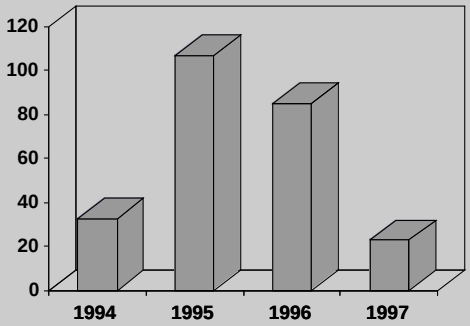
Tracking: name, address, ethnicity, gender, MSET courses taken, grades, grade point average, and highest academic level.

Lessons Learned: Some desirable students could not make the commitment to both summer and Saturday participation as the program design required because of competition with public summer school and other special programs. In every type of course, the traditional full-period lecture needs to be modified when working with students age 14–17. Strategies and methods such as hands-on practice, group competition, and rewards are effective.

Issues/Challenges

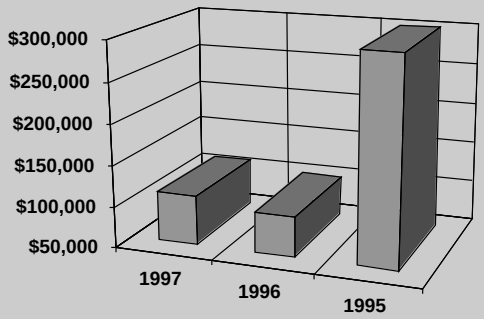
Edward Waters College must secure additional funding sources to continue operating the program after May 1997. The group is of mixed age and experience level; the program is challenging the college to design a curriculum that provides consistent growth. Recruitment must bring in a more uniform startup student pool for future phases.

Edward Waters College Enrollment



Program enrollment for the past 4 years for the Edward Waters College program.

Funding History—Edward Waters College



Hispanic Association of Colleges and Universities
Proyecto Access

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Project Overview

The NASA/Hispanic Association of Colleges and Universities (HACU) Proyecto Access identifies middle school and high school students with the potential and interest in becoming practitioners or teachers in engineering, science, and other mathematics-related areas and to reinforce them in the pursuit of these fields. Minority students are the targeted participants. NASA and HACU selected seven sites across the country to serve as centers for the project.

Objectives

The main objectives for the project are to:

- Acquaint the students with professional career opportunities in math, science, and engineering
- Reinforce the mathematics preparation of these students at the secondary level
- Increase the retention rates of these students in college
- Increase the number of competently prepared minority and female high school students from Proyecto Access who will ultimately pursue engineering, mathematics, or science studies in college

Project Implementation

NASA and HACU selected the following Hispanic Serving Institutions to serve as the implementation centers for the 1997 project year:

Florida International University	Miami, Florida
Hostos Community College	Bronx, New York
Jersey City State College	Jersey City, New Jersey
Los Angeles City College	Los Angeles, California
New Mexico State University	Las Cruces, New Mexico
Pima Community College	Tucson, Arizona
Richard J. Daley College	Chicago, Illinois

Precollege Awards

The academic portion of the program consists of an 8-week program, conducted between June 2, 1997, and August 29, 1997. The actual dates of the program depended on the site. The overall project end date for 1997 is mid-January 1998. The following programs, courses, and activities were offered at the sites (actual selection varied by site):

- Logic and its Applications to Mathematics
- Introduction to Engineering
- Introduction to Computer Science
- Topics in Problem Solving (Seminar)
- Career Awareness—guest speakers and special presentations
- Field trips
- Practice SAT examinations

The selection criteria are the completion of the school year by June 27, 1997, 3.0 grade point average, and the completion of required mathematics courses depending on the students' class level (pre-algebra, algebra, or geometry). Each applicant needs to be nominated by two teachers or counselors, at least one of which must be a mathematics teacher.

There are no tuition and fees. Financial assistance from the local Private Industry Council Summer Youth Programs and free breakfasts and lunches through the State-administered U.S. Department of Agriculture Summer Food Service Program became available to many low income students who are eligible for their academic year school lunch program. Five sites had the Summer Food Service Program, two had a Summer Youth Program, and one had program counselors provided free of charge.

Program staff include college faculty members, high school and middle school teachers, and program assistant mentors (undergraduate engineering and science majors). Financial and in-kind program support come from NASA, center institutions, local school districts, local private industry/Council Summer Youth Program, the State-administered U.S. Department of Agriculture Summer Food Service Program, and other public and private sector agencies. HACU provided fiscal and programmatic support. Initial technical support was provided by the Texas Pre-freshman Engineering Program office of the University of Texas at San Antonio.

Precollege Awards

Hispanic Association of Colleges and Universities
Proyecto Access

Outcomes to Date

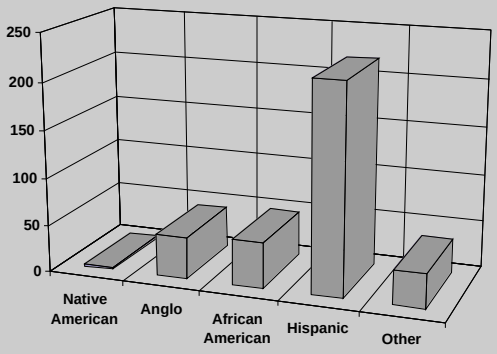
The following is the basic statistical summary of the program participants: applied—539, started—426, and completed—349. Of those students completing the program, the following ethnic breakdown applies: 2 Native Americans, 44 Caucasians, 48 African Americans, 219 Hispanics, and 36 others. The gender breakdown was: 51.86 percent male and 48.14 percent female.

The following information is being gathered (or will be gathered in future years) for evaluation, research, and tracking purposes: name, address, ethnicity, gender, grades, SAT/ACT scores, career choices, college entrance, college major, grade point average, education levels of parents, and college degree(s). Other data may be added in the future.

Issues/Challenges

Proyecto Access needs to work closely with its schools that have the year-round calendars and to identify the students earlier in the year so that they receive the necessary authorization/permission from their home schools to be able to participate in the local program. Each program needs to develop linkages with local public- and private-sector agencies so that local support will fund the program's growth.

Hispanic Association Enrollment



Lincoln University ExCITE Program

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Program Overview

The purpose of this program is to promote the use of technology in middle school science education. The program is currently working with three middle schools: Penns Grove Middle School in Oxford, Pennsylvania, a small community in a mostly rural area; Gordon Middle School in Coatesville, Pennsylvania, an urban area with a significant minority population; and Glenbrook Middle School in Concord, California, also an urban area with a significant minority population. The objective is to get the schools involved in working on a community project and in using technology to accomplish the goals of the project. The schools are working on the following projects using both classes and before and after school clubs:

- Penns Grove Middle School (Project ExCITE)—This school includes 6th and 7th graders who are working on two projects. The first is a determination of the availability and suitability of farm ponds for fighting fires in rural areas; the second project is a study of methods to reestablish and preserve natural grasslands (savannas) that occur in a serpentine barrens area that serves as a county park.

- Gordon Middle School (Project ExCITE)—The 5th, 6th, and 7th graders at this school are working on Lyme disease. Specifically, they are involved in gathering information about it and sharing this information with the community in printed form and through public presentations.

- Glenbrook Middle School (Project PLANET)—These 6th, 7th, and 8th graders are working on a tidal marsh area that adjoins the schools grounds where they plan to develop a wetlands interpretative area and teaching park.

Enrollment Data

The Penns Grove Middle School is in Oxford, Pennsylvania, a small town in a largely rural area. The students, 6th and 7th graders, are mostly white (86 percent); both male and female students have participated in the project. The students are recruited through a technology fair that is held early in the school year; the fair includes stations that illustrate the Internet, satellite technology, optics, the serpentine barrens habitat, and mapping. In addition, the students in the program make presentations to their peers in school assemblies for the purpose of recruitment.

Precollege Awards

Gordon Middle School, which enrolls 5th, 6th, and 7th graders, is in Coatesville, Pennsylvania, an urban community with a significant African-American population, which is reflected in the school population (29 percent). The students are recruited into the program through a science fair similar to the one held at Penns Grove. The fair at Gordon includes a station on Lyme disease, microscopy, rabies, hand washing and germs, aerial photographs and mapping, and satellite technology.

Glenbrook Middle School is in Concord, California, and enrolls 6th, 7th, and 8th graders. The student population is about 40-percent Hispanic, 10-percent African-American, 5-percent Asian, and the remainder white. The students are introduced to the project by a science fair. Students can choose to participate on a volunteer basis, but all students are exposed as the curriculum in all three grades contains units derived from the work on the marshes.

Outcomes to Date

Penns Grove Middle School

To build on the first year's work, it was decided to involve students in three ways. One was to use volunteers both before and after school. Second, Project ExCITE offered a club that met twice a week whose function was to concentrate on the fire pond project. Third, a new approach was to offer an extra class during school hours that met twice a week. This class was team-taught by project teachers, using a multidisciplinary approach to teach a multigrade, multilevel mix of students.

The volunteer group was in charge of communications; this included community displays, public speaking, newspaper reporting, and a display case. This group of 20 prepared a trifold display that was used to promote community involvement at a variety of public gatherings. In addition, this group spoke to four school assemblies, at a Home and School Association meeting, and to congressional aides in Washington, D.C.

The club analyzed aerial photographs to locate ponds for the fire company. The members used mapping and analytical skills to complete the first phase of this project. Next fall, the data will be used to prepare maps and data bases; this information will be presented to the fire company.

The Project ExCITE class was established to create an informed nucleus of students who would serve as leaders for the project. Students had to apply to join this class by filling out an interest and achievement questionnaire and obtain parental permission to take on extra school duties. The class was limited to an enrollment of 25 and met twice a week throughout the entire school year. Content focused on two areas: the use of the Internet as a research and communications tool and the use of controlled

burns to maintain the serpentine barrens that are threatened by encroaching vegetation. To learn about the Internet, students divided into cooperative groups and researched its origin, language, use, and information. Then, they presented the information to their classmates. Students enjoyed a field trip to Lincoln University's computer laboratory for an afternoon of "surfing the net." The outcome of these activities was the creation of a home page for the project by a parent volunteer with articles and input from students.

To learn about the use of controlled burns, students participated in an electronic field trip purchased with the NASA grant. This field trip was broadcast live from Minnesota, and students could send in questions by e-mail. This precipitated several classroom meetings and discussions on fire, followed by five experiments on fire and two on "tree cookies" to study the history of trees as revealed by their growth rings. Next, the students hiked through Nottingham Park with Superintendent Jim Subach to look at areas targeted for fire and other control methods to protect the prairie grasses from encroaching green briar and leaf litter. Unfortunately, because of safety and insurance reasons, the students were not allowed to attend the burns, which were conducted in areas of 4 to 5 acres at a time. Two teachers were able to film a burn, and the students will finish writing the script for voice-overs and editing the film over the summer. The students went on a hay ride after the fire to survey the results of the burns.

The highlight of the year was an exchange program with Glenbrook Middle School in Concord, California. Six students and a teacher spent a week in California learning firsthand about a different geographic area, culture, and school system. The students were exposed to Glenbrook's Project PLANET, new technology, and sites of San Francisco. Students sent back daily messages and photos though e-mail to keep Penns Grove's students updated on their adventures. The following week, six Glenbrook students and one teacher arrived in Oxford, where they spent time at Penns Grove and went on field trips to Amish country, Nottingham Park, Washington, D.C., and Philadelphia. Everyone involved in the exchange agreed that this unique opportunity resulted in a memorable learning experience.

Gordon Middle School

Early in the school year, a science fair was held in the school's library; the purpose of the fair was to attract students to the project. All students had one 45-minute period to attend the fair, which lasted over 3 days. This resulted in the formation of a student population to work on the project that included new students and students who had participated the year before. These students then had afternoon meetings to gather and organize information about Lyme disease; in the spring, this was expanded to include before-school meetings. The focus in the spring shifted to the preparation of the Lyme disease information booklet; the students also prepared their presentation, which was part of a year-end trip to Washington. The presentation, which included a rap song on Lyme disease, was made to Representative Miller (California) and Representative Pitts' (Pennsylvania) legislative assistant.

Glenbrook Middle School

During the past year, the students completed a geographic information system (GIS) of Peyton Hill Marsh. They have also completed a comparison of four different marshes to determine which one was most suitable as an educational resource. Several partnerships with local environmental groups have allowed the students to obtain more information on the marshes. The students and teachers were trained on ARCView by outside experts. Finally, the integration of project units into the curriculum was completed for all three grades at the school.

Partnering

Lincoln University coordinates the project by overseeing the budget for this project, serving as a link between the schools and the funding agency, and providing technical support, training for teachers and students, and support for the technology being introduced into the schools.

TRW Corporation serves as a subcontractor on the project, providing training for teachers in satellite image analysis and GIS. In addition, the company has supported the science fairs at the schools by providing the Lewis satellite model as well as a person to explain its operation. Dr. Jay Pearlman of TRW has also communicated with the teachers on a regular basis, providing valuable input to accomplish the projects.

Midtown Educational Foundation

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Program Overview

Midtown Educational Foundation (MEF) provides supplemental education programs for inner city youth through its Midtown Center for boys and the Metro Achievement Center for girls. Three programs serve students in the 4th through 12th grades. In the One-on-One Program for grades 4 through 6, students receive individual tutoring in math, science, and English. The focus on math, science, and English continues in the Midtown/Metro Achievement Program for 7th and 8th graders, which prepares students for entrance into college-track high schools. Finally, the College Orientation Program prepares high school students for college entrance exams, helps them explore college options, and opens professional horizons, especially in the fields of math and science.

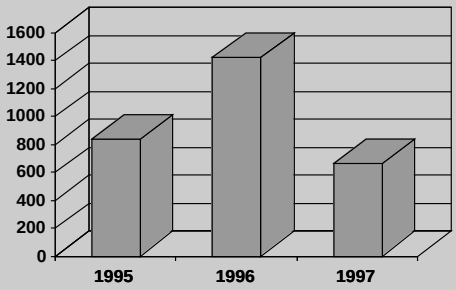
In 1993, with a multiyear grant provided by NASA, MEF began to implement a curriculum focused on math and science to prepare students to pursue studies and careers in technical fields. The 1996–97 goals of the project were as follows:

- Excite students about math and science
- Encourage students to pursue math and science courses in high school so that they might then pursue technical studies in college
- Orient students toward careers in math and science
- Provide supplementary assistance and professional guidance through individual mentoring

To achieve these goals, Midtown and Metro use a multifaceted approach that combines academics, mentoring, character education, and parental leadership.

MEF programs target the average student—those in the 30th to 70th percentile. Students participate in MEF programs after school, on weekends, and during the summer. Many students attend for more than one semester. Students are recruited through presentations made at local schools and program brochures. This year, in an effort to reach out more effectively to teachers in Chicago's inner city, MEF sent a mailer that announced the Summer Program—the centers' busiest time of the year—to more than 500 teachers and principals. The mailer incorporated strong testimonials from teachers who already know the value of the MEF programs.

Midtown Educational Foundation Enrollment



Precollege Awards

Parents and students alike undergo personal interviews in a screening process for admission to the program. To be admitted, students must demonstrate a desire to better themselves, personally and academically. They and their parents must also show intent to stay with the program for the long term. Students also must submit a copy of their report card.

Enrollment Data

In the 1996–97 academic school year, 661 students from close to 75 public and private schools participated in MEF programs: 293 males in grades 4 through 8; 210 females in grades 4 through 8; 78 males in high school; and 80 females in high school. Of these, 90 percent were African American or Hispanic. Typically, the students are the first in their families to attend college. While 7 out of 10 of their peers drop out of high school, 95 percent of MEF students graduate from high school and 65 percent go on to college.

Outcomes to Date

In the 1996-97 academic year, students in all three programs continued to build their math, science, and computer skills through classroom instruction and educational activities. Students spent 50 percent of their academic time in math and science classes and activities.

In the One-on-One Program for 4th through 6th graders, MEF expanded the Family Math Series for Metro students and introduced the Technology in the Home Project at Midtown. The three-part Family Math Series offers students the opportunity to attend hands-on math classes with their family members. Activities focus on the development of critical thinking and problem-solving skills. The Technology in the Home Project uses computers and the Internet as a tool for increasing the contact time between One-on-One students and tutors. Computers were installed in the homes of 14 students enrolled in the summer session of One-on-One.

Ninety percent of the students in the Midtown/Metro Achievement Program for 7th and 8th graders were accepted in college-track high schools. Thirty-two stu dents received high school scholarships totaling more than $90,000. This year, boys enrolled at Midtown spent more than 100 classroom hours strengthening their math, science, and computers skills. At Metro, students were divided into study groups according to their academic level and school curriculum. Metro students also participated in the Museum of Science and Industry's Science Club Network. Students learned mathematical and scientific concepts through engaging, hands-on experiments. Topics covered include architecture, engineering, electricity, and plant biology.

Finally, 100 percent of the seniors enrolled in the College Orientation Program for students in the 9th through 12th grades graduated from high school, and 100 percent were enrolled in college in the fall of 1997. Students are attending schools such as Northwestern University, Cornell University, the University of Southern California, the University of Illinois, and DePaul University. Seven seniors received scholarships totaling almost $100,000. Midtown student Rolando Padilla received the largest award—$66,000. Rolando will attend the Illinois Institute of Technology on a full 4-year scholarship.

This past summer, both centers worked in collaboration with local colleges to prepare students academically and practically for college. At Midtown, 9th and 10th graders benefit from challenging classes taught at Robert Morris College. At Metro, students attended weekly seminars at Lexington College, a private 2-year college for women, which emphasizes business management, social responsibility, and the value of work.

Academics occupied only half of the day for these young men and women. The other half was spent volunteering in all areas of the One-on-One and Midtown/Metro Achievement Programs, including advising, assisting teachers, organizing sporting events, and performing general maintenance. College Orientation Program students in the 11th and 12th grades were exposed to the world of work through paid and volunteer internships. Thirty-eight students worked in local corporations, hospitals, universities, and museums.

Midtown Educational Foundation

Precollege Awards

Earlier this year, MEF was one of only 50 organizations selected from across the country to participate as a model program at the President's Summit for America's Future. For the last 2 years, the One-on-One Program for students in the 4th through 6th grades has been invited to participate in the Chicago Public Schools' 10,000 Tutors initiative. A part of the city's Children First program, 10,000 Tutors was designed to create a volunteer corps of 10,000 tutors who provide academic support to students and teachers. College Orientation Program students operated a Junior Achievement company. The Museum of Science and Industry has chosen Metro and Midtown as sites for their Science Club Network. Other organizations involved include Daley College, the Daniel Murphy Scholarship Fund, Future Leaders of Chicago, and Toastmasters International.

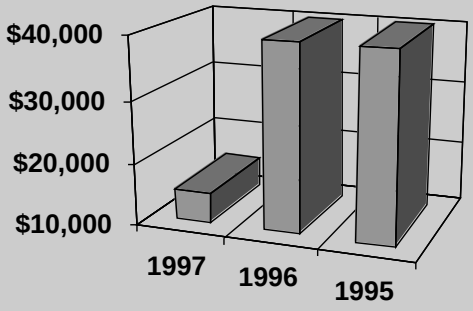
Over the past year, MEF has proven that given sustained personal attention and an opportunity to learn, inner city children can become excited about math and science. Subsequently, they are able to excel in these courses. Students prefer hands-on experiential learning to a lecture approach. Finally, to have a lasting impact, mentoring and individual attention must be a part of the learning process.

Issues/Challenges

While MEF is working to integrate technology into its activities, there is a need to increase the resources available to students. Many of the computers in the Computer Lab are quite old and are in constant need of repair. In addition, they do not have the capacity to run newer educational software programs. By integrating learning technologies into the programs, MEF can help students build the critical computer skills that they will need to succeed in their academic and professional careers.

Staffing also continues to be a concern for MEF. In addition to making sure that there is adequate staffing levels for the programs, MEF must further study how to effectively recruit and retain qualified professionals who share a commitment to Chicago's youth. Retention of staff, particularly at the at the program level, is a notable challenge. MEF must also ensure that staff are provided with resources to help them continue their professional development.

Funding History—
Midtown Educational Foundation



Mount Holyoke College SummerMath

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Project Overview

SummerMath is a summer mathematics project for young women in high school. It is based on research in women's learning and a constructivist approach to learning. A diverse group of approximately 100 students participates. Academic classes consist of three 90-minute classes per day for 6 weeks and focus on conceptual understanding, with students working in pairs to explore solutions to problems. Students also study computer programming, attend workshops on topics such as brain imaging, architecture, economics, and astronomy, explore careers, and participate in sports and field trips. Feedback shows consistent positive changes in confidence levels and attitudes toward mathematics.

The target audience are female students of diverse racial and ethnic backgrounds in 9th grade through the entering-college level. Courses targeted are problem-solving conceptual understanding of mathematics and the use of technology. The selection criteria are a desire to participate, a willingness to try new learning methods, an essay, and a teach/mentor recommendation (optional). Recruitment strategies include a network of teacher, administrators, and former students and mailing lists from the College Board. The program has two major strategies:

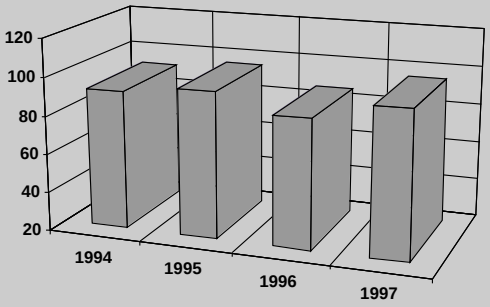
- *Partners*: SummerMath partners include the Black Student Fund of Washington, D.C., and the Summer Search Foundation of California.

- *Other Strategies*: A summer project has strong academics and makes linkages to the next level. It incorporates the use of technology, hands-on learning, reflection on activities, and problem solving. It involves teachers and administrators and provides mentors and field trips.

Enrollment Data

The total enrollment is 1,399 since June 1982. The fiscal year 1997 female enrollment breakdown is 27 African Americans, 4 Native Americans, 7 Hispanics, 0 Native Alaskans/Pacific Islanders, and 37 others (32 European Americans and 5 Asians or Asian Americans, for a total of 96.

Mount Holyoke College Enrollment



Mount Holyoke College
SummerMath

Precollege Awards

Outcomes to Date

Results: An independent evaluation found that students maintained confidence in their ability to learn and use mathematics for several years after the program, that students in high school were taking the necessary college preparatory courses, and all who had graduated from high school were attending college. Extensive research by project directors into attitudes toward mathematics shows positive changes in all areas for most students.

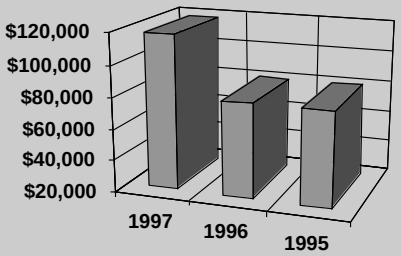
Tracking: name, address, ethnicity, gender, next courses taken, college entrance, and college major.

Lessons Learned: To effect significant positive change in mathematical understanding, attitude, and behavior of high school students, a project must build a strong staff team with expertise, shared goals, and trust.

Issues/Challenges

The program should convince students that they will be more empowered by learning mathematical reasoning, communication, and justification than by memorizing algebraic and numerical facts.

**Funding History—
Mount Holyoke College**



New Mexico Highlands University An Integrated Approach to Engineering Education in a Minority Community

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Program Overview

This program integrates two threads of engineering education: undergraduate research experience and precollege outreach. In the undergraduate component, students participate in a summer internship at NASA facilities, and during the school year, they work with their faculty mentor. In the precollege component, support is provided during the school year for the Young Astronauts program, and during the summer, middle school students are selected to participate in a water ecology program. Professors conduct Internet training programs for both precollege teachers and staff throughout the year. These, in turn, train and supervise students who access the Internet. Highlands students provide a network and mentor middle and high school MESA students.

Objectives

The program has the following five objectives:

- Produce a pool of applied engineers recruited from rural or minority populations in New Mexico
- Produce graduates who are competitive in technical jobs with graduates of major universities
- Engender engineering creativity and encourage entrepreneurship between college and precollege students and improve preparedness for college (especially math readiness) of high school graduates in the northeastern region of New Mexico
- Increase the retention of regional students who have already entered the math and science educational “pipeline”
- Foster scientific inquiry by giving secondary school children and their teachers direct access to the Information Superhighway

Enrollment Data

The total number of students impacted is 1,298 since September 1, 1992. The targeted grades are 6 through 12. Students targeted are 846 female Hispanics and 452 male Hispanics.

Precollege Awards

New Mexico Highlands University
An Integrated Approach to Engineering Education in a Minority Community

Program Implementation

Strategies: year-round enrichment; strong academic component; mentoring relationships; academic year component; involvement of teachers, school counselors, and administrators; community involvement; tutoring; research component; use of technology; hands-on learning; problem solving; and skill development.

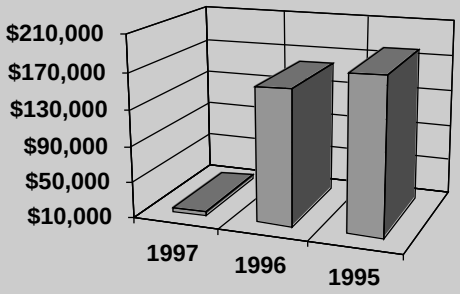
Recruitment Strategies: Teachers are recruited through mailing and word-of-mouth. Student recruitment is not a problem because of the high demand for Internet access among students.

Selection Criteria: Internet access is available to all students in middle and high schools provided that a parental consent form and waiver is on file with the school network administrator, usually the librarian. Young Astronauts and Water Ecology students are teacher-selected.

Outcomes to Date

This outreach project has brought the Information Superhighway to the schools of northeastern New Mexico. As a result of the interactions with precollege students, the engineering enrollment has tripled over the 4 years of the project.

Funding History—
New Mexico Highlands



Precollege Awards

New Mexico MESA, Inc. NASA Senior Incentive Field Trip, Maintenance and Expansion Efforts, and the K–5 Buddies Program

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Program Overview

New Mexico MESA, Inc., is a nonprofit organization and part of a national initiative promoting educational enrichment for precollege students from historically underrepresented groups. New Mexico MESA prepares students in grades 6 through 12 for college majors and careers in mathematics, engineering, science, and related fields. While the primary focus is on Native American, African-American, and Hispanic groups, all students are encouraged to participate. New Mexico MESA is a year-round program and is currently in its 15th year of operation and includes field trips, competitions, tutoring, leadership workshops, summer enrichment, incentive awards, teacher enhancement, and so on. NASA provided funding for the 1997 NASA Senior Incentive Field Trip, the maintenance and expansion efforts; and the K–5 Buddies Program.

Enrollment Data

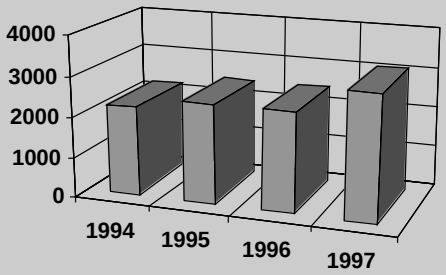
Any student in grades 6 through 12 may participate; however, emphasis is placed on Native American, African-American, and Hispanic involvement. Recruitment is handled on a school-by-school basis and is directed by the MESA advisor at that site. Strategies range from notices in school newsletters and school announcements to recruiting through math and science teachers at the individual school. Students must have and maintain a minimum 2.0 grade point average and enroll in college prep math, science, and English courses.

Outcomes to Date

Based on a recent survey, 98.9 percent of New Mexico MESA seniors indicated they plan to enroll in higher education after high school graduation, with 69 percent indicating majors in mathematics, engineering, or science. Of these graduates, 79 percent are receiving grants or scholarships. Based on the August 1996 New Mexico Commission on Higher Education Evaluation of New Mexico MESA, 97 percent of MESA's 1994–95 graduates are still in college. New Mexico MESA added one new school during the 199–97 school year, bringing the total number of schools served to 72.

Belen Middle School student Stephen Scott and Central Elementary School student Buddy Chris Griffith work together on a project.

New Mexico MESA Enrollment



Precollege Awards

New Mexico MESA, Inc.
NASA Senior Incentive Field Trip,
Maintenance and Expansion Efforts,
and the K–5 Buddies Program

New Mexico MESA students continue to enroll in higher education at higher numbers than their peers do. The majority receives grants and scholarships. During the 1996–97 school year, 302 middle and high school students mentored 463 elementary students, providing hands-on math-, science-, and English-based activities, tutoring, and serving as role models.

Seventy-two high school seniors from 18 New Mexico MESA school sites were selected to participate in the Senior Incentive Field Trip to NASA's Kennedy Space Center in Florida. Students were selected based on outstanding participation in New Mexico MESA, exceptional grade point average, and extracurricular activities. These students toured Kennedy for 2 days, including job shadowing with NASA mentors, viewing a Space Shuttle launch, and completing the trip with a visit to Epcot Center.

Of 106 females tested, the Enhanced ACT Composite Score was 21.8, and of 45 males, the score was 22.7. In addition, 119 students were awarded $75,300 in incentive awards upon their full time enrollment in a degree-granting institution of higher learning.

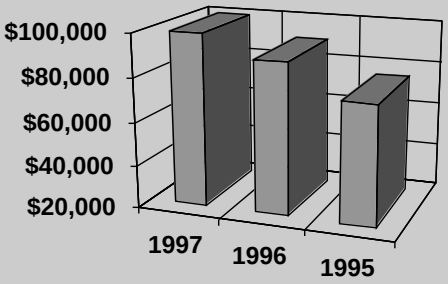
Partnering

New Mexico MESA administers Project Partnership in New Mexico. MESA students are partnered with Federal employees who introduce these students to the people, activities, and the mission of their respective Federal agency. Students participate in field trips, job shadowing, and the like. Teachers are provided with professional development by individuals from these Federal agencies. Mentors, in turn, participate in joint community service projects, provide leadership training, serve as judges at math and science competitions, and participate in career fairs and summer enrichment courses.

Challenges/Lessons Learned

New Mexico MESA must limit its expansion because of monetary and staffing limitations. Schools are currently wait listed until such time that New Mexico MESA can fully support their MESA program. Expansion must be limited to a strict number of schools each year to ensure quality support during their first year.

**Funding History—
New Mexico Mesa College**



NonProfit Initiatives, Inc.
El Ingeniero

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El Ingeniero
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Program Overview

El Ingeniero seeks to instill an interest in mathematics, science, and engineering careers in Hispanic junior high students and enhance their mathematics and science skills. The program consists of two components: the Summer Component and the Alumni Component. The Summer Component consists of three elements: the Self-Awareness Element, the Career Exploration Element, and the Mathematics and Science Enrichment Element. The objectives of the Summer Component are to:

- Reinforce the students' self-confidence, self-esteem, and positive attitudes toward the world of work
- Provide the students with an introduction to the engineering occupation and its career options
- Increase the students' skills in mathematics and science.

The objectives of the Alumni Component are to:

- Reinforce alumni self-confidence, self-esteem, and positive attitudes toward school and work
- Maintain alumni group identity and a mutual support network dedicated to mathematics and science achievement
- Provide alumni with information regarding educational and career opportunities in mathematics, science, and engineering
- Motivate and increase the skills of the parents of alumni in working with their children's educational concerns.

The activities that have been used to accomplish these objectives include presentations of the summer projects, alumni-parent meetings, career and guidance counseling, and summer job and internship placement assistance.

Parents are involved in all aspects of the program. Specifically, the students' parents participate in a program orientation before the start of their child's El Ingeniero experience and in a midprogram parent luncheon seminar (focusing on planning for future educational opportunities, including college). The parents also accompany their children on field trips not only as chaperones but as active participants in the experience, participate in a closing

NonProfit Initiatives, Inc.
El Ingeniero

ceremony where their children make their final presentations and display their project, and interview candidates for the program during the program recruitment process.

Enrollment Data

The participants of the Summer Component are 22 7th and 8th grade students (approximately 50 percent boys and 50 percent girls), primarily Hispanic, from junior high schools in the Capital District area (that is, Montgomery and Prince George's Counties in Maryland; Washington, D.C.; and northern Virginia). The students are on or above a grade level with a "B" average in mathematics or science. They are U.S. citizens currently enrolled in normal or honors college prep mathematics and science sequences. The process for selecting the students includes contacting middle schools in the Capital District area and with staff assistance, identifying students who meet the selection criteria. Students are selected on the basis of academic records, school recommendations, attendance reports, and the screening interview conducted by parents of El Ingeniero alumni. The participants of the Alumni Component are the 327 alumni of the Summer Component.

Outcomes to Date

Alumni have graduated from the country's finest engineering schools and are now professional engineers. The program has also been a bridge and catalyst for alumni to reach for other opportunities in the education pipeline. Herein lies the value and exponential impact of El Ingeniero. For example, one of the program's alumni, Elizabeth Mendoza, was featured in an article about another NASA-funded precollege engineering program experience. Another example is Claudia Molina, an El Ingeniero alumna who (using El Ingeniero as a model) was instrumental in the design and development of the other precollege education program in which Elizabeth participated and who was that other program's first coordinator. Claudia holds two engineering degrees from the University of Pennsylvania and an MBA from Harvard. She is currently a consultant with Booz-Allen.

Because of the breadth of media coverage (for example, National Geographic's *World* magazine) on the program, El Ingeniero's impact has been national and international in scope. This, coupled with the director's promotion of mathematics, science, and engineering education in collaborative efforts with public and private middle schools in the Capital District area, means that over the years El Ingeniero has impacted positively on thousands of Hispanic and other students. During the 1997 Summer Component, the students designed and constructed a large-scale model of a residential drainage system and developed individual home pages for the Internet. Their work was featured on local cable television.

Partnering

The program's summer host is the University of Maryland at College Park. Specifically, the university's Center for Minorities in Science and Engineering enables the project to obtain university support services (such as copying, buses, and parking permits). Other university entities (such as the Physics, Engineering, and Agronomy Departments) have provided the program with space. Private industry, government agencies, and other institutions have provided support through offering speakers and hosting field trips.

Norfolk State University Cooperating Hampton Roads Organizations for Minorities in Engineering

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Program Overview

Cooperating Hampton Roads Organizations for Minorities in Engineering (CHROME) is a model organization for mentoring and inspiring youths in area schools toward science, mathematics, and engineering. CHROME is a highly effective partnership of volunteer organizations with more than 70 contributing community member organizations that work together to provide enrichment programs for the community's youth. The November 1997 organizations consist of partners from business, industry, governmental agencies, institutions of higher education, public school systems, and civic and professional associations. CHROME serves Hampton Roads, which consists of nine cities and three counties in the Tidewater area of Virginia.

To provide continuous support for students of all ages, CHROME has developed a CHROME club structure, with clubs throughout 11 school systems in the area. Led by a guidance counselor and science and/or mathematics teacher, these clubs provide the students with a sustaining program throughout their precollege education. These experiences are aimed at enhancing their knowledge base and/or improving their academic skills, especially in the areas of mathematics and science, broadening their understanding of these fields, and increasing their awareness of the opportunities available to them.

Objectives

CHROME has the following eight objectives:

- Continue expansion of the CHROME club program
- Provide additional enhancement activities on Saturdays, on holidays, and during the summer
- Strengthen the CHROME alumni network to provide additional motivation and support for students and teachers
- Provide training activities, programs, and resources for teachers, counselors, and parents to encourage these students to pursue careers in technical fields
- Increase parental participation through more direct communication with the home, workshops for parents, and the encouragement of parental participation in all programs

Precollege Awards

Norfolk State University Cooperating Hampton Roads Organizations for Minorities in Engineering

- Expand the identification and distribution of local state and national opportunities for teacher and counselor enhancement related to CHROME's mission

- Foster partnerships between member organizations and CHROME clubs

- Continue to build school system and community support for minority student participation and achievement in mathematics and science

Enrollment Data

CHROME is currently in 79 percent of its member school systems' middle and high schools. In 1996, there were 122 clubs representing 3,264 students; in 1997, there were 138 clubs representing 3,804 students. The target grade levels are K–12 and alumni. The students targeted are 2,331 females and 1,460 males who are African Americans, Native Americans, Hispanics, individuals with disabilities, Pacific Islanders, Alaskans, and others.

Program Implementation

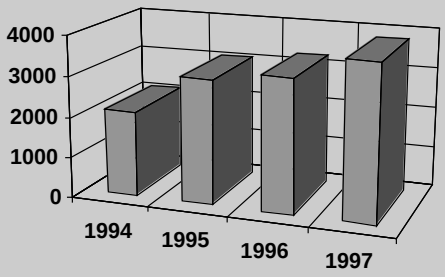
CHROME operates a club program in more than 135 elementary, middle, and high schools in Hampton Roads, Virginia, involving close to 4,000 students and 400 teachers and counselors. CHROME offers a variety of programs for club members, which include speakers at club meetings, academic counseling, career education, Saturday and summer academic and mentoring programs, field trips, a student-teacher annual recognition symposium, an annual celebration for outstanding students, and academic research experiences at area colleges and universities. CHROME also trains teachers and counselors in the school systems to be effective leaders of local student clubs and rewards its sponsors with appreciation days and outstanding club awards.

Recruitment Strategies: Sponsors handle the recruitment of students in the various schools by making announcements. CHROME staff host several public open houses during the year, particularly during science/mathematics/engineering weeks.

Selection Criteria: high motivation, interest, and ability to communicate orally and verbally.

Courses Targeted: mathematics, trigonometry, Earth science, pre-algebra, pre-calculus, biology, algebra 1, calculus, chemistry, geometry, computer science, physics, algebra II, and physical sciences.

Norfolk State University Enrollment



Precollege Awards

Outcomes to Date

The CHROME club program has undergone major expansion during the past 7 years. The number of schools involved has more than tripled, and the number of teachers and counselors participating has grown from 100 to more than 400. During the past year, the most significant growth in the number of CHROME students occurred at the critical middle school level. CHROME's expansion of its program to the elementary level is well under way. Two Hampton Roads school systems have undertaken efforts to ensure that CHROME clubs are established in every school. In September 1997, CHROME was awarded a Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring. Also, with the support of NASA, Norfolk State University, Paul D. Camp Community College, and local business and industry, CHROME is about to embark on a new effort to expand its program to rural western Tidewater, Virginia.

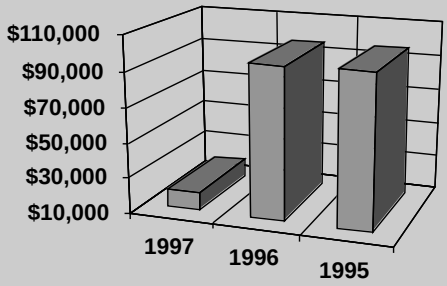
Issues/Challenges

Although significant progress has been made, much remains to be done. Many of the clubs are in their embryonic stage and need continued development and support. Major efforts on behalf of the regional coordinators will be needed to support the new growth as well as to extend it. While on its way to achieving the goal of being in each of the 100 middle and high schools in the region, adding 170+ elementary schools in the area will be a considerable challenge.

Lessons Learned

Existing club programs require far-reaching efforts on the part of the CHROME staff. Over the years, CHROME has found that extensive effort is needed each year to maintain existing school club programs. However, with a concerted effort on the part of CHROME along with growing support of the participating school systems and member organizations, CHROME has proven to be adaptable to a wide variety of scholastic settings.

Funding History—
Norfolk State University



Pasadena Unified School District
The Saturday Academy

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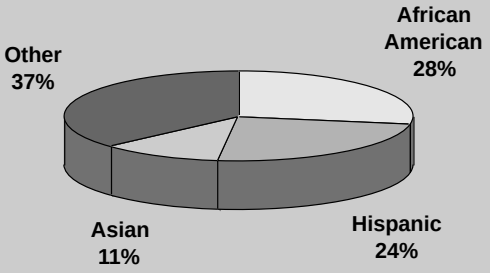
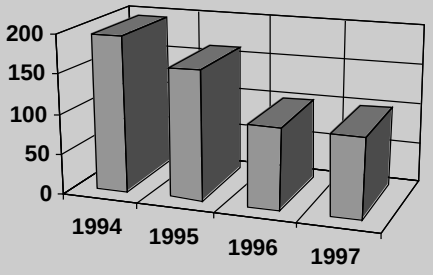
Pasadena Unified School District Enrollment by Ethnicity



Pasadena Unified School District Total Enrollment



Project Overview

The Saturday Academy provides an opportunity for 4th through 6th grade district students to participate in hands-on interactive learning experiences in the curricular areas of science and engineering, pre-algebra, and computer literacy. Students from throughout Pasadena Unified School District's 22 elementary schools are nominated by their principals to attend 20 Saturday classes from September through May for 3 hours per session

Students are instructed by district teachers in conjunction with high school academy students (students who were once participants in the program) and Jet Propulsion Laboratory (JPL) scientists, engineers, and technicians. Students work independently and at their own rate by progressing through a series of hands-on engineering experiments in the beginning engineering classes to actually soldering, reading, and drawing schematic diagrams at the advanced level. The pre-algebra classes include basic instruction in algebraic concepts, with the computer classes ranging from the students learning how to store and retrieve data to writing basic programs to learning how to design web pages.

Enrollment Data

The students targeted are disadvantaged students, with an emphasis on African Americans and Hispanics in the 4th through 6th grades. The breakdown is 65 males, of which 19 are African Americans, 16 are Hispanics, 6 are Asians, and 24 are others, and 35 females, of which 9 are African Americans, 8 are Hispanics, 5 are Asians, and 13 are others, for a total of 100 students.

Program Implementation

Partners: NASA/JPL, Pasadena Unified School District, and Pasadena City College (funding, technical support, and guidance).

Strategies: The project incorporates technology hands-on learning, problem solving, and skill development. It provides a continuum for students who have participated to return to the academy as high school students to share and reinforce learning with students and to serve as role models. It also provides a bridge to the NASA Pasadena City College Pre-College Academy. It involves parents, the community, and teachers.

Precollege Awards

Tracking: name, address, school of attendance, ethnicity, gender, grades, career choice, college choice, college major, and highest academic level completed.

Outcomes to Date

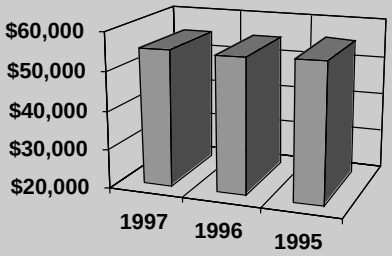
An evaluation was completed by an outside evaluator. The project provides students with self-esteem, enhanced mathematics and computer skills, engineering skills to build individual projects, a positive attitude toward science and engineering fields and toward the space program and its accomplishments, a positive attitude toward school, and an exposure and involvement with JPL engineers and technicians in the professional field.

Lessons Learned

Students can learn and understand science engineering and algebra skills at an early age. Early exposure to this curriculum develops sensitive and positive attitudes toward science and engineering fields of study.

Issues/Challenges

There is still a need for funding.



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Texas A&M University–Kingsville College Outreach Programs in Science, Engineering, and Math

Program Overview

The College of Engineering at Texas A&M University–Kingsville (formerly known as Texas A&I University) secured a 5-year grant with NASA for 4th-year funding in 1996–97. The primary goal of this grant was to provide a series of programs for junior high and high school students that would expose and motivate them toward science, engineering, or math degrees.

The components of the program include: South Texas Engineering, Math and Science (STEMS), for junior high students; Satellite, for high school students; South Texas Adventures in Research (STAR), for high school and incoming college freshmen students; and Chemistry Bridge, for incoming college freshmen. An outreach component features events such as an engineering day, where more than 500 students compete in design events, Girl Scout days, parent involvement programs, a mentoring program for elementary students and teachers, and college campus tours and visits. The overall objective of these programs was to expand the awareness and enhance the skills of south Texas students in grades 7–12 as related to math, science, and engineering, as well as to heighten knowledge of the U.S. space program opportunities. The goals of these programs were to:

- Expand the current successful outreach and summer programs for grades 7–12. The goal is to reach more than 650 students, parents, and teachers within the 5-year period.

- Further impact students' and parents' knowledge regarding preparation for careers in math, science, and engineering. Exit surveys administered at the programs' completion posed questions about the impact on participants of the career information disseminated.

- Increase the pipeline of students enrolling as science, engineering, and math majors in college. The goal was to attract students interested in studying science and engineering, but lacked the proper academic skills or preparatory information needed to successfully complete such degrees.

- Improve the success rate of underprepared freshman by enhancing mathematical and verbal skills. The College of Engineering can track participants' graduation rate from high school, data on college matriculation, degrees sought, and persistence.

Precollege Awards

- Strengthen problem-solving and mathematical (pre-algebra and algebra) skills of precollege students and provide hands-on science laboratory experiences, thereby creating enthusiasm among students at the junior and senior high levels, as well as first-time college students.

- Encourage strong outreach participation by women and minorities at levels equal to the population distribution of south Texas. Hispanics comprise more than 60 percent of the south Texas population. Participation in Texas A&M University–Kingsville's summer engineering programs would be maintained at a similar percentage.

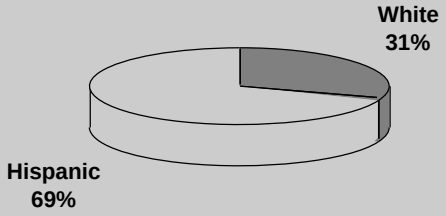
Enrollment Data

For all programs, applications were distributed through school counselors and teachers in south Texas. Applications for the STEMS program were solicited from students in the Kingsville and Riviera area, especially those in Memorial Middle School in the Kingsville Independent School District and Riviera Independent School District. The STAR and Chemistry Bridge programs also solicited students from a list of students applying to the university as science and engineering majors and from high schools in the south Texas region.

Outcomes to Date

The STEMS program is unique in that it has had participants ranging from gang members to honors students. Such exposure and mentoring are often what at-risk students need to continue in school and what students as a whole need to understand that they can become scientists and engineers. The Chemistry Bridge participants have a higher retention and achievement rate in a first-semester chemistry course than do TAMUK engineering students not attending the program. It proved to be extremely difficult to recruit seniors to the Chemistry Bridge program, as many needed to work summer jobs or felt they had a good chemistry background. The College of Engineering has implemented an incentive program with outside funding that stipends students enrolling in Chemistry Bridge who also enroll in the first chemistry course during the fall. Furthermore, an adaptive model is being developed for those students who earn grades of D or F during the fall. It will be offered the week prior to the return to classes for the spring semester.

Texas A&M University–Kingsville Chemistry Bridge



Precollege Awards

Texas A&M University–Kingsville College Outreach Programs in Science, Engineering, and Math

Student participants in the South Texas Adventures in Research or STAR program had an opportunity to tour the NASA Johnson Space Center facility in Houston.

Texas A&M University Program Coordinator, Veronica Ramos, with a NASA astronaut during a visit to Johnson Space Center by STAR participants.

Student Achievements

The students and their director, Helen Mebane, were so enthused by the STEMS program that they formed a team to compete in the statewide Odyssey of the Mind Contest. The group competed in the regional and district events, placing second. Dan Wright, an instructor for the College of Engineering, served as the technical consultant on the project.

A number of the Chemistry Bridge participants were full-ride scholarship recipients at Texas A&M University–Kingsville. Furthermore, many of the student employees on the project went on to take summer jobs across the country as undergraduate researchers; one became president of the Engineering Student Council, and one was hired as “webmaster” for the College of Engineering. All are significant accomplishments within the College of Engineering and Texas A&M University–Kingsville.

Partnering

The College of Engineering partners with industrial members such as Hoechst-Celanese to provide students in the STAR and Chemistry Bridge programs with industry facility tours and talks by engineers and scientists. Furthermore, the National Science Foundation-funded College of Engineering program, the Foundation Coalition, also assists the program with funding and faculty involvement.

The College of Engineering has partnered with middle school science teacher, Helen Mebane, to conduct academic-year parent involvement programs and mentoring projects for both elementary teachers and students. Mebane, a Hispanic female, trains parents, teachers, and students in hands-on science experiments that she has developed or found through her participation in the Society for the Advancement of Chicanos and Native Americans in Science.

Trenholm State Technical College High School Science Enrichment Program

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Program Overview

The NASA High School Science Enrichment Program (HSSEP) held at Trenholm State Technical College in Montgomery, Alabama, is designed to address the lack of preparation in precollege mathematics, English, and science that the National Science Foundation has identified as a major deterrent to educational excellence in the United States. The NASA HSSEP consists of two components: a 7-week Intensive Summer Science Camp and two 10- to 12-week Saturday Academy sessions held during the academic year. HSSEP has five curriculum components: Mathematics Applications, Integrated Science, Computer Literacy and Programming, Communication, and Field Experience in Science. The overall program objective is to provide access to mathematics, science, engineering, and technology careers for historically bypassed students.

Objectives

The major objective is to improve students' skills in and understanding of mathematics and science subject contents to successfully complete the high school college preparatory courses and advance to the next academic level without the need for remediation. Consequently, these participants will be better prepared to enter college and successfully complete their college mathematics, science, engineering, and technology courses without the need for remediation. In addition, time is devoted to developing effective study skills, good test-taking techniques including American College Test (ACT) preparation, and critical thinking and analytical skills. Specific objectives are to:

- Increase students' math/science/computer science/communications skills
- Improve students' grade point average in math and science
- Improve students' SAT/ACT performance
- Improve student retention in math and science subjects

Students at work on a space hunt at the US Space & Rocket Center in Huntsville, Alabama.

Precollege Awards

Trenholm State Technical College High School Science Enrichment Program

Enrollment Data

During this reporting period, 86 minority students from Montgomery and Lowndes Counties participated in NASA HSSEP. There were 31 males and 55 females in grades 9 through 12. Recruitment is by word-of-mouth from parents of NASA HSSEP participants and through junior high school counselors and math/science teachers.

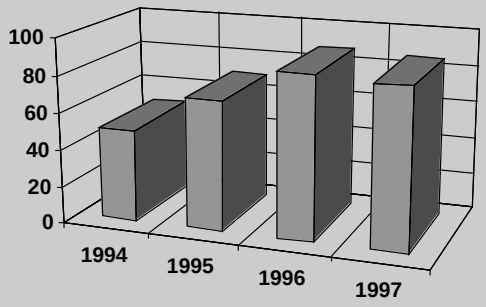
Outcomes to Date

There was a 100-percent graduation rate among HSSEP students and 50 percent enrolled in a college mathematics, science, engineering, and technology major. The graduating seniors participated in the Summer Bridge Program for entering college freshmen at Alabama State University. Also, Monica Whiting and Gerald Cobb (11th graders) participated in the High School Summer Research Apprentice Program at Alabama State University. Monica placed first and Gerald third in an oral and written presentation of their research projects. Both students attributed their success to the lessons learned while attending NASA HSSEP, which has:

- Served an increased number of students without the benefit of additional funding
- Increased significantly the participation of boys over the last 2 years
- Increased the percentage of students in each cohort who are 9th graders
- Maintained an attendance rate of 97 percent, with very few students dropping out during any given session
- Modified successfully its math/science curriculum to correlate with the schools from which the participants come to enhance students' school performance
- Improved (raised) math/science grade point averages for students who persist in the program

In an effort to increase male participation, there was a sudden emergence of poor classroom performance. However, it was determined that because of the male underrepresentation in previous HSSEP cohorts and given their poorer classroom performance, boys contributed to the overall decline in HSSEP students' math/science grade point averages. The frequency of HSSEP's student/parent/staff interactions increased student participation and performance. It was also noted that those students

Trenholm State Enrollment



whose parents were actively involved in HSSEP and those with the highest percentage of possible sessions attended were better performers in the classroom.

A parallel form of the ACT exam scores administered on a pretest and posttest basis continues to reflect significant pre-post improvements in math and science. However, because the critical mass of HSSEP students has yet to have the ACT administered for college admissions purposes, it is still too early to determine the impact of test preparation activities on scores that are meaningful.

Concentrating the recruiting efforts to 9th graders increased the number of HSSEP students who remain in the mathematics, science, engineering, and technology pipeline. It is evident that earlier participation:

- Helps students avoid the initial failure that caused sibling/peers to drop out of the math/science pipeline
- Helps students unlearn previously learned errors
- Helps develop the practice of working in groups
- Helps students gain opportunities to earn money as tutors—while reinforcing skills that they might otherwise have forgotten
- Puts students in line to take the higher math and science subjects in preparation for college mathematics, science, engineering, and technology courses

The participants' personal assessments revealed that the program has played a major role in increasing their math/science/technology interest and learning. Classroom teachers of program participants observed students as having greater interest/motivation, appearing more confident, being more focused and serious about approaching work, and improving homework preparation and attention to homework.

The participatory activities in math, science, and technology offered individualized as well as group activities in mathematics, science, engineering, and technology learning. Group projects in science, math, and technology required students to integrate concepts and use their communications skills. Students developed computer video presentations of mathematics and science concepts learned, as well as prepared the layout design for the HSSEP newsletter. These and other hands-on activities worked well to get students involved in the learning process. The students assumed responsibility for their learning experiences by using investigative learning styles, critical thinking, and decisionmaking skills.

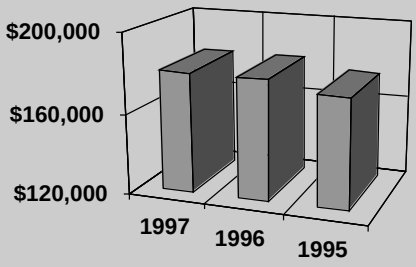
Precollege Awards

Trenholm State Technical College High School Science Enrichment Program

During the Summer 1997 session, NASA HSSEP participants went on the following field trips: Alabama State University, Montgomery, Alabama; Army National Guard, Montgomery, Alabama; The Challenger Learning Center, Chattanooga, Tennessee; U.S. Space and Rocket Center Astrotrek Adventure, Huntsville, Alabama; Kennedy Space Center, Florida (July 1, 1997, Space Shuttle launch); Marshall Space Flight Center, Huntsville, Alabama; and the U.S. Army Space and Strategic Defense Command Center, Huntsville, Alabama. During each trip, the students had opportunities to meet interesting, entertaining role models in mathematics, science, engineering, and technology careers.

As a means of increasing parental involvement in their children's educational process, a computer literacy class was held for parents of HSSEP participants. The response was very good. These sessions addressed current academic expectations, basic computer literacy, word-processing applications, and parental assistance in the learning process.

Funding History—Trenholm College



United Cerebral Palsy of Prince George's and Montgomery Counties HIGH SCHOOL/HIGH TECH

Mr. Charles McNelly
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Program Overview

To help increase the diversity of workers at the NASA centers, it is necessary to provide students with disabilities the opportunities to explore careers in high technology. HIGH SCHOOL/HIGH TECH, an enrichment program pioneered at NASA's Goddard Space Flight Center, successfully introduces students with disabilities to high-tech careers. This community-based partnership serves as a model for three additional NASA sites—Ames Research Center, Johnson Space Center, and Lewis Research Center.

Objectives

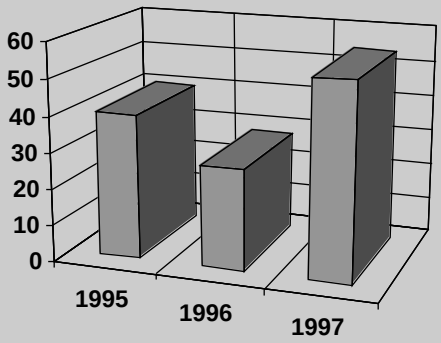
For a 3-year period beginning August 15, 1995, the goal of this program is to provide financial and technical support to a local agency in each NASA center area that serves persons with disabilities to enable a high school/high-tech program to develop and stand alone. This support is through United Cerebral Palsy of Prince George's and Montgomery Counties, Inc., and the three local agencies are United Cerebral Palsy affiliates. Each project will develop a basis of cooperation with Ames, Johnson, and Lewis, as well as a variety of community groups, including the public schools, high-tech employers, postsecondary education and training programs, rehabilitation agencies, and community economic development organizations.

Throughout the startup period and thereafter, local youths with disabilities will have early exposure to professions in mathematics, science, and technology-related fields. This exposure will be multifaceted to ensure adequate opportunity for realistic career exploration so these youths have an opportunity to test their interests and abilities. The exposure will be presented in the most supportive environment that is feasible.

Enrollment Data

The project focuses on youth with disabilities beginning in the 10th grade and continuing throughout high school. Youth from groups that are traditionally underserved are encouraged to participate. Project participants at each site are identified and referred to the project by school personnel from cooperating schools. Schools and school districts are chosen for involvement in the project in a manner to increase diversity and ensure a reasonable number of project participants.

United Cerebral Palsy of Prince George's and Montgomery Counties, Inc.



Precollege Awards

United Cerebral Palsy of Prince George's and Montgomery Counties
HIGH SCHOOL/HIGH TECH

Outcomes to Date

During the school year at each project site, there were multiple opportunities for the participants to become involved in experiences to enhance their awareness of career opportunities in high technology. These included workshops, tours, mentoring and shadowing experiences, and for 67 youngsters a chance to work last summer in a high-tech setting. Twenty-seven of the students worked at one of the NASA centers. In particular, these work experiences provided a great boost to the youngsters' self-esteems, enabled them to learn high-tech skills, and provided information that could lead to career decisions in high technology.

Student Achievements

Because the project is primarily one of enrichment and exposure, the students do not create products or easily demonstrate accomplishments. The most evident accomplishments are seen in their performance at work sites. Without singling out any one student, in general the students who worked during the summer were lauded for their enthusiasm, maturity, and work skills. Reports are still being developed that compile the results of their work experiences. Some students have been chosen to continue working at their job sites past the end of the summer work experience because their work was outstanding and their contributions could be ongoing.

Partnering

An intent of the program is to embed it among the many educational institutions, employers, and community groups that are in the position to help the participants move into careers in high technology. A listing of the partners that have been identified by the four program sites follows (it includes a total of 88 distinct partners or an average of 22 per project):

<u>Government Agencies</u>

Federal

Library of Congress
National Aeronautics and Space Administration (NASA)
NASA/Ames Research Center
NASA/Goddard Space Flight Center
NASA/Lewis Research Center
National Institutes of Health
National Oceanic and Atmospheric Administration (NOAA)/National Marine Fisheries
NOAA/National Weather Service
Patuxent Wildlife Research Center
U.S. Department of Agriculture/Beltsville Agriculture Research Center
U.S. Department of Transportation/Federal Transit Administration
U.S. Food and Drug Administration

Thomas (Eddie) Haddad, at work, during his HIGH SCHOOL/HIGH TECH summer work experience at NASA Lewis Research Center, in the Architectural/Structural Engineering Division.

Precollege Awards

Local

Bureau of Vocational Rehabilitation-Cleveland
Division of Rehabilitation Services
Ohio Aerospace Institute
Prince George's Commission for Persons with Disabilities
San Jose Police Department

Educational Entities

School Systems

Berea School District
Brecksville/Broadview Heights School District
Brunswick School District
Clear Creek Independent School District
Cleveland Heights/University Heights School District
Cleveland School District
Cuyahoga Heights School District
Houston Independent School District
Lakewood School District
Montgomery County Public Schools
Parma School District
Prince George's County Public Schools

Colleges and Universities

Bowie State University
Capitol College
Case Western Reserve University
Cuyahoga Community College
Evergreen Community College
Houston Community College
John Carroll University
Montgomery College
Notre Dame College
Prince George's Community College
San Jose City College
University of Maryland

Private Sector Companies

Adobe Systems
Advanced Technology Research Corporation
Analex Corporation
Bechtel Foundation
CAMP Manufacturing Leaning Center
Cleveland FES Center
CTA, Incorporated
Edison BioTechnology Center
Fairey Hydraulics, Inc.

Precollege Awards

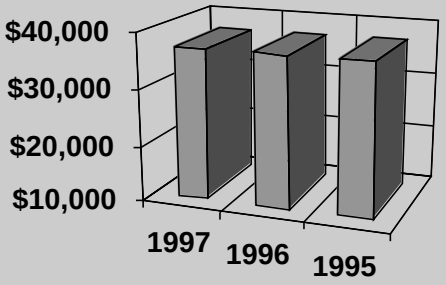
United Cerebral Palsy of Prince George's and Montgomery Counties
HIGH SCHOOL/HIGH TECH

General Electric-Lamp Division
Hughes Applied Information Systems Litton–Amecom Division
Local Aerosystems
McDonnell Douglas Aerospace–Engineering Services Division
MetroHealth Medical Center
Nortel
NSI Technology Services Corporation
Ogden Logistics Services
Silicon Graphics
SoundCom
Tencor Instruments
The Cleveland Clinic
The Plain Dealer
WOIO-TV 19/WUAB-TV 43
Xiliox, Inc.

Nonprofit and Community Organizations

Digital Clubhouse
Edward H. White II Memorial Youth Center
High Technology Council of Maryland
Houston Mayor's Committee on Employment of People with Disabilities
Martha Holden Jennings Foundation
Maryland Governor's Committee for People with Disabilities
Memorial Hospital Southeast
Metropolitan Multi-Service Center
Montgomery County Workforce Development Corporation
Ohio Governor's Council of People with Disabilities
Prince George's Private Industry Council
Prince George's County United Way
Prince George's Economic Development Corporation
Prince George's County Career Connections
Texas Governor's Committee on People with Disabilities
United Cerebral Palsy of Greater Cleveland
United Cerebral Palsy of Greater Houston
United Cerebral Palsy of Texas
United Cerebral Palsy of Prince George's and Montgomery Counties, Inc.
United Cerebral Palsy of Santa Clara and San Mateo Counties
United Way of the Bay Area
United Way Services (Cleveland)

Funding History—United Cerebral Palsy



University of Central Florida Success Programs for Academic Careers in Engineering

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University of Central Florida
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Orlando, Florida 32816
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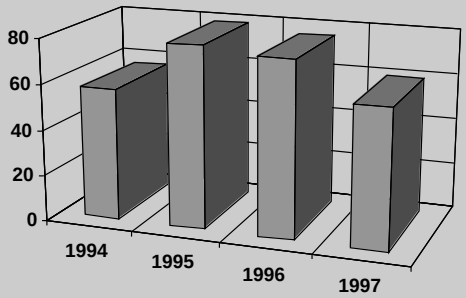
Success Programs for Academic Careers in Engineering (SPACE) address students' diverse academic preparation, different learning styles, study habits, and group cohesiveness, while developing self-confidence and encouraging academic success. The program provides a continuum of opportunities for academic enrichment in engineering, science, mathematics, and communication from the 6th grade through the bachelor's degree. Throughout the academic year, personal, career, and academic counseling and tutorial services are available for college students. SPACE students' academic progress is monitored. Computer classes and engineering-related seminar programs are held for precollege SPACE participants throughout the regular school year, as well as inservice workshops for Southeasten Consortium for Minorities in Engineering (SECME) teachers. Program features include the following:

- An academic year-round program for SECME/P-SPACE students
- A summer-term prefreshman summer bridge program
- Collaborative efforts among the university, industry, school systems, and NASA
- Exposure to graduate school and research opportunities
- A total of 121 students participating in the bridge program
- A total of 70 students participating in the summer and academic school year P-SPACE/SECME Saturday engineering-related seminars

University of Central Florida Enrollment



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University of Cincinnati NASA Lewis Institution Grant: Emerging Ethnic Engineers

Program Overview

The Emerging Ethnic Engineers (E^3) Program has a precollege and undergraduate component. The 5-week Summer Institute is designed for precollege students with career interests in mathematics, science, engineering, and technology (MSET). Students enroll in MSET classes that they will be taking in the fall. In addition, students participate in a special MSET Project and attend field trips. Students who successfully complete the summer component with a grade of B or better earn a 1-year scholarship to the University of Cincinnati if they major in an MSET field. Students earn additional 1-year scholarships for each summer they attend and successfully complete.

Objectives

The E^3 Program has the following objectives:

- Recruit 60 6th through 11th grade students who have participated in the academic-year Minorities in Mathematics, Science and Engineering activities and who have demonstrated an interest in mathematics, science, and engineering as evidenced by school grades and teacher recommendations

- Introduce students to key topics and concepts in their next level of mathematics and science courses while providing hands-on experience that complement this instruction

- Promote greater competencies in critical thinking and problem solving through “hands-on” mathematics, science, and engineering activities

- Improve the student’s attitude toward mathematics, science, and engineering by building their confidence and ability to handle number sense, translation from English to mathematics, and application of mathematical concepts

- Motivate these students to enroll in their high school’s college preparatory mathematics and science academic sequence

- Have students explore the world of engineering by learning about the different roles of engineers through hands-on activities, games, and role-playing activities

Precollege Awards

- Have students form production teams and build mechanical devices using a new computer-based system called LEGO TC logo

- Have 30 incoming freshmen in the Summer Bridge Program and prepare them to excel in calculus, chemistry, physics, and English courses during their freshman year

Enrollment Data

The total number of students impacted is 617 since June 1, 1990. The target grades are 6 through 13. The students targeted are 34 females, of which 31 are African American or Hispanic and 3 are Caucasian, and 55 males, of which 48 are African American or Hispanic and 7 are Caucasian. Program enrollment for the past 4 years is shown in the chart to the right.

Program Implementation

Strategies: year-round enrichment; strong academic component; involvement of parents, teachers, school counselors, and administrators; academic year component; exposure to career options; summer component; field trip opportunities; Saturday component; linkages to the next level; tutoring; research component; use of technology; hands-on learning; problem solving; and skill development.

Recruitment Strategies: Applications are first mailed to former institute participants. Applications are then mailed to Minorities in Mathematics, Science and Engineering coordinators at local middle and high schools, who then distribute, review, and return completed the applications to the institute. In addition, the institute is publicized through local public service television programs.

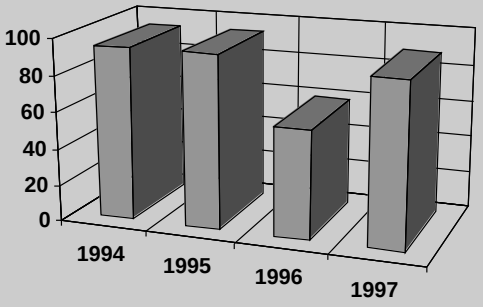
Selection Criteria: academic year participation in Minorities in Mathematics, Science and Engineering; B+ average in mathematics and science courses; mathematics and science teacher recommendations. All African American, Hispanic, and Native American students who are accepted in the College of Engineering are invited to participate in the Bridge Program.

Partner: Minorities in Mathematics, Science, and Engineering.

Courses Targeted: trigonometry, pre-algebra, pre-calculus, biology, algebra I, calculus, chemistry, geometry, and algebra II.

Tracking: name, address, ethnicity, gender, MSET courses taken, grades, career choice, college entrance, and college major.

University of Cincinnati Enrollment



Enrollment for the past 4 years for the E³ Program.

Precollege Awards

University of Cincinnati NASA Lewis Institution Grant: Emerging Ethnic Engineers

Outcomes to Date

Of the 64 participants who have graduated from high school, 53 have enrolled in college and 60 percent are majoring in mathematics, science, or engineering. Of the 528 who have participated in the project since its inception, 242 have earned 1-year tuition scholarships at the University of Cincinnati. Of the 71 Summer Institute students who have graduated from high school, 60 have enrolled in college and 60 percent are majoring in mathematics, science, or engineering. Of the 590 students who have participated in the project since its inception, 256 have earned 1-year tuition scholarships at the University of Cincinnati.

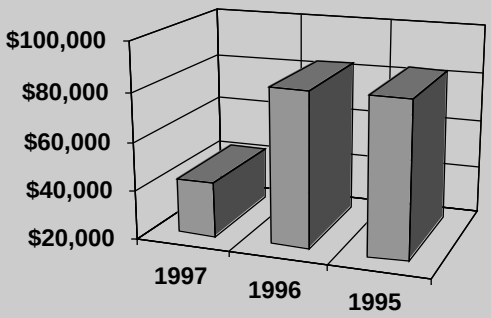
Lessons Learned

Because the University of Cincinnati was not able to offer student stipends, it was discovered that students who enrolled were more conscientious.

Issues/Challenges

There is the challenge of raising funds to house nonlocal and out-of-state students.

Funding History—University of Cincinnati



University of Maryland–Eastern Shore Engineering and Pre-Engineering Programs

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Program Overview

Minorities and females are underrepresented in the field of engineering. History shows that few minorities and women have been encouraged to pursue careers in engineering and other science and technology professions. In recent times, efforts have been made to reverse this situation. Society, with strong support and initiative from government and private industry, is encouraging minorities and women to prepare themselves for careers in the sciences, mathematics, engineering, and related fields. The University of Maryland–Eastern Shore (UMES), a Historically Black College and University, is playing an important role in helping meet these needs.

About 15 years ago, UMES proposed and received enthusiastic support from the University of Maryland Central Administration and the University of Maryland at College Park (UMCP) College of Engineering to establish the first 2 years of the engineering curriculum at UMES. NASA supported this effort with funding to recruit minorities and women through scholarships, outreach programs, and extensive counseling and tutoring programs. Much emphasis is placed on making the transition from high school into the rigorous engineering curriculum as smooth as possible.

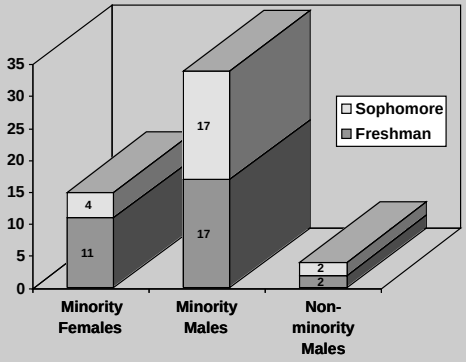
In the past, a triad approach has been taken to attract more minorities and women into engineering: an outreach program, a summer enrichment program, and on-campus engineering and preengineering curricula. The UMES outreach program works very closely with counselors, teachers, students, and parents to keep them informed through workshops, seminars, and direct communications. Another component is a 2-week summer enrichment program for high school students entering grades 11 and 12. The thrust of the program is to seek out and identify engineering student candidates and provide positive experiences and samplings of engineering and the sciences. Students are presented with hands-on experiences, such as mechanical theories (for example, the operation of internal combustion engines), structural theory along with model bridge construction, and digital theory and the use of digital techniques for computers, data handling, graphics, and communications. Participants are informed of careers in the various fields of engineering, technology, and the sciences.

Precollege Awards

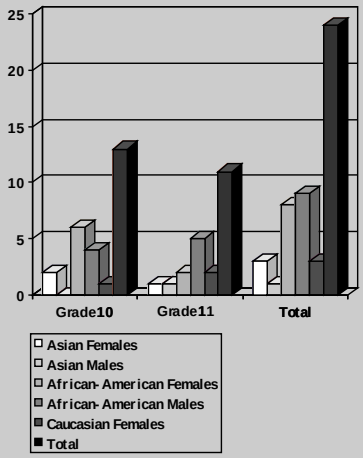
University of Maryland–Eastern Shore Engineering and Pre-Engineering Programs

The Engineering Curriculum at UMES is offered in cooperation with the UMCP A. James Clark School of Engineering. UMES offers the first 2 years of the engineering curriculum. Students meeting minimum scholastic performance standards may transfer to the UMCP College of Engineering after their freshman or sophomore years. Because most classes at UMES are small, students are able to get more personal attention during the first 2 years when most universities use large classes. Tutors are available for extra help in difficult courses. Students not eligible for admission to the engineering curriculum may enter the preengineering curriculum for preparation.

University of Maryland–Eastern Shore Enrollment



University of Maryland–Eastern Shore Enrollment by Gender/Ethnicity



Enrollment Data

At the beginning of the fall 1996 semester, the engineering and preengineering programs had the enrollment shown to the left. The 1996 Summer Engineering Enrichment Program had the enrollment also shown to the left.

Outcomes to Date

The UMES Engineering Program has been successful. It began operations in the fall of 1982 and has completed its 15th academic year. The following is a statistical achievement breakdown:

- An average of about 24 students per year have been recruited into the Engineering Program, most being minorities and females.

- Thirty-two percent of all students who have entered the UMES Engineering Program have graduated or persist at a 4-year engineering institution. Seventy-five students have graduated with B.S. degrees in engineering, including 47 minorities and females. Three of these students have also earned M.S. degrees in engineering or engineering management and one in computer science.

- Forty-seven percent of the entering total group has graduated or persist in a 4-year professional engineering, engineering technology, mathematics, computer sciences, or airway science program. Of this group, 102 have graduated, including 64 minorities and females.

A survey was conducted of all students who participated in previous Summer Engineering Enrichment Programs who have reached college age. All of the participants returning surveys are currently attending or have graduated from college, 45 percent of them in engineering. Of the minorities in the program 43 percent majored in engineering. Of the nonminorities, 46 percent of them majored in engineering.

University of South Florida Yes, We Care! Minority Engineering Program

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Program Overview

The University of South Florida's Yes, We Care! Program is designed to enhance the academic competence of students in grades 6 through 12 in the areas of mathematics, science, computer science, and engineering, as well as in science-oriented college programs and subsequent professional careers. Implementation is accomplished through a well-established Saturday morning enrichment program at four centers for normally 26 Saturdays during the regular school year, but only 20 Saturdays in 1997.

Objectives

The Yes, We Care! Program has the following objectives:

Over 25 weeks, conduct 3-hour Saturday morning "enrichment" schools

Use combined resources of supporting organizations to create the best program structure

Have students experience engineering, mathematics, science, and computers

Offer small classes and personal attention in a club-like atmosphere so the students can form friendships and get to know teachers and volunteers

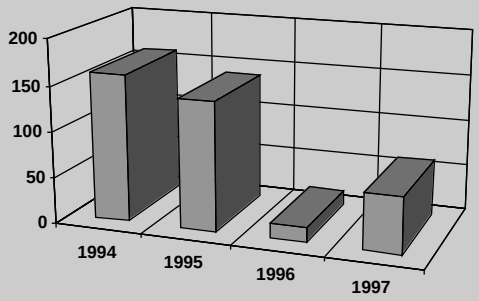
Enrollment Data

The total number of students impacted is 637 since January 1, 1991. The current enrollment is 61 students for 1997. The students targeted are 34 females and 27 males who are African Americans, Native Americans, and Hispanics.

Program Implementation

Strategies: strong academic component; involvement of parents, teachers, school counselors, and administrators; mentoring relationships; academic year component; exposure to career options; field trip opportunities; Saturday component; SAT/ACT preparation; linkages to the next level; community involvement; tutoring; research component; use of technology; hands-on learning; problem solving; and skill development.

University of South Florida Enrollment



Precollege Awards

University of South Florida
Yes, We Care! Minority Engineering Program

Recruitment Strategies: Recruitment is done by science and mathematics teachers and guidance counselors, with referrals from past and present students or their parents.

Selection Criteria: African American, Hispanic, and Native American students in grades 6 through 12.

Partners: General Telephone Company, Seminole Electric, and Hillsborough City School System.

Courses Targeted: mathematics, trigonometry, Earth science, pre-algebra, pre-Calculus, biology, algebra I, chemistry, geometry, computer science, physics, algebra II, and physical sciences.

Tracking: name, address, ethnicity, gender, grades, grade point average, highest academic level, and attendance.

Outcomes to Date

This joint effort by the University of South Florida, the school system, business and industry, and individual professionals (volunteers) is increasing minority representation in the engineering profession.

Lessons Learned

The program's use of teamwork and competitions is very effective.

Issues/Challenges

Resource limitations hold down the number of students. More students could benefit from the program. A delay in 1997 funding hampered the number of students recruited.

University of Texas–Brownsville/Texas Southmost College South Texas Engineering, Math and Science

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University of Texas–Brownsville
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Brownsville, Texas 78520
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Program Overview

South Texas Engineering, Math and Science (STEMS) is an outreach program for high school students from Rio Grande Valley in south Texas. STEMS addresses many of the educational issues relating to a population living at a social and economic disadvantage. It accomplishes its goals through a collaboration among NASA, the University of Texas–Brownsville, area school districts, and Gorgas Science Foundation, a community nonprofit organization. The goals of STEMS are to:

- Provide a superior scholastic background
- Break down cultural and gender barriers to nontraditional occupations
- Reach elementary through college-level students
- Provide role models as guest speakers
- Encourage minorities to share their knowledge and skills
- Develop a substantial program that will continue beyond the funding period.

All the goals continue to be met as STEMS encompasses five school districts and plans to expand to other areas of high minority enrollment.

Objectives

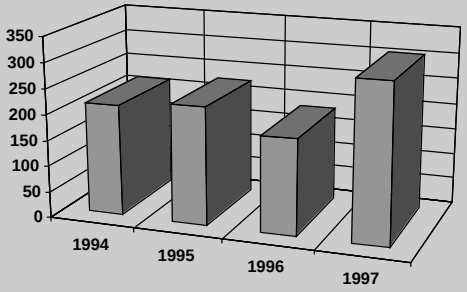
STEMS is on a year-round calendar that is separated into two parts. The objectives are accomplished with a school-year program, from September through May, and a 6-week program during the summer. The objectives are to:

- Increase awareness and career planning in mathematics, science, engineering, and technology fields
- Improve academic and test-taking skills
- Increase participation and performance for the SAT/ACT exams
- Promote critical and analytical thinking skills
- Expand the program to other school districts

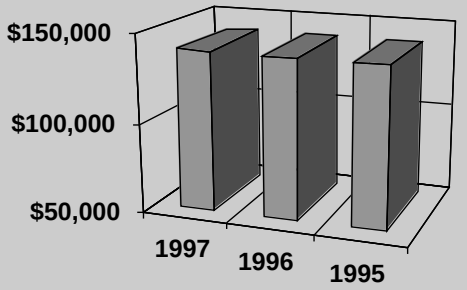
Precollege Awards

University of Texas–Brownsville/Texas Southmost College
South Texas Engineering, Math and Science

UTB Southmost STEMS Enrollment



Funding History—STEMS



During the school year, students are exposed to hands-on laboratories, SAT/ACT workshops, engineering competitions, guest speakers, college mentoring, school projects, field trips, community involvement, and other activities. The summer program consists of courses taught by professors and instructors at the University of Texas–Brownsville/Texas Southmost College campus. Students are enrolled in courses with a curriculum based on engineering, medicine, science, SAT math and verbal, Texas Instruments calculators, college orientation, computer word processing, and keyboarding. The summer program concludes with a career fair, a recognition ceremony, and a 4-day science field station experience.

Enrollment Data

The selection process targets high school students who have an interest in engineering, mathematics, science, or medicine. STEMS involves elementary and middle school students via presentations and career fairs. The STEMS program is funded by NASA and has 304 students. Two underrepresented populations, Hispanics and females, make up the majority of students in the program. However, no student is turned away, and all students are encouraged to participate. Recruitment is accomplished through classroom presentations, campus sponsors, mathematics and science teachers, counselors, announcements, word-of-mouth, news articles and letters, and parents.

Outcomes to Date

STEMS accomplished something most programs often do not: it made the transition to hard funding. Brownsville Independent School District now funds its own STEMS program previously piloted by NASA STEMS. Brownsville Independent School District includes about 550 students and expanded STEMS into its elementary, middle, and high schools. STEMS is at four other school districts and will soon go to three more school districts.

The project is attempting to reach more parents in an effort to overcome some of the obstacles students confront. Traditionally, parents from this area do not want their children to go away for college. Students are often fearful of the unknown, are usually late in taking college entrance exams, and are often not encouraged to take challenging courses. It is difficult for students to overcome the idea that they cannot compete with students from other areas of the country.

Student Achievements

Students excel while participating in STEMS. A few examples include Francisco Castillo, a Port Isabel High School STEMS student, who is presently at MIT working on a mathematics degree.

Precollege Awards

He was the state champion at the University Scholastic League number sense competition during the 1996–97 school year. Another student, Claudia Reyna, a STEMS participant from Brownsville Independent School District, is currently working on a research grant out of the University of Texas-Brownsville/Texas Southmost College to enhance our knowledge on bird species. Her research is being conducted at a remote ranch in Mexico. STEMS students have also been recognized at competitions at the University of Texas–Brownsville/Texas Southmost College during the summer program, at Texas A&M University–Kingsville, and during the school year.

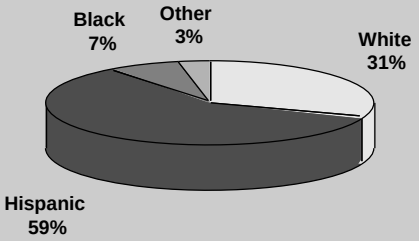
During the past years, STEMS has encouraged public awareness. Students are involved in reporting program activities in individual STEMS schools' newsletters. Veteran STEMS students serve as mentors for incoming students. Students who graduate from high school return to give back to the program by sharing their college experiences and achievements.

Partnering

STEMS is a collaboration among the University of Texas–Brownsville/Texas Southmost College, Gorgas Science Foundation, San Benito School District, Point Isabel School District, Los Fresnos School District, and Rio Hondo School District. The University of Texas–Brownsville/Texas Southmost College provides classroom space for the summer program and vehicles for transportation. Individual school districts provide funds, classroom space, and summer transportation to the university. Gorgas Science Foundation provides scholarships for students in the summer program and other funding as needed to sustain the program. Overall, the above entities provide one-third of the program's funding, or $62,759 out of a total budget of $139,702.

An evening gathering with students observing the moons of Jupiter, stars, and constellations.

Texas A&M University–Kingsville STEMS



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University of Texas–Brownsville/Texas Southmost College K–12 Science Outreach Program

Program Overview

This new outreach program was designed mainly to encourage college students to work with students and teachers at the secondary, middle, and elementary school levels. The role of the college student includes mentoring, counseling, and facilitating MUREP and National Science Foundation project specialists with program implementation. Four outreach programs are linked-two MUREP (STEMS and Treasures of the Rio Grande Delta: A South Texas Curriculum) and two National Science Foundation (DinoScience and Students Teaching Students). College students, because of their age, help serve a bridge, linking with K–12 and providing effective mentorship, guidance, and support. In turn, the college students (some of whom are MUREP students) gain the most difficult skills of leadership and self-reliance.

Enrollment Data

The first year of the K–12 Science Outreach Program was very successful. More than 25,000 students and teachers from south Texas benefited from the program. In addition, 30 college students participate. The ethnicity breakdown is: 97 percent Hispanic, 2 percent white, and 1 percent Native American. Forty-five percent are women. The breakdown of majors, hours, and grade point average is as follows: 75 percent biology majors with at least 65 hours and an average grade point average of 2.7; 20 percent enrolled in a medical program with an average grade point average of 3.5; 2 percent industrial engineering majors with at least 45 hours and an average grade point average of 3.0; 2 percent chemistry and physical science majors with at least 49 hours and an average grade point average of 2.5; and 1 percent business majors with at least 32 hours and an average grade point average of 2.5.

Outcomes to Date

The K–12 Science Outreach Program accomplished its goal to partner college students with high school, middle, and elementary school students. The objectives of the four outreach programs to promote science, math, medicine, and engineering were facilitated by the integration of college students. College students were present and active at most of the outreach programs' sessions, workshops, and field trips.

Precollege Awards

Student Achievements

All the college students have commented on the personal benefits and accomplishments this program has provided them-from the presentation skills needed to talk to groups of hundreds to the personal skills when talking to young students on a one-to-one basis. Their enthusiasm to learn and teach was overwhelming. All the students decided to pool their consulting fees and venture to learn about a new culture, people, and conservation methods. Having been provided the opportunity and the invitation from one of their peers, they decided to take a trip to India; 17 students and 4 teachers embarked on a trip of a lifetime.

Partnering

The University of Texas–Brownsville/Texas Southmost College provided the resources and curriculum for the program. The program's principle investigator, Lawrence V. Lof, is a faculty member at the university. Gorgas Science Foundation provided additional resources and took charge of the program's management. Inkind contributions were provided in the amount of $30,000. Gladys Porter Zoo provided staff and materials for the program. Most of the equipment needed for the program was provided by the zoo, which also matched the inkind contributions.

University of Texas–Brownsville/Texas Southmost College Hispanic Mother-Daughter Program

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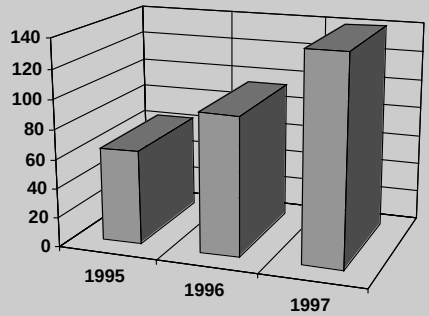
University of Texas–Brownsville Hispanic Mother-Daughter Program Enrollment



Program Overview

The Hispanic Mother-Daughter Program at the University of Texas–Brownsville/Texas Southmost College is a program that focuses on encouraging participation of Hispanic females in career fields such as mathematics, science, engineering, and medicine through higher education.

Objectives

The program has the following objectives:

- Provide exposure to role models, field trips, and careers in the math, science, engineering, and health professions
- Offer skill-building and enrichment programs that use individualized instruction plans and promote cooperative learning, activity-based instruction, and discovery methods
- Provide academic support that includes tutoring, study skills, and test preparation
- Work with parents (usually mothers) to provide support and encouragement for their daughters to succeed

Enrollment Data

The total number of students impacted is 298 since September 1, 1995. The program enrollment for the past two years and the current year is: first year—64 students (1995–96); second year–94 students (1996–97); and present year—140 students (1997–98). The target grade level is 8th grade, and the 298 students were all female Hispanics.

Program Implementation

Strategies: provide academic support services that will help with the completion of high school and college; break down culture barriers to nontraditional careers for women (in particular, math, science, engineering, and medicine); and promote self-sufficiency and self-respect.

Recruitment Strategies: presentations in mathematics and science classrooms, on-campus sponsors, announcements over the

intercom, word-of-mouth (student to student), phone calls to parents, and, most importantly, counselors.

Selection Criteria: Hispanic females in the 8th grade who are first generation, college bound, and low income and have an interest in mathematics, science, medicine, and engineering.

Partners: University of Texas-Brownsville/Texas Southmost College, Brownsville Independent School District, Los Fresnos School District, San Benito School District, and Point Isabel School District.

Courses Targeted: mathematics, pre-algebra, geometry, science, biology, chemistry, and engineering.

Tracking: name, address, ethnicity, gender, Texas Academic Skills Scores (TAAS), career exploration, mail surveys, and phone calling.

Outcomes to Date

During its first year, the program was implemented at Oliveira Middle School with the Brownsville Independent School District and the middle schools from Los Fresnos and San Benito School Districts. During the second year, Faulk Middle School from Brownsville Independent School District was added to the program. The students who have participated in the program have exceeded the TAAS scores and district percentages as a result of their attendance at tutoring sessions. The program had a high percentage of attendance during the enrichment sessions as well as the tutoring sessions. The parents' (mothers) involvement has been an important element of the program because it demonstrates the support needed for each student's success.

Lessons Learned

After 2 years, an opportunity was presented to modify the program by hiring three student mentors who are students at the university. The student mentors facilitated the tutoring and self-enrichment sessions, tracked the students' academic progress, and have acted as role models for the students in the program.

Issues/Challenges

So far, the program has had great parental involvement. A major challenge is to motivate the parents to complete their G.E.D. or pursue a postsecondary education to promote self-sufficiency.

University of Texas–San Antonio
Texas Pre-Freshman Engineering Program

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Project Overview

The Texas Pre-Freshman Engineering Program (TexPREP) identifies high achieving middle and high school students with the potential to become scientists and engineers and provide them with academic reinforcement in pursuit of these fields. This program is designed to increase the number of competently prepared middle and high school students who will ultimately pursue science and engineering studies in college and to acquaint these students with professional opportunities in science and engineering.

Objectives

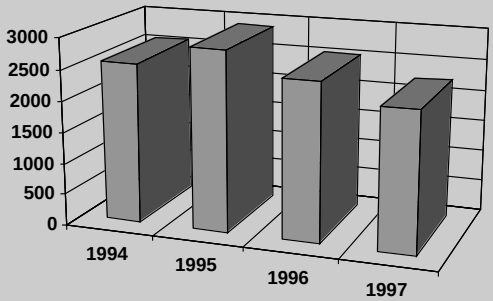
TexPREP has the following objectives:

- Acquaint these students with professional opportunities in engineering
- Reinforce the mathematics preparation of these students at the secondary school level
- Increase the retention rate of these students in college
- Increase the number of competently prepared minority and female high school students from TexPREP who will ultimately pursue engineering or science studies in college

Enrollment Data

The total number of students impacted is 14,988 since June 1, 1979. The target grades are 6 through 12. The students targeted are 54 percent female and 46 male, who are African Americans, Native Americans, and Hispanics. The program enrollment for the past 4 years is shown at left.

University of Texas–San Antonio TexPREP Enrollment



TexPREP's enrollment for the past 4 years.

Program Implementation

Strategies: year-round enrichment; strong academic component; mentoring relationships; academic year component; involvement of teachers, school counselors, and administrators; exposure to career options; summer component; field trip opportunities; Saturday component; SAT/ACT preparation; linkages to the next level; community involvement; tutoring; use of technology; hands-on learning; problem solving; and skill development.

Precollege Awards

Recruitment Strategies: visitations/presentations at local middle and high schools and mailing of recruitment packets to agencies and programs that work within the minority populations in their communities, such as NAACP, Texas Alliance for Minorities in Engineering, Communities in Schools, and Federal housing authorities.

Selection Criteria: There must be completion of the school year by May 31, 1997, a 3.0 grade point average, and completion of required mathematics courses, depending on the student's class level (pre-algebra, algebra, and geometry). Each 8th, 9th, 10th, and 11th grade student is expected to have earned at least a B average in mathematics courses by the end of the first semester. Each 6th, and 7th grade student is expected to have earned an A average in his or her mathematics, science, or English course by the end of the first semester. Each first year applicant will need to be nominated by two teachers or counselors, at least one of whom must be a mathematics teacher.

Partners: 24 universities, 142 businesses from the private sector, and 108 businesses from the public sector.

Courses Targeted: mathematics, trigonometry, pre-algebra, pre-calculus, algebra I, geometry, computer Science, physics, and algebra II.

Tracking: name, address, ethnicity, gender, grades, SAT/ACT scores, career choice, college entrance, college major, grade point average, highest academic level, college degree(s), and education levels of parents.

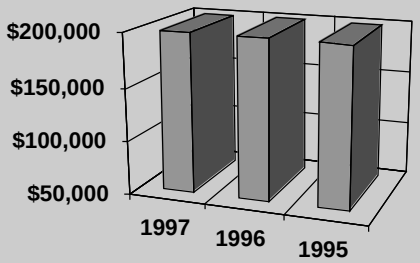
Outcomes to Date

More than 14,988 middle school and high school students have completed at least one summer of TexPREP; 80 percent have been minority, and 54 percent have been female. The high school graduation rate is 99.9 percent; the college entrance rate is 91 percent, and the college graduation rate is 87 percent. Of the college graduates, 57 percent are engineering or science majors. NASA has awarded a major grant to the Hispanic Association of Colleges and Universities to collaborate with the University of Texas-San Antonio and TexPREP for the replication of PREP sites at seven Hispanic-serving colleges outside Texas. This program is known as Proyecto Access.

Issues/Challenges

TexPREP needs to work closely with its schools that have year-round calendars and identify the students earlier in the year so that they receive the necessary authorization or permission from their home schools to be able to participate in PREP. The program needs to find a more effective way to conduct its annual followup to increase its response rate. Finally, there needs to be a replacement of the local funds from the Texas Higher Education Coordinating Board.

Funding History—
University of Texas–San Antonio



University of the District of Columbia Saturday Academy

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Program Overview

The Saturday Academy was designed as a scientific academic intervention program for urban city precollege youth. The program involves this group in participatory hands-on activities that promote critical thinking. The program meets on Saturdays only during the fall and again in the spring and daily during the summer.

Objectives

The long-term goal of the program is to increase the number of women and minorities working and studying in the mathematics, engineering, and technological fields. The general objectives are to:

- Influence positively the high school graduation rates
- Increase the number of urban youth in college
- Increase the number of them majoring in quantitative fields

Enrollment Data

The Saturday Academy focuses on a precollege population made up of 4th through 8th graders from a diverse background of environmental influences. An attempt is made to recruit from all of the available population and to balance the gender of participants selected. Recruitment is done by personal appearances of program staff and alumni, contact with schools (both public and private), youth-based community centers, YMCA's, and churches.

Outcomes to Date

Since 1988 through 1996, program participants have been able to show a significant difference between their performance on the following benchmarks and those of their peers with respect to high school graduation rates, college enrollments, and choices of a quantitative major. From the beginning of the program though the summer of 1997, more than 5,000 participant slots have been filled by public and private school children in the metropolitan area of Washington, D.C. This population has worked on nine levels of performance, from beginners to special projects, based on their longevity in the program and the ability to apprehend, comprehend, analyze, and synthesize the concepts explored in

the training. To further accommodate the students, a teacher-training program emerged first to provide their present teachers and then to provide training for other teachers who would be sending students to the academy in the future. More than 160 teachers have taken the course Saturday Academy Materials (SAM) Parts I and II.

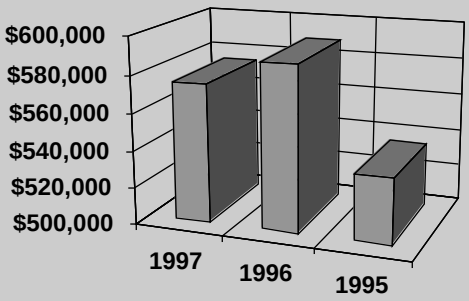
Student Achievements

Many of the program participants have gone on to become teaching assistants in the program and in the replications of the program throughout the city. By so doing, they reinforce the materials that they have learned and go on to enter and win local math/science fairs. They also serve as the major recruiters for new students.

Partnering

The major partners in this endeavor have been the District of Columbia Public Schools and the Department of Education with direct financial support. Other partners have come from area organizations, churches, community centers, and the like. Parents, staff teachers, and SAM teachers also have been an invaluable resource, serving as role models and tutors.

Funding History—UDC



University of Turabo Engineering Preparatory Project for Hispanic High School Students

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Program Overview

The Engineering Preparatory Project for Hispanic High School Students includes 11th and 12th grade students who represent a broad spectrum of educational backgrounds from private and public high schools in rural areas, small towns, and the San Juan metropolitan area. All the students in this program are Hispanics, reflecting the population-at-large in Puerto Rico. These students, to a large degree, are planning to major in the various engineering disciplines when they enter college. The goal of the program is to provide students with academic experiences not available to them at their high schools, to better prepare them to succeed in college engineering programs. These experiences include courses such as pre-calculus, calculus, computer science, communications skills in English, introduction to engineering, chemistry, and physics.

Objectives

This project has the following objectives:

- Recruit and retain young Hispanic women with the intention of attracting them to the engineering field
- Offer career counseling emphasizing options within the engineering professions
- Increase the pool of well-trained Hispanic students entering engineering undergraduate programs
- Motivate and train students for college engineering majors by providing an intensive academic enrichment program of mini-courses and formal college-level course work in science, mathematics, computer science and pre-engineering
- Offer extracurricular enrichment activities (lectures, seminars, field trips, and an internship summer program in research and experimentation)
- Provide participating students with a supportive environment where they develop the personal attributes that will help them succeed in their academic and professional careers
- Strengthen parental support through group meetings, assemblies, and opening and closing activities

Precollege Awards

Enrollment Data

The total number of students impacted is 622 since April 1, 1995. Program enrollment for the past 4 years is as follows: 1994—160; 1995—165; 1996—152; and 1997—155. The target grades are 11 through 12. The students targeted are 73 females and 82 males, all Hispanic.

Program Implementation

Strategies: year-round enrichment; strong academic component; parent involvement; mentoring relationships; academic year component; exposure to career options; summer component; involvement of school counselors and administrators; field trip opportunities; Saturday component; linkages to the next level; tutoring; use of technology; hands-on learning; problem solving; and skill development.

Recruitment Strategies: The initial candidate screening process is directly coordinated with the counselors or school administrator, by scheduling a group for orientation visits, or by coordinating group visits to the facilities of the University of Turabo School of Engineering. In addition, program information (brochure) is sent directly to the schools or to the students by request.

Selection Criteria: student's overall grade point average, grade point average in science and mathematics, Mathematics Placement Exam, 11th and 12th grade high school students, as well as group and individual interview.

Courses Targeted: trigonometry, pre-calculus, computer science, physics, algebra II, physical sciences, and chemistry.

Tracking: name; address; ethnicity; gender; math, science, engineering, and technology courses taken; grades; career choice; college major; grade point average, and highest academic level.

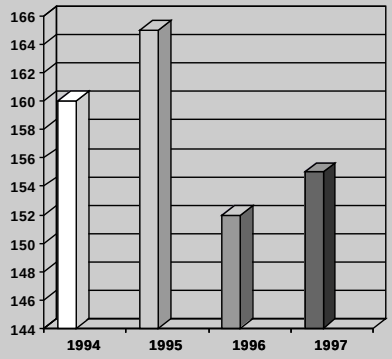
Outcomes to Date

In the past 7 years, 79 students from the program have enrolled in the School of Engineering at the University of Turabo. Approximately 85 percent of all (910) students who have gone through the program pursue an engineering or science career.

Lessons Learned

By providing the students with the necessary tools for their development and sense of direction, they would reach any desired goal. Students need help to develop thinking and reasoning skills. The serious commitment with concerned citizens involved in the

University of Turabo Enrollment



Engineering preparatory project for high schools hispanic students

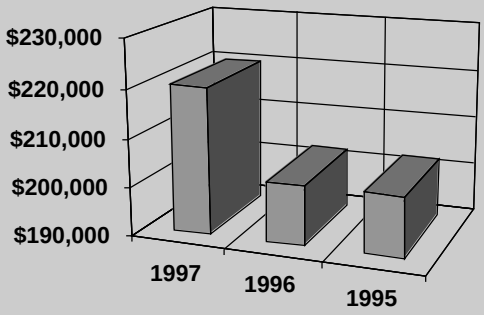
University of Turabo
Engineering Preparatory Project for
Hispanic High School Students

decisionmaking process helps to make a better program. The program can create a deep consciousness in the preservation of the Earth and its resources.

Issues/Challenges

With the implementation of the Applied Engineering Laboratory (last year's challenge), the students now gain firsthand experience in the design and application of simple engineering problems.

**Funding History—
University of Turabo**



Bridge Awards

NASA's vision is to serve America through space exploration and to improve the quality of life on Earth. In achieving this, NASA involves the academic community and fosters educational excellence by creating learning opportunities to challenge and inspire young minds. The ability of the United States to maintain leadership in the world economy depends in part on its ability as a Nation to educate and train talented scientists and engineers. The partnership that is fostered between secondary and postsecondary education gives rise to Bridge programs.

Bridge awards are funded on an annual basis and range between $10,000 and $150,000. The average award, however, is around $70,000. Recipients are expected to leverage these dollars with funds from other sources to maximize their impact.

Awards are generally made to colleges and universities that conduct academic enrichment programs most often for high school seniors and high school graduates preparing to enter postsecondary education. These enrichment experiences take a variety of forms, including class work, research, seminars, and so forth. The overall goals of such programs are:

Provide a smooth transition between secondary and postsecondary education

- Increase the enrollment of students in mathematics, science, engineering, and technology (MSET) disciplines
- Strengthen precollege students' MSET skills
- Encourage students to pursue MSET careers in the future

To achieve these goals, the programs often:

- Target students to successfully complete gateway courses, such as algebra, geometry, college preparatory mathematics, and science
- Establish collaborative efforts among the mathematics, science, engineering, technology, and education departments within the university
- Engage students to participate in enrichment activities, such as research, use of advanced technology, peer support groups, and mentoring relationships
- Increase student awareness of the MSET career world

During fiscal year 1997, 10 Bridge awards were granted to the schools listed on the right.

Bowie State University

City University of New York–Medgar Evers College

Florida A&M University

Morehouse College

Northern Arizona University

South Dakota School of Mines and Technology

Spelman College

Turtle Mountain Community College

University of South Florida

Xavier University of Louisiana

Bowie State University
Bowie State's Science, Engineering, and Mathematics Education

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Program Overview

Bowie State's Science, Engineering, and Mathematics Education (BSEME) reform is a program of the Model Institutions for Excellence (MIE) initiative, one of six programs at different institutions funded by the National Science Foundation and the NASA. The overall goal of BSEME is to ensure that a higher number of students seek and complete advanced, quality education in science, engineering, and mathematics (SEM). The focus is on developing and validating an educational reform model that can be disseminated and successfully adapted by other institutions.

Bowie State's MIE initiative is implementing an institutional development model that encompasses the following educational reform components:

- Outreach
- Retention
- Educational Reform
- Research
- Linkages and Collaboration
- Infrastructure and Human Resource Development
- Assessment and Self-Evaluation

The efforts of the second year (July 1, 1996, through June 30, 1997) of this long-term, comprehensive project focused on a number of key activities in the educational reform model. While BSEME continued to develop and enhance the infrastructure, the following areas were the primary focus of the resources and efforts during the 1996–97 project year: supplemental education, assistantship program, internship program, and faculty and student development.

Enrollment Data

The MIE initiative supports recruitment and retention activities to increase the enrollment of minority students in SEM. The strategy includes assisting the Admissions Office on recruitment visits and hosting special showcase and outreach activities. In addition, financial assistance is offered to more than 120 students to help recruitment and retention. The overall headcount of SEM enrollment was 507. The overall science, engineering, and mathematics enrollment was: 75 percent African Americans, 9 percent Caucasians, 16 percent others, with 48 percent females and 52 percent males. Students financially supported by MIE were:

70 percent African Americans, 15 percent Caucasians, and 15 percent others, with 48 percent females and 52 percent males.

Outcomes to Date

A number of milestones and accomplishments have been achieved, including the following:

Outreach

- The 6-week SEM Summer Academy program was successfully implemented for high school graduates in transition to college. The program focused on learning and study skills, mathematics, and computer and information technology applications. Fifty-nine students participated in the program, and 73 percent of them moved from one level math course to another as a consequence of the program.

- SEM Week was a week-long program of activities showcasing student achievements in SEM from Bowie State and area high schools. Several student and faculty speakers were featured, and awards were given to students with best poster presentations.

Retention

- An SEM Tutoring Center was established to provide needed academic support to students. A group of trained tutors provided more than 1,400 one-on-one and group tutoring sessions this year.

- The Summer Internship Program continued to be developed. Consequently, a data base of more than 200 summer internship programs has been created and was used to place 28 SEM assistants in summer programs nationally and internationally.

Student Achievements

There were a number of significant achievements of students supported by MIE, including:

- Twenty-eight students placed in national and international summer internship programs.

- More than 30 paper posters were presented at the Annual MIE Conference.

- Several students have been awarded national scholarships.

Bridge Awards

Bowie State University
Bowie State's Science, Engineering, and Mathematics Education

Partnering

The following summarizes the partnership with this program:

- Partnerships with several organizations (for example, Bell Atlantic Corporation and Argonne National Laboratory) have been established to increase internship and employment opportunities for students.

City University of New York–Medgar Evers College
GISS-CUNY Institute on Climate and Planets

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Program Overview

The Institute on Climate and Planets (ICP) is an education and research collaboration between the Goddard Institute for Space Studies (GISS) and the City University of New York's (CUNY) Alliance for Minority Participation (AMP). It involves minority community college, senior college, and high school students, their science and mathematics faculty, and GISS scientists in a team approach to carrying out current NASA climate and planetary science research. The aim of the program is to increase the number of disadvantaged minorities entering the science pipeline and create opportunities for scientists and educators to collaborate on reforms in science education.

Objectives

This collaboration has the following objectives:

- Involve students as active participants in the research community, where they are exposed to scientists, research habits, and science problems, to explore their interests in and potential for science and develop competitive workforce skills.

- Provide precollege and college minority students with greater access to science and research experiences that involve them in a professional network that develops their potential to complete high school, baccalaureate, and graduate studies in science, engineering, and mathematics, as well as to gain basic scientific understandings related to their research.

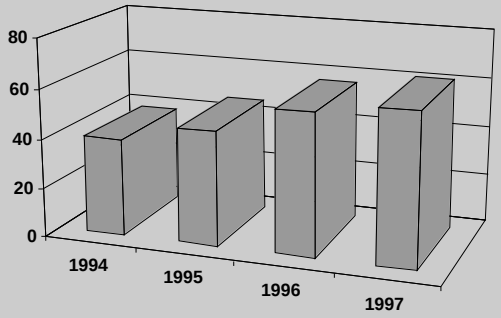
- Offer CUNY precollege and college faculty professional opportunities to work with scientists on current climate and planetary research, leading to the integration of NASA data and research into curricula (science, mathematics and computer science) and the institutionalization of ICP research program for their students at their schools.

- Offer professional and academic opportunities that retain in the science pipeline, and enrich the GISS research community with disadvantaged students and faculty who possess the interest in and potential for contributing to NASA's climate and planetary research program.

Bridge Awards

City University of New York–Medgar Evers College
GISS-CUNY Institute on Climate and Planets

CUNY–Medgar Evers College Enrollment



ICP's program enrollment for the past 4 years.

Enrollment Data

The total number of students impacted is 203 since May 1, 1994. The target grades are 9 through 12 and high school graduates. The targeted students were 26 female and 31 males who are all African American and Hispanic. Program enrollment for the past 4 years is shown at left.

Program Implementation

Strategies: year-round enrichment; strong academic component; mentoring relationships; academic year component; involvement of teachers and school administrators; exposure to career options; summer component; field trip opportunities; Saturday component; linkages to the next level; tutoring; research component; use of technology; problem solving; and skill development.

Recruitment Strategies: Announcements are sent to college deans, school principals, and department chairs. ICP representatives conduct school visits with the interested students, faculty, principals, and department chairs.

Selection Criteria:

- Minority and other disadvantaged students in science, mathematics, engineering and technology
- Demonstrated interest and ability in physics, chemistry, mathematics, and/or computer science
- Commitment to serve as a school representative to establish GISS school-based research programs
- Application with faculty recommendation
- Interviews by CUNY (students and faculty) and GISS scientists
- Committee reviews applications

Partners: Columbia University and National Science Foundation-New York City.

Courses Targeted: trigonometry, Earth science, pre-calculus, calculus, chemistry, computer science, physics, and physical sciences.

Tracking: name, address, ethnicity, gender, MSET courses taken, grades, SAT/ACT scores, career choice, college entrance, college major, grade point average, college degree(s), and extracurricular activities.

Outcomes to Date

Some of the research groups have obtained research results suitable for publication. Activities to develop the school-based ICP satellite research programs are being led by faculty who translate their research experience into the science, mathematics, and technology curriculum.

An interdisciplinary high school faculty team was developed and field-tested a weather and climate curriculum, which will also serve as the bases of Summer Institute workshops. The colleges are including research to design a prep course as an introduction to scientific inquiry, integrating research-related topics into the physics and computer science curricula, and establishing a campus-based research program. Multimedia interactive courseware materials, based on ICP research, are currently being developed and placed on the Internet for dissemination to high schools and colleges.

Lessons Learned

Workshops can be designed to prepare students with the skills and knowledge they need for research, and selected students can be teaching assistants for these workshops. The faculty members gain much from having high school and undergraduate students conduct research with them because of the variety of research experiences and the sharing of how they can acquire essential knowledge and skills. This is valuable for developing a campus research program at their home institutions. A research course (lecture hours and lab hours for conducting a miniresearch project) is a valuable format to ease students into a productive research experience. For all ICP activities, everyone contributes to the planning: students, faculty, GISS scientists, the ICP director; and CUNY project directors.

Issues/Challenges

ICP needs to integrate research into the precollege science curriculum so that it complements New York State regent requirements. The research experience (in general) must be moved to campuses, with faculty leading the initiatives. Research data and software should be prepared to facilitate campus research, Internet connectivity should be established, and workstations should be provided at the schools and campuses.

Florida A&M University Engineering Concepts Institute

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Program Overview

The Engineering Concepts Institute (ECI) at Florida A&M University has provided enrichment activities for 387 students since its inception in 1987. ECI has evolved from a program that targeted high-risk minority students from rural areas to minority students with diverse backgrounds and academic achievements. ECI is a summer bridge program designed to prepare students for the rigors of a first-year engineering program at Florida A&M.

Enrollment Data

The ECI program invited 44 students to participate in the tenth session of ECI. The student body for this tenth session was geographically and sexually diverse, with 45 percent in-state, 55 percent out-of-state, 55 percent (24 students) male, and 45 percent (20 students) female. All of the ECI students were admitted to Florida A&M and were committed to attending the university for the 1996-97 academic year.

Outcomes to Date

The ECI program has achieved great success in preparing minority students for the rigors of engineering. Because the engineering program is a 5-year program, students involved in the first six ECI programs have had an opportunity to graduate. There have been 56 graduates from the program. Of these 56 graduates, 17 are in graduate school working on their terminal degrees.

Performance Results of the ECI Class of 1996

The performance analysis of the ECI class of 1996 is now complete. There were 44 minority students who participated in the ECI program in the summer of 1996. Of these 44 participants, 39 enrolled for the fall semester of the 1996–97 academic year. The 44 participants had outstanding high school credentials. The average grade point average was 3.49 (out of 4.00), the average SAT score was 1,068, and the average ACT score was 23. The performance of these ECI students was compared with the performance of a cohort group of students enrolled directly into the Florida A&M without participating in ECI.

There were 96 Florida A&M engineering students who did not participate in ECI. The non-ECI participants had an average high school grade point average of 3.36, an average SAT score of

1,095, and an average ACT score of 23. The two cohort groups of students, ECI and non-ECI, were comparable in terms of academic prowess. The ECI students had a slightly higher average grade point average, while the non-ECI students had a slightly higher SAT average. The two groups had equal ACT averages. Because of the similarity in academic prowess of both cohort groups, a direct comparison can be made of the effect of ECI on the performance of students in the program. In terms of grade point average, the ECI students achieved an average of 3.37, as opposed to the non-ECI students who earned 2.94. There were no ECI students with an average grade point average below 2.5, as compared to 30.2 percent for the non-ECI students. As shown below, the ECI students outperformed the non-ECI students in every grade point bracket.

The retention rate for this class was 100 percent. The university-wide retention rate for all ECI participants is 85.2 percent.

Program Evaluation

For the tenth session, 98 percent of the students felt that the program was beneficial, and 100 percent of the students would recommend the program to other high school students. In addition, the students indicated that they had a positive academic experience from all of the courses that were taught as part of the ECI program. Also, the 1996–97 ECI students stated that they had a positive experience with the program counselors and facilitators and recommended them highly.

Student Achievements

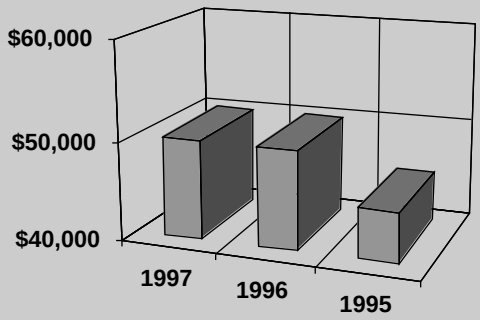
Joliette Eddings and Comas Haynes were recipients of the prestigious National Science Foundation Fellowships. David Hogan, Jon Brown, Vashon Roland, Rhashan Walker, and Kevin Brinson were the recipients of the prestigious NASA Lewis Research Center Minority Fellowships, and Consuela Hargrove, Delariah McNeal, and Latoya Deans were recipients of GEM Fellowships.

One former ECI student, Comas Haynes (ECI 1990) graduated with a perfect 4.0 grade point average and has successfully passed his doctoral qualifying exam at the Georgia Institute of Technology. Three former ECI students, Monica Laing, Sonja Jonas, and Vashon Roland have recently graduated with their master of science degrees.

Partnering

NASA support for the ECI program was augmented with support from the ARCO Foundation ($15,000), British Petroleum of America ($15,000), and Florida A&M University ($60,000).

Funding History—
Florida A&M University



Morehouse College Project Space

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Program Overview

Project Space is a 6-week bridge program for prefreshmen students accepted to Morehouse College. These scholars will take a specified combination of the following courses: analysis, chemistry, computer science, introduction to engineering, physics, and English. The courses during the summer session are designed to:

- Strengthen the problem-solving abilities of the scholars
- Improve their skills in science and mathematics
- Improve their reading, writing, study, and test-taking skills
- Increase their awareness in the sciences and engineering

Objectives

Project Space has the following four objectives:

- Recruit talented high school students with an abiding interest in and commitment to pursue an academic career in engineering and sciences
- Continue the collaborative relationship with NASA to provide internships and research experiences for scholars
- Increase the number of Morehouse students attending graduate school in engineering and sciences
- Establish collaborative relationships with other programs and projects designed to increase the number of minority students in engineering, mathematics, and science

Enrollment Data

The total number of students impacted is 135 since January 1, 1992. The target grades are 9 through 12 and high school graduates. Program enrollment for the past 4 years is as follows: 1994—10, 1995—20, 1996—16, and 1997—16. The students targeted are 16 African-American males.

Program Implementation

Strategies: year-round enrichment; strong academic component; mentoring relationships; academic year component; involvement of teachers and school counselors; summer component; linkages to the next level; tutoring; research component; use of technology; and problem solving.

Recruitment Strategies: Selection is made from the pool of students submitted from the Admission's Office.

Selection Criteria: 3.0 grade point average and 1,000 or higher on SAT.

Courses Targeted: pre-calculus, calculus, and computer science.

Tracking: name, address, grades, career choice, college major, grade point average, and graduate School.

Outcomes to Date

Ronald E. McNair graduates are enrolling and pursuing graduate school programs.

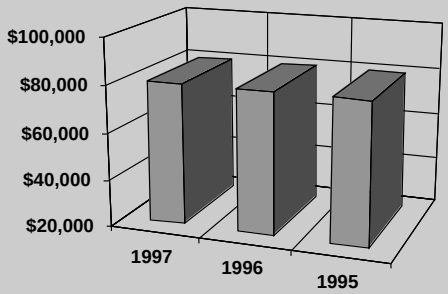
Lessons Learned

The Bridge program experiences have proven to be invaluable.

Issues/Challenges

Project Space should continue to increase the number of students pursuing graduate studies versus industry employment offers.

Funding History—Morehouse College



Bridge Awards

Northern Arizona University Multicultural Engineering Program

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Program Overview

To increase and enhance the academic performance and graduation rates of the underrepresented students, the Multicultural Engineering Program was established in 1993. This program consists of several programs: STAR PALS (the summer bridge engineering program), the Hispanic Engineering Program, the Sacred Mountain Scholars, and the Native American Engineering Program. Both the Hispanic and Native American Engineering Programs use many of the techniques described in this report for STAR PALS. For example, intrusive advising and academic remedies are used to enhance academic performance. Although there are no formal programs for either African-American or women students, all services are available to these individuals.

Outcomes to Date

The first STAR PALS group was recruited in 1994. At that time, 16 freshmen minority students (Hispanic, African American, and Native American) were admitted. They entered a summer engineering program for 5 weeks that emphasized math, English/writing, and cultural studies. The 16 freshman had math scores that placed them into Math 110 (the equivalent of college algebra). They also enrolled in both English 199 and an introductory course in engineering. The freshmen engineering preparation program provided credit toward graduation.

The first group of STAR PALS began with the 16 students. Since the spring of 1997, there has been a constant decline in retention. Currently, seven members of the original class are still in engineering. The decline has been attributed to several factors, but the primary reason has been academic disqualification. A number of students have failed to pass calculus, while others continue to do well in their classes. The cumulative grade point average of the students still enrolled is 2.88.

There were 21 students recruited for the 1995–96 STAR PALS program, which used the same schedule. They enrolled in English 199 and Math 110, as well as an introductory engineering course. To ensure their success in math, the foundation material was covered in Math 110 and mandatory tutoring was added. For the fall semester, the students registered for Math 198 (engineering math), Engineering 198 (Multicultural Engineering Program orientation), and physics. Engineering 198 was facilitated by program staff; the goal of this class was to teach each student academic survival

skills. The topics included time and finance management, study skills, test-taking, note-taking, stress management, and learning about campus resources (Learning Center, computer centers, and so on).

The group's retention rate is 71.4 percent, with a cumulative grade point average currently at 2.58. The program lost one student because of academic and personal difficulties. Another student decided that engineering was not for her, and she transferred to business. The students in this group are experiencing difficulties with calculus I, specifically Native Americans. Of the 14 students, 6 have passed calculus I, while 6 are still trying to pass calculus for the third time.

Twenty students were selected for the 1996–97 STAR PALS: 2 African Americans, 6 Hispanics, and 12 Native Americans. The program has retained 16 of the students, making the retention rate 80 percent. One Hispanic female, one African-American males, and two Native Americans withdrew. The Hispanic female withdrew from classes at midterm during the fall semester. She indicated that she was very close to her mother and sisters and missed them. She had already decided not to return to Northern Arizona University in the spring. The African-American male also withdrew from classes. He stopped attending classes and spent more time with his friends. All attempts by the Multicultural Engineering Program and the National Society of Black Engineers to reach him were unsuccessful. The Native American female had a series of family problems, and she withdrew from classes at midterm. Repeated contacts with her did not provide any meaningful change. The Native American male did not register for the spring semester. No reason was provided except that he transferred to San Juan College in Farmington, New Mexico. All four were excellent students; their grade point average at time of withdrawal was 3.20.

The 1996 PALS did well during the fall semester. The students were registered in Engineering 198, Physics 141, and Math 198. The Multicultural Engineering Program orientation class again focused on academic survival skills, such as time and budget management, study skills, note-taking, test-taking, and so forth. Tutoring was mandatory in both the math and physics class. Academic progress was monitored through grade checks, enabling the program to initiate remedies immediately.

The students were clustered in chemistry, English, and pre-calculus classes during the spring semester. Tutoring was again mandatory in both chemistry and pre-calculus. The program used upper division minority students as tutors. The students also registered for the second-semester Multicultural Engineering Program orientation class. Instead of repeating the fall semester curriculum, the class changed. A project-oriented class was established. The curriculum included projects that are geared to increase the students' engineering knowledge. An additional purpose was to increase the students' communications skills because written as well as oral reports were required.

Projects included building paper airplanes, bridges, and a sound-activated robot, constructing a solar-celled fan, and determining the costs of computers. Theoretical concepts were included in the project writeups. For example, does the wing span of an airplane affect the gliding distance, or does the weight of a material impact its strength capacity? The theoretical concepts were included so students understand the relationship to their chemistry and physics classes. If students can understand why these classes are necessary, they are more likely to perform better in those classes.

In 1997–98, STAR PALS recruited 18 students; the ethnic breakdown includes one Asian/Pacific Islander, two Hispanics, three white females, and ten Native Americans (three Hopis, one Apache, and six Navajos). The program took place from May 31 to July 3. The curriculum used previous formats. The classes were augmented by community-building and social events. The program kicked off with a welcome and orientation dinner for both the parents and students. Field trips to Meteor Crater and Oak Creek Canyon were scheduled. A barbecue was sponsored by the Multicultural Engineering Program for students and engineering faculty. Other programs included pizza night, talent night, and shopping night at the mall.

Northern Arizona University
Multicultural Engineering Program

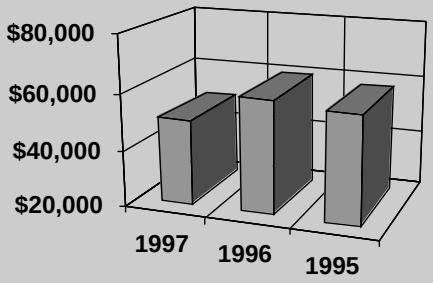
Bridge Awards

The program concluded with an Awards Banquet. More than 80 students, family members, and special guests attended, including the chair of the Hualapai Tribal Council and the vice chair of the Hopi Tribal Council; the Arizona MESA (Math, Engineering and Science Achievement) director was the guest speaker.

The College of Engineering and Technology designed the math and engineering component of STAR PALS to incorporate principles of collaborative learning and academic excellence. The College of Engineering and Technology has worked closely with the Math Department to provide a math class that would incorporate group learning, the integration of physics and engineering concepts, problem solving, and the use of technology, such as graphics calculators and computer-based applications programs. In addition to the Math 198 instructor, a tutor hired specifically for PALS students provided daily study groups to integrate, review, and enrich the concepts introduced in the class.

PALS students spent 3 hours each afternoon, 3 days a week, at the College of Engineering. Each engineering discipline was represented. College of Engineering and Technology faculty presented a weeklong lesson that allowed PALS to experience the disciplines offered. For example, the Civil Engineering Department introduced students to bridge design and construction. Students took part in a bridge-building contest in which teams designed and built bridges to scale. They then test-loaded their bridge in the Materials Testing Laboratory to determine the highest load to weight ratio. The local media provided news coverage of the event, and the story and accompanying photograph made front-page news.

**Funding History—
Northern Arizona University**



South Dakota School of Mines and Technology Scientific Knowledge for Indian Learning and Leadership (SKILL) Program

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Program Overview

The mission of the Scientific Knowledge for Indian Learning and Leadership (SKILL) Program is to develop and support academic training emphasizing mathematics, science, and engineering to enable minority students (principally Native Americans) to enroll in and graduate from post-secondary institutions. The SKILL Program is an effort by the South Dakota School of Mines and Technology to help the Nation overcome an expected shortage of professionals in math and science fields.

Beginning with an elementary program in 1989, SKILL has reached more than 3,000 Native American students, fostering their interest in math and science, increasing their awareness of career opportunities, and enhancing their confidence in their abilities. Now in its 8th year, SKILL provides a wide range of programming for students from grade school through high school, including research opportunities, tutorial assistance, classroom curriculum, and academic summer programs.

The SKILL/NASA Honors Program is the South Dakota School of Mines and Technology's precollege high school project that began in 1992. The Honors Program focuses on recruiting 25 Native American students each year for the 4-year program. Students attend a 4-week skill-building summer experience each year with year-round followup of students through site visits to their schools. They are encouraged to conduct research on science projects during the academic year. The program curriculum includes an emphasis on student understanding of NASA's Mission to Planet Earth.

Objectives

The SKILL Program has the following objectives:

- Support students' desires to excel in the study of science and mathematics
- Introduce students to careers that require math and science knowledge through participatory activities, field trips, research, and mentor relationships
- Contribute to student confidence in their academic abilities, and strengthen their study skills

Bridge Awards

South Dakota School of Mines and Technology
Scientific Knowledge for Indian Learning and Leadership (SKILL) Program

- Acquaint students with post-secondary education and the necessary preparation for careers in science and math

To determine student achievement for program evaluation, each student completed a number of entrance and exit exams. These exams included attitude surveys in science (Dutton) and mathematics (Podell). The students also took an assessment survey, which focused on the students' study habits, their knowledge of careers in science and mathematics, and what courses they should take in school to achieve a career in science or mathematics. Student ability tests were also administered in all academic classes. All third-year students are given the South Dakota School of Mines and Technology's math placement exam. Students scoring in the top six of the class may enter the Math 110 college algebra summer class for dual credit.

Entrance exams of students continue to show that the majority of these students have poor study skills and little knowledge of career fields in science and mathematics, and few have any long-term goals and/or had no understanding of what elective courses might prepare them for college. The results of the pretests in the academic classes show that most of the students had little or no knowledge of the course work outlined in individual class syllabi. Through the support of SKILL/NASA Honors Program staff, the participation and encouragement of Goddard Space Flight Center personnel, and the commitment of each student to succeed in the program, the exit exams showed a dramatic increase in all these areas, with emphasis on individual assessments, the establishment of goals, and the ability to make choices in their education.

Enrollment Data

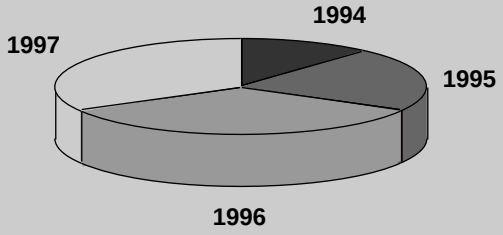
The current enrollment is 68. The total enrollment since the June 1992 project inception has been 100. The students targeted are Native Americans at the high school level. The enrollment breakdown of the 100 students is as follows: of the 39 males, 32 are Native Americans and 7 are others, and of the 61 females, 55 are Native Americans and 6 are others. The 13 others are 12 Caucasians and 1 Asian.

Program Implementation

Recruitment Strategies: Applications and project information are distributed to schools with high percentages of minority students in South Dakota. The targeted recruitment is students previously involved in SKILL.

Courses Targeted: mathematics, computer science, Earth science, physics, environmental chemistry, and communications.

South Dakota School of Mines Enrollment



Bridge Awards

Selection Criteria: student essay on interest and commitment, math or science teacher recommendation, parent commitment, transcripts, attendance, and personal interview.

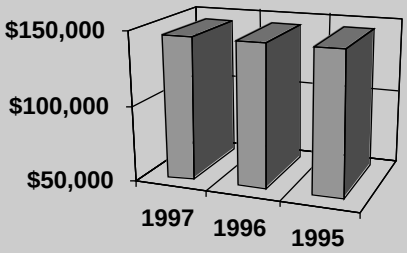
Outcomes to Date

Of the 24 original first-year students, 20 graduated from the program on June 28, 1996. All applied for admission to a university and identified a major in science or engineering. Of the 20 students, 18 are currently attending a university. One student is in a vocational-technical school, and one student is in the U.S. Navy. Of the 18 attending universities, 8 are attending South Dakota School of Mines and Technology, comprising 25 percent of the Native American freshman enrollment. The students in the SKILL Program have had the following accomplishments:

- Of the numerous medals and special awards won at regional and national science fairs by students conducting individual research over a span of 5 years, SKILL students have won more awards than any other contingency from South Dakota at the American Indian Science and Engineering Society's (AISES) National Science Fair.
- Fifteen separate student experiments have flown on two Space Shuttle missions.
- Four students presented their research at the Shuttle Small Payloads Symposium in 1995.
- Ten students successfully completed 11 math classes and 3 college freshman-level courses at South Dakota School of Mines and Technology during their high school sophomore and junior years of the program.
- Fourth-year students completed a total of 589 hours of program instruction.
- There has been an overall increase in the students' grade point averages.
- Students receive presidential recognition at the Oval Office on December 2, 1996.
- The program won the 1997 National Science Foundation Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring, September 11, 1997.

A group photograph of the 1997 NASA Honors participants.

Funding History—University of South Dakota



Bridge Awards

Spelman College
Model Institutions for Excellence, Summer Science and Engineering Program

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Program Overview

The Summer Science and Engineering Program (SSEP) is a 6-week residential summer program for prefreshmen who intend to pursue a major in mathematics, science, or engineering. The program provides an academically challenging curriculum with classes in computer science, mathematics, chemistry, statistics, and engineering, as well as academic enrichment experiences in problem solving and critical thinking, study skills, time management, and seminars that feature scientists and engineers. Educational excursions are made to a NASA Center and local scientific sites. The program enables students to strengthen their science and mathematics backgrounds and to develop skills essential to success in these areas.

Objectives

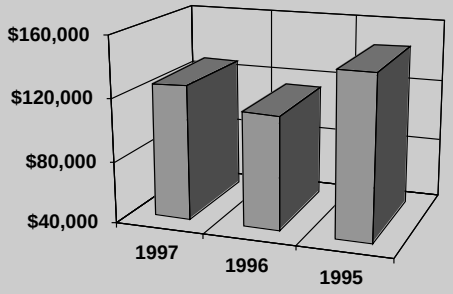
This program has the following objectives:

- Increase the number of African-American women earning mathematics, science, and engineering baccalaureate degrees
- Enhance the science and mathematics backgrounds of prefreshmen students
- Provide students with information on careers in mathematics, science, and engineering, with exposure to role models, and with encouragement
- Gain parental support in encouraging students to pursue mathematics, science, and engineering careers

Enrollment Data

Total number of students impacted is 338 since June 1, 1988. The targeted group is high school graduates. The targeted students are 42 African-American females. Program enrollment for the past 4 years is shown at left.

Spelman College Enrollment



SSEP enrollment for the past 4 years.

Program Implementation

Strategies: strong academic component, exposure to career options; summer component, field trip opportunities, involvement of school administrators, linkages to the next level, tutoring, use of technology, hands-on learning, problem solving, and skill development.

Recruitment Strategies: Applications are sent to all students who have applied to Spelman and indicate an interest in majoring in science, engineering, or mathematics.

Selection Criteria: high potential for success in mathematics, science, and engineering college studies as judged by SAT or ACT scores; grade point average; courses selected in science and mathematics; and extracurricular activities.

Partner: Morehouse College Penn Foundation.

Courses Targeted: pre-calculus, calculus, chemistry, and computer science.

Tracking: name, ethnicity, gender, grades, college entrance, and college major.

Outcomes to Date

The program has produced a strong core of highly motivated, well-prepared science, engineering, and mathematics freshmen who have successfully completed degrees and moved into graduate programs in scientific and technical careers. This has enhanced the academic climate and led to an overall increase in science, mathematics, and engineering majors.

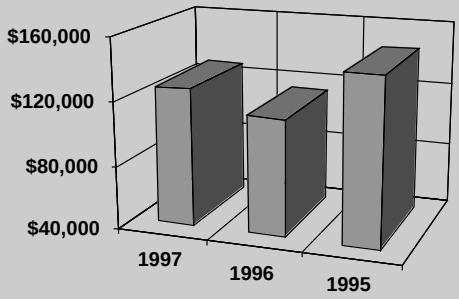
Lessons Learned

Early planning, a strong organizational structure, and support from other units of the college are essential to project success. Parents should be contacted to explain the importance of students participating in this program.

Issues/Challenges

Increasing costs, particularly relating to attracting good faculty member, is a challenge. Students with major financial needs are not always able to participate because of the need to earn summer money to pay for fall college costs.

Funding History—Spelman College



Turtle Mountain Community College Recruitment and Retention of Indians in Science and Engineering

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Turtle Mountain Community College
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The Recruitment and Retention of Indians in Science and Engineering (RISE) project recruits and retains Native American students in the fields of science and engineering. The project offers an innovative program to engineering students at Turtle Mountain Community College by establishing a working relationship with North Dakota State University to offer onsite laboratory and research experience under the guidance of the faculty from the civil and mechanical engineering departments. The mechanical properties of the engineering materials, such as concrete, steel, wood, and composites, are obtained by the students through hands-on experiments during their 3-day visit to North Dakota State University. The students also participate in the Sunday meetings to discuss properties of the materials. To reward student participation, the RISE project provides each student with the stipend and offers two credits for the course called "Introduction to the Engineering Materials."

University of South Florida Minority Engineering Program

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Program Overview

The University of South Florida's Minority Engineering Program offers women and disadvantaged minorities an opportunity to hone their mathematical, scientific, and analytical skills for the freshman-year engineering curriculum. In addition, students, faculty, and high school teachers tour local engineering facilities and NASA Centers and participate in career panels with professional engineers.

Objectives

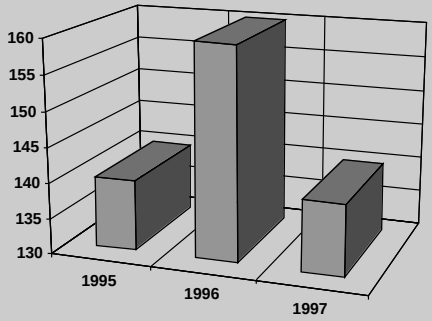
The Minority Engineering Program has the following objectives:

- Introduce students to college-level calculus, chemistry, computer science, and English
- Provide hands-on laboratory experiences similar to those encountered during the freshman year
- Conduct research designed by critical corporate engineers to enhance thinking
- Establish a mentor program among high school graduate students, engineering faculty, and upper class individuals to provide college survival skills
- Enhance a partnership between local high school mathematics and science teachers through team teaching with university faculty
- Provide participants with college survival skills

Enrollment Data

The total number of students impacted is 440 since January 1, 1995. The targeted students are 70 African-American, Native American, and Hispanic females and 70 African-American, Native American, and Hispanic males. Program enrollment for the past 3 years is shown at right.

University of South Florida Enrollnent



Minority Engineering Program enrollment for the past 3 years.

Program Implementation

Strategies: year-round enrichment, strong academic component, mentoring relationships, academic year component, involvement of teachers, exposure to career options, summer component, field

University of South Florida
Minority Engineering Program

trip opportunities, linkages to the next level, community involvement; tutoring, research component, use of technology, problem solving, and skill development.

Recruitment Strategies: High school counselors in a three-county area (Hillsborough, Pinellas, and Polk Counties) of Florida receive applications and fliers. Also, Southeastern Consortium for Minority Engineering (SECME) teachers are contacted. Churches and youth organizations are provided information. The National Society of Black Engineers and the Society of Hispanic Professional Engineers provide recruitment assistance. The Minority Engineering Program director makes presentations to classes. Every student who meets the criteria and has been admitted to the College of Engineering receives a letter from the dean.

Selection Criteria: disadvantaged students and women who have been admitted to the College of Engineering at the University of South Florida with a minimum 3.0 grade point average.

Partner: Proctor & Gamble.

Courses Targeted: pre-calculus, calculus, chemistry, and computer science.

Tracking: name, address, ethnicity, gender, MSET courses taken, grades, career choice, college major, and grade point average.

Outcomes to Date

The partnership with industry has resulted in scholarships and internships.

Lessons Learned

The program must continue to personalize the recruitment of minorities, especially Hispanics. Stipends must remain as incentives for participation and retention.

Issues/Challenges

There is strong competition with other Florida universities for the best and the brightest students.

Xavier University of Louisiana
Stress on Analytical Reasoning II Program

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Program Overview

The Stress on Analytical Reasoning II (SOAR 2) Program is a 4-week summer program for prefreshmen initiated to help students develop the type of problem-solving skills needed to succeed in college-level mathematics and science, thereby increasing the number who can succeed in and choose a science-related career goal. SOAR is unusual among programs developed by scientists because it attempts to develop "problem-solving ability" rather than to teach content. SOAR 2, the program for students interested in computer science, engineering, mathematics, or physics, has the following five components:

- An inductive approach to laboratory experiments to improve general problem-solving ability
- Specific instruction to improve verbal and quantitative reasoning skills
- General vocabulary-building
- Group competitions
- A selection of activities to inform and motivate students for careers in the targeted areas

Objectives

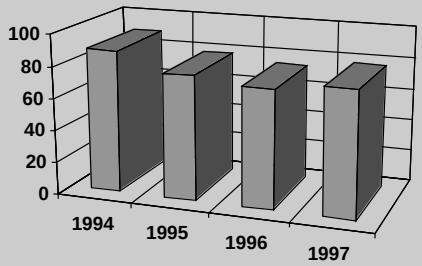
SOAR has the following objectives:

- Increase the number of minority students exposed to the Xavier intervention method through a nationwide recruiting effort
- Improve participants' problem-solving skills through exposure to an instructional model based on Xavier's successful biological science interventions
- Expose students to the university's academic environment so they are better prepared to negotiate the educational process when they enroll as freshmen
- Expose students to career opportunities and issues in advanced technological environments
- Enhance the retention rate of students enrolling in mathematics, science, and engineering courses of study

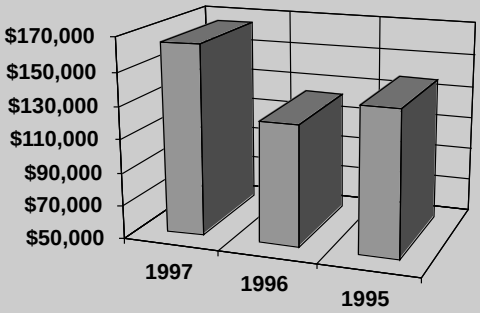
Bridge Awards

Xavier University of Louisiana Stress on Analytical Reasoning II Program

Xavier University of Louisiana Enrollment



Funding History— Xavier University of Louisiana



Enrollment Data

The total enrollment since project inception (May 1986) is 741. The fiscal year 1997 enrollment breakdown is 26 African-American and 1 Caucasian male and 51 African-American females, for a total of 78.

Program Implementation

Students are recruited through a mailing of more than 2,000 applications to high school counselors and science teachers in selected school districts around the country. All eligible participants in the local precollege Louisiana Engineering Advancement Program (LEAP) Program and all eligible prospective freshmen at the university are also invited to participate in the program. In addition to the mailouts to school districts, information letters are sent to parents of local students who participate in Xavier University's Summer Science.

Students are selected for the program on the basis of their high school performance in their academic subjects, their standardized (ACT/SAT) test scores, their projected college majors (engineering, mathematics, or physics), the expected date of graduation, and the recommendation of their teachers or counselors.

Outcomes to Date

The program has been a significant contributor to the growth and stability of the Xavier Dual-Degree Program. As a model, it has also most recently contributed to a significant increase in the enrollment in the Computer Science Department at Xavier. The student accomplishments include the following:

- Of the SOAR 2 students enrolled at Xavier, 49 percent are in the Dual-Degree Engineering Program.
- Of the SOAR 2 students enrolled at Xavier, 59 percent chose majors in engineering, computer science, physics, or mathematics.
- Of the SOAR 2 students enrolled at Xavier, 71 percent chose majors in engineering and the physical sciences (includes chemistry and biology).
- Of all the SOAR 2 students, 71 percent chose majors in engineering, computer science, physics, or mathematics.
- Of all the SOAR 2 students, 72 percent chose majors in engineering and physical sciences.

- Participants maintain a cumulative grade point average at Xavier University that is approximately 0.6 higher than nonparticipants.

- Participants are retained at a 20-percent higher rate than nonparticipants.

- The largest percentage of participants in special graduate school preparation programs are former participants in the Bridge program.

Lessons Learned

Bridge programs can significantly impact a student's ability to integrate into and negotiate the academic process when that program focuses on the issues essential to a student's critical thinking and group dynamic process.

Issues/Challenges

SOAR must maintain an open approach to introducing innovations into the program as society, students, and technology change.

Scholarship/Fellowship Awards: Undergradaute/Graduate Student Support

Undergraduate student support programs provide scholarships, internships, grants, and other forms of support for students to carry out research and related activities. In some instances, awards are made to a particular HBCU, OMU, or organization that facilitates the awards to the student. In other cases, such as Undergraduate Student Awards for Research (USAR), awards are made directly to the student. Overall goals of undergraduate student support programs are:

- Attract students who are underrepresented in mathematics, science, engineering, and technology (MSET) fields to MSET fields of study of interest to NASA
- Encourage student persistence and appropriate progress to a degree, and support degree completion
- Enrich the undergraduate educational experience by increasing student exposure to and involvement in research activities in NASA-related fields
- Encourage and support the transition from undergraduate work to graduate studies in MSET or to the first professional position in MSET-related fields

Graduate student support programs generally provide fellowships, internships, grants, and other forms of support for students to carry out research and related activities. In some instances, awards are made to a particular HBCU, OMU, or organization that facilitates the awards to the student. In other cases, such as Graduate Student Research Program, awards are made directly to the student. Overall goals of graduate student support programs are:

- Recruit high-quality students to pursue graduate studies in NASA-related fields of science and engineering
- Maintain appropriate numbers of high-quality scientists and engineers, who are typically underrepresented in MSET fields, in NASA-related fields

During fiscal year 1997, more than 800 students were supported through a variety of scholarship/fellowship programs. Among them were those listed to the right.

Scholarship Programs

Bowie State University

Florida A&M University

Morehouse College

NAFEO Services, Inc. (Student Researchers Consortium)

Northern Arizona University

Spelman College (WISE Program)

Spelman College (USAR Program)

University of New Mexico

Fellowship Programs

American Society for Engineering Education-Helen T. Carr Fellowship Program

Florida A&M University/Florida State University Colleges of Engineering

National Consortium for Graduates (GEM)

National Physical Sciences Consortium

North Carolina A&T State University

Bowie State University
Model Institutions for Excellence

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Program Overview

Bowie State's Science, Engineering, and Mathematics Education (BSEME) Reform is a program of the Model Institutions for Excellence (MIE) initiative, one of six programs at different institutions funded by the National Science Foundation and NASA. The overall goal of BSEME is to ensure that a higher number of students seek and complete advanced quality education in science, engineering, and mathematics (SEM). In the meantime, the focus is on developing and validating an educational reform model that can be disseminated and successfully adapted by other institutions alike.

Bowie State's MIE initiative is implementing an institutional development model that encompasses the following educational reform components:

- Outreach
- Retention
- Educational Reform
- Research
- Linkages and Collaboration
- Infrastructure and Human Resource Development
- Assessment and Self-Evaluation

The efforts of the second year (July 1, 1996, through June 30, 1997) of this long-term, comprehensive project focused on a number of key activities in the educational reform model. While BSEME continued to develop and enhance the infrastructure, the following areas were the primary focus of the resources and efforts during the 1996–97 project year: supplemental education, assistantship program, internship program, and faculty and student development.

Enrollment Data

The MIE initiative supports recruitment and retention activities to increase the enrollment of minority students in SEM. The strategy includes assisting the Admissions Office on recruitment visits and hosting special showcase and outreach activities. In addition, financial assistance is offered to more than 120 students to help recruitment and retention. The overall headcount of SEM enrollment was 507. The overall science, engineering, and mathematics enrollment was: 75 percent African Americans, 9 percent Caucasians, 16 percent others, with 48 percent females and

52 percent males. Students financially supported by MIE were: 70 percent African Americans, 15 percent Caucasians, and 15 percent others, with 48 percent females and 52 percent males.

Outcomes to Date

A number of milestones and accomplishments have been achieved, including the following:

Outreach

- SEM Week was a week-long program of activities showcasing student achievements in SEM from Bowie State and area high schools. Several student and faculty speakers were featured, and awards were given to students with best poster presentations.

- The 1997 Annual MIE Conference was hosted; it showcased Bowie State's accomplishments in SEM and technology. Approximately 100 people attended the conference.

Retention

- More than 120 students were granted partial and full assistantships under the SEM Assistantship Program. All 46 full-time assistants served as research, teaching, or laboratory assistants under the mentorship of faculty or staff members.

- An SEM Tutoring Center was established to provide needed academic support to students. A group of trained tutors provided more than 1,400 one-on-one and group tutoring sessions this year.

- The Summer Internship Program continued to be developed. Consequently, a data base of more than 200 summer internship programs has been created and was used to place 28 SEM assistants in summer programs nationally and internationally.

Infrastructure and Human Resource Development

- New research staff and faculty members in the Department of Biology have been hired to support research and studies in Earth and space sciences.

- Several faculty, staff, and student development workshops were held, including "Integrating Technology into the Curriculum," "Institutionalizing Undergraduate Research," "Effective Mentoring," and "Active Learning."

- A state-of-the-art Scientific Data Visualization Laboratory was established to support interdisciplinary research in Earth, space. and medical sciences.

Scholarship Awards

On another front, the MIE program assisted Bowie State University in its governance reform activities and in automating personnel requisition and hiring processes in Human Resources.

Student Achievements

There were a number of significant achievements of students supported by MIE, including:

- Five alumni entered graduate schools.
- Six students presented papers/posters at national conferences or symposia.
- Twenty-eight students placed in national and international summer internship programs.
- More than 30 paper posters were presented at the Annual MIE Conference.
- Several students have been awarded national scholarships.

Partnering

The following summarizes the partnerships with this program:

- An SEM Graduate School Fair was held to introduce SEM students to many graduate study opportunities at institutions such as George Washington, Johns Hopkins, University of Maryland, University of Oklahoma, and Penn State.
- The Bowie State University Satellite Operation and Control Center has been established as a partnership with NASA's Goddard Space Flight Center to train students and develop curriculum in mission and spacecraft operation and control.

Florida A&M University
Project IMAGE

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Program Overview

Beginning with the 1988–89 school year, Florida A&M University was awarded a grant from NASA to initiate a project aimed at increasing the number of minorities completing graduate degrees in engineering. Dubbed "Program IMAGE" (Increasing Minority Access to Graduate Engineering), the project provides financial and academic support for participants throughout their undergraduate years of study and, upon graduation, offers assistance in pursuing graduate study and employment.

To qualify for participation, a student must have a minimum high school grade point average of 3.5, have an ACT score of 27 or SAT score of 1,200, and be interested in pursuing a graduate degree, preferably the Ph.D. degree in engineering. Upon acceptance, the student must complete a minimum of 30 hours of course work each academic year, maintain a cumulative grade point average of 3.0, and accept internships at a NASA facility. Students have an option of pursuing a degree in chemical, civil, electrical, industrial, or mechanical engineering.

Enrollment Data

Since 1988, there have been 192 participants in Project IMAGE. During the 1996-97 school year there were 93 students (50 females, 43 males) in the project. These participants come from 21 different states, Washington, D.C., and the Virgin Islands.

An aggressive recruitment effort is conducted each year; this includes the active involvement of the Florida A&M's President, Dr. Frederick S. Humphries. This effort has resulted in Florida A&M being ranked among the top three institutions in the Nation in attracting National Achievement Scholars.

Outcomes to Date

Project accomplishments include the following:

- Of 110 participants in six entry classes (1988 through 1993) eligible for graduation, 81 (nearly 74 percent) have done so. Some of these included students in 5-year degree programs.

- Of these graduates, 41 have enrolled in graduate engineering programs.

Florida A&M University
Project IMAGE

Scholarship Awards

- Twenty-two graduates have earned graduate degrees.

- Forty-six students were provided internship experiences at NASA sites. The students engage in numerous and diverse projects, and their mentors reported high performance by Florida A&M students. A large number of Project IMAGE students performed internships with private companies.

Student Achievements

- Fifteen students have received fellowships to attend graduate school.

- Ten students received a NASA fellowship for graduate study at Florida A&M.

- Three students received National Consortium for Graduate Degrees for Minorities in Engineering and Science, Inc. (GEM), fellowships.

- One student was the recipient of an Air Force fellowship, and another student was awarded a Wright Laboratory Cooperative fellowship.

Partnering

Project IMAGE students are active participants in the Florida A&M's Graduate Feeder Program, which has a cooperative arrangement with 33 major universities. These universities reserve spaces for graduate study by Florida A&M's graduates, with financial assistance provided in various forms.

Morehouse College
Project SPACE

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Program Overview

The primary goal of the Project SPACE (Strategic Preparedness Advancing Careers in Engineering/Sciences) program is to give high-achieving students an opportunity to pursue undergraduate studies in engineering, mathematics, and the physical sciences. Students selected for the program will receive scholarship awards that cover the cost of their undergraduate education. Participants (incoming Morehouse College freshmen) are required to meet the following criteria:

- A minimum overall grade point average of 3.00
- A minimum score of 1,000 on the SAT or comparable ACT
- An interest in pursuing an advanced degree

Selected program participants are named Ronald E. McNair Scholars in honor of the late *Challenger* astronaut.

The Project SPACE program is designed to increase the number of African-American men in the sciences. Because of the under-representation of African-American men in the sciences, it was necessary and critical to create an initiative that would focus on developing a talent pool of educated men to meet the needs of the 21st-century workforce.

With the goal of encouraging students to pursue careers in engineering mathematics and the sciences, the Project SPACE program provides scholarships that specifically provide financial support to engineering, math and science (EMS) students. Students who receive financial support can focus on their academics and not worry about how they will pay for tuition.

Enrollment Data

The Project SPACE program has existed for almost 8 years. Currently, there is a total of 95 Ronald E. McNair Scholars enrolled at Morehouse College. The following is a program profile for these 95 scholars. There are 40 freshmen, 14 sophomores, 17 juniors, and 24 seniors. In terms of college major, 18 are enrolled in engineering, 15 in computer science, 8 in physics, 18 chemistry, and 36 in mathematics. There are a total of 81 scholars scheduled to graduate May 1998.

Scholarship Awards

Since 1989, the program has selected a class of 10 to 20 incoming freshmen students for each academic year. However, for the 1997–98 academic year, the number of selected students doubled because of funding changes. The program offers scholarships that cover 50 percent of the total educational costs instead of 100 percent; therefore, more students were selected as program participants.

Outcomes to Date

The success of the program can be attributed to the critical program components that serve to enhance the scholars' academic experiences. The components are designed to ease their transition from high school to college, motivate students to attend graduate school, and provide them with a forum that encourages them to strive for excellence. Overall, the program has been successful in retaining students and motivating them to graduate school. Program statistics indicate that with each graduating class, over half of the students will enroll in a graduate school program.

NAFEO Services, Inc.
Student Researchers Consortium

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Program Overview/Objectives

The major objectives of the NASA-sponsored Student Researchers Consortium coordinated by NAFEO Services, Inc., are to:

- Identify, from a universe of financially needy students, a targeted number who have high potential for conducting research in areas relevant to NASA's mission
- Identify mentors who will give support and guidance to the student researchers
- Create a consortium so that the researchers would have an opportunity to interact among their peers from other institutions
- Provide a summer research experience for the students
- Initiate the actual performance of research by the students

Outcomes to Date

NAFEO Services has enjoyed spectacular success in accomplishing the objectives of the project. It has worked in close cooperation with administrators from 15 HBCU's. The principal investigator and her staff have selected the finalists for the Student Researchers Consortium after thoroughly screening them from a large pool of nominees. The NAFEO Services personnel have documented that the finalists meet financial need and, following clearance with NASA officials, have selected 58 student researchers from the 15 institutions.

Fifteen faculty members were selected by the presidents of these institutions to serve as mentors to the students. Two workshops were held in the Washington, D.C., area for both the mentors and the student researchers. Scholarships were processed for all of the students in consultation with mentors and faculty members. Forty-nine student researchers were placed in summer research internship positions and have embarked on their research careers. A significant number of researchers have specifically identified research projects.

The Student Researchers Consortium is both directly and indirectly relevant to NASA's Strategic Enterprises. An important component of this program is to ensure that the scholars are given preparation for obtaining leadership roles in the fields of science

NAFEO Services, Inc.
Student Researchers Consortium

and technology and to develop ground-breaking research relevant to the solar system and the currently known and unknown infinity of the universe. This program, in step with NASA's Space Science Enterprise, strengthens the cooperative benefits of education and scientific literacy to enhance the prospectus of the further advancement of future space missions and its relativity to economic programs and natural resource preservation.

This project aims to increase the participation of underrepresented groups in the various programs sponsored by NASA. NAFEO Services has redirected 58 students whose financial need may have impeded their academic progress and restrained them from being catapulted into career paths parallel to the career opportunities provided by NASA. Their success will inevitably produce tax-paying rather than tax-supported citizens. It also will produce individuals who, as researchers, may expand our scientific knowledge of Earth and space.

Student Achievements

A number of students have initiated research projects—an achievement in itself. Many of the researchers have been provided strategies for research on any given subject matter. The preparation includes preliminary research, the preparation of a research prospectus and a formal research methodology, the maintenance of a structured lab notebook, and the assimilation of the completed research outcomes into a presentable formula that equals success. The following are some specific examples of the achievements the students have made in initiating and developing research projects:

- In solving simple structural problems in compounds and molecules, success was achieved by the detection of bonds concerning their molecular structure and mass weight by using infrared spectroscopy.

- The development of a research-supported petition to gradually introduce hydrogen as the primary energy source for the future can be accomplished through the development of solar energy concentrators or photovoltaic systems to decompose energy at an affordable price. The petition also provided an outline of the benefits this energy source will afford society by its encouraging a more sound and stable ecosystem.

- Some interns have been performing biomedical research that might be used to benefit individuals physically involved in outer space research through highly complicated microbial and genetic experimentation.

- One researcher performed risk analysis for flight missions and missile observation and became familiar with equipment used for missile testing and attack drills. The student researcher

developed a new computer application for the Computer Science Center at NASA Wallops Flight Facility using Delphi computer software. This new application has transformed the center's complex wind interphase information system to become more user friendly for accessing files.

- Another researcher had the opportunity to perform research that potentially could have a wide-spread impact on NASA employees. Serving as a member of the Boeing Information Services Team at NASA Headquarters, research was conducted on development for the implementation of a tactical plan that will allow NASA installations to operate more effectively. A conclusion was derived that this could be accomplished by standardizing workstations regardless of location and/or status to increase the potential interoperability of each employee and reduce the amount of time used to resolve problems and overcome obstacles.

As an observation, the student researchers in this program are taking long strides toward fulfilling the expectations of them and their obligations as scholars in the Student Researchers Consortium.

1997 NAFEO Scholars.

Northern Arizona University
Sacred Mountain Scholars

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Program Overview

To increase and enhance the academic performance and graduation rates of the underrepresented students, the Multicultural Engineering Program (MEP) was established in 1993. The program consists of several programs: STAR PALS (the summer bridge engineering program), the Hispanic Engineering Program; the Sacred Mountain Scholars, and the Native American Engineering Program. Both the Hispanic and Native American Engineering programs use many of the techniques described in this report. For example, intrusive advising and academic remedies are used to enhance academic performance. Although there are no formal programs for either African-American or women students, all services are available to these individuals.

Outcomes to Date

Sacred Mountain Scholars

Currently, there are six Sacred Mountain Scholars. The program lost two students during the fall 1996 semester. Lorrisa Betoney left the program when her husband completed his engineering studies and they relocated to Seattle. She is waiting until she qualifies for residency before she returns to complete her engineering studies. Nolan Curley transferred to another school (University of New Mexico) and also changed his major to computer information science. Gregory Sheperd was on leave from the program for a semester and has since returned. He is more focused and is working harder to raise his grade point average. The program has three students who are 3.0 and above.

Milestones seem to describe this group. Two students graduated in May. Benjamin Hoskie graduated cum laude. As an environmental engineering student, Hoskie accepted an offer with BHP Minerals in Farmington, New Mexico, and intends to work for a year; he is considering returning to take on graduate studies in environmental engineering or the MBA program. Norman Collins was picked by the both the students and faculty to be the student speaker at the college's recognition ceremony. Collins, an electrical engineering major, accepted an offer from Motorola. He is also considering doing graduate work in business.

It is anticipated that Rachel Brown will graduate in December 1997. It was anticipated that Nathaniel Morris would graduate in December but he is deficient one class; the program is exploring

several options with him He is expecting an offer from Ford Motor Company. Luther Nez will graduate in May 1998. Nez, along with Rachel Brown, spent the summer at the Jet Propulsion Laboratory in Pasadena, California, this past summer for 10 weeks. Martin Sagg has indicated that he is interested in a co-op in the spring semester so he plans to put off graduation until December 1999. Peter Littlehat will also graduate in December 1999, but he plans to work overseas for at least a semester before he starts graduate work. The program will then be left with Gregory Shepherd, who returned to classes at Northern Arizona University and seems to be more focused. He spent the summer working for the USDA Forestry Service. Nolan Curley left Northern Arizona, changed majors, and enrolled at the University of New Mexico.

Several individuals were successful this academic year. In addition to their academic workloads, Luther Nez, Norman Collins, and Peter Littlehat worked as tutors. Littlehat served as AISES president this year and still maintained his high grade point average. As far as professional growth topics were concerned, the students discussed a number of issues, such as stress management and computer topics, and the highlight was a mock dinner interview for both business and graduate school interviews. The students were required to dress in their business attire and participated in a dinner interview. The dean and other faculty served as interviewers. Discussions with the Sacred Mountain Scholars indicated that they found this exercise very useful because it provided a “real life” experience.

General MEP

There was more in-depth advising and more personal contact with the students. A review of the semester’s statistics demonstrates that more intrusive advising and constant monitoring is necessary to ensure academic progress. More academic remedies will be initiated, such as tutoring and grade checks. Tutoring was available for the following classes: physics, chemistry, statics, circuits, microprocessors, programming in C++, EGR 280, 305, pre-engineering math, calculus I, II, III, and IV, and differential equations. The program utilized 10 upper division minority-engineering students as tutors; some students tutored two classes. PALS have mandatory tutors so their grade point averages are higher.

When the grade checks are returned, MEP contacts the students and, if needed, tutoring sessions are initiated. In addition, students are asked to conduct semester-by-semester course scheduling with anticipated date of graduation. Ongoing discussions are held monthly to ensure that students adhere to the plan. This also shows the retention and graduation rates. For the first time, MEP graduated 11 underrepresented students—two Hispanics and nine Native Americans. The program anticipates 15 students graduating in December 1997 and 11 more in May 1998.

Issues/Challenges

One problem associated with this program is the lack of student data. Tracking data is necessary because such information provides program strengths and weaknesses. MEP is implementing a student data base that will provide basic student information, academic and professional progress, and scholarship information.

It is difficult to find tutors because engineering is such a demanding field. Students spend so much time on their own class work that they do not have time to help others. To address this issue, MEP is now recruiting tutors from other departments. In addition, MEP contacted the math, physics, and chemistry faculty and solicited their support for these programs.

The lack of scholarships prevents the college from attracting top-quality students. An MEP objective is to initiate more scholarship searches and encourage many of the students to apply. For example, the Society of Hispanic Professional Engineers just announced their scholarship. MEP contacted a number of Hispanic students and provided the application. It was asked that the application be returned to the MEP

office so that the program could forward all the applications to the national office. This would ensure that a number of students would apply. Currently, MEP is reminding them of the deadline and intends to use this method for all students.

Future Direction of the Program

The program has recruited 18 students for the 1997–98 STAR-PALS, and similar methods will be used to ensure academic success. Although most of the curriculum will remain unchanged, the second semester of Engineering 198 will be undergoing changes. This is a project-oriented class, which will provide hands-on experience in engineering. The class focuses on team-building skills. The class also will promote the students' oral and written skills; students will be required to write reports as well as present their projects in classes. Finally, the class will provide motivational tools and provide more information in their chosen disciplines.

Another emphasis will be to initiate a student data base. Currently, tracking students is difficult. MEP initiated a three-page information sheet which should provide comprehensive information on students. This information will demonstrate program effectiveness as well as provide such information as the number of students who received scholarship, from what sources, and ethnic/gender breakdown.

Professional student development will be another area of emphasis for MEP, which is implementing a training program for the mentors, and 1996 STAR PALS will be matched with the 1997 STAR PALS. The program will place more students on scholarship and internships. A cultural awareness workshop was held for the students on September 17, 1997. The Society of Women Engineers will be brought under the MEP umbrella. How MEP will address the women issue is still unclear because there are a number of issues to consider.

Spelman College Women in Science and Engineering Scholars Program

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Program Overview

The Women in Science and Engineering (WISE) Scholars Program is an academic and research program in science and engineering that embraces the undergraduate years. The program provides scientifically talented minority and disadvantaged women students with the opportunity to pursue undergraduate studies in science and engineering in the highly motivating and supportive environment of Spelman College. WISE scholars enroll in Spelman as freshmen and pursue majors such as electrical engineering through the Dual Degree Engineering Program, mathematics, and physics.

Objectives

The WISE Scholars Program is designed to motivate students to pursue a Ph.D. in science or engineering and to enter careers as scientists, engineers, or teachers. Its goal is to increase the number of highly qualified women in scientific and technical careers. The program objectives are to:

- Identify and recruit capable students with an interest in science or engineering
- Enhance the science and mathematics backgrounds of prefreshman students selected for the WISE Scholars Program
- Enrich the undergraduate academic experience for talented students majoring in science and engineering
- Provide research experiences for scholars at Spelman College, NASA Centers, and other sites
- Provide students with information on career opportunities and activities at NASA
- Motivate and encourage students to pursue graduate degrees in science and engineering

Enrollment Data

Students begin the WISE Scholars Program as freshmen at Spelman College. They are selected on a competitive basis from talented minority and disadvantaged female high school seniors who are interested in the physical sciences, mathematical

Spelman College
Women in Science and Engineering
Scholars Program

sciences, computer science, or engineering, particularly those living close to NASA Centers. Brochures and applications are sent to high schools in the targeted areas. The materials are distributed during college recruitment trips, on high school campus visitation days, and upon request. Applications are also sent to seniors applying to Spelman College who indicate a major in the specified fields and demonstrate scientific talent.

Fourteen new WISE scholars of the highest quality were added to the program in the fall of 1996, bringing the total to 64. One student was enrolled at North Carolina A&T State University, and 18 enrolled at Georgia Tech as Dual Degree Engineering Program students. The remaining 45 students attended Spelman College.

Outcomes to Date

Freshman scholars attended the Summer Science and Engineering Program prior to entry and an orientation conference for students and their families. Presentations were given by NASA officials and the Spelman College program staff. The scholars at Spelman were approved for registration in strong sequences leading to majors in mathematics, physics, chemistry, computer science, and engineering. A weekly seminar was held for the freshman scholars with the director and codirector. Presentations of summer research projects at NASA Centers were given during two open sessions in September. Tutorials throughout the year provided assistance in freshman and sophomore science and mathematics courses. Other activities included a transitional meeting for Dual Degree Engineering Program students, the Graduate Research Orientation Workshops (GROW) for seniors, science lectures, a newsletter, and a recognition activity for graduating seniors. Twenty-nine students engaged in summer research for 10 weeks at NASA Centers and the Jet Propulsion Laboratory.

Student Achievements

Fourteen students graduated from Spelman with bachelor of science degrees, and seven of these also graduated from Georgia Tech with bachelor of engineering degrees. Six students were accepted to graduate school with scholarships and two to professional schools. Four students were elected to the Pi Mu Epsilon Honorary Mathematics Fraternity, five to the Mortar Board, two to the Golden Key Honor Society, and one to the Beta Kappa Chi Honorary Scientific Society. WISE scholars were named as the Most Outstanding Fourth-Year Mechanical Engineering Student, the Most Outstanding Fourth-Year Chemical Engineering Student, and the Leadership Student of the Year at the Dual Degree Engineering Program Awards Banquet. Wise scholars won first place for a mathematics poster, a physics poster, and an

engineering oral presentation at the Annual Science Day. Scholars gave poster or oral presentations at the joint mathematics meetings and the National Conference on Undergraduate Research. A junior scholar coauthored a paper with her chemistry professor.

Partnering

The only formal partner is Spelman College. The college provides many support activities, which are essential for the success of the scholars through the Student Life Division. A major contribution is the provision of research opportunities during the academic year by professors, who supervise students in undergraduate research and prepare students for campus and external public presentations.

A Spelman Wise Scholar, Michon Pinnix, explains her project on Science Day.

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Spelman College Undergraduate Scholars Awards for Research

Program Overview

The Undergraduate Scholars Awards for Research (USAR) Program provides academic, research training, and scholarship support for outstanding students in science, mathematics, engineering, and computer science. The goal of USAR is to increase the number of qualified minority women scientists and engineers, particularly those with graduate degrees.

Objectives

The program objectives are to:

- Identify and attract disadvantaged, entering women students to career paths in science, mathematics, and engineering
- Retain students in science, mathematics, and engineering majors until they receive bachelor's degrees
- Prepare students for success in graduate study in scientific and technical areas
- Increase the number of students who pursue graduate degrees and research-related or teaching careers in scientific and technical areas

Enrollment Data

Students are selected for the USAR Program on a competitive basis from the pool of scientifically talented students who have applied for admission to the freshman class of Spelman College and from the pool of outstanding students completing the freshman class. Students are considered if they are seeking majors in the areas of science, mathematics, and engineering that are related to NASA's mission and if they have grade point averages and entrance test scores that reflect high academic achievement and promise. A small number of students meeting the qualifications are invited to apply, as well as any student who makes an inquiry.

There were 11 USAR students in the Spelman USAR Program during the 1996–97 academic year. Two fourth-year Dual Degree Engineering Program students and one junior attended Georgia Tech. Two freshmen, one sophomore, two juniors, and three seniors were enrolled in Spelman College.

Scholarship Awards

Outcomes to Date

Each USAR scholar was assigned a faculty mentor, with returning scholars given the same faculty mentor as the previous year. The scholars and faculty mentors were invited to a joint opening reception/meeting where program policies and procedures were outlined and student responsibilities were discussed. A program was held in the fall for oral and poster presentations of summer research projects. Faculty mentors attended a group meeting to make plans for the year. Scholars met with their faculty mentors at least twice a month for advisement and counseling. In some cases, the faculty mentor served as a research supervisor for the student, and their meetings were merged into the research endeavor. In some cases, because of changing interests of the student, the faculty mentor made arrangements for research supervision by another faculty member.

USAR seniors participated in the Graduate Research Orientation Workshops (GROW). Students of all classifications were encouraged to attend special science events that were identified by their faculty mentors. Students were assisted by their faculty mentors and the Office of Science, Engineering and Technical Careers in applying for summer research opportunities. All of the students who were expected to continue as USAR scholars in 1997–98 were placed in external locations for the summer, with the exception of one freshman who remained at Spelman.

Student Achievements

Two students graduated from Spelman College in May with honors. One was accepted to a Ph.D. program in mathematics and the other to medical school. Two students gave poster presentations at the Spelman Annual Science Day and the National Conference on Undergraduate Research. A USAR scholar in the Dual Degree Engineering Program was selected as the Most Outstanding Fourth-Year Electrical Engineering Student at the Dual Degree Awards Banquet.

Partnering

As partners, Spelman College and Georgia Tech provided faculty mentors for the USAR scholars. Spelman College also provided a program director and services of the Office of Science, Engineering and Technical Careers.

A Spelman faculty mentor works with her USAR scholar.

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University of New Mexico NASA Training Project

Program Overview

The NASA Training Project is a federally funded program designed to increase the number of scholastically well-suited, highly qualified Hispanic, Native American, and African-American students achieving degrees in engineering, mathematics, science, or related undergraduate degrees. It achieves this by establishing a support system to maximize the students' ability to achieve and maintain a record of academic excellence during their undergraduate years. The professional development and cooperative/collaborative learning components of the program are designed to increase the numbers of underrepresented minority engineering and science students who pursue advanced study and research, as well as academic careers in engineering, science, or technology-related pedagogy. The NASA Training Project consists of the following components:

- The Freshman Scholars Component focuses on increasing the numbers of high-quality students with the potential, interest, and drive for completing undergraduate degrees in engineering, mathematics, and science in a curriculum that includes cooperative education.

- The Mentoring Scholars Component is aimed at increasing the ability of the participating students to achieve and maintain a 3.0 grade point average in upper level courses in the pursuit of undergraduate degrees in engineering, mathematics, and science and increase their awareness and interests in the possibility of advanced study and research and academic careers.

- The Educator Exposure Project is directed at underrepresented students majoring in education with an expressed interest in teaching secondary mathematics and/or science. This effort is intended to impact the fashion in which science, engineering, and mathematics teachers view their disciplines and thereby improve the ways in which students are trained at the secondary school level, before they arrive at the college or university level of study. Exposing the potential teachers to the rigors of science, engineering, and mathematics academic environments, while they themselves are being trained, will prepare and empower those teachers to do a better job once in the classroom. The education students will interact with NASA students and follow similar rules, guidelines, and stipulations of the NASA Training Project.

- The University of New Mexico/NASA Engineering Transfer Bridge Component provides transferring sophomores and juniors matriculating into the NASA Training Project from 2-year and 4-year

colleges with the much-needed emphasis in science and mathematics necessary to perform optimally in an engineering curriculum at a comprehensive university such as the University of New Mexico. This component will nourish an increased pool of U.S. students capable of progressing through undergraduate programs in science, engineering, and mathematics and better prepare them for admittance into the University of New Mexico's School of Engineering by promoting excellence in their academic performances at their respective institutions.

- The University of New Mexico/NASA Undergraduate/Graduate Bridge Component will introduce high-quality and qualified NASA Training Project juniors and seniors in good standing to real-time graduate school activities by partnering these students with active research professors to participate in graduate-level research and in this way encourage graduate school attendance for master's and Ph.D. degrees. In addition, students will have the opportunity to intern at NASA sites during the summer.

- The University of New Mexico/NASA Kindergarten-Fifth Grade Program will present an opportunity for the NASA scholars to give something back to their communities through presentations that are intended to increase the interest and awareness of science and mathematics at the kindergarten through 5th grades of elementary school, including participation in the "Junior University" with the San Felipe Pueblo Elementary School and the Family Math Academy.

Outcomes to Date

The NASA Training Project and its scholars have experienced many successes. The students have participated in some excellent NASA-sponsored activities this year, including an expanded freshman orientation; a welcome back activity; a NASA co-op representative function; numerous outreach activities cosponsored by the University of New Mexico student chapters of the National Society of Black Engineers, AISES, and Hispanic Engineering Organization (HEO), as well as the Northwest New Mexico Regional Science and Engineering Fair; extensive recruiting efforts to schools in outlying areas, as well as career fairs and college days; and a series of student success workshops.

In collaboration with the NASA-funded Center for Autonomous Control Engineering, many of the NASA scholars participated in portions of the 1997 NASA University Research Center Technical Conference. They attended workshops, viewed the numerous displays, and were recognized at the conference's awards banquet.

During the summer of 1996, two NASA scholars were funded by the University of New Mexico to participate in the internship program at NASA's Kennedy Space Center. In 1997, 11 students will be funded by the University of New Mexico to participate in internship programs at Kennedy as well as at NASA's Langley Research Center, Johnson Space Center, and Ames Research Center.

Possibly the biggest accomplishment of the NASA Training Project is its ability to impact such a large number of engineering, mathematics, and science students for such a relatively low cost. About 100 students directly participate in the NASA Training Project as NASA scholars. Another 50 to 100 students benefit every year from the many NASA-sponsored activities. Overall, the project has created an environment where academic excellence thrives.

To summarize, NASA enables the University of New Mexico and its School of Engineering through the NASA Training Project to attract some of the best and brightest students New Mexico has to offer. It provides a model retention program recognized for its excellence and a highly visible outreach program in New Mexico communities. It clearly demonstrates NASA's commitment to quality education with a focus on increasing the pool of underrepresented students in engineering, mathematics, and science. In turn, the University of New Mexico and its School of Engineering contribute additional funds and services to complement the programs offered through the NASA Training Project to help ensure a successful and rewarding undergraduate experience for the scholars. The end result of this highly effective collaboration is the production of a cadre of extremely well-educated and talented graduates from traditionally underrepresented groups who are prepared to assume leadership roles in their professions, serve as role models for subsequent generations of students, and promote the missions of NASA and the NASA Training Project based on their knowledge and experience.

American Society for Engineering Education NASA-Helen T. Carr Fellowship Program

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Program Overview

The NASA-Helen T. Carr Fellowship Program is designed to provide incentives for African-American and other socially and economically disadvantaged underrepresented groups to pursue doctoral studies in engineering and to consider teaching careers in minority institutions. The program originated in the late 1970's and provides financial assistance up to $10,000 per year to students selected by the member deans at one of the eight participating schools (Hampton, Howard, Morgan State, North Carolina A&T, Prairie View A&M, Southern, Tennessee State, and Tuskegee).

Enrollment Data

Since 1990, NASA has invested $465,000 in the NASA-Helen T. Carr Fellowship Program. To date, the program has helped more than 20 African-American engineers earn Ph.D.'s and join the faculty at one of the Historically Black Engineering Colleges (HBEC). Since 1990, seven NASA-supported fellows have earned their Ph.D.'s and fulfilled their commitment to teach at an HBEC. Currently, NASA supports six fellows (including two women) who are expected to earn Ph.D.'s by the end of 1998.

Issues/Challenges

The 1997 Helen T. Carr Fellowship Program continuation proposal calls solely for direct stipend support. Under the program guidelines, students selected may receive up to $10,000 in support each year for a maximum of 5 years of support, provided they continue to make satisfactory progress toward the completion of their doctoral degrees in engineering. The program will continue to be managed by the American Society for Engineering Education (ASEE) with an HBEC committee serving as a board of directors to ASEE. The participating deans of engineering will continue to select the students to be nominated for consideration by the HBEC committee. The full committee of the HBEC will approve selections. The ASEE Projects Office, with a staff of five full-time employees, will be responsible for administering the program. A 3-year funding cycle beginning in 1997 requests $50,000 to support four current participants and three new awards; 90,000 is requested for 1998 to support six previously funded participants and three new awards; and $110,000 is requested for 1999 to support eight previously funded participants and three new awards.

Florida A&M University–
Florida State University
FAMU Graduate Fellowship Program

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Program Overview

In 1995, Florida A&M University requested funds from NASA to initiate a bold venture to produce minorities (especially African Americans) with their Ph.D. degrees in engineering. This venture enabled Florida A&M to recruit 15 outstanding African-American students to pursue their terminal degrees. As outlined in the original grant proposal, 10 of the 15 African Americans would be recruited from the NASA scholarship program at Florida A&M called Program IMAGE.

Enrollment Data

There were 22 African-American students recruited and awarded the NASA Lewis Research Center Fellowship at Florida A&M. There were 8 females and 14 males with their bachelor of science degrees in engineering. Of the 22 fellows, 20 (91 percent) were recruited from HBCU's: Southern, Morehouse, Tuskegee, South Carolina State, and Florida A&M. The average Graduate Record Exam (GRE) score and the average undergraduate grade point average for the fellows were 1,100 and 3.35, respectively.

Outcomes to Date

Of the 22 NASA Lewis fellows, 11 have graduated from the program with their master of science degrees. Seven of these 11 graduates are pursuing their terminal degrees in engineering. Three of the 10 graduates (Jesse Ingram, Nigel Richardson, and Shannon Grady) are continuing at Florida A&M to obtain their Ph.D. degrees. One of the 10 graduates (Shannon Grady) has already passed the Ph.D. qualifying exam and is assured of obtaining her Ph.D. degree.

The retention rate for the NASA Lewis fellows is 86.4 percent, or 19 out of 22. The remaining 8 fellows are continuing with the program and are expected to graduate with their master of science degrees in the spring of 1998.

Partnering

Florida A&M provided halftime support in the amount of $19,450 for the coordinator for the NASA Lewis Graduate Fellowship Program. Lockheed-Martin Marietta provided $28,000 for teaching development and $15,000 for graduate stipend support; the British Petroleum Company of America

Florida A&M University-
Florida State University
FAMU Graduate Fellowship Program

provided recruitment funds in the amount of $7,500 and faculty development funds in the amount of $20,000 for the Graduate Fellowship Program at Florida A&M.

Issues/Challenges and Lesson Learned

The NASA Graduate Fellowship Program at Florida A&M completed its second successful year. There were several key events that provided an opportunity for assessing and improving the program. In particular, it seems that it would be beneficial if the fellows' advisor and researchers at NASA's Lewis Research Center could have a research meeting once a year to discuss a plan of action leading to the Ph.D. degree for the fellow. This would enable a structured approach and more collaborative efforts between Florida A&M and Lewis in ensuring the successful performance of the fellows. This would also provide a basis for the formation of thesis or dissertation committees composed of members from the engineering faculty at Florida A&M and researchers at Lewis.

The production of Ph.D.'s in this country is primarily determined by the student's performance on a doctoral qualifying exam and by the successful negotiation of the politics of a Ph.D. defense. There is some uncertainty about obtaining the degree after passing the appropriate exams, completing the coursework, and conducting the research. It is not guaranteed that the research will be considered worthy of contributing new knowledge to a field or that the student can find a solution to a research topic within an allotted timeframe. The uncertain nature of obtaining the Ph.D. is sometimes called the "Ph.D. uncertainty principle." Since 1991, 50 percent of the African Americans that have taken the doctoral qualifying exam at the College of Engineering have passed the exam. If the Lewis fellows follow this trend, then only half of them will graduate with their Ph.D. degree. There is a tremendous need to increase the pool of available students because there is no way to guarantee that a student will pass the doctoral qualifying exam and successfully negotiate the academic politics.

In addition, a good number of Ph.D.-level students in engineering are rejected by the Graduate Degrees for Minorities in Engineering and Science (GEM) Consortium. In 1997, 32 African-American students interested in obtaining their Ph.D. degrees in engineering were rejected by the GEM Consortium. Seven of these students came from HBCU's. These students all had outstanding academic credentials. Because NASA is one of the selecting agencies for GEM, it would be beneficial if NASA could select some of these students as NASA GEM fellows with the intent of the students pursuing the Ph.D. degree at Florida A&M or other NASA-supported universities. It is too late to try to recruit the rejected GEM Ph.D. students when the list is made available in August of each year.

The NASA Lewis fellows need an incentive to continue pursuing the Ph.D. degree. The lure of high-paying industry jobs is too great of a pull on the students. Hence, it is suggested that a graduated stipend scale be used based on the level of the student's achievement toward the Ph.D. degree. Master of science students will receive a $1,250-per-month stipend, Ph.D. students prior to the qualifying exam will receive a $1,400-per-month stipend, and Ph.D. candidates will receive $1,600 per month. These changes represent a no-cost modification to the grant.

National Consortium for Graduates Graduate Degrees for Minorities in Engineering and Science, Inc.

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Program Overview

The NASA Education Grant to the National Consortium for Graduate Degrees for Minorities in Engineering and Science, Inc. (GEM), provides selected NASA undergraduate scholars with master of science fellowships, NASA summer research experiences, and mentoring to enhance their competitiveness for the NASA Graduate Student Research Program, leading to a Ph.D. in key disciplines.

Enrollment Data

Nine NASA sites will recommend two fellows each year for a total of 18 fellows. These selected students are senior-level undergraduates and NASA scholars who are pursuing a graduate degree in engineering. These individuals will be selected based on recommendations by the NASA site. Selected fellows will have expressed research interests suitable for the participating NASA Center. These fellows will intern in a NASA laboratory for the summer and enroll in graduate school in the fall.

Outcomes to Date

The successful summer internship program provided the student with a NASA mentor and an enriching research experience at a NASA Center. The selected students began graduate school in this academic year of 1997–98. A goal at this juncture in the program is the retention of those students in their graduate programs, with the continuing view toward increased competitiveness for the NASA Graduate Student Research Program. This was enhanced by a comprehensive Summer Institute, given by the GEM Consortium, which addressed this through our Graduate Research Orientation Workshop (GROW) and the mentoring workshops.

Eighteen students have been awarded fellowships in the first year. Out of those 18, 14 (78 percent) are NASA scholars or NASA Lewis scholars. Eleven of the selected students are female (61 percent), and seven are male (39 percent). Thirteen of the students selected are African American (72 percent), and five are Hispanic. All of the students selected have grade point averages of 3.0 or above.

Partnering

Through the GEM Consortium, the 83 university members provide a strong partnership that will support the NASA GEM fellow through the graduate school experience. This is further enhanced by the partnership between the NASA mentor and the NASA GEM fellow. This builds a triad partnership that strengthens the entire structure, with the fellow as the recipient. As the students continue on through their graduate school education, they will receive further preparation through their NASA mentors, summer internships, and the GROW program to enhance their competitiveness in the NASA Graduate Student Research Program and their Ph.D. degrees.

National Physical Sciences Consortium Graduate Fellowships

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Program Overview

The National Physical Sciences Consortium (NPSC), now in its ninth year, has provided 211 physical science fellowships. Currently, 26 fellows have been awarded a Ph.D., and 23 have received a master's degree. Graduates are employed as research scientists by their sponsoring employers, as a university professor, or are doing prestigious postdoctoral work.

NPSC membership now consists of 105 major Ph.D. granting universities, 15 associate member universities, and 37 private and public employers. NPSC fellowship opportunities are open to U.S. citizens who wish to pursue a Ph.D. in one of the physical sciences. Applicants must have a minimum grade point average of 3.0. Over the past 7 years, the average grade point average of the NPSC applicant has been 3.6.

NPSC recruits candidates for the fellowship program from all U.S. undergraduate institutions providing a first-class physical science curriculum. All applicants are screened by a select committee of science professors from member universities. This committee develops a rank-ordered list of those students they feel will be highly successful in graduate school. NPSC provides employers with this rank-ordered list along with detailed demographics and copies of the student applications. New NPSC fellowships are awarded annually, during the third week of January. These awards are totally employer driven and are made only by the employer member at the annual selection meeting.

Funding for NPSC fellows is provided by cost sharing between the universities and employer members. Universities provide full tuition and fees; the employer provides the stipend and two summers of employment performing research at the employer's site. Many companies and public agencies have adopted vigorous campaigns to seek out, educate, and employ underrepresented students. NPSC targets qualified minorities and females, encouraging them to pursue Ph.D. degrees in the physical sciences. This approach has given NPSC the opportunity to identify and recruit the most qualified students and the ability to offer the employer members the student diversity necessary to build a balanced workforce.

Once selected, mentoring begins with an orientation seminar and continues throughout the program. This mentoring is provided by both the university and the employer. NPSC monitors the student academic progress and the job performance and is able to provide this information should the sponsoring employer request it. In short, this is an employer-driven program. The employer continues to be the master link in the chain of events that begins with the selection of the fellow and tracks the fellow's progress throughout his or her academic career and future employment.

Outcomes to Date

The NPSC fellowship is the most successful program of its kind with a retention rate of 93 percent. This fellowship provides up to 6 years of graduate education. The employer sponsor will find the NPSC program to be very cost effective. NPSC does all student recruiting and screening, handles student logistics, and provides that interface with the employer and the university so important in creating smooth transitions from undergraduates to graduate studies and employment.

North Carolina A&T State University Ronald E. McNair Graduate Research Fellowship Program

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College of Engineering
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Program Overview

The purpose of the Ronald E. McNair Graduate Research Fellowship Program is to increase the number of "socially and economically disadvantaged students and individuals with disabilities, with special emphasis on these students historically underrepresented in NASA programs (disadvantaged students)" to obtain Ph.D. degrees in engineering at North Carolina A&T State University through academic-year financial assistance and paid summer research internships.

Objective

The objective of this program is to fund doctoral students, enabling them to earn Ph.D. degrees in the recently established Ph.D. programs in electrical and mechanical engineering.

Program Implementation

This program required coordination, implementation, and administration of a funded program of study to attract talented and committed disadvantaged candidates for degree completion. This will ultimately result in the availability of a diverse workforce necessary to fulfill the research mission of NASA and to increase the pool of highly trained HBCU faculty.

The program team has developed operational strategies to implement in the program and designed mechanisms to administer the program with an intrinsic commitment to providing academic advisement and financial support that offers each fellow an enhanced "graduate school experience." All aspects of program administration are focused on meeting the needs and expectations of NASA, the fellow, and the College of Engineering at North Carolina A&T State University.

Plans are being implemented to bring the fellows and their selected NASA Centers together to develop a defined research plan that meets the fellows' degrees and NASA needs. Fellows and their faculty advisors have been advised to finalize the research focus together prior to the development of collaborations with the NASA Center researcher. Some changes in research areas and departmental focuses have presented a delay in finalizing summer of 1997 plans. This is expected to be completed by February 15, 1997. Upon completion, documentation will be provided to NASA that will outline plans and locations.

North Carolina A&T State University Ronald E. McNair Graduate Research Fellowship Program

Outcomes to Date

The Ronald E. McNair Graduate Research Fellowship Program was implemented at North Carolina A&T State University during the fall of 1995. The university's College of Engineering Ph.D. program is in the second year of performance and has increased from 3 fellows in 1996 to a current number of 10 fellows enrolled in electrical and mechanical engineering disciplines. Program growth is on target based on data from other universities implementing new Ph.D. programs.

The College of Engineering is implementing strategies to create interdisciplinary doctoral studies across all engineering disciplines, including computer science. Those initiatives are still in the developmental stages, and application has been made to the university system for degree-granting approval.

Current Ph.D. fellows are involved in diverse research areas and have developed collaborations with NASA Centers across the nation. Summer research plans are being finalized to ensure that the Ron McNair fellows have opportunities to develop team research with NASA Centers and other Government contractors. In addition, the summer research opportunities will provide the fellows access to enhanced science knowledge, hands-on research experiences, and opportunities to perform research in NASA state-of-the-art research facilities.

Program recruitment has expanded to include all eight Ph.D. degree-granting HBCU engineering programs. A fall 1997 colloquium has been proposed to bring together HBCU fellows, faculty advisors, and NASA researchers to provide a platform for developing ongoing research projects beyond degree completion and possible NASA employment.

Program Management

The Ronald E. McNair Graduate Research Fellowship Program team is as follows:

Dr. Carolyn Meyers	Program Director
Dr. John Kelly	Program Co-Principal Investigator
Dr. Jag Sankar	Program Co-Principal Investigator
Ms. Sunnie Howard	Program Administrative Coordinator

Dr. John Kelly serves as the Associate Dean for Graduate and Research Programs and performs program oversight from the academic and research areas. Day-to-day administrative activities are performed by Sunnie Howard under the supervision of Dr. Kelly. In addition, graduate recruitment, program information dissemination, and interdepartmental academic advisement is performed by Dr. Jag Sankar.

Teacher Training Awards

NASA is committed to increasing diversity among mathematics, science, and technology state-certified teachers. For our Nation to achieve and maintain a position of economic leadership, all of its citizens must acquire the necessary skills to compete in an increasingly global, technological society. This requires our schools and our teachers to deliver a world-class education to all students. Rapidly changing student demographics coupled with a renewed emphasis on educational reform have increased awareness of the need to improve curricula and teacher preparation, to integrate theory and practice, and to determine what works in educating all of our students-particularly in the areas of mathematics, science, and technology.

Teacher training awards, the majority of which are MASTAP (Mathematics, Science and Technology Awards for Teacher and Curriculum Enhancement Program), increase the number and strengthen the technical skills and knowledge of socially and economically disadvantaged and/or disabled mathematics, science, and technology teachers. As a result of this award, selected preservice and inservice teachers will have knowledge of national and state teaching standards. Participants become state-certified and experienced in teaching at middle and high schools that have substantial enrollments of disadvantaged students.

Teacher training awards are funded annually and range between $30,000 and $225,000. The average award is $140,000. MASTAP awards, although refunded annually, are 3-year awards not to exceed $200,000 annually.

The goals of teacher training awards are to:

- Increase the number of state-certified socially and economically disadvantaged and/or disabled teachers in schools with substantial enrollments of minorities by strengthening the technical skills and knowledge of underrepresented secondary mathematics, science, and technology preservice teachers

- Improve mathematics and science literacy among socially and economically disadvantaged and/or disabled preservice and inservice teachers impacting middle and secondary school students.

Teacher Training Awards

MASTAP Programs

Bennett College

California State University–Los Angeles

City University of New York (CUNY)–
Medgar Evers College

CUNY–York College

Florida International University

Shaw University

South Carolina State University

University of North Carolina-Pembroke

University of Puerto Rico–Humacao University College

University of Puerto Rico–Mayagüez

Xavier University of Louisiana

Teacher Training Programs

American Indian Science and Engineering Society
(AISES)

Fayetteville State University

Hampton University

Turtle Mountain Community College

University of Texas–Brownsville

University of the District of Columbia

The objectives are to:

- Improve the education and preservice teaching skills and experiences of disadvantaged undergraduates preparing for careers in teaching mathematics, science, and technology at the middle and secondary school levels

- Enhance the preservice curriculum to provide pedagogical models emphasizing (1) team teaching in middle and secondary schools with substantial numbers of disadvantaged students, (2) mathematics and science standards and assessment, (3) activities involving applications of critical thinking, and (4) culturally sensitive approaches to teaching science and mathematics

- Expand disadvantaged education students' knowledge of career opportunities as mathematics, science, or technology teachers

- Disseminate information on successful strategies and models to other minority colleges and universities and to middle and secondary schools with significant minority enrollments

During fiscal year 1997, 18 teacher training awards were given to the entities listed on the left. Sixteen of the 18 submitted data for this report.

American Indian Science and Engineering Society Teacher Enhancement in Science and Mathematics Project

Suzanne Benally
American Indian Science and Engineering Society
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Boulder, Colorado 80301-2339
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Program Overview

The goal of the Teacher Enhancement in Science and Mathematics Project is to provide for teachers who had previous American Indian Science and Engineering Society (AISES) teacher education programs with continuing education development opportunities in the areas of science and mathematics content knowledge, teacher problem-solving strategies, the effective use of technology, the incorporation of experiential learning, and the development of culturally appropriate curricula. A fundamental aspect of these objectives was to integrate indigenous cultural knowledge in science curricula, advance teaching pedagogy, implement cooperative learning strategies, and implement the use of technology in classes and among teachers involved in the AISES Foundation.

Outcomes to Date

The major activity of the project was a teacher education workshop at the 1996 AISES National Conference. Forty teachers attended a 1-day workshop on “Indigenous Ways of Knowing and Teaching.” The topics included “Patterning in Math,” “Using Traditional Techniques in Teaching and Learning,” “Native Ways of Knowing,” and “Developing Culturally Integrated Science Curriculum.” The teacher education workshop was very successful, and feedback following the conference indicated that teachers were interested who had participated in previous AISES-sponsored teacher programs. Other workshops and concurrent sessions in the conference followed this theme, and teachers were able to select sessions that furthered training along these lines. The teachers participating included those who had participated in previous AISES-sponsored teacher programs. The 6-day conference workshop originally planned was reduced to this 1-day workshop. Teachers could not commit 6 consecutive days during an academic year and be absent from their teaching assignments.

AISES will conduct a Teacher Education Program at the 1997 AISES National Conference with the theme “Developing Community Based Education.” Four major activities will occur (Teacher Education Day, NASA Mission to Planet Earth, Teacher Teams Development and Planning Workshop, and Teacher Education Concurrent Sessions). Teachers will have the opportunity to participate in a day-long workshop, with elders speaking on traditional forms of education, elders and Native American scholars addressing indigenous knowledge of science and the

American Indian Science and Engineering Society Teacher Enhancement in Science and Mathematics Project

reconciliation of technology and tradition, and presentations of successful community-based education projects. A half-day teacher workshop will be designed in conjunction with NASA's Mission to Planet Earth education program. A half-day planning and development workshop for the core teacher teams continuing curriculum development and educational technology development will be held. Six follow-on concurrent sessions will be designed for teachers to continue their interest emanating from the major teacher education themes.

Participants

Core teacher teams of three from a school will be identified and invited to participate. The teacher teams will be identified from the Comprehensive Education Program (12 total), Gila River Crossing (3 total), Santa Fe Indian School (3 total), and Teecs Nos Pos School in New Mexico (3 total). A total of 15 teachers will be supported on the NASA grant. The event will also be opened to other teachers attending the conference not identified as a core team. A total of 70 educators are anticipated. The core teams will participate in an additional workshop to frame and design a project that they will continue at their home school sites, including the development of a culturally integrated space and Earth curriculum and the use of technology in their classrooms.

The Mid-continent Regional Educational Laboratory will also sponsor 10 to 15 teachers to attend and participate in the AISES Teacher Education Program at the conference. Their teacher education effort also focuses on strengthening teaching and learning in math and science.

Each site brings a vast amount of expertise in community- and culturally based curricula, indigenous knowledge, experiential learning, cooperative learning, and the use of technology in teaching and learning. This event will provide an opportunity for these various projects to collaborate and share knowledge and resources, develop potential partnerships, network, develop a product to disseminate, and serve as a catalyst for developing a larger sustainable initiative in math, science, and technology. The AISES Conference Teacher Education Program will be the major and final activity to complete the grant.

Bennett College
MASTAP

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Program Overview

The purposes of the NASA MASTAP Resource Center are to:

- Enhance the Bennett College mathematics and science education programs through strengthening technology
- Provide preservice training designed to motivate prospective teachers to become mathematics, science, or technology teachers, and enhance the teaching ability of persons engaged in the teaching of mathematics, science, and technology through summer institutes and workshops
- Provide curriculum materials and equipment designed to enhance the training of prospective teachers and provide additional training to inservice teachers of mathematics, science, and technology to teach children with physical, mental, visual, and/or auditory challenges
- Provide resources and instructions on the learning and teaching of ethnic minorities

The center is open 5 days a week and on Saturdays by appointment. The Bennett faculty, staff, and students are encouraged to use the center for classes and the equipment to supplement their curricula and assignments. In addition to computers, the center houses curriculum guides and resource materials for classroom teachers in science, mathematics, technology, learning styles, multicultural education, and special education.

Enrollment Data

The target audiences for this project are middle and high school mathematics, science, and special education teachers and college students. Also included are teachers who teach ethnic minorities and students with special needs. The goal is to provide supplemental materials and training to preservice and inservice teachers.

Preservice participants were recruited through a mass mailing to all community colleges, colleges, and universities in the State of North Carolina. Inservice participants were recruited from a mass mailing to all middle and high schools in the State of North Carolina. Inservice participants were also recruited at the North Carolina Council of Teachers of Mathematics (NCCTM)

Bennett College
MASTAP

conference (NASA MASTAP set up a booth), the North Carolina State Teachers' Association State meeting, Education Day activities, and word of mouth.

Outcomes to Date

The NASA MASTAP Project held more than 30 workshops, 3 field trips, and 4 seminars during the 1996–97 year. The participants volunteered at the Gateway Educational Center at its Family Fun Day. The coordinator conducted several workshops for the Bennett College Children's House's Washington Elementary School and Smith High School. During the course of the project year, participants received 17 contact hours in technology and a $50 stipend for attending the workshops. The following workshops were held during the year:

- Explore the World Wide Web
- CBL Workshop for Science Teachers
- CBL Workshop for Math Teachers
- Integrating Technology Into the Curriculum
- Effective Teacher Training
- How To Pass the New Math Competency
- Multicultural Education
- Math Games with Graphing Calculator
- Strategies for the Hearing Impaired
- Science for the Middle School Curriculum
- Working With the Special Needs Child
- Animals in the Wild
- Computer Technology
- How to Design a Spread Sheet
- Cultural Differences in the Classroom

The NASA MASTAP Summer Institute was held June 16, 1997 through July 3, 1997. The following workshops were offered during the Institute:

- Effective Teacher Training
- How to Pass the Praxis the First Time
- Sign language
- The Employment
- Biology Magic
- Math Games
- Special Kids First
- Teaching Styles Learning Styles
- Why Teach and What Is a Teacher
- Teaching Science to Students with Disabilities
- How to infuse African American Literature in the Math and Science Curriculum
- How to Infuse Technology in the Math and Science Curriculum
- CBL for Math and Science Teachers Ocean Circulation

All preservice participants attending the summer institute received a $500 stipend, and inservice participants received a $1,000 stipend and qualified for 6 continuing education units.

Partnering

The Bennett College NASA MASTAP Project has a strong partnership with the Guilford County Public Schools. The Science and the Math Supervisors and the lead teacher at James B. Dudley High School Science and Math Technology Academy serve on the Advisory Board. Workshop presenters and summer institute participants have been teachers in the Guilford County Public Schools, and Dudley High School was used to hold a computer workshop.

California State University–Los Angeles MASTAP (FAST)

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Program Overview

This grant was awarded in November 1994, but only became fully operational in 1995 because of the requirements of the university academic calendar. The two basic goals are to increase the number of African-American and Hispanic science teachers serving inner city schools and to increase the scientific literacy of those pupils who have been historically undeserved by NASA's science, mathematics, and technology programs. The complexities of California laws that affect State teacher certification, matched with the acute shortage of science teachers, predetermined the inclusion of three types of teachers in this project: undergraduate science majors who are teacher aides, student teachers who hold a bachelor's degree in science and teach under emergency credentials, and crossover teachers with elementary credentials plus strong experiential backgrounds in science who teach in the middle school grades.

Each participant was required to sign a forgivable loan contract in an effort to institute accountability on the part of the teacher/student. This effort was predicated on the research data that revealed that more than 50 percent of all new science teachers leave Los Angeles County urban schools within 3 years. In addition, many science majors entering financially beneficial programs such as this do not enter the teaching profession after graduation as they promised when entering the program.

Primary Objectives and Outcomes to Date

The first objective stated that within 3 years the project would recruit 60 and retain 40 African-American and Hispanic participants to be educated (technical skills and content knowledge) and state certifiable as biology, chemistry, geoscience, physics, or general science teachers for schools that have substantial enrollments of underrepresented minority pupils.

The outcomes at the end of 2 complete academic years are the following:

"Recruited" refers to all students, 54 undergraduates and preservice teachers, who entered the project. The count does not include students who did not participate in any of the project activities. Of the 54 students who participated at some level in

California State University, Los Angeles
MASTAP (FAST)

the program, 44 percent were African American, 59 percent were Hispanic, 7 percent were other, and 15 percent were undergraduate students.

"Retained" refers to students who participated and were state certified, are very close to certification, or are completing their bachelor of science degree. Of the 24 African Americans recruited, 75 percent were retained. Of the 26 Hispanic students recruited, 81 percent were retained. Four of the six undergraduate students are still participating in the project. Each of the "other" ethnic groups completed state certification.

Of the 54 students recruited, 39 will be state certified by March 1998, 4 are completing preliminary certification, and 15 are completing lifetime-clear certification. Each remaining undergraduate will graduate between now and August 1998. A "no-cost financial extension" has been requested to support the program through August 1998, the project's actual third year of full operation.

The second objective is to enhance California State University–Los Angeles' teacher training curriculum to provide appropriate and exemplary cross-cultural pedagogical models, field experiences, and suitable academic content in the sciences emphasizing team teaching by preservice teachers with experienced teachers and the implementation of curricula that should net measurable results in the preparation of target underrepresented minority pupils in mathematics and science-based classes.

The outcomes are measured in terms of the reduction in the number of pupils who earn "D's and F's" in the participants' science classes. The overall average shows a reduction of between 9 and 12 percent, which is not statistically significant but still an improvement, considering at the beginning of the project 48 to 62 percent of the pupils were receiving below-average grades. Because of the acute shortage of science teachers, only four of the participants were team teaching, as teacher's aides. Any participant who earned a bachelor's degree was immediately assigned to his or her own classroom. The project hired outstanding retired teachers to serve as coaches in the classrooms of these teachers. Between the weekly coaching and monthly workshop sessions, the teachers were steeped in the strategies shown by research to work with the target population.

Through this methodology, the participants learned the most current exemplary academic content knowledge, national standards and curriculum, pedagogy appropriate for cross-cultural classrooms, strategies of the reform literature and its application to the urban classroom, and the appropriate use of pupil assessment techniques to broaden both the knowledge base of the prospective teachers and to contribute to the academic environment of minority students in the sciences. Through the courses that the participants took in the summer institutes, they experienced activities involving applications of critical thinking, problem solving, cooperative learning, and other techniques to encourage scientific literacy and higher order thinking among not only themselves but also the pupils in their classrooms. Assessment of their growth involved classroom observation and evaluation, course exams, discussions, simulation teaching, and brainstorming sessions with the participants and coaches.

Key Activities and Components of the Project

Academic Advisement: Participants are provided increased advisement time and direct assistance with the demanding admissions process, course requirements, tutoring, and assistance upon demand for two required exams, the CBEST and the NTE: PRAXIS.

Professional Education Institutes: Summer special experimental professional development institutes of courses are offered toward fulfilling the 45 education quarter units postbaccalaureate and the 15-unit science and/or mathematics requirement for state certification. The experimental professional development block is

intense and highly academic, speeds the educational process, and seeks to build enduring collegiality among each cohort group.

Special Fellowship Stipend: A special fellowship stipend of $7,000 was awarded to high-ability, mature graduate students to complete the new California State-required science and mathematics subject matter sequence for secondary science teacher—in one quarter, which required a 5-day, 12-hour/day schedule of coursework and laboratories in lieu of full-time teaching.

Academic Excellence Workshop: Workshops come in three types. First, basic substantive courses in the sciences were presented as required. Second, workshops with content that covered the breadth and depth of science education at the national and state level were offered. A third type of academic workshop involved a variety of topics central to the reform in science education, such as technology, assessment and evaluation, national and state science standards, research into better schooling for underrepresented minority students, and so forth.

Special Seminar Component: Special seminars will be offered for credit when the students have not mastered critical portions of the education curriculum required to assist urban students in learning important science or mathematics concepts.

Textbook and Materials Support: Participants were provided 15 fundamental textbooks and a variety of other science/mathematics materials. A wealth of materials was secured from the NASA Centers; these materials are being used by those participants who have their own classrooms.

Field Trips: Eleven field trips to NASA teaching centers and other science- and mathematics-related learning institutions and geological sites gave the educators an opportunity to see firsthand science and math theories converted into practice. The group attended their first National Science Teachers Convention in New Orleans in 1997; they were genuinely impressed with the important contribution that science is making in the lives of teachers and children.

Master Teacher and Graduate Teacher Trainee Coach Component: Science and mathematics secondary teachers who successfully work in inner city, predominantly minority schools, who have attended workshops/seminars on national standards and thematic interdisciplinary teaching, and who have participated in numerous other enrichment science/mathematics programs at any of the many local universities team with teacher apprentices, called "teacher aides" by the districts. The university coaches, described above, work closely with each master teacher, principal, and district mentor, as well as with the NASA student teacher.

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City University of New York–Medgar Evers College Science and Technology Teachers for the Next Millennium MASTAP

Program Overview

The Science and Technology Teachers for the Next Millennium Project, a collaborative effort between Medgar Evers College and the City College of New York (CCNY) of the City University of New York (CUNY), provides science and technology majors with the opportunity, knowledge, and skills to become teachers of secondary school science and technology in an urban, multicultural environment. The project is a partnership with selected secondary schools and local school districts in New York City, the National Science Foundation-sponsored New York City Alliance for Minority Participation (NYC-AMP) Teacher Preparation Program, the CCNY/CUNY Network Resource and Training Site (NRTS), the Institute on Climate and Planets of the Goddard Institute of Space Studies and the NASA Teachers' Resource Center at CCNY. The goals are as follows:

- Increase the number of individuals from underrepresented minority groups who complete teacher preparation requirements, achieve certification, and gain teaching positions

- Enhance the knowledge base of pre- and inservice teachers in science content and through the use of innovative pedagogical approaches

- Develop a new model of teacher preparation that emphasizes research-based training in science content, creative uses of technology, inquiry-based teaching methods, and roles for master teachers from the public schools that can be disseminated and replicated at other colleges and universities

Middle College High School student explaining terra-forming to Dean Thomas Oliver of Medgar Evers College.

Teacher Preparation Program

The major features of the program are an innovative recruitment system involving community colleges in CUNY, an internship designed to bring the participating students into close contact with practicing secondary school teachers and their students, education courses constructed to include the needs of multicultural, urban teaching with constructivist and inquiry-based classroom strategies, and enriched science experiences in areas related to NASA's research interests (computers and network connectivity, global climate studies, and planetary science. The students take their science and mathematics requirements at their

community college and/or senior college and their education courses and field experience at the senior college. The students get their student teaching experience in school districts around their respective senior colleges, under the supervision of education faculty at the senior college. In addition, inservice teachers from the participating school districts and high schools have the opportunity to participate in a professional development program, which includes short courses and workshops, curriculum development, and research. The inservice teachers serve as mentors to CUNY preservice teacher candidates.

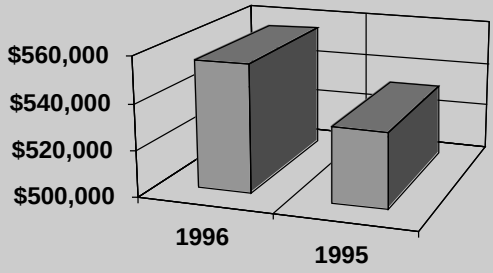
Recruitment

Science, mathematics, and technology majors at participating colleges were invited to attend orientation receptions on their campus with the project directors, Professors Leon Johnson and Michael Weiner. Many of the students were peer tutors and workshop leaders involved in the CUNY-wide NYC-AMP. Most of the new participants are from CCNY, Medgar Evers College, New York City Technical College, Borough of Manhattan Community College, and LaGuardia Community College. The student participation increased to 85 during the 1996–97 academic year, and 66 are receiving stipends. More than 90 percent of the students are minorities (60 percent African American and 30 percent Hispanic), and 55 percent are female.

Curriculum

CCNY and Medgar Evers College have baccalaureate degree programs in teacher education. The Teacher Education Departments at both schools have agreed to cross-list those courses developed for science teachers. The two introductory courses are: Educational Psychology (EDUC 307—Foundations of Educational Psychology at Medgar Evers and EDUC 202—Human Learning and Instruction at CCNY) and Teaching Science (EDUC 314.4—Inquiry in the Science Classroom at CCNY and EDUC 317—The Teaching of Science at Medgar Evers). Although the courses have different titles, the syllabi are essentially equivalent. Students enrolled at other schools without Education Departments register at their home school "on permit." This allows them to register for the educational courses at either Medgar Evers or CCNY. The second level of courses are taught at CCNY: EDUC 433, 443—Methodology of Teaching and Curriculum Development I and II, EDUC 464—Student Teaching-Junior High School. The third level courses are EDUC 465—Student Teaching-Senior High School, and students at Medgar Evers may register for EDUC 471, 472—Student Teaching I and II.

Funding History—Medgar Evers



City University of New York–Medgar Evers College
Science and Technology Teachers for the Next Millennium
MASTAP

Collaboration With the Teacher Preparation Program

This project began a collaborative effort with the NYC-AMP Teacher Preparation Program and the New York City Board of Education. The major thrust of this collaboration is the establishment of the AMP Science Teacher Preparation Summer Academy. Fourteen students were awarded undergraduate teaching assistantships for the summer and the academic year. The participating high schools are Fort Hamilton, A. Philip Randolph, Morris, Hillcrest, South Shore, and Lincoln Hostos. The activities were as follows:

- During the month of June, teaching assistants enrolled in either the Educational Psychology course or the Inquiry/Teaching Science Education course.
- During July and August, the master teachers trained the teaching assistants in the use of exemplary science curricula in a Summer Academy with recently graduated New York City middle school students.
- The relationship between the high school teacher and the teaching assistant is continuing during the academic year via an internship at the school of the master teacher.

Teacher Professional Development Program

The Summer Professional Development Program for inservice teachers included the following activities: a course (Introduction to Computing—C++), workshops (Using Internet in the Classroom, HTML Authoring, and Curriculum Development), and research opportunities. Twenty teachers enrolled in courses or workshops. Four teachers were involved in research and partially supported by the recently funded NASA award, "MEC/GISS Partnership—Atmospheric/Ocean and Environmental Science Research Program." Faculty participants from elementary, junior high, and senior high schools in New York City are selected on the recommendation of their supervisor or principal.

Strengths of the Project

The project emphasizes retention in the regular science-based major courses first and then has the students begin the education sequence in the upper sophomore or junior year. The introduction of the preservice participants to the secondary school classroom at an early stage is important. This is aided by the project's plan to have the participating inservice teachers act as mentors to the preservice participants. Another strength involves using the resources of the NASA Goddard Institute of Space Studies' Institute on Climate and Planets, the NASA Teachers' Resource Center at CCNY, the CCNY/CUNY NRTS, the NYC-AMP Teacher Preparation Program, and "MEC/GISS Partnership—Atmospheric/Ocean and Environmental Science Research Program." Finally, the offering of stipends to all students who are participating helps defray part of the costs of recent increases in tuition.

Issues/Challenges

Increased tuition and a decrease in student aid have decreased the number of students participating in summer school. Some students have dropped out because of outstanding college bills. Stipends are particularly valuable in the summer when most students cannot attend full time and are therefore not eligible for state aid. Also, the problem of welding participating students at several campuses of CUNY into a cohesive teacher preparation program will have to be addressed more vigorously in the coming years.

Fayetteville State University Teacher Training Workshop-Graphics Calculator

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Program Overview

The Teacher Training Workshop-Graphics Calculator was designed to address the problem of how best to introduce technology mathematics and how to use the Internet as a resource for teaching and learning. The mathematics courses selected were algebra, geometry, pre-calculus/calculus, and statistics. Faculty selected were HBCU faculty and those at deprived high schools across the southeastern United States. Emphasis was placed on participants gaining hands-on experience in the use of this technology and in understanding the recent National Council of Teachers of Mathematics (NCTM) Standards for delivering effective mathematics instruction.

The workshop consisted of 5 days with 5 hours of instruction per day, and on Monday through Wednesday, there were three 2-hour labs, during the week of June 23–27, 1997. The four mathematics workshop sessions were: Algebra/CBL led by Sherman Sumpter, a high school algebra/trigonometry instructor in the Cumberland County School System; Geometry with the TI-92 led by Duane Olson of Olympia, Washington; Precalculus/Calculus with the TI-92 led by Dr. Kenneth Jones, who recently completed the doctoral program in mathematics education at American University in Washington, D.C.; and Statistics with the TI-83 led by Lane Peeler, a mathematics consultant for the South Carolina Department of Education.

Content and methods to teach and assess with the new technology were demonstrated, and participants were able to practice in cooperative groups. Effective instructional methods were modeled according to the NCTM Standards. The most effective instruction with graphing calculators involved the use of a classroom overhead projection model; this was demonstrated during the workshop by each presenter. Each participant received a TI-83 or -92 calculator. Each day, a TI-82/83/92 view screen was raffled. CBL's were available for participant use during the workshop.

There were also three evening workshops: Beginning Internet led by Dr. Edwards, director of the Mathematics/Science Education Center at Fayetteville State University; Advanced Internet led by Dr. Dan Wishnietsky, Winston-Salem State University; and Web Page Creation led by Bill Gibson, training and web site coordinator for Management Information Systems at Fayetteville State University.

Fayetteville State University
Teacher Training Workshop-Graphics Calculator

Enrollment Data

There were 73 participants; 31 were HBCU faculty members and 42 were high school teachers. Of the 73 participants, 41 were African American, 5 were Asian/Pacific Islanders, 1 was Hispanic, and 25 were Caucasians. The participants came from Alabama (14), Georgia (10), Louisiana (2), Maryland (3), New Jersey (3), North Carolina (26), South Carolina (1), Virgin Islands (5), Virginia (8), and Washington, D.C. (1). They were recruited from the pool of previous graphics calculator workshop attendees, through a mailing to all HBCU's, and through the distribution of a brochure at professional meetings and conferences. Registration information was also placed on the center's web site.

Outcomes to Date

Based on participants' evaluations, the workshop was a great success. This workshop will have a multiplier effect in enabling participants to share their knowledge with other professors at their respective HBCU's and high schools and will serve as a catalyst to inspire disadvantaged youth to experience the power of visualization in mathematics via the TI-82/83/92 calculators and computers. Such empowerment should enable additional students to persist and appreciate higher levels of mathematics and increase the recruitment, retention, and graduation rates in mathematics and other sciences.

A midyear followup is planned to encourage and sustain growth and development, along with a midyear evaluation and survey of technology use at respective participating institutions. These data will serve as a benchmark for follow-up sessions and research in the use of technology in HBCU's and high schools.

Partnering

Through a partnership with the Eisenhower Consortium SERVE, 44 high school teachers from the southeastern region were also participants in this teacher training workshop. Funds were made available for their travel, housing, and materials.

Florida International University Minorities Achieving Success in Teaching Mathematics and Science Project MASTAP

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Program Overview

The overall accomplishments of the Minorities Achieving Success in Teaching Mathematics and Science Project (MASTMS) at Florida International University are as follows:

- Nine courses are offered with the Treisman Support Model. (Treisman is a professor at the University of California-Berkeley. He has developed a model that effectively supports students from urban settings.)
- Twenty-five students were supported in work-study efforts.
- Forty students spend 5 or more hours in a teaching experience at the junior year level.
- Fifteen seniors devote all day on Fridays (for a full semester) to collaborative study and mentoring.
- Two new technology laboratories are furnished with college and university cooperation.
- Seven colloquia have supported faculty growth and development.
- Thirty faculty and students benefit from professional conference participation.
- Twenty senior high school mathematics and science teachers participate in year-long study groups.
- Fifteen students are fully supported by scholarship.

Objectives

Although MASTMS is principally an education program, it does contain a research component. This component is approximately one-fourth of the thrust of this NASA education program, and it has the following objectives:

1. Study the effects of MASTMS on retention and increased standards in mathematics and science teacher preparation
2. Study the effects of technology on the preparation of undergraduates in the learning and teaching of mathematics and science

Florida International University
Minorities Achieving Success in Teaching Mathematics and Science Project
MASTAP

3. Study the effects of technology on the attitudes toward learning in mathematics and science

4. Study the learning styles of students, particularly undergraduate students, as they relate to mathematics and science

Outcomes to Date

Objective 1

MASTMS is collecting substantive data to support the belief that it is clearly possible to increase the number and standards of programs that graduate more and better prepared underrepresented students to teach secondary school mathematics and science. In 2 years, this project has been able to increase from 40 students in junior and senior year preparing to be mathematics and science teachers to 89 such junior and senior students. In that same time, the project has doubled the number of African Americans and nearly tripled the number of Hispanic students succeeding in these programs, as follows:

The standards have increased during this time, partially as a result of an intent to better prepare these secondary school teachers and partially because of increases in Florida's standards.

Objectives 2 and 3 (Reported Together)

Research studies have been intensively conducted on students' mathematical thought (for example, geometric visualization) in terms of reasoning and concept development. This is taking the form of investigations of the effects of technology on visualization and reasoning of undergraduate students and, in parallel, concurrent studies of mathematical thought in underrepresented minority 7th and 8th graders. In both groups, approximately half of the students have a strong sense of visual, intuitive approaches in both geometry/measurement and statistical/probabilistic areas. The contrast, for another one-third of the group, is of a verbal, procedural tendency. These students are less likely to be comfortable with technology and are likewise uncomfortable with hypothesis building and hypothesis testing. The project's partially confirmed patterns include the following:

- Technology is a powerful tool for students with a well-developed "sense of visual, relational" understanding of mathematics and science. They are able to adapt to and adopt the use of technology in both learning and teaching. They are able to make sense of the mathematical and scientific problems and see the technology as a valuable tool for studying mathematics and science.

- The "verbal, procedural" students are more characterized as avoiding the use of technology or expecting to be told exactly

what to do with it. They are less likely to use it as a tool for investigations and are quite procedural in their view of mathematics. They depend on the more experienced persons in a group to tell them how to solve a mathematical problem or the meaning of a mathematical or scientific concept, often wanting to stop to write down the statements. They are typically quite dependent, wanting to know if they are "right" and to have someone confirm and affirm what they are doing.

- In contrast, the "sense of visual" subpopulation is more relational in their thought, seldom being limited to thinking in procedures. They are typically able to see more connections and to look for hypotheses in situations. They also typically are more apt to work independently and test their hypotheses and draw conclusions on their own.

Objective 4

Learning styles are showing greater consistencies among categories of ways of thinking than along minority/nonminority lines. The visual thinker and the verbal thinker have characteristics that tend to describe the larger subpopulations and that support the initial hypothesis about the learning styles. They also tend to differ in the way of thinking about technology as tools for improved standards and understanding. These "thinking" characteristics do not parallel ethnic lines, because there are very visual thinkers in each ethnic group and likewise very verbal thinkers as well. These two groups do not utilize technology in the same ways, do not process mathematical concepts and problems in the same ways, and have very different sets of values. In general, the hypothesis on which the project is working is that the "visual" thinkers are more able to utilize technology effectively for learning and teaching mathematics and science. They also are able to move to levels of abstraction through the use of technology more effectively than the "verbal" thinkers. On the other hand, the "verbal thinkers" are more likely to grapple for procedural guides and to need each detail explicated, or they are very uncomfortable. Thus, the free exploration and use of technology tends to be slower to develop with them, and their movement to more clear and meaningful abstractions is more deliberate and emerges more slowly.

Relevance to NASA Strategic Enterprises

The underrepresented minority students in these teacher preparation programs have or will become familiar with NASA curriculum materials. These preservice teachers are developing (or will develop) enough knowledge and skills in science, mathematics, and technology so that they will be able to effectively teach the content of NASA and related curriculum materials to their future students. This project has successfully stimulated these teachers' enthusiasm and sense of responsibility to educate and influence

Florida International University Minorities Achieving Success in Teaching Mathematics and Science Project MASTAP

their future students to develop a strong interest in NASA and related careers. This project has helped to train leader teachers to better help other teachers and administrators to work with science, mathematics, and technology curriculum in multicultural settings. The project also has successfully stimulated these teachers' enthusiasm and sense of responsibility to help their future students become educated, experienced, and highly skilled adults, many of which will be employed in science, mathematics, and technology fields, including the U.S. aerospace industry. Finally, the project has helped to identify improved instructional strategies for enhancing science, mathematics, and technology learning outcomes for underrepresented minority students.

Benefits to Society

The project has significantly increased the number of underrepresented minority students graduating from teacher preparation programs who not only have strong knowledge and skills in mathematics, science, and technology, but also are well aware of the needs of society and will show great care, concern, love, and respect for their future students. These teachers' enthusiasm and sense of responsibility have been stimulated to educate and influence their future students to develop a strong interest in careers of medicine, agriculture, aerospace, transportation, computer, and other high-tech areas important in Florida. The teachers are also stimulated to help their future students become educated, experienced, and highly skilled citizens in society.

Undergraduates facilitating 7th graders learning mathematics in a technology lab setting.

Hampton University Teacher Training

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Hampton University and the Portsmouth and Hampton City Public School Systems propose to develop, implement, and evaluate a 3-year teacher training program in mathematics, science, and technology for socially and economically disadvantaged teachers and students. The project will feature a three-phase 8-week Summer Institute. Phase one will focus on course content in mathematics and science for inservice teachers. Phase two will include pedagogical skills and techniques for preservice and inservice teachers, and phase three will focus on a practicum with middle and high school students for both preservice and inservice teachers. The preservice teachers will be mathematics, science, and technology majors who have studied at least 3 years of science and mathematics. Twenty-four middle and high school teachers will be selected to participate in this initiative, and approximately 12 preservice teachers will be selected.

Nationally recognized science and mathematics curricula appropriate for middle and high school students will be the foundation for instruction. In addition, all components will be developed and presented within the context of Virginia Standards of Learning for mathematics and science, the newly released National Science Standards of Learning, the National Council of Teachers of Mathematics Standards, and the local standards for mathematics and science. Teachers will focus on innovative ways to teach mathematics and science using technology with a problem-solving, inquiry, and hands-on approach to teaching and learning. The expected outcome is to enhance the teaching of mathematics and science at the middle and high school levels.

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Shaw University Mathematics, Science and Technology Awards for Teacher and Curriculum Enhancement Program MASTAP

Program Overview

Research shows a strong correlation between student achievement and student role models. Teachers, including minority teachers, serve as positive role models for students. Minority teachers enhance the overall development and educational growth of children. They help to foster an understanding of diversity and an appreciation of various cultures. These teachers also hold a considerable percentage of the powerful foundation needed for our country to be successful in the competitive, diverse, and global society of the 21st century. Therefore, the current shortage of minority teachers is a problem of great magnitude—a problem that warrants a decisive, prompt, and effective resolution involving all caretakers.

The Shaw University Mathematics, Science and Technology Awards for Teacher and Curriculum Enhancement Program (MASTAP) is an innovative approach to minority teacher recruitment and training. Collaboratively, the university, NASA, and 20 North Carolina local education agencies (LEA) engage in an innovative approach to the recruitment, training, and job placement of certified minority mathematics and science teachers.

This project is a preservice training model with two major components: (1) an ongoing curriculum enhancement program that relies on the expertise of inservice teachers and qualifies consultants to strengthen and intensify the traditional training of prospective teachers and (2) ongoing teacher recruitment. Ongoing curriculum enhancement includes bi-supplementary instruction for preservice teachers that reinforces classroom instruction and gives the student the opportunity to synthesize and apply the theories and principles of pedagogy learned during regular instruction. This supplementary training also has a focus on the development of the personal skills necessary for success as a teacher (such as speaking, personal interactions, reflection and contemplation, leadership, and general classroom coping skills). The second component of the program, teacher recruitment, is student centered. MASTAP scholars plan, design, and implement an initiative to successfully attract to the program high school students, neighboring university and community college students, and other Shaw University students. The project is also exploring the impact of perceived learning styles and self-confidence on minority student performance and career choices.

Objectives

This project has the following objectives:

- Recruit and retain prospective mathematics and science teachers
- Review and revise the mathematics and science curricula to include more opportunities for teaching experiences in school districts with more than a 50-percent minority student population
- Review and revise the mathematics and science curricula to include the development of students' knowledge and the most recent mathematics and science standards and assessments
- Expand the use of critical thinking and problem-solving strategies in the math and science curricula

Enrollment Data

Several competitive programs seek students with an interest in the math and science fields. Many of these students have preconceived notions about the salary benefits of teaching and refuse to consider the profession as an option. MASTAP scholars commit to teach for a minimum of 2 years in a North Carolina school system with a high concentration of minority students. Given these concerns, recruitment is challenging. More than 30 percent of the Shaw University students are out-of-state residents and choose not to remain in North Carolina following graduation. Thus, a major focus of recruitment is directed toward North Carolina students. This project is unique in that it successfully uses a student-centered recruitment initiative that attracts and retains students. A total of 19 minority students are currently enrolled in the project—10 from North Carolina and 9 from other states. The 1997–98 recruitment initiative is ongoing.

Outcomes to Date

The primary goals of the Shaw University MASTAP project are to (1) enhance the mathematics and science/technology teacher preparation programs, (2) plan, design, and implement an exemplary teacher preparation model that expands the minority student's knowledge of teaching mathematics and science/technology, and (3) produce more state-certified mathematics and science teachers. This training model is summarized in publications (newspaper and journal) and shared with colleagues during conferences. The project increases the number of minority teachers and is strongly recommended to others as a viable approach to alleviating the current teacher shortage. Specific accomplishments follow.

Students demonstrate their knowledge of anatomy on a human skeleton.

Shaw University Mathematics, Science and Technology Awards for Teacher and Curriculum Enhancement Program MASTAP

Recruit and Retain Prospective Math and Science Teachers

A total of 19 scholars are participating in the project (9 math and 10 biology). One math scholar graduated and is now successfully teaching in a partnership school district. Several scholars will soon complete the program (8 in 1997–98, 7 in 1998–99, and 4 in 1999–00). Another two students are pending processing, and recruitment is ongoing. Telephone inquiries continue to increase as information about the program goes public. Approximately 25 unsolicited telephone or other inquiries occur each month.

Review and Revise the Curricula to Include More Teaching Experiences in Districts With More Than 50-Percent Minority Population

On a regular basis, scholars complete field experiences in the Franklin County schools, a rural district with a high student minority enrollment. Scholars also make visits to schools in other partnership districts and are eligible to complete the Level III field experience (student teaching) at a partnership site (other than Franklin) when that site hosts the visit and provides accommodations.

Review and Revise the Curricula to Include the Development of Students' Knowledge and the Most Recent Standards and Assessments

The mathematics and biology curricula were fully revised to include an emphasis on and incorporation of all new challenging standards and guidelines governing the fields. All licensure areas of the Education Department successfully underwent National Council for the Accreditation of Teacher Education (NCATE) and North Carolina Department of Public Instruction (NCDPI) continuing accreditation in the fall of 1997, including the math and science programs.

Expand the Use of Critical Thinking and Problem-Solving Strategies in the Curricula

The program expanded its collection of instructional materials that develop critical thinking problem-solving skills. The purchase and inclusion of computer technology that enhances the acquisition of content knowledge and skills were extensive and included new computer instructional aids, such as Forces and Motion, Exploring the Solar System and Beyond, Exploring Mathematics With Technology, Math Blaster Mystery, The Great Brain, Data Insights, and so on. Scholars planned, developed, and delivered instructional activities related to aeronautics (grades 7–12) and requiring critical thinking and problem-solving skills. These activities were creative, challenging, and appropriate for use with minority students.

Partnering

The minority population in the 118 North Carolina school districts ranges from a low of 1 percent to a high of 94 percent in minority enrollment. Those districts with at least a 50-percent minority school population are eligible to participate in this project. A total of 20 LEA's collaborate with Shaw University and NASA on this project. These partners refer students for program participation, make suggestions regarding implementation, and provide opportunities for field experiences and site visits. They also sponsor teachers to aid in preservice training, employ certified graduates, and support new employees during the 2-year initial licensure program. NASA provides financial support and guidance for program implementation. Shaw University provides personnel, supplies, and inkind assistance. Corporations serve as informal partners by providing summer internships for interested MASTAP scholars.

South Carolina State University
SWAPOP Project
MASTAP

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Program Overview

The SWAPOP Project is designed to foster a collaborative relationship between preservice and inservice science, mathematics, and technology teachers in middle and high schools. Inservice teachers serve as mentors to preservice teachers. Preservice teachers assist inservice teachers in the preparation, maintenance, and instruction of their classes. These combined efforts are focused toward the academic development of the students. It is from this relationship that the project's acronym and name, SWAPOP (Share with a Pair of Peers), is derived. Mentoring and assisting activities are conducted mainly during the academic year.

The project also conducts a 6-week Summer Institute that provides training in the integration of science, mathematics, and technology to effectuate better planning, instruction, selection, and use of instructional materials and assessment of the learning process. The Summer Institute participants are preservice and inservice middle and high school science, mathematics, and technology teachers. A variety of planned events relative to the institute's theme are utilized. These include field trips, presentations by representatives of state and Federal agencies, and required research projects on an environmentally oriented topic with science, mathematics, and technology implications. The research projects are supervised by faculty in each of the aforementioned areas. These activities and others are directed toward the achievement of the following goals:

- The preparation and state certification of underrepresented minority teachers in schools with substantial enrollments of minority students
- The improvement of mathematics and science literacy of middle and high school students
- The exposure to and achievement of science and mathematics standards advocated by organizations, agencies, and councils
- The expansion of students' knowledge of career opportunities as teachers of mathematics, science, and technology
- The dissemination of relevant information generated through project activities

SWAPOP students learning through hands-on experience in the classroom.

South Carolina State University
SWAPOP Project
MASTAP

Enrollment Data

The target groups for this project are preservice and inservice science, mathematics, and technology teachers, HBCU's, and partnership middle and high schools teachers with substantial numbers of disadvantaged students. Preservice teachers become project participants as a result of their selection of teacher education as a major and the need to satisfy preprofessional clinical experiences requirements. Inservice teacher participants are identified by school administrators and are given the opportunity to become a part of the program.

Outcomes to Date

There has been a significant increase in the number of science, mathematics, technology, and engineering (SMTE) majors since the advent of the project, especially in biology education. The SWAPOP Project has been given permission by both the School of Education and the Department of Teacher Education at South Carolina State University to assume greater responsibility in providing teacher education experiences for the university's majors. To assist in this effort, the previously chartered SMTE Association serves as a guidepost. A Tutorial and Test Preparatory Center has also been established that provides students an opportunity to improve their knowledge in specific courses and increase their passing of state-certifying and professional entrance examinations. Claflin College (a neighboring HBCU) has been invited and agreed to participate in SWAPOP Project activities. The 1997 SWAPOP Summer Institute was a great success. Participants experienced a wide range of field, laboratory, research, and classroom activities that integrated science, mathematics, and technology. Graduate students working toward master of arts degrees in teaching were granted permission to take certain courses in conjunction with the institute. In addition, graduate credits were earned by inservice teachers for recertification.

Partnering

Partnerships with participating area schools have provided a spirit of collegiality and cooperation between preservice and inservice teachers and the university. A structured activity plan has been devised and used to properly match the experiences of preservice teachers with the classroom roles they will play.

University of North Carolina–Pembroke Minorities in Science and Mathematics Education

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Program Overview

The aim of the Minorities in Science and Mathematics Education (MISME) program is to increase the number and strengthen the skills of underrepresented minorities, particularly Native Americans and African Americans, in science and mathematics teacher education programs at Pembroke State University.

Objectives

The MISME program plans to achieve the following objectives:

- Improve the education of underrepresented minority undergraduates preparing for careers in teaching science, mathematics, and technology at the secondary school level
- Improve the preservice teaching skills and experiences of underrepresented minority undergraduates preparing for careers in secondary science or mathematics teaching
- Enhance the existing preservice curriculum at Pembroke State University with pedagogical models that emphasize national mathematics and science standards and assessment techniques
- Enhance the existing preservice curriculum at Pembroke State University with pedagogical models that emphasize activities involving applications of critical thinking skills
- Replicate and export pedagogical models to other colleges and universities and secondary schools with significant minority enrollments
- Expand underrepresented minority education students' knowledge of career opportunities as mathematics or science teachers
- Enrich the science and mathematics background of underrepresented minority preservice teachers preparing for careers in teaching secondary school science and/or mathematics
- Enrich the science and mathematics background of underrepresented minority inservice science and mathematics secondary teachers
- Enhance the science and mathematics background of underrepresented minority secondary school students

The MISME program will achieve these objectives by improving the existing preservice programs at Pembroke State as follows:

- Implement a new student recruitment plan
- Establish a mentor/advisor team for each student in the program
- Conduct intensive summer science/mathematics enrichment programs on and off campus
- Provide for offcampus field trip experiences during the academic year
- Establish and implement a new pedagogical model, a professional opportunities seminar series, a Saturday morning science/mathematics program, and a preservice teacher tutorial assistance program
- Establish a strong, dynamic partnership between the university and local secondary schools

University of Puerto Rico–Humacao MASTAP

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Program Overview

This project's main goal is to increase the number of state-certified Puerto Rican teachers by strengthening the technical skills and knowledge of middle and secondary science and mathematics inservice teachers, as well as providing a strong pedagogical background for preservice teachers who are currently enrolled as science and mathematics students pursuing a B.S. degree in those disciplines. To achieve these goals, the project capitalizes on the strength of the school's education, science, and mathematics programs.

The basic objectives of this project are as follows:

- Increase the number of competent Puerto Rican secondary science, mathematics, and technology teachers through increased educational opportunities at the preservice and inservice levels

- Provide strong content and knowledge to develop the appropriate pedagogical skills of preservice/inservice science, mathematics, and technology teachers at the University of Puerto Rico-Humacao by offering a wide range of activities that lead to the full development of individual content knowledge and teaching ability

- Increase the number of certified secondary science, mathematics, and technology teachers in the eastern region of Puerto Rico by offering coursework that will allow noncertified inservice teachers to obtain certificates

- Contribute to the Puerto Rico Systematic Statewide Initiative reform by improving preservice and inservice science, mathematics, and technology teacher preparation and by providing curricular enhancement/enrichment opportunities

Enrollment Data

Two populations are served by the project:

- Science and mathematics students currently enrolled in the Departments of Biology, Chemistry, Physics, and Mathematics who want to choose education as a professional option receive, through the project, the educational and pedagogical preparation required to be teachers and to obtain the official certification for the actual professional practice.

- Science and mathematics inservice teachers who are to complete the official certification process, through the project, will complete their specialty as well as their education credits.

All participants are Hispanics. At the end of the second year of the project, there was an enrollment of 63 students, of which 36 are females and 27 are males.

Recruitment is performed following two strategies, one for every targeted population. For regular science students (preservice), the project posts around campus announcements of the program objectives and the existing financial aid for the project. A basic requirement is a grade point average of no less than 2.5. For inservice teachers, the project informs the local Puerto Rico Department of Education officer and relies on his or her network to detect teachers who may apply to the program. So far, both strategies have proven effective. Inservice teachers must have a bachelor of science degree and not necessarily have already taken specialty credits. Applicants then are interviewed by the director and codirector of the project, and those whose ideas (and attitudes) about teaching and education are sound are then accepted.

Outcomes to Date

Sixteen new preservice and 9 new inservice teachers have enrolled in the program. Two new courses, not existing in either science or education curricular and aimed to cover the need for certification, were designed, implemented, and offered: Methodology of Mathematics Teaching and Geometry. This latter course has a strong computational component. A revision of the course Exceptional Children was made to include material relative to intermediate and high school children. Four MASTAP participants registered and passed the required Puerto Rico Teacher Certification Examination with higher than average marks. Most participants have attended science and education meetings, some of them have made conference presentations, and others have participated in seminars, colloquia, and conferences outside Puerto Rico.

Student Achievements

Four students requested and passed the Puerto Rican Teacher Certification Examination with outstanding marks. Two students were invited by NASA MASTAP to the Pre-service Summer Institute at Bennett College, Greensboro, North Carolina, on June 16 to July 3, 1997. Two students created a geometry teaching project, which was tested with high school students of a local high school. The report and outcomes of the project were presented at the 11th Annual Latin American Mathematics Educational Meeting held in Morelia, Michoscan, Mexico. This report will be published in the proceedings of the conference. Two preservice teachers designed and presented posters on the philosophy and strategies of the University of Puerto Rico–Humacao's MASTAP at the Puerto Rico Conference for Excellence in Science and Mathematics Teacher Preparation Programs. So far, the attrition rate is low (7.3 percent).

Partnering

Local partnering so far is most important. The University of Puerto Rico–Humacao's science departments are the main contributors providing facilities for courses and activities. Connections with local industry are already established to comply with one of the originally proposed activities.

University of Puerto Rico–Mayagüez MASTAP

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Program Overview

The principal objectives for this project were to improve the teaching skills of high school mathematics and science teachers in the western region of Puerto Rico and to improve the education curricula at the University of Puerto Rico–Mayagüez of mathematics and science teachers. These objectives coincide with the purpose of the NASA MASTAP program.

To that end, during the past 2 years, the University of Puerto Rico-Mayagüez, with the sponsorship of NASA MASTAP, offered a series of workshops to 99 local high school mathematics and science teachers from the western region of Puerto Rico. The workshops were to train the teachers to use Calculator Based Laboratory technology (CBL technology) in the classroom. CBL technology uses a portable, handheld device to collect "real-world" data and a graphics calculator to analyze these data. With inexpensive sensors, this device can measure force, motion, temperature, light intensity, sound, pH, acceleration, gas pressure, heart rate, magnetic field, and so forth. The teachers were recruited in interdisciplinary teams. The workshops were directed by professors from the physics, mathematics, chemistry, biology, and education departments. Through CBL technology, students and teachers can work with "real" data to *do* science. Using the graphics calculator to construct mathematical models to explain relationships of "real" data highlights the interaction between mathematics and science.

Outcomes to Date

The high school teachers who participated in the project used the CBL technology in their classrooms as expected. In addition, they made presentations with CBL technology in local conferences, wrote successful proposals for acquiring more technology for their schools, and offered technology workshops for their peers. The enthusiastic reports of the participants in local conferences have generated so much interest that the Puerto Rico Statewide Systemic Initiative is planning to include CBL technology in its development of new high school mathematics and science curricula.

The effectiveness of antiacids is tested by a Croem High School team.

Teacher Training Awards

The project and the University of Puerto Rico–Mayagüez will host the first Caribbean Conference on Using Technology to Teaching Science and Mathematics in Mayagüez, Puerto Rico, on May 22–23, 1998. The Puerto Rico Department of Education has agreed to sponsor the participation of at least 125 teachers in the conference. This is half the total number expected to attend the conference. Drs. Frank Demana, Antonio Quesada, Florial Gracia, and Bruce Edwards will be the four guest speakers at the conference. All are internationally recognized educators. Texas Instruments will sponsor Frank Demana and Florial Gracia. The conference will offer many CBL technology workshops conducted by former project participants. These presentations are being prepared and polished with the assistance of the workshop leaders. Project staff and participants are now preparing a CBL activity guidebook for high school teachers. The activities will be presented in a format that includes all of the related pedagogical considerations, as well as step-by-step instructions.

A light intensity workshop by the Eugenia Maria de Hostos Team.

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University of Texas–Brownsville Training Teachers to Teach Students with Disabilities in Inclusive Settings

Program Overview

The current 1996–97 project titled "Training Teachers to Teach Students with Disabilities in Inclusive Settings" is designed, as in the past, to provide teachers in elementary and secondary school settings the tools to teach students with disabilities. The program especially addresses the need of teachers in science content areas to address students who are part of the classroom's regular science program. The specialized theme of the yearlong program continues to be "The Environmental Interactions within the Wildlife Corridor." All science content areas are related to this theme. The program of study consists of two courses and related field trips.

Objectives

The objectives of the program include:

- Familiarize practicing elementary and secondary science teachers with the characteristics of students with disabilities
- Enable practicing elementary and secondary science teachers to develop adaptations and modifications of investigations in science to facilitate the inclusion process of students with disabilities
- Develop and pilot science modules that meet the needs of students in inclusive settings for use in public schools
- Disseminate the project activities, results, and products

Enrollment Data

Twenty-two elementary and secondary teachers participated in the project. Seventeen females and five male teachers attended courses taught by Dr. Reynaldo Ramirez and Dr. Melanie Dreisbach. The group enrolled in EDCI 6342—Topics in Science Education and SPED 6306—Selected Topics in Special Education. The group was recruited from school districts near the University of Texas–Brownsville. One participant from Santa Rosa Independent School District and another participant from Pharr, Texas, had to travel more than 50 miles to attend the Monday night class. The students were recruited by fliers sent to surrounding school districts, e-mail and other electronic announcements, instructional television stations, and personal contacts.

Teacher Training Awards

The participants made up the following demographic composition: 12 Hispanic females, 5 Hispanic males, and 5 Caucasian females. Four of the teachers taught in secondary schools, 17 were elementary teachers, and 1 individual was an educational specialist with the National Wildlife Refuge System.

Outcomes to Date

Teacher participants participated in a year-long program of courses and workshops. The teachers developed modules and disseminated them to other elementary and secondary science teachers at a special conference (Celebration 2000). The following is a list of accomplishments made possible to the 22 participating elementary and secondary teachers through the implementation of this grant:

- Earning a minimum of 6 graduate hours of coursework in science education and special education content and pedagogy
- Participating in more than 105 hours of professional development activities in science and special education topics
- Attending workshops that developed an understanding of environmental science concepts of the wildlife corridor and skills in observing, recording, and interpreting natural phenomena and investigating resources and adaptations for students with disabilities
- Developing a resource module for teaching science to students with disabilities
- Disseminating the skills and techniques that they learned and the activity modules that they developed as part of the coursework and workshop activities

The primary responsibility of the module development fell under the science education course. In addition, teachers involved in the project were given opportunities to conduct research as part of the special education course requirements.

University of the District of Columbia Scientific Renewal Program

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Program Overview

The primary function of the Scientific Renewal Program has been to provide transitional hands-on scientific experiences for inner city urban area teachers of mathematics and science at the precollege level. These experiences range from historically based African mathematics and science through state-of-the-art technology provided by NASA and other technology professionals. Introductory experiences are designed for the math/science inservice and preservice teachers whose background has been in part compromised by the lack of hard-core math/science courses taken during their collegiate training, combined with a basic reluctance to take traditional courses at the graduate level to remove any existing deficiencies, prior to or during their teaching careers.

Objectives

It is the long-term goal of the Science and Engineering Center, in implementing the Scientific Renewal Program, to better provide its target population of teachers with transferable scientific experiences that will not only enhance their abilities in teaching but will also in part encourage their peers to further their own studies. With this in mind, the following general objectives were to:

- Increase the teachers' knowledge of math/science and computer science in a user-friendly atmosphere
- Enable them to feel comfortable using a hands-on approach in their classrooms
- Prepare them to use a multicultural approach in their classrooms to increase their students interest in science and self-esteem
- Prepare them to serve as master teachers by sharing their training with their peers

Enrollment Data

After an initial planning year (1990), the Scientific Renewal Program enrolled its first cohort in 1991. In response to the first year's participant group, a second year was implemented in 1992 and a third in 1993. All three phases were run concurrently from then through 1996. In 1996, funding was cut in half, and

only two groups were offered. Throughout the program, each session reached its intended enrollment and over. This enabled the program to pick from a rather extensive list of prospective participants and thereby reach the "critical mass" recommended by the program evaluator for participating area schools.

Outcomes to Date

Through the analysis of standardized math test data published by the D.C. committee on Public Education, it did seem that:

- At a time of declining D.C. test scores, Scientific Renewal Program early elementary instruction seems to minimize these negative trends noted in otherwise comparable non-Scientific Renewal Program schools.

- Despite system-wide declines, a majority of the schools designated as "at risk" that also have a "critical mass" of three or more Scientific Renewal Program-trained teachers have demonstrated dramatically increased math rankings.

- Students attending junior high schools with two or more Scientific Renewal Program teachers are substantially more likely to improve or at worst maintain their 9th-grade math achievement scores and achieve scores at or above the national norms.

A very significant number of Scientific Renewal Program teachers requested additional courses during the academic year, and some even became recertified via these courses. To accommodate this group, the Science and Engineering Center sponsored the following courses for precollege teachers:

- Topics in Astronomy

- Topics in Space Science

- Introductory Physics I and II

Student Achievements

Because our Scientific Renewal Program students are inservice or preservice teachers, their achievements are measured in the overall accomplishments listed above. Other evidence of their achievements has been documented through an 8-month followup in the form of telephone interviews conducted by the program evaluator. The interviews were made with Scientific Renewal Program teachers who had attended one, two, or three sessions. The results were as follows:

- Of the teachers interviewed in three annual interviews, 97 percent (117 of 121) indicated that their teaching in the Scientific Renewal Program content areas had improved.

- Of the respondents to the principals' survey, 70 percent indicated that they had observed that Scientific Renewal Program teachers' instruction improved after their inclusion in the program.

- A large majority of teachers and principals also reported both increased math/science interest and performance among students taught using the Scientific Renewal Program approach.

Partnering

During the development and implementation of this program, the Science and Engineering Center of the University of the District of Columbia partnered with the National Urban Coalition and included the training of African math and science strategies. These strategies had been developed and tested with their "Say Yes" program in various urban areas throughout the United States and abroad.

Xavier University of Louisiana
Project Teach
MASTAP

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Program Overview

Critical personnel shortages of secondary math and science teachers pose a formidable problem in the delivery of educational services in Louisiana and throughout the Nation. Minorities are especially underrepresented as secondary math and science teachers. One of the major goals of Project Teach is to educate African-American preservice secondary teachers in competencies that will enhance the instruction of middle and high school math and science subjects.

Five preservice teachers per year are provided scholarships and graduate assistantships for a 1-year, 31-hour graduate program of study, culminating in a master of arts in curriculum and instruction degree. Students who have completed undergraduate degrees in mathematics, biology, chemistry, physics, or computer science are recruited into the Project Teach program. Here, they develop professional skills, improve content knowledge, learn multimedia and computer technology skills, and acquire the pedagogical strategies and abilities necessary to teach African-American and other ethnically and culturally diverse middle and secondary school students in mathematics and sciences.

Objectives

The objectives of this project include the following:

- Increase the recruitment and retention of African-American secondary and middle school math and science teachers
- Increase the number of African-American middle and secondary math and science teachers with observation and student teaching experiences appropriate for African-American students

Enrollment Data

For the 1997–98 school year, there are five students (all African American) enrolled in the program. Four are females, and one is a male. There is one student in math, one in chemistry, and three in biology. There is an open policy for recruitment, provided the entering graduate students have a grade point average of at least 3.0. Preference is given to Xavier students, but the program does admit students from other colleges and states. Last year, one student was from Alabama, and this year, one is from Mississippi. The opportunity for admission into the program is widely advertised on campus and off campus. At the end of the 1997–98 school year, 15 students would have graduated from the program. All 10 previous graduates have passed the NTE and are certified to teach two subjects. The feedback from schools where the previous graduates are working has been very positive. The graduates are praised for their efficiency and effectiveness. The program also make use of faculties as mentors for the students.

Partnering

Students perform their “student teaching” in local high schools, and this is very beneficial to both the project’s students and the high schools. A paper on Project Teach has been submitted for publication.

PACE Awards

NASA science is an investment in America's future. The ability of the United States to maintain leadership in the world economy depends in part on its ability as a Nation to educate and train talented scientists and engineers. Changing demographics indicate that Americans who are socially and economically disadvantaged and/or disabled (a disability that limits a major life activity) will make up nearly 30 percent of the new entrants into the labor force by the end of the century. This target group must be included in the development of the Nation's stock of well-trained scientists and engineers.

PACE awards are funded to support educational outreach projects at eligible universities to increase the number of students who successfully pursue mathematics, science, engineering, and technology (MSET) study at the undergraduate level and beyond, ultimately contributing to the pool of talented scientists and researchers in MSET fields. Awards are generally designed to:

- Increase the enrollment of students in MSET college preparatory courses
- Strengthen the students' MSET skills
- Increase student enrollment in college in MSET disciplines
- Encourage students to pursue MSET careers in the future

To achieve these goals, the objectives of the PACE program are to:

- Increase the number of targeted students successfully completing gateway courses, such as algebra, geometry, and college preparatory mathematics and science
- Communicate and collaborate among the MSET and education departments within the university and between the university/nonprofit organization and the public schools
- Engage students in participatory activities, such as hands-on learning, research, use of advanced technology, peer support groups, and mentoring relationships with professionals and college students
- Increase student awareness of MSET in the world, multicultural contributions to MSET fields, and career options through career

PACE Awards

exploration, counseling, and discussions of higher education options, requirements, and financial assistance

- Inform parents of the students' academic progress and involve them in orientation and awareness activities designed to strengthen family support of MSET education

- Involve community groups, business, industry, research laboratories, museums, and educational and professional organizations through mentoring, field trips, and guest speaker invitations

PACE awards are established under a grant with funding not to exceed $100,000 annually for 3 years. Second- and third-year funding is based on an annual evaluation of documented progress, the availability of funds, and the amount of funds reported in NASA's Financial and Contractual Status Report as disbursed at the end of the award's period of performance. During fiscal year 1997, 17 PACE awards were given to organizations to master.

Bennett College

California State University–Los Angeles

City University of New York–Lehman College

Elizabeth City State University

Fayetteville State University

Fort Belknap College

Hampton University

Jackson State University

Jarvis Christian College

Lincoln University

National Hispanic University

Northwest Indian College

Pasadena City College

Southwestern Indian Polytechnic Institute

St. Augustine's College

Stillman College

University of Texas at El Paso

Bennett College
PACE/SEMSET

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Program Overview

The PACE program at Bennett College is a 6-week summer residential camp and a 7-month Saturday Academy for middle and high school students. Specifically, the program targets Guilford County school students between the 6th and 11th grades. The project combines academic instruction with practical application and hands-on experiences to introduce new concepts and enhance the knowledge of its participants. The focus of the PACE/ SEMSET program is science and technology, with specific emphasis on biology, chemistry, computer science, and space technology.

The Life Skills portion of the program seeks to enhance the social aspect of the lives of the participants. This is achieved by counseling sessions that address social issues that have an impact on middle and high school children. Exercises in conflict resolution are designed to help youth in addressing conflict appropriately.

Objectives

The overall objectives of the program are to:

- Motivate middle and high school students to pursue careers in science
- Heighten each student's awareness of the importance of science, mathematics, and computer science to daily living
- Build self-confidence and remove negative attitudes toward math and science
- Provide a broad range of instructional, extracurricular, and recreational activities designed to allow the participants to explore science and math

Enrollment Data

All students in the program were middle and high school students in the 6th–11th grade range. Thirty-seven of the participants were males, and 56 participants were females. The students were recruited from middle and high schools from Guilford County schools through school counselors, teachers, and parents.

Bennett College
PACE/SEMSET

Outcomes to Date (Year 3)

Students entering the 1997 Summer NASA SEMSET Program were administered the Wide Range Achievement Test (WRAT) within the first week of the program. This test is designed to test basic skills in reading comprehension, spelling, and mathematics. The students were administered the test during the last week of the program. All students improved on their test scores from the initial test.

One new module, Physics, was successfully implemented during the summer program. In addition to the science curriculum, the program continued the implementation of three noninstructional modules: Minorities in Science, Space and Technology, and Conflict Resolution I Counseling.

Perhaps the most important and rewarding accomplishment of the program is the continued overall academic improvement and performance of the students within the public school system. Many of the participants are recognized by their schools as excellent students; many of them are honor roll students.

The involvement of industry in NASA SEMSET included Rosenberg Foundation, as well as Bennett College. There was also the involvement of parents as mentors and chaperones. The students traveled to the U.S. Space and Rocket Center in Huntsville, Alabama.

Improvements

The program experienced the following improvements:

- Teachers who work in the Guilford County School System served as teachers of biology, English, computer science, and mathematics in the SEMSET Program. This proved to be a major advantage in that the instructors were familiar with academic issues that needed to be addressed. In addition, these instructors were familiar with the curriculum patterns and competencies that must be achieved by the students within the public school system. Most of the participants attend schools within the Guilford County School System.

- There was the addition of the Physics curriculum.

- There were separate teachers for middle and high school mathematics and English classes.

Future Goals

This program has set the following goals for the future:

- Incorporate use of the Internet in NASA/SEMSET

- Introduce students to new and advanced technologies

- Encourage the involvement of the business community, parents, and other civic organizations in partnerships

California State University–Los Angeles University Preparatory Program

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Program Overview

The University Preparatory Program (UPP) provides underrepresented disadvantaged students at Garfield High School and Lincoln High School with a pathway to the baccalaureate degree. In the fall, approximately 80 9th grade students are accepted into UPP at each high school. These students have C to B grades and agree, with their parents, to participate in a program that requires a rigorous college preparatory curriculum, after-school tutoring, and Saturday laboratory experiences at California State University–Los Angeles. The goal of the program is to prepare these students for success in college in science, engineering, and mathematics majors. UPP was first established at Lincoln High School in 1989. The purpose of this PACE/MSET project is to determine whether UPP can be replicated at another high school and to further refine the Lincoln High School program. Thus in 1996, a UPP program was established at Garfield High School.

Enrollment Data

During the 1996–97 reporting period, there was a total of 279 students in the UPP programs at Lincoln and Garfield High Schools. These were all Hispanic students. At Lincoln, there were 67 in 9th grade, 55 in 10th grade 58 in 11th grade, and 35 in 12th grade. At Garfield, there were 64 in 9th grade. Students are recruited for UPP through close cooperation with the counselors at the feeder middle schools. An initial screening is conducted of all 8th grade middle school students who are potential UPP students. The program looks for middle-achieving students who have grades in the C to B range and good attendance records. When available, scores on standardized tests are also examined. Candidates for UPP are then interviewed individually and told about the program. Written information is given to each candidate, along with an application to take home. Final decisions on admission are done by personnel from California State University–Los Angeles and the high schools.

Outcomes to Date

A major objective of UPP is to determine whether the experiences and successes with the initial program at Lincoln were particular to that site and to the teachers and administrators there. Starting a second program at Garfield provides a useful test of the validity of the general UPP program concept. Garfield is a

California State University–Los Angeles
University Preparatory Program

multitrack school, which is on a different time table than a traditional single-track school such as Lincoln. Garfield also changed principals at the start of the first year of UPP, while Lincoln has had the same principal since well before UPP started there in 1989.

The first year at Garfield got off to a hectic start because funding for the program was secured in late spring, much later than desirable to start recruiting students for the track, which starts at the end of August. Nevertheless, the program was able to pull together a good candidate class of 64 students and an initial cadre of teachers for the clustered UPP classes. An important feature of UPP is that this is a true partnership program that is ultimately structured by the participants from both the university and the high school. The program evolved at Garfield along the general lines of the UPP program at Lincoln, with some interesting differences. The council and steering committee meetings at Garfield had more direct parent participation than at Lincoln, and the after-school tutoring program ultimately was built around a peer tutor-led study group concept. Here, students from California State University serve in a supervisory, troubleshooting role rather than being directly engaged in one-on-one or group tutoring, and UPP students from Garfield, who are doing well in their classes, work as paid peer tutors to lead groups of students during the tutoring sessions.

Several meetings on improvement of writing skills were held. Marilyn Elkins, a professor of English at California State, went with UPP co-coordinators to these meetings at Lincoln. The issue was a discussion on the performance of UPP students on the English Placement Test (EPT) as they make the transition to the university. Although UPP students do somewhat better that the average entering Bushman at California State, their performance leaves room for improvement. That is, based on their EPT scores, many place in the remedial English composition course sequence rather that in the college-level composition course. Given the rigorous sequence of English courses they take as UPP students at Lincoln, this has been a perplexing matter. In this PACE/MSET proposal, it was planned to coordinate meetings between English faculty at Lincoln and California State to address this. In the meetings, an action plan was established. It included the development of a required summer reading list for UPP students, attendance of UPP students at plays and talks at the university, a contract with a representative from the California Poets to meet with the 9th grade UPP English classes on several days, EPT review sessions in the 12th grade UPP English class, and participation by Lincoln English faculty in the university's Intersegmental English Conference. Several of these were put into place in the spring of 1997. A final meeting for the 1996–97 year was held on May 16, 1997, to review progress, evaluate each element of the plan, and determine action items for the 1997–98 year.

The program able to run all of the planned UPP activities. These included three Saturday morning activities at California State for each class from each high school. They were mostly science labs, but also included some lectures and demonstrations as well as library and public speaking skill-building activities. During the year, there were three parent meetings at each school, a Christmas potluck event at Garfield, and a midday Christmas social activity at Lincoln. In addition, there were field trips for several of the individual classes. Among these were an oceanography trip aboard the California State University boat (*Yellow Fin*), attendance at a play (*The Glass Menagerie*), and a trip to the Los Angeles Zoo led by graduate students from the university's Biology Department. The program concluded the year by having separate award ceremonies for each high school at California State University.

The UPP program at Garfield has gotten off to a solid start. The program has successfully recruited a second class of students, and so far it seems that UPP is model that can be successfully replicated at other high schools. As had been expected, it has required a major increase in personnel to add another UPP high school.

The structure that had been proposed to address this seems to be working well. In particular, the program has recruited three California State University–Los Angeles seniors who are UPP students from Lincoln to work with the UPP director. Two of these students work at the high schools and one is at the UPP office at the university. It is particularly gratifying that they have all done an excellent job.

One of the challenges is preserving the enthusiasm and commitment among the faculty and administrators at Lincoln for a program that has been an acknowledged success there but can sometimes be neglected since it is already an essential component of the school. The program has responded to this by scheduling special meetings at Lincoln to discuss this issue. This is an ongoing situation that seems to be getting better largely because everyone recognized the problem and are now committed to improving things.

Student Achievements

In the fall of 1996, 279 students were in the UPP program. Of these, 35 graduated, and 202 continued in the UPP program in the fall of 1997. Of the 35 who graduated, 34 enrolled in a 4-year college, and 19 of these declared majors in science, engineering, and mathematics disciplines. Eleven of the graduating students were selected to participate in a summer partnership program involving California State University–Los Angeles and the Jet Propulsion Laboratory (JPL). These students were placed in research groups at JPL.

Partnering

The partners are California State University–Los Angeles, Garfield and Lincoln High Schools, and Southern California Edison. The university coordinates the project and provides faculty, laboratory materials, financial aid and admissions counseling, and facilities for several events during the year. The high schools provide administrative support, faculty to teach UPP classes and supervise tutoring sessions, counseling support, and facilities for meetings and tutoring. California Edison donated $1,200 for field trip expenses.

A small group discussion at a UPP Saturday lab activity.

UPP participants of a lab activity at Lincoln High School.

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City University of New York (CUNY)–Lehman College Mathematics, Science, and Technology with Excellence in Research: A Science and Technology Entry Program (MASTER-STEP)

Program Overview

The proposed program provides students from Bronx high schools the opportunity to prepare for careers in science, mathematics, and technology by participating in project-oriented, inquiry-based, hands- and minds-on science based in real-world issues related to Earth systems and physical science, to build a seamless science-mathematics pipeline for students that facilitates and eases the transition from secondary to postsecondary education, and to link high school teachers with college faculty and with Bronx Systemic Initiative member schools in planning and delivering science project-based learning and developing alternative assessment techniques. By engaging students in activities that afford them the opportunity to gather information on a topic, formulate hypotheses, design research using the concepts of variables and controls, gather data, analyze data; and explain findings through projects in science, mathematics, and technology, they use and hone techniques of critical thinking and problem solving and are captivated through participation in laboratory experiences of their own design in which outcomes may be predictable but are uncertain.

The areas of study include Earth systems, physical climate, and Internet/technology/research. Students engage in sequential constructivist/laboratory projects in the three areas during summer and academic-year project sessions. A highlight of the program is, as always, the Academic Olympics, college bowl-type competition that is a weekly event during the summer in which cooperative teams of students compete to earn points. The point structure is such that any team can win up to the last competition by improving their preparation efforts, thus sustaining interest over the summer sessions.

Program evaluation relies on alternative assessment procedures, including student portfolios composed of lab journals and reports, library research papers, and selected school work; long-term tracking of program participants; anecdotal reports of program staff, coordinators, counselors, and group leaders; a comparison of general, science, and mathematics academic achievement with a matched sample; and a comparison of attendance in the program and in school, standardized test and regents scores, PSAT/SAT scores, the rate of progress toward graduation, college advance and type and status of college, and level of scholarship support.

Elizabeth City State University PACE

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Program Overview

The major objective of the project is to provide instructional enhancement in mathematics, science, computer science, and technology to 100 8th-grade-level students of five middle schools located in rural poverty-stricken northeastern North Carolina through instructional activities via a Saturday Academy, a Summer Science Academy, After-School Club activities, and science- and technology-focused field trips. Faculty development through a series of Saturday workshops conducted by invited consultants and active participation by parents in every programmatic phase are hallmarks of this total endeavor.

Objectives

The objectives of the program included identifying students with a strong interest in mathematics, science, and technology and providing them with intellectually challenging experiences and activities to:

- Motivate them to develop a life-long interest in learning mathematics, science, and technology
- Enable them to develop personal goals leading to continuing their mathematics, science, and technology studies at high school and college
- Enable them to develop their self-confidence in their own power to successfully negotiate, understand, learn, use, explain, and profit from science and technology
- Explain how scientists, mathematicians, and technologists develop, promote, and create mathematics and science—thereby enriching their lives and the lives of their fellow humans

Elizabeth City State University
PACE

Another objective of the project is to increase student awareness of career options in mathematics, science, and computer and other technologies. This objective is achieved though exposing the students to professionals in the field of mathematics, science, and technology either by arranged visitations at their place of work or by inviting them to give lectures and/or demonstrations to program participants. Students were trained in accessing the Internet (in schools where this is available) and using it to procure a variety of information pertaining to activities in which NASA is involved, such as understanding our changing planet. The students compared space food with regular food to study the impact of space food on our regular food. They exploited capabilities to develop science and math projects for participating in variety of competitions. They developed scale models of the solar system and a biodome. They assembled model rockets and spaceships and used computer applications and research related to space travel.

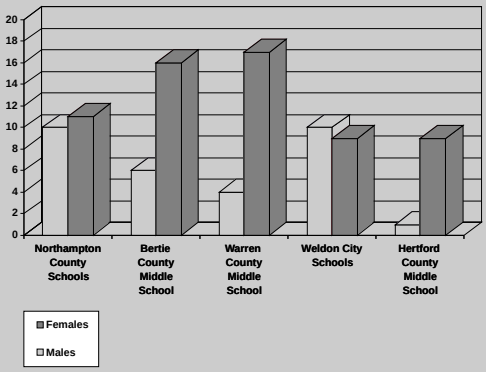
Enrollment Data

All of the students who participated in the project are African-American 8th grade children with the following gender distribution as shown to the left.

Outcomes to Date

The program targeted intellectually challenging activities in pre-algebra, algebra I, Earth science, physical science, environmental science, and computer science. Ten master teachers involved in the program were trained in conducting the program activities through a series of Saturday workshops. Simultaneously, Saturday Academies were held on school sites on alternate Saturdays. Program students were also involved in After-School Club activities. The program activities culminated with a summer Science Academy at each school site. Several field trips were organized, including visits to Virginia Living Museum in Newport News, Nauticus in Norfolk, Virginia Air and Space Museum in Hampton, Virginia, Museum of Life and Science in Durham, North Carolina, Halifax Community College in Halifax, North Carolina, and Elizabeth City State University, Elizabeth City, North Carolina. As a result of these trips, students were able to study dinosaurs that lived in prehistoric times and the sea animals that are found in Chesapeake Bay. They were able to pet sharks and see shark feedings. They participated in weather channel activities and made their own videos.

Elizabeth City State University Enrollment



PACE Awards

During the Saturday and Summer Science Academies, students were involved in numerous laboratory activities, including the study of gravity and its impact on our daily lives. They experimented and researched through the Internet as to what life would be like without the force of gravity. Students drew illustrations of the interior of a Space Shuttle and drew pictures of the Mars probe. They discussed what the probe sent back and how it will effect the world of science. Students also wrote job descriptions of various space-related jobs. They discussed questions such as what holds the Earth as it moves in its orbit around the Sun and what if that force vanishes. Most of the program students have been placed in science-related high school courses.

Lessons Learned

With carefully structured academic activities involving hands-on experiences in a laboratory setting, students are very receptive to cooperative participation in problem solving and scientific experimentation. Science- and technology-focused field trips and guest lectures provide tremendous motivation to the students in learning science, mathematics, and technology. Frequent interaction with professionals in the field of mathematics, science, and technology is a strong booster for goal setting in mathematics-, science-, and technology-related professional careers. The principals of the school sites are critical factors in the success of such a project.

Students attending a summer field trip.

Fayetteville State University MSEN Precollege Program

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Program Overview

Fayetteville State University's Mathematics/Science Education Center (MSEC) implemented its year-round MSEN (Mathematics/Science Education Network) Precollege Program for students of grades 6 through 12. The MSEN Precollege Program is an academic enrichment program offering instruction for those groups of students underrepresented in mathematics, science, and technology. The NASA PACE/MSET grant provided MSEC the opportunity to continue its summer scholars and Saturday Academy programs as well as provide teacher inservicing and parent training workshops.

Objectives

The objectives of the MSEN Precollege Program include ensuring that: (1) all 9th grade students are enrolled in algebra I, (2) 9th through 12th grade students enroll in academic- or honors-level mathematics and science courses, (3) seniors graduate with at least 4 years of math and science even though only 3 years are required for college entrance, and (4) the pool of students entering and successfully completing math, science, and technology fields of study is greatly increased. Tutorial outreach programs in mathematics and science are provided via MSEC for students of grades 4–12 throughout the academic school year.

The MSEN Precollege Program successfully implemented a 20-Saturday session Saturday Academy throughout the school year and a 4-week summer program for all students enrolled. Teachers who work with the program participate in extensive training and planning sessions to ensure that all students are receiving quality enrichment activities that are hands on and not textbook oriented.

Enrollment Data

The MSEN Precollege Program targets underprivileged, disadvantaged, and disabled students from counties in and surrounding Fayetteville State University. Students are recruited through Guidance Counseling Offices from schools within a five-county region. Based on the guidelines of the MSEN Precollege Program as established across North Carolina, students must be willing to remain for 1 full year of commitment, willing to complete and excel in the curriculum established for the summer and Saturday Academy programs, maintain at least a C average in any core course, and enroll in the appropriate high school courses that will ensure preparation for college.

More than 500 applications were received for enrollment into the program at Fayetteville State. More than 300 students had the opportunity to participate. Because it has been nationally determined that underprivileged, disadvantaged, and disabled individuals are underrepresented in mathematics, science, and technology college and career fields, the program at Fayetteville State focuses specifically on these groups.

Outcomes to Date

Statistics on course enrollment for students of grades 6 through 12 participating in the MSEN Precollege Program indicates that more than 50 percent of 7th grade students are enrolled in pre-algebra, more than 60 percent of 8th graders are in algebra I, 50 percent of 9th–11th grade students are enrolled in academic- or honors-level math and science courses in high school, and 70 percent of 12th grade students are enrolled in pre-calculus, calculus, physics, or top-level math, science, and technology courses, with 40 percent of these academic or honors courses. Based on information provided upon graduation (12th grade) and tracking of these students, 65 percent pursue math, science, and technology fields of study. This past year's graduating class reinforces that trend and reflects the high grade point average received in high school and retained through college.

The challenge for the MSEN Precollege Program at Fayetteville State is parent awareness and involvement, ensuring that parents of students enrolled in the program are actively involved in their child's education, high school curriculum alignment (course selection), and their child preparing for and taking the SAT prior to the 12th grade year. The MSEN Precollege Program provides one-on-one tutorial assistance in math, science, and technology, SAT preparation, and scholarship research as a component part of its Saturday Academy.

Student Achievements

This year's graduating class reflected impressive demographics. Of the 18 students graduating from the MSEN Precollege Program, all enrolled in a 4-year college or university, except one. This exception student enrolled at a technical community college to pursue a degree in architectural engineering. Of the 17 students who enrolled in a 4-year school, the following data apply:

- Eight students are pursuing medical careers (cardiovascular, obstetrics, neuroscience, or pathology).

- Four students are pursuing engineering careers (electrical, mechanical, or biomedical).

A presentation during a MSEN Saturday academy class.

Fayetteville State University
MSEN Precollege Program

PACE Awards

- Three students are pursuing business/accounting careers.
- Two students are pursuing other fields of study (such as transportation).

Two of the students pursing cardiovascular careers received full 4-year scholarships. Total scholarship/award offers for one of these students was approximately $250,000, while the other student's was more than $400,000.

Other student achievements were reflected during the Awards Ceremony, whereby students were recognized for Top Honors (all A's for the academic year), A-Honors (all A's plus one B), B-Honors (A's, B's, plus one C), and Perfect Attendance. More than 125 students were recognized in these categories.

Partnering

The Alpha Phi Alpha Fraternity partnered with 15 male students of the senior high component during the Saturday Academy and conducted monthly sessions on leadership skills, mentoring, social development, and preparation for college. These fraternity members volunteered their time to this project. Through fundraising activities by the parents' support group, many businesses donated merchandise in support of this program. Major companies and academic professions in the area such as E.I. DuPont, Wellman Industries, and Fayetteville Technical Community College made up the background for the Precollege Advisory Board that provided major support throughout the year.

Staff

Dr. Leo Edwards, Jr., Director of Mathematics/Science Education Center and Pre-College Programs
Patricia Murray, Coordinator of Precollege Programs
Fara Sloan, Secretary for Precollege

Math
Valoria Ingram
Debora McPhaul
Shonette Simmons
Sherman Sumpter
Quincy Magby

Science
Linda Williams
Annie Owens
Janice Daniels
Wilma Godwin
Wilson Marion

MSEN students dissecting a frog in a lab experiment.

PACE Awards

Technology/Other
Theresa Williams
Norma Jones
Hopella Renwick
Rebecca Gentry
Karen Darlington
Lorraine Price
Peggie Williamson

Role Model Presenters/Mentors
Ronnie M. Coats, Carolina Power & Light Company
Dr. Timothy Corbett, Sr., Aeromedical Services Family Practice, Pope Air Force Base
Dr. Leo Edwards, Jr., Fayetteville State University, Mathematics/Science Education Center
Dr. Nashid Fakhrid-Deen, Minority Student Affairs, University of Kentucky College System
Dr. Joyce Hilliard-Clark, MSEN Precollege Programs, University of North Carolina at Chapel Hill
Dr. Henri Jadotte, Fayetteville State, Department of Natural Sciences–Physics
O.C. Holloway, Fayetteville, Department of Math and Computer Science–Math and Engineering
Earl Jones, E.I. DuPont of Fayetteville
Dr. James Raynor, Fayetteville State, Department of Natural Sciences–DNA Research
Garland Stewart, Fayetteville State, Department of Career Services
R. Shashu Tucker, "Break the Link. . .," Louisville, Kentucky
Dr. Kwami Tuprah, Fayetteville State, Department of Math and Computer Science–Storytellers
Gloria Tuprah, Fayetteville State, Department of Math and Computer Science–Storytellers
Dr. Floyd Waddle, Fayetteville State, Department of Natural Sciences –Snake Demons
Russell Williams, former principal at Westover Middle School
Jeff Womble, *Fayetteville Observer Times*, "Saturday Extra"

Fort Belknap College
Preserving the Past and the Future

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Program Overview

Preserving the Past and the Future is a unique blend of science and culture designed to increase Native American student interest, participation, and success in math, science, engineering and technology (MSET) fields. Through a variety of activities, including an outdoor camp, the program strives to increase student awareness in MSET fields as well. Another focus is to increase parent, community, and tribal college participation in the public schools' efforts to achieve these goals. The program is also committed to helping students develop their technological skills, adapt to changing technologies, and select appropriate technologies to enrich their lives and career opportunities.

The program has provided computers in classrooms in Harlem schools, along with appropriate software to enhance the learning experiences. Technological support has also been extended to three other school districts on or near the Fort Belknap Reservation in north central Montana. This year's plans include Internet access in all these schools.

Tutors were made available in these schools in 1997 to address the goal of improving math, science, and technology literacy among underrepresented minority and disabled middle and high school students. In addition, various teaching and curriculum materials, software, and small equipment were provided to all the schools to upscale the classroom experience. Thanks to the help of this NASA PACE/MSET grant, MSET is now a major emphasis for the Native American students in this area.

Enrollment Data

While the initial targeted group was the 6th grade in Harlem, the scope of the program has been expanded to include all levels of students in all the schools serving the Fort Belknap Reservation. Male students of Native American descent numbered 403, with 473 Native American females, K–12 grade levels. Male non-Native American students were 48 and female non-Native Americans 33. Native American students are the target population of the grant, but the non-Native American students are served as well.

Outcomes to Date

This project has now held two summer camps. The second year involved a higher level of scientific educational opportunities,

while maintaining the cultural richness of the Assiniboine and Gros Ventre people and history. The faculty and students of Fort Belknap College provided workshops, experiments, and demonstrations for the camp participants. A particular challenge for an outdoor camp setting is the weather. The campers have endured wild thunder and wind storms both years while sleeping in their tipis. There has yet to be a tipi blow over, but occasionally a traumatized youngster has to be taken home to recover!

Whether involved in the summer camp or participating in enrichment activities in the classroom, the Native American students are now deeply involved in MSET. They are also reaping the benefits of increased faculty preparedness in these fields.

Student Achievements

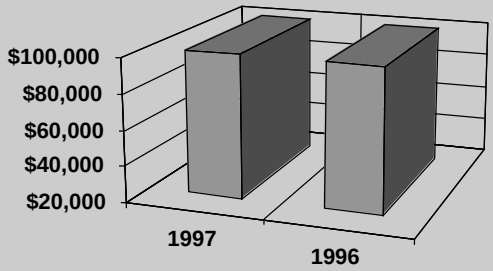
Student accomplishments this past year that were most noteworthy were the winners of the first annual science fair hosted by Fort Belknap College faculty and students. Students competed in their school fairs first; then the winners advanced to the college fair where they competed against entries from the local schools. The categories were primary, intermediate, junior high, and high school. Ribbons and plaques were awarded the winners in the top three places. Science fairs are a common occurrence in many areas, but this was a first for Fort Belknap College and the first time the schools have had the opportunity to compete against each other.

Partnering

Partnering with other programs has made a significant impact on the interest in MSET for the students of Fort Belknap Reservation. The High Plains Rural Systemic Initiative at the college, funded by the National Science Foundation, provides professional development for the teachers in K–12. The School to Work program provides assistance with career opportunities in these fields. Working together on all the projects results in providing activities, opportunities, and education in ways that are truly making a difference. In addition, the tribal departments, such as Environmental Protection, Water Quality, and Fish and Game, collaborate to enrich this program's experiences as well as theirs.

The most rapidly growing programs at Fort Belknap College are Natural Resources, Medical Science, and Biological Sciences. The most exciting changes taking place in the public school classrooms are in math and science. All of this has been accomplished with participation by organizations such as NASA and the teamwork of a group of people in an isolated corner of the world least expected to be original and innovative. The program is committed and ready to send a Native American into space.

Funding History—
Fort Belknap College



Hampton University
PACE

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This report highlights the first summer program activities. The summer program enhances the basic skill level of the students to jumpstart their academic careers at Spratley Middle School and to build a technical foundation that can be incorporated into their fall enrichment experiences.

Student Selection Process

Twenty-five students were selected for the NASA-Hampton University MSET Program. These students were chosen from a candidate pool of 42 rising Spratley middle schoolers screened by a Hampton University/Spratley Middle School Review Committee. This preselected pool of students met all of the criteria outlined in the original proposals—that is, students were selected based on the Hampton city School System's placement of students in its Free and Reduced Lunch Program and Free Bus Program. In its final screening, the committee considered such factors as (1) self-nomination data, (2) parent nomination survey, and (3) teacher/principal nomination.

Objectives

The two objectives of the summer program were as follows:

- Enhance student mathematical and science skills in a relaxed setting

- Introduce students to the scientific method and have them perform experiments that they can scale up during the academic year into a major science project

Summer Program Activities

The 1997 summer program started on June 30, 1997, ran for 5 weeks, and formally ended on August 1, 1997, with an award banquet that celebrated student accomplishments. At the banquet, parents and guests had an opportunity to inspect student projects and learn what their students had accomplished during the 5-week program.

At the beginning of the summer session, student groups were formed and student mentors were assigned to each group. These student groups remained intact throughout the summer program. The mentors, however, rotated among the student groups. These student mentors supervised individual groups' activities and

maintained them on a daily work schedule. These summer activities were quite varied in scope and ranged from basic scientific studies of fluids to image-processing investigations. The aim of these activities was to expose students to a wide spectrum of scientific fields.

Outcomes to Date

The inception of the summer program was covered by the local press (see *Daily Press* article). That article addressed the purpose, goal, and scope of the NASA-Hampton University MSET program. Other highlights of the summer program were the end of the session banquet where the banquet speaker was Dr. Bisi Oladipupo, Assistant Dean of Engineering and Technology at Hampton University. Dr. Oladipupo stressed to both students and parents the need to seriously commit to the goals of the MSET programs. These student participants were described as our future scientists and engineers and, as such, that we must nurture them.

Additional outcomes of the summer program included the leveraging of these activities with ongoing and new Spratley Middle School initiatives. In particular, three initiatives come to mind:

- During the upcoming school year, several of 6th grade classes at Spratley will participate in an American Statistical Association endeavor to expand the statistical knowledge of middle school students. This initiative evolved as a result of MSET faculty interacting with Spratley faculty.

- The student mentoring will be extended beyond the Fall Academy. Several of the student mentors will also serve as mentors for the Advocacy Program, which will enhance their overall effectiveness.

- The Spratley faculty who participated in the NASA-Hampton University MSET have been reassigned to follow the select group of students identified by the NASA-Hampton University MSET program.

Fall Enrichment Activities

During the Fall Enrichment Program, Hampton will expand the scope of several of the experiments performed in the summer into full-fledged science projects. Student mentors will aid the NASA-Hampton University students in developing these expanded pro jects. The resource book titled *The Complete Handbook of Science Fair Projects*, by Julianne Blair Bochinski, will serve as the guidepost.

The major goal this year is to have several of the students competing in local (regional) science fairs. Their school performance will be monitored, and the program will assist in their successful progress through their first year of middle school. In addition, the program will actively assist Spratley Middle School in accelerating the development of two new initiatives identified above. New student activities developed by Joanne Hill will also be included as part of the students' fall enrichment.

Summer Program Experiments

- Wind tunnel
- Stem-and-leaf diagram
- Fruit Loops study
- Anatomy studies
- Living histogram
- Thin layer chromatography
- Making a magnet
- Lens and mirrors
- An investigation in pH
- Brownian motion

Jackson State University
PACE

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PACE students on a field trip to Marshall Space Flight Center.

Program Overview

The scope of the project was a 4-week intensive summer program and a Saturday academy program. Activities were planned to stimulate interest and enhance motivation of the students through hands-on laboratory activities, demonstrations by university faculty, computer applications of mathematics and science, the application of mathematics and the solving of problems in the sciences, and the utilization of communications skills to interpret and communicate mathematical scientific concepts.

Techniques and approaches included motivational and scientific speakers and field trips to scientific landmarks such as NASA's Stennis Space Center and the Aquarium of the Americas to introduce the middle school students to careers in the sciences. There were demonstrations by university faculty, interactive sessions with parents, the mentoring of students on the scientific method in the development of science fair projects, and interactive classroom presentations.

The program culminated with an awards ceremony for participants, parents, and staff. During the ceremony, the participants received certificates for participation, as well as trophies, plaques, ribbons, and certificates for outstanding achievement/performance in the various components of the project.

Objectives

The primary objectives of the Pre-College Awards for Excellence in Mathematics, Science and Engineering and Technology (PACE) were as follows:

- Identify and recruit rising 7th and 8th graders interested in mathematics and science
- Expose and provide various approaches to the study of science, mathematics, computer science, and writing skills
- Expose students to professionals in these areas and help them explore career options
- Provide experiences not included in the regular school curriculum

- Increase students' awareness of the academic preparation necessary for such careers
- Contribute to students' confidence in their ability to make career decisions
- Acquaint students with the environment and resources of universities, colleges, and research organizations

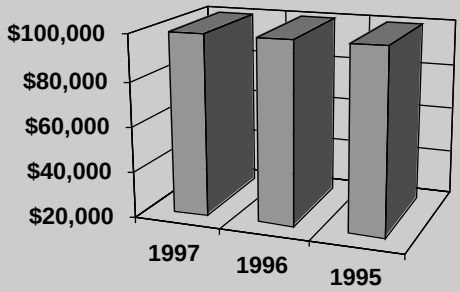
Enrollment Data

Fifty-two male and female students participated in the program.

Outcomes to Date

The tracking data indicate that all of the participants are taking the appropriate mathematics and science courses in the proper sequence to satisfy the college preparatory curriculum.

Funding History—Jackson State



Jarvis Christian College
NASA Center for Academic Excellence

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Program Overview

The Jarvis Christian College NASA Center for Academic Excellence provides a 6-week/summer precollege preparatory instructional program in science, engineering, mathematics, and computational science for 30 underrepresented minority and/or disabled students at target middle and high schools within the Tyler Independent School District. Through group and individual instruction, field and laboratory work, site visits, parent involvement, guest speakers, test preparation, and other special programs, middle and high school students will receive academic instruction, as well as personal and career guidance, through programs specifically designed to meet the needs of each participant. The students studied chemistry, trigonometry/geometry, and computer science during the second summer.

Objectives

The program objectives are as follows:

- Increase student interest and exposure to science-, mathematics-, and technology-related curricula that foster a lifelong interest in these subjects
- Encourage the exploration of MSET options as choices for higher education and career goals
- Provide a forum for personal exploration and reflection of societal stigmas attached to minority and/or disabled persons involved in MSET fields of study and career goals
- Teach transferable skills while promoting a sense of linkage between exposure to these skills and their relation to daily living
- Provide a science, mathematics, and computer science handbook suitable for use in middle and high school precollege courses and/or future summer MSET-related programs
- Develop an evaluation and tracking method by which participants' subsequent academic success, course selections, academic progress in secondary school and college, and future career choices can be followed

Enrollment Data

Participants in the 1996–97 program are from Boulter and Dogan Middle Schools and John Tyler High School. The 30 students selected for participation included 22 rising 9th graders and 8 rising 10th graders. Recruitment strategies included visits to target schools, brochures, information and application packets sent to principals and counselors at the target school, and invitations to them to nominate students with an interest in the areas of mathematics, science, computer science, and engineering.

Outcomes to Date

The program accomplishments were numerous. One was securing 100 percent of needed participants and establishing a waiting list prior to the startup date. The program also had an increase in the number of Hispanics and enrolled its first Hispanic male.

NASA's Parent Advisory Board increased in size and activity level. The board held meetings throughout the summer and academic year. The summer 1996–97 NASA program manuals were completed for each discipline, which included a variety of lessons, activities, and other related materials. Students participated in educationally sound, motivational field trips to NASA's Johnson Space Center in Houston and the Texas Utilities Mining Company's coal operation in Mt. Pleasant, Texas. Students also participated in a series of seminars and workshops that focused on self-respect, responsibility, time management, and other topics essential to positive student development. Career and self-exploration activities allowed the students to gain insight into MSET studies beyond high school as they relate to employment, geographical location, pay scales, and work environment.

Student Achievements

All of the students are enrolled in precollege preparatory courses designed to further increase the level of interest and knowledge in careers in science, mathematics, and engineering. The students also achieved an understanding of MSET careers through guest lecturers who used personal and professional experiences during their presentations.

Lesson Learned

The students were very receptive to scientific and mathematical activities, which included problem-solving strategies using basic mathematical computations and computer simulation activities correlated with the science and mathematics instruction.

Jarvis Christian College
NASA Center for Academic Excellence

Issues/Challenges

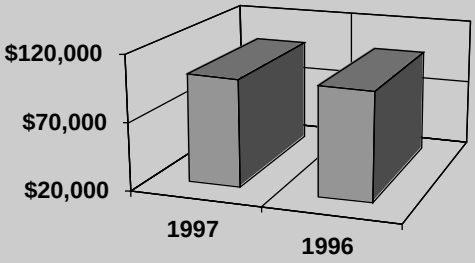
The biggest challenge is getting all the parents to participate, as well as getting students to continue to participate in the program each summer, because the majority of the students need to work during the summer.

Partnering

The Jarvis Christian College NASA Center for Academic Excellence is involved in a cohesive partnership with target schools and counselors. This partnership allows the NASA Center to access student records as well as conduct evaluations. The partnership also allows for counselors to personally recommend student applicants for enrollment into the program. Included within this partnership is the agreement to release grade reports throughout the semester to the NASA program. The following institutions are also involved in partnering with the Jarvis Christian College NASA Center for Academic Excellence:

- NASA's Johnson Space Center, Houston (field trip)
- Jarvis Christian College (host site and transportation)
- Tyler Independent School District (students and curriculum materials)
- Pittsburg Independent School District (transportation)
- Texas Utilities Mining Company (field trip)
- Prairie View A&M University's Chemistry Department (guest lecturer)
- Hawkins Independent School District (curriculum materials)
- Parent Advisory Board

Funding History—
Jarvis Christian College



Lincoln University
Lincoln Advanced Science and Engineering (LASER) Program

Dr. Robert Langley
Lincoln University
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Telephone: (610) 932-8300

Funded by NASA, the Office of Naval Research, and other sources, LASER employs a comprehensive plan to increase the number of well-prepared minority students seeking a Ph.D. degree in science, engineering, and mathematics (SEM). This preparation begins with the precollege component, known as "Early Alert." The Early Alert Program seeks to motivate minority students in grades 7 through 12 for possible careers in SEM. The specific goals of Early Alert are:

- Motivate minority precollege students to pursue undergraduate studies in SEM
- Motivate minority Early Alert students to apply to the 10-week LASER Summer Bridge Program
- Provide support services and exposures that will increase the likelihood of the students' success in technical careers

The Early Alert Program is held in Philadelphia on Saturday mornings. Each grade has one lead instructor, one technical professional, and at least one LASER mentor. Students in grades 7 through 12 review concepts in mathematics, biology, chemistry, physics, engineering, and computing, respectively. Students are encouraged to participate in local science bowls and poster sessions. Outstanding students in grades 10 and 11 are invited to participate in a 3-week Early Alert Summer Program. This program, held on Lincoln University's main campus, encourages students to develop individual projects, such as how to design and launch a rocket. The eligibility requirements for Early Alert are:

- At least a 2.50 grade point average in the middle and/or high school
- Three letters of recommendation
- An interview with the LASER staff

The LASER Summer Bridge Program offers a well-structured curriculum and a supportive environment to help students make a smooth transition to college. The students are provided with textbooks, academic support, counseling services, parent and mentor support groups, field trips, and guest seminars by minority professionals. Students can earn up to 18 college SEM credits during the summer. Successful students in the Summer Bridge Program receive merit-based scholarships in the freshman and sophomore

Lincoln University
Lincoln Advanced Science and Engineering (LASER) Program

years at Lincoln. The Academic Year Program has activities similar to those in the Summer Bridge Program. LASER students are required to participate in offcampus research experiences to remain eligible for a scholarship. After the sophomore year, a select number of outstanding students may apply for LASER fellowships in their junior and senior years. LASER fellows are required to participate in oncampus research activities, special programs, and graduate school enrichment activities.

LASER students participate in a research experiment.

National Hispanic University
Cientificos 2

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Program Overview

The Cientificos 2 project during its second year (January 1, 1997–December 31, 1997) formulated its objectives and activities based on the following goals:

- Increase the college-going rate among socially and economically disadvantaged and disabled high school students residing in the City of San Jose and their level of preparation for college studies in math, science, engineering, and technology (MSET)

- Improve the mathematics, science, and technology literacy among the same targeted high school students

The goals of the project during its second year were successfully addressed by implementing the (1) Academic Year Saturday Academy utilizing Peer Advisor Learning Skills (PALS) tutors and math and science instruction and (2) the Summer Enrichment Academy. The project was implemented in collaboration with the Upward Bound Program, a precollege program of the National Hispanic University with similar but distinct goals and services. The collaboration between Cientificos 2 and the Upward Bound Program added more advanced math and science curricula, including algebra 1, geometry, introduction to calculus, and biology. Also, additional faculty were hired with the Cientificos grant, strengthening the math and science precollege component.

Enrollment Data

Forty-one high school students from the 9th through 12th grades were enrolled in the program. Thirty-nine students completed.

Outcomes to Date

A highlight of the summer program was the very successful "Knowledge Bowl" challenge to neighboring San Jose State University's precollege program. The "Knowledge Bowl" was an academic competition in mathematics, science, social sciences, and English. Despite the strong emphasis of the San Jose State University program in mathematics and science, the Cientificos 2 project participants outperformed their opponents 585 points to 290, consistently outperforming in math and science.

Summer Academy participants role-play at a career workshop.

PACE Awards

National Hispanic University Cientificos 2

In addition, the collaboration enabled Cientificos 2 Project activities to be expanded during the academic year from conducting only 5 Saturday Academies to 10, as well as students being eligible to participate in a Southern California college tour in addition to visits to local colleges and universities. The collaboration with the Upward Bound Program also allowed the Summer Academy to be expanded to 6 weeks during which students were eligible to participate as day students or as participants in the residential university experience sponsored by the Upward Bound Program at the San Jose State University dormitories. Thirty-one of 41 students participated in the residential experience at San Jose State University (Sunday evening through Thursday) and were transported daily to classes at the National Hispanic University (Monday through Friday), while 10 students were day students.

The 6-week Summer Academy activities were so numerous that it was decided to postpone a site visit to NASA's Ames Research Center to December 1997. Instead, campus visits were made to four local colleges and universities, and other educational field trips were taken.

The retention rate this summer was 92.6 percent, with 38 of the 41 students attending regularly. With regard to instruction of mathematics, 9 students completed the algebra 1-level class, 20 students completed geometry, and 7 completed the introduction to calculus class. For science instruction, 18 students completed the biology class. All students were enrolled in at least one 5-unit mathematics or 5-unit science class (45 contact hours), and 17 students enrolled in a math and science class. All students were also enrolled in a third class (composition, social foundations of history, or Spanish II) sponsored by the Upward Bound Program.

The following is a list of field trips, motivational speakers, and college visits conducted during Year 2 of the project:

June 26, 1997
Santa Clara University (college visit)

July 8, 1997
Mr. Don Dorsey, Equal Opportunities Program, Foothill College (on campus speaker)

July 9, 1997
Ms. Alisa Hall, Events Specialist, "Etiquette: Feeling Comfortable Where You've Never Been Before" (oncampus speaker)

July 10, 1997
University of California, Santa Cruz (college visit)

July 11, 1997
Field Trip to Alum Rock Park–Biology: specimen collection

July 17, 1997
California State University, Hayward (college visit)

July 21, 1997
James Wallace II: Story Telling Workshop (on campus)

July 22, 1997
Knowledge Bowl Competition (at Santa Clara University)

July 23, 1997
Coleeta McElory: College and Financial Aid Workshop (on campus)

July 24, 1997
San Francisco State University (college visit) and field trip to San Francisco Planetarium and Laserium

July 25-27, 1997
Student and Staff Retreat: Workshop Presenters–Jodi De Lucca (Psychologist) and Steve Paul (Database Manager)

July 28, 1997
Field Trip to Grant Park, San Jose–Biology

PACE Awards

Students were pretested prior to the start of the Summer Academy in the areas of math and science using the Iowa Test of Educational Development (Levels 15–18). Students were retested following the conclusion of the summer courses during the week of August 4, 1997. Those test results are forthcoming. This information will be incorporated into the program final evaluation report at the conclusion of Year 2 and forwarded to NASA.

In summary, the experience of identifying low-income Hispanic and other minority students to undergo tutorial and counseling services provided through Upward Bound and supplemented by advanced mathematics and science curricula through the NASA grant proved successful beyond the traditional introductory-level courses offered. The NASA Cientificos 2 grant enabled the program to add more advanced math and science curricula, plus the introduction of successful role models in math and science. The project participants will now be tracked by the staff to follow the progress they make in their math and science classes. Academic advising will be conducted through the college prep math and science courses. Cientificos 2 will continue to provide the students with math and science tutoring after school and advanced math and science instruction during the 1997–98 Saturday Academy. Instructor/student ratios will not exceed 1/20.

Northwest Indian College Seaquest Phase II

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Seaquest students get hands-on experience during a field activity on the water.

Program Overview

The NASA Seaquest Program at Northwest Indian College is designed to motivate Native American youth (ages 14–19) to master the math/science disciplines and consider a career in the sciences. Learning experiences are fine-tuned to the learning style and cultural heritage of Native American youth and provide them with practical applications that they can relate to their immediate world. The Seaquest Program is designed to increase the number of disadvantaged Native American students who pursue careers in math, science, engineering, and technology or related fields. The program offers academic-year courses at night with a strong emphasis on its 6-week intensive summer program. In its Phase II Program, there is new emphasis placed on developing a peer-tutoring network for Seaquest students as well as implementing Seaquest science courses over a satellite network using distance-learning technologies available at Northwest Indian College. To date, from its inception in April 1994, the Seaquest Program has serviced 172 Native American youth.

Ninety-three percent of Seaquest students have continued or graduated from high school. This fall, the number of former Seaquest students to enter a degree program at Northwest Indian College or other institutes of higher learning grows to 13. Nineteen percent of the students participating in a Seaquest course since 1994 have graduated from high school, and 7 percent of these students are continuing on in college.

Outcomes to Date

Northwest Indian College's NASA Seaquest Phase II Program has enjoyed success in its first year. During the academic year, students had the opportunity to earn high school credit by enrolling in a Seaquest world geography course. Seaquest also sponsored three students, sending them to the national AISES Conference in Salt Lake City, Utah, in November. The fourth annual summer session had 48 Native American participants, ages 14–19.

A spring break field trip took students to the University of Washington's campus, where they met with students from the campus chapter of AISES (American Indian Science and Engineering Society), enjoyed a lecture given as part of the Washington NASA Spacegrant Lecture Series (this one by a geologist interested in dinosaurs), stayed in dorms, and visited Microsoft's world headquarters.

PACE Awards

This year's 6-week summer program featured courses in marine science, environmental science, physical science, math, computers, English, and study skills, with a focus on contemporary Native American issues. Classes took place from Monday to Thursday, 8:30–4:30 p.m. and sought to teach both in a collegiate lecture style and actively through participation in hands-on activities. Field or lab activities took place each Monday–Wednesday afternoons and all day on Thursdays and were designed to enhance the morning's lecture topics with real-life examples.

Twenty-one NASA Summer Seaquest Program students were enrolled concurrently in summer youth employment programs. Two students were selected from the NASA Summer Seaquest Program to attend NASA Space Academy in Alabama in August. Thirteen students were certified in P.A.D.I. scuba during the 1997 NASA Summer Seaquest Program. Forty-eight students (27 female and 21 male) participated in the fourth annual, 6-week intensive NASA Summer Seaquest Program at Northwest Indian College. These students came from 12 area schools and represented the Swinomish, Nooksack, and Lummi Indian Tribes.

The numbers of students from area schools who have participated in a NASA Summer Seaquest Program are as follows:

High School	**Location**	**Number of Students**			
		1994	**1995**	**1996**	**1997**
Lummi Tribal High School	Lummi Reservation	4	12	10	11
Ferndale High School	Ferndale, WA	13	15	16	12
Bellingham High School	Bellingham, WA	1	3	3	1
La Conner High School	La Conner, WA	11	9	6	2
Anacortes High School	Anacortes, WA	0	0	1	1
Mount Baker High School	Deming, WA	1	10	3	3
Mount Vernon High School	Mount Vernon, WA	1	1	0	0
Nooksack Valley High School	Everson, WA	0	4	0	3
G.E.D. Instruction	Nooksack Tribal Center	0	1	0	0
G.E.D. Instruction	Northwest Indian College	0	0	0	1

High School	**Location**	**Number of Students**			
		1994	**1995**	**1996**	**1997**
Vista Middle School	Ferndale, WA	1	9	2	5
Lynden Middle School	Lynden, WA	1	0	0	0
LaConner Middle School	La Conner, WA	0	0	1	3
Lummi Tribal School	Bellingham, WA	0	3	5	2
Mount Baker Middle School	Deming, WA	0	0	0	4
Shuksan Middle School	Bellingham, WA	0	2		
Total Number of Students		**33**	**69**	**47**	**48**

PACE Awards

Northwest Indian College
Seaquest Phase II

Seaquest Tutoring Network

A strong foundation has been laid for a region-wide peer tutoring network. The Seaquest Program seeks to collaborate with other programs to make this peer tutoring venture as sound and effective as possible. The following have agreed to be partners in this venture:

- NASA Seaquest Program
- Washington MESA Program
- University of Washington's Educational Talent Search
- The Swinomish Bridge Program
- Lummi High School
- Lummi Youth Outreach Task Force
- Nooksack Tribe Learning Center
- Western Washington University's Native American Peer Mentoring Network
- Northwest Indian College's Y'ae Tenges Program (Peer Mentoring)

Some of the goals the Seaquest Program has for the peer tutoring network for the academic year of 1997–98 include:

- Three tutoring sites will be set up.

- Ten peer tutors (current Native American college students) will be hired to work with 20 selected students throughout the school year.

- Twenty Native American high school students to be tutored will be selected from the 1997 NASA Summer Seaquest Program.

Pasadena City College PACE

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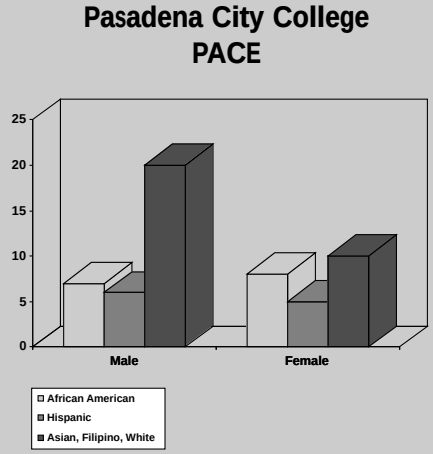
Program Overview

NASA's MURED in 1996 sponsored Pasadena City College to provide an academic enhancement project for minority students from four middle schools. Pasadena Unified School District students attended classes for 11 Saturdays, February 22 through May 31. Students met 4 hours per Saturday. The core courses covered were mathematics/computer studies, (general) science, and engineering and technology. The coursework pointed scholars toward an annual theme (for example, in 1997–98, the theme is "Telepresence and Remote Sensing"). This project was enriched by the continuous access to scientists, engineers, staff, and technicians from the Jet Propulsion Laboratory, Pasadena City College, and Pasadena Unified School District.

Enrollment Data

The targeted students were disadvantaged students, with emphasis on African Americans, Asians, Native Americans, Filipinos, Hispanics, and Pacific Islanders. Students must be in 7th or 8th grade in a Pasadena Unified School District middle school. Nomination forms are sent to school administrators, with guidelines. Each school nominates 30 students. Participants have SAT scores at the 85th percentile or above in mathematics and reading/language. Their grade point averages are 2.8 or higher.

For fiscal year 1996–97, the total enrollment was 56, with the breakdown shown to the right.



Major Strategies

The Saturday instruction incorporated technology, hands-on learning, Orange County Marine Institute (field trip-simulated teleconferencing and broadcasting of marine biology research), problem solving, and skills development. The program has a strong academic linkage to high school, with an eye beyond to college. The program provided mentoring and exposure to career options. The program involved parents, the community, and Pasadena City College teachers. (During 1997–98 a new service called the Family Forum will offer enrichment workshops for parents/guardians.)

Pasadena City College
PACE

PACE Awards

Outcomes to Date

An evaluation was done by an independent evaluator. The team activities improved student self-esteem, enhanced math and computer skills, and enhanced engineering skills through assembled kits and computers. Individuals developed a more positive attitude toward science, toward the space program and its accomplishments, and toward school, and they were exposed to working engineers, technicians, and college science majors.

Some of the activities of the project are as follows:

- Scholars built electronic kits.
- Scholars built two fax/modem, CD-ROM IBM-compatible computers.
- Scholars' computers were bundled with six Dorling Kindersley CD's and workbooks.
- Scholars received hands-on application of the scientific method and microbiology.
- Scholars used VoiceType 3.0 (to communicate verbally with computers).
- Scholars reviewed telepresence and CuSeeMe technologies.
- Scholars received Pasadena City College library cards.
- Scholars visited the Orange County Marine Institute, producing a research video.
- Scholars received training in writing and communications skills.
- Scholars received instruction in a wide variety comparative subjects: photosynthesis, eye anatomy/physiology, and molecular biology.
- Parents received information on perception and learning differences among people.
- Parents received study skills workshop training and literature.
- Parents received admissions information from five colleges and/or universities.

Pasadena City College NASA Pre-College Science Academy students demonstrate CuSeeMe technology.

Tracking

A data base (provided by Pasadena Unified School District) tracks scholars by name, address, ethnicity, gender, grades, career choice, college entrance, college major, and highest academic level completed.

Future Goals

The project will continue to offer introductory, review, and hands-on participatory projects for young minority and/or disabled scholars into math, science, engineering, and technology core areas. Activities are designed to promote and strengthen their desire to pursue enrollment in precollege preparatory courses throughout middle and secondary high schools. The project's long-term goal is to increase the number of minority and/or disabled scholars who receive associate degrees form Pasadena City College and surrounding community colleges and bachelor degrees from the state universities and private universities in the core areas of MSET.

The classes were limited to a teacher/staff to student ratio of 1/20. Pasadena City College students are hired as staff—that is, technical assistants. NASAPSA (grades 7–9) is a bridge program that links the Pasadena Unified School District elementary school "Saturday Science Academy" (grades 4–6) and the high school academies (grades 11–12). The challenge is to expand the project to serve 9th and 10th graders in l998.

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Southwestern Indian Polytechnic Institute PACE

Program Overview

The Southwestern Indian Polytechnic Institute's PACE/MSET serves 30 high school students destined for MSET careers. Coming from reservation schools around Albuquerque, these students attend a 6-week summer residential enrichment program on the institute's campus, receive year-round academic, college, and career guidance, attend Saturday workshops, and communicate, if possible, through e-mail regularly. The fundamental goal of the project is to motivate and enable minority students to choose, pursue, and achieve postsecondary education in the MSET fields successfully.

Students selected a module for the summer program—astronomy, geology, engineering, or computer science. An instructor, an intern, an assistant, and a volunteer scientist formed a team to plan the curriculum, activities, field trips, guest lecturers, projects, and recreation related to the module topic. Students received instruction in math, science, communication, and college survival as they worked on projects, presentations, research, and applications of their module material. They went on significant field trips locally and to NASA's Johnson Space Center. Several guest lecturers also shared specialized information about the module subject. The students were able to take home a rebuilt computer system, a telescope, and experiments on which they worked during the session. They presented their module information, project, activities, and experiments at an open house on the last day of the program. Parents, staff, students, and the community visited the displays.

Objectives

The objectives are to increase knowledge, skills, and abilities in college prep classes, score at or above the 40th percentile in standardized tests, improve grade point averages, and involve parents and students in workshops for college survival and creative applications of MSET.

Enrollment Data

Eighteen students are female, and 12 are male. Fifteen are 9th graders, 8 are sophomores, and 7 are juniors. One hundred percent are Native American. Students were recruited through local liaisons at schools, flyers, and some presentations. After filing an application, which includes an essay, students were selected based on desire and commitment to participate.

Outcomes to Date

All students received a “B” or better grade for their work. The students evaluated the program as beneficial to continued success in high school and enhancing their choice of science careers. They enjoyed seeing movies from the module viewpoint and discussing specific applications of concepts studied in the classroom then evidenced in the movie plot and settings. The students had opportunities to learn to swim, make a flute, construct a resume, learn line dancing, explore German, Spanish, and Navajo languages, and to experience other miniclasses of a similar nature. Because this is the first year of the project, which began in April, comparison data still need to be gathered for confirmation of expected success in achieving all objectives.

Each module group was given a set of parameters, objectives, and dollar amount to budget. The facilitating team met several times in March, April, and May to plan and develop curriculum. Enthusiasm and ownership were high. Frustration developed over time and money constraints. Sometimes the students were reluctant to participate in the high-demand activities that differed greatly from a traditional classroom environment. This was the first year of the project, and overall it was evaluated as creative and successful—a good model for next year.

Partnering

This NASA project partnered with the Upward Bound and Microsoft projects at Southwestern Indian Polytechnic Institute and with Sandia National Laboratories, the University of New Mexico, and local businesses, often sharing resources and talent to make all modules as creative and efficient as possible.

Saint Augustine's College Summer Science Camp

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Program Overview

St. Augustine's Summer Science Camp is a joint effort among the college, Raleigh's public Enloe Magnet High School, and the non-profit Higher Education Extension Service. The goal of this collaborative camp is to encourage those students who have traditionally been underrepresented in the sciences to develop a life-long interest in MSET areas and to enroll and succeed in mathematics and science courses that will prepare them for MSET college majors.

The Summer Science Camp is an enriching and exciting summer program with academic-year follow-up activities. The summer component is a 4-week commuter program and simulates a college experience, offering classes in science, mathematics, communications, computer literacy, and test-taking enlivened by the addition of NASA materials, "hands-on" laboratory and computer work, presentations by science professionals, and field trips to nearby technical installations. Support for campers is ongoing. Academic-year activities include tutorial sessions in mathematics and science for camp participants, as well as a networking program each semester. The fall networking program is planned to be held on October 28, 1997, for student participants, their teachers, parents, and friends. A North Carolina State University Mission to Mars researcher, Dr. Jerold Walburg, will be the guest speaker for that program.

Students are eligible to continue in succeeding summers. Upon entering college, camp participants will be given priority in St. Augustine's National Science Foundation Alliance for Minority Participation Summer Bridge Program and for the Alliance for Minority Participation's college scholarships and paid research opportunities. To evaluate the program, participants' course-taking, grades, and scores will be compared to those of a carefully constructed control group.

Enrollment Data

The camp will enroll up to 60 African-American 9–11th grade "graduates" of the college's Saturday Science Academy for 6–8th graders and from Enloe Magnet High School by the end of the project. Each year, applications are accepted from students exiting 9th grade at Enloe Magnet. Twenty students are selected each summer. The initial 20 come back the remaining summers, while a new 20 will be added each year of the project. Targeted groups

are those students with grades of C or better in all high school mathematics and science courses. Particularly, the camp looks at those students from underrepresented career areas, MSET. Participants are chosen for their potential for success in demanding MSET courses.

Outcomes to Date/Partnering

An intense year of planning culminated with the first summer camp being carried out during the weeks of June 16–July 11, 1997. Twenty students exiting 9th grade were selected to participate as the Year 1 cohorts. Two St. Augustine's faculty and two teachers from the partnering Enloe Magnet High School taught content area classes. The project evaluator, C. Morning, is from the partnering nonprofit organization, the Higher Education Extension Service. Lloyd Gardner, the principal at Enloe Magnet, maintains close ties through program attendance and support.

Saint Augustine's Dr. L. Shimpi, an assistant professor, taught the computer skills course and focused on teaching students how to use PowerPoint to create multimedia presentations, as well as using the World Wide Web in searching research literature. Dr. Shimpi also served as an assistant program director. Dr. D. Brown, an associate professor, taught the communications skills class. Some of the areas of focus in the communications class included interpersonal and intrapersonal communications. Key strategies for giving an effective multimedia presentation to an audience were integrated in the class as well. M. Petree Mouzzan, a teacher from Enloe Magnet High School, taught the mathematics class and served as an assistant program director. Her course instruction focused on teaching the students a basic course in statistics. C. Wilder, also a teacher from Enloe, taught the integrated science course. She reviewed some basics on the scientific methods and the metric system and then proceeded with content in basic physics and chemistry.

Students were taken on field trips to the North Carolina State Museum of Natural Sciences, the National Weather Service Center, and NASA's Virginia Air and Space Center. Various MSET Program speakers included C. Morning, a professional engineer and former NASA project engineer, J. Woods, a St. Augustine's alumnus and mathematics teacher, and C. Morris and S. Taylor, MSET undergraduate students. All emphasized to camp participants the importance of reading, studying, developing relationships with mentors, and making better than "average" grades.

Student Achievements

The summer program was drawn to a close with students presenting group projects to parents, summer camp faculty and staff, colleagues, their principal, and Saint Augustine's science faculty.

Saint Augustine's College
Summer Science Camp

PACE Awards

These projects integrated information learned by students in all four content areas. Two groups were selected as the most outstanding based on excellence in integrating communications skills, computer integration, accuracy of mathematics, and science content credibility into the oral and written presentations. Jamal Turpin and Gwendolyn Bass won first place for their research and presentation of "Water Storage and Usage on the Moon." Teenna Burnside, Alexia Whitaker, and Aya Wallace won the second place award.

Each teacher also selected the student that exemplified outstanding achievement in the content areas. Billyde Brown was selected as the outstanding mathematics student, Gwendolyn Bass was the outstanding science student, Tracie Williams was the outstanding achiever in communications skills, and Teenna Burnside was the outstanding student in computer skills.

Summer Science Camp participant, Gwendolyn Bass, with workshop facilitator, Mr. Anthony Hinton, at the North Carolina State Museum of Natural Sciences.

Stillman College Summer Science Camp/Saturday Academy

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Program Overview

The Stillman College NASA PACE/MSET Program consists of a 6-week Summer Science Camp and a Saturday Academy. The Summer Science Camp focuses on classroom instruction and hands-on laboratory enrichment activities centered around mathematics, physics, chemistry, computer science, and biology. It also includes science enrichment field trips and seminars. The Saturday Academy focuses on tutoring in math/science courses, writing, and SAT/ACT preparation.

Objectives

The objectives of the project are as follows:

- Encourage high school students to take more math/science courses
- Motivate high school students to pursue careers in MSET fields
- Improve the students level of competence in math/science by at least 25 percent
- Provide direct contact with mentors who will motivate and encourage students to pursue careers in MSET fields
- Get parents more involved in their children's education

Enrollment Data

The total enrollment since the project's inception is 175 students; June 1995–96 had 55 students, June 1996–97 had 50, and June 1997–98 had 70. The target group is African-American males and females in grades 9–11.

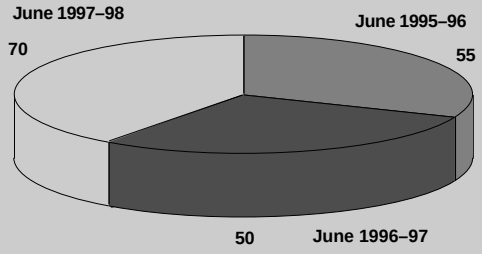
Recruitment Strategies

The director of the project visits the school campuses and takes applications, issues announcements, and gets recommendations from high school math/science teachers.

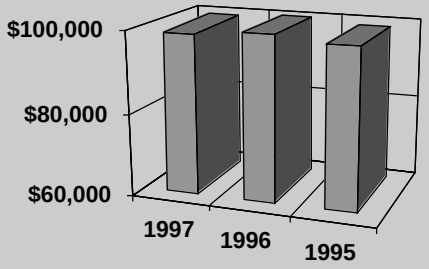
Outcomes to Date

Based on pretest and posttest analysis, students have improved their competence by at least 30 percent.

Stillman College PACE Enrollment



Funding History—Stillman College



University of Texas at El Paso Excellence in Technology, Engineering & Science (ExciTES)

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Program Overview

Excellence in Technology, Engineering & Science (ExciTES) at the University of Texas at El Paso (UTEP) was funded by NASA PACE/MSET in 1995 and is a longitudinal program designed to excite and nurture the interests of a broad spectrum of minority students in science, engineering, and mathematics, to provide committed/highly motivated students demonstrating high potential with sustained nurturing and support, and to develop and strengthen the capacity of local schools to prepare students for college-level mathematics, science, and engineering education. ExciTES features two major activities that directly serve students: (1) academic year synergizers and (2) summer programs for high school students at different levels. Within these activities, ExciTES interacts with a variety of constituencies that include science, engineering, and mathematics professionals, undergraduate engineering and science students, teachers, and parents. Synergizers are activities that fully engage high school students in engineering- and science-related activities that are rigorous and challenging. Specifically, the synergizers engage high school students in local, regional, and statewide design competitions.

Longitudinal in scope, ExciTES now offers three summer programs based on the classification of the high school student. The entry point for students into the summer program or summer kickoff is the summer between their freshman and sophomore years (as rising sophomores). As students return the following summers, ExciTES+ and ExciTES++ are offered to rising juniors and rising seniors, respectively, where each program increases in intensity and is designed to challenge the students' critical thinking skills and to broaden their experience in engineering and science. This stage-wise activity engages the students continuously up through their high school graduation.

Enrollment Data

The targeted population is El Paso area high school students. Rising sophomores, juniors, and seniors participate in the summer activities while the academic year synergizers are open to grades 9 through 12. The demographics of the El Paso area are reflected in the participation of El Paso area youth in the ExciTES program: 80.8 percent Hispanic, 0.4 percent Native American, 1.2 percent African American, 2.7 percent Pacific Islander/Alaskan native, and 15 percent other (total of 515). Students are recruited in a variety of ways—past participants are invited to attend, applications are distributed to all high schools, public service announce-

ments are given on the public radio station, and participating teachers encourage students to apply.

Outcomes to Date

Year 2 has indeed been an exciting year for the project with significant outcomes across all areas, including the following:

- The percentage of students with high self-ratings of their confidence and ability to perform science research increased from 24 to 65 percent and in designing engineering projects increased from 24 to 86 percent as a result of ExciTES. Moreover, student self-ratings of thinking about a career in science or engineering increased dramatically, doubling from 41 to 80 percent the percentage of students rating this a 4 or 5 on a 5-point scale.

- The involvement of undergraduate students continues to be a powerful intervention for the individual student and the program as a whole. Undergraduate students have the direct opportunity to apply the principles of their discipline, establish enduring relationships with faculty, serve as role models to future generations of scientists and engineers, and recognize the value of lifelong community service.

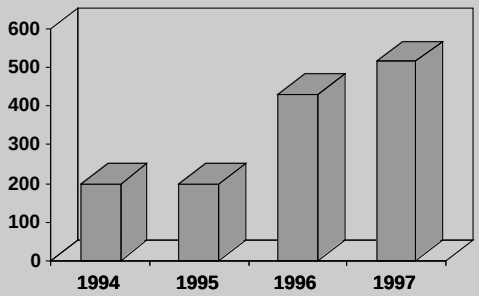
- There has been a surge in teacher involvement and professional development as evidenced through a wide array of curricular products and activities.

- There is evidence that the ExciTES program has an impact on students beyond those directly participating in activities. Teacher development and curricular dissemination activities supported by ExciTES benefit hundreds, if not possibly thousands, of students. Moreover, there is evidence suggesting that academic development has been enhanced for all students touched by ExciTES.

- With initial support from NASA, ExciTES has been able to pursue and successfully secure funding from a number of sources. These have included corporate funding from General Motors and Hewlett-Packard and other Federal agencies, such as the National Science Foundation and the Environmental Protection Agency.

- University faculty involvement in ExciTES has increased by more than 100 percent. This includes faculty-driven grant writing to directly support programmatic activities of the ExciTES program. One such grant has been successfully awarded expressly for ExciTES curricular development and dissemination.

University of Texas at El Paso Project ExciTES Enrollment



PACE Awards

University of Texas at El Paso Excellence in Technology, Engineering & Science (ExciTES)

- A concerted effort has been made to disseminate the NASA model to local, state, and national constituencies, with one publication earlier this year and another in the works for this fall.

Student Achievements

Eight students were involved in ExciTES program delivery and university research.

Partnering

- *El Paso Collaborative for Academic Excellence (EPCAE)*. As an ExciTES partner, EPCAE provides funding for the undergraduate students who assist in the day-to-day programmatic activities of ExciTES. EPCAE additionally provides stipends to the teachers who participate as curriculum developers and as participants. EPCAE is funded by the National Science Foundation through the Urban Systemic Initiative.

- *General Motors*. Grant monies support undergraduate student salaries and participant costs.

- *Hewlett-Packard*. The Diversity in Education award was used to assist in the administrative costs of ExciTES.

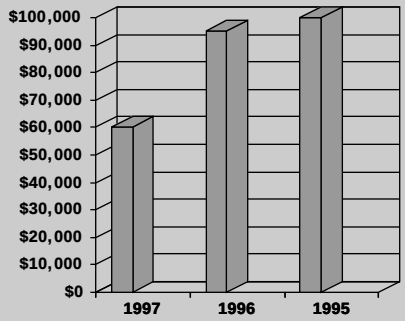
- *American Society for Civil Engineering (ASCE)*. ASCE awarded the College of Engineering at the University of Texas at El Paso with monies for field trips associated with the ExciTES program.

- *CUESTA/JPL*. The Jet Propulsion Laboratory funded the University of Texas at El Paso with the CUESTA grant, and monies were used to support ExciTES undergraduate staff.

- *Texas Society for Professional Engineers (TSPE)*. TSPE sponsors the statewide design competition and funded the five winning teams' travel expenses to Austin.

- *College of Engineering*. Travel to the statewide competition in Austin for two of the ExciTES undergraduate staff was paid by the College of Engineering. The dean also contributes space, use of the copy machine, and paper that translates into a substantial contribution.

Funding History—UTEP



Partnership Awards

Partnerships between NASA installations and minority universities have great potential to further the ongoing mission of NASA and to assist in developing a diverse community of research institutions with a significant percentage of socially and economically disadvantaged students. The Partnership Award is designed to create and strengthen such partnerships. Projects supported are unique and innovative, and they fall outside of NASA's usual competitive programs. These projects show evidence of having high potential for long-term support from other sources. Special efforts are made to include outreach to individuals with disabilities and to public schools with enrollments of predominately socially and economically disadvantaged students.

Partnership Awards are funded for no more than 2 years, at a maximum of $200,000 per year for each participant minority institution. Second-year funds are contingent upon the successful completion of the first year's activities. NASA installations and minority institutions' partners are expected to leverage the impact of the award with other funding.

Awards are made in three categories: education, research, and a combination of education and research. Education awards are made in support of precollege projects, bridge projects, course and curriculum development projects, and/or projects that expand the understanding and use of education technology. Research awards are made to cover a wide spectrum of research that is of interest to NASA. Combination awards are made to projects that skillfully combine activities in both the research and education areas. During the current reporting year, 15 education awards, 18 research awards, and 32 combination awards were made.

A list of research project awards made during the current reporting period can be found in a companion MURED report titled Research and Technology Report 1997. The education project awards and selected combination project awards [labeled (c)] made during the current reporting period are at right.

Bowie State University

California State University–Los Angeles

California State University–Los Angeles (c)

Cuyahoga Community College

Edward Waters College

Fayetteville State University

Florida A&M University

Florida International University

Mississippi Valley State University

Navajo Community College

Navajo Community College (c)

National Hispanic University

National Hispanic University (c)

Norfolk State University

Norfolk State University (c)

Oglala Lakota College

Salish Kootenai College

San Antonio College and Our Lady of the Lake University

Southern University at New Orleans

University of Texas–El Paso

Voorhees College

Xavier University of Louisiana

Partnership Awards

Bowie State University
Bowie State's Satellite Operation & Control Center (BSOCC)

Dr. Nagi T. Wakim
Bowie State University
14000 Jericho Park Rd.
Bowie, Maryland 20715
Telephone: (301) 464-7241

California State University–Los Angeles
NASA Dryden Flight Research Center and California State University, Los Angeles Presents: The Science Ambassador Distance Learning

Dr. T. Jean Adenika-Morrow
California State University–Los Angeles
Charter School of Education
5151 State University Dr.
Los Angeles, California 90032
Telephone: (213) 343-4371

California State University
CSLA/JPA Partnership to Ensure Disadvantaged Students Become Scientists and Engineers

Drs. Martin Epstein, Milan Mijic & William Taylor
California State University–Los Angeles
Physics and Astronomy Dept.
5151 State University Dr.
Los Angeles, California 90032
Telephone: (213) 343-2100

Cuyahoga Community College
Mobile Aeronautics Education Laboratory (MAEL) Replication

Mr. J. Thomas McManamon
Cuyahoga Community College
SEMMA Program, Metropolitan Campus
2900 Community College Ave.
Cleveland, Ohio 44115
Telephone: (216) 987-3658

Edward Waters College
Classroom of the Future Center (COTF) Master Science Teacher Certification (MTCP) Program

Ms. Doris Brown
Edward Waters College
1658 Kings Rd.
Jacksonville, Florida 32209
Telephone: (904) 739-3002, (904) 366-6561

Fayetteville State University
A Preservice/Inservice/Model for Teaching Integrated Math Science with Technology (TIMS/T)

Dr. Leo Edwards, Jr.
Fayetteville State University
Fayetteville, North Carolina 28301
Telephone: (910) 486-1669

Florida A&M University
Project Discover

Dr. Sybil C. Mobley
Florida A&M University
1 SBI Plaza
Tallahassee, Florida 32310
Telephone: (904) 599-3565

Florida International University
Project S.P.A.C.E.

Dr. Gustavo Roig
Florida International University
FIU College of Engineering
University Park, EAS 2450
Miami, Florida 33199
Telephone: (305) 348-3027

Partnership Awards

Mississippi Valley State University
Incorporating Information Technology to Enterprise Zones and Empowerment Community School Systems

Dr. Stacy J. White
Mississippi Valley State University
14000 Hwy. 82 West
Itta Bena, Mississippi 38941
Telephone: (601) 254-3661

The National Hispanic University
Minority Educators Neurolab Training for Excellence in Science

Dr. Maria Cruz Viramontes de Marin
The National Hispanic University
14271 Story Rd.
San Jose, California 95127
Telephone: (408) 254-6900

The National Hispanic University
Learning Innovative Mathematics, Science with Technology

Dr. Raul Cardoza
14271 Story Rd.
San Jose, California 95127
Telephone: (408) 254-6900

Navajo Community College
American Indian Network Information Center (AINIC)

Mr. Alvino "Vino" Sam
Navajo Community College
Tsaile, Arizona 86556
Telephone: (520) 724-6612

Navajo Community College
Science Enrichment Activities

Dr. Mark C. Bauer
Navajo Community College
Tsaile, Arizona 86556
Telephone: (505) 368-3590

Norfolk State University
Rural Outreach Project

Dr. Clarence Coleman
Norfolk State University
Norfolk, Virginia 23504
Telephone: (757) 683-8180

Norfolk State University
The "Science and Math for Everyone" Project

Dr. Moses Newsome, Jr.
Norfolk State University
Norfolk, Virginia 23504
Telephone: (757) 683-8663

Oglala Lakota College
Project "SMASH" (Student Math & Science Healthcare Initiatives)

Drs. Donna J. Demarest & Kathie McAlpine
Oglala Lakota College
Department of Nursing
P.O. Box 861
Pine Ridge, South Dakota 57770
Telephone: (605) 867-5856

Partnership Awards

Salish Kootenai College
NASA Aeronautical Ambassador Program for American Indians (NAAPAI)

Ms. Judy Gobert
P.O. Box 117
Pablo, Montana 59855
Telephone: (406) 657-4800 ext. 211

San Antonio College and Our Lady of the Lake University
Teaching Learning Model for Middle School Geoscience

Ms. Cecilia V. Gonzales & Dr. Jean Kucker
San Antonio College
1300 San Pedro Avenue
San Antonio, Texas 78212
(210) 733-2442

Southern University at New Orleans
NASA/SUNO Partnership for Excellence in Mathematics Education

Drs. Penney Heath & Robert Perry
Southern University at New Orleans
6400 Press Drive
New Orleans, Louisiana 70126
Telephone: (504) 286-5149

University of Texas–El Paso
Distance Learning Strategies Promoting Minority Access to Internet Tools and Resources

Dr. Michael A. Kolitsky
University of Texas–El Paso
P.O. Box 68651
El Paso, Texas 79912
Telephone: (915) 747-5010

Voorhees College
Voorhees College GIS Center

Dr. Jun Qin
Voorhees College
Denmark, South Carolina 29042
Telephone: (803) 793-3351

Xavier University of Louisiana
Project Kaizen

Dr. Etim Eduok
Xavier University
Academic Science Complex–304D
7325 Palmetto St.
New Orleans, Louisiana 70125
Telephone: (504) 486-7411 ext. 6335

Network Resources and Training Site (NRTS) Awards

Recognizing that the inhouse expertise required to develop and support a campus local area network with an interconnect to the Internet was not common among Historically Black Colleges and Universities (HBCU) and Other Minority Universities (OMU), NASA's Office of Equal Opportunity Programs created the Minority University-Space Interdisciplinary Network (MU-SPIN) program in 1991. MU-SPIN's purpose was to improve electronic information exchange and sharing of computational resources at HBCU's and OMU's that participated in NASA-related research. Since its creation, the MU-SPIN program has provided network access and conducted national and regional workshops to achieve its goals.

To further enhance HBCU and OMU efforts in achieving MU-SPIN program goals, the Office of Equal Opportunity Programs funded seven regional Network Resources and Training Sites (NRTS) at HBCU's and OMU's under the Institutional Research Award (IRA) program. The purpose was to bring the benefits of computer networking and Internet connectivity to a greater number of HBCU's, OMU's, and predominantly minority-attended elementary and secondary schools. These NRTS's were required to provide the following services for institutions identified in the region: assessment of specific needs, design of computer networks for the institutions, network connectivity, a network user resource center, and supplemental network training for the mathematics, science, engineering, and technology faculty and student bodies of those institutions.

Funded proposals focused on the following: design and implementation plans for local, metropolitan and wide area networks; network management and the provision of access to online resources for network training; and research and education information servers for students and faculty of institutions in their region. Those that capitalize on new and existing collaborations and interactions with other academic institutions, predominantly minority-attended elementary and secondary schools, government agencies, and industrial partners were particularly encouraged.

IRA-NRTS awards were for up to $650,000 per year for as many as 5 years. The funded sites were the schools listed at the right.

City University of New York–City College

Elizabeth City State University

Morgan State University

Prairie View A&M University

South Carolina State University

Tennessee State University

University of Texas at El Paso

City University of New York–City College
Network Resource and Training Site

Dr. Sherman Austin
City University of New York–City College
Convent Avenue and 138th Street
New York, New York 10031
Telephone: (212) 650-6165

Year One Report Summary

The City University of New York initiated a multiyear scientific program to study climatic conditions of the Earth and planetary science that involves most of the urban consortium members defined in this regional hub. Network services such as electronic mail, the World Wide Web, and Telnet will be accessible to an enormous number of faculty, staff, and students in this urban area NRTS in support of ongoing science programs in collaboration with the Goddard Institute of Space Studies, the Alliance for Minority Participation in Science, Engineering and Mathematics Program, and other major programs supported by the local K–12 school system to revise the educational curriculum for science and math.

Technological Accomplishments for Year 1

Most of the NRTS members received, for the first time, major enhancements of the internal infrastructure to support ongoing NASA programs supportive of science, mathematics, engineering, and technology (SMET) faculty and students. In addition, extended network services have gone to more than 12 new K–12 institutions in the New York region.

Programmatic Impacts for Year 1

Collectively, among the consortium members, at least 20 new science computer labs were created, and at least 10 science computer labs were enhanced in SMET departments.

Technological Plans for Year 2

This site will continue to develop and enhance internal network infrastructures for SMET departments of consortium members. Another two to five new institutions will be added to the consortium and for the first time receive dedicated connectivity to the Internet and network training.

Expected Programmatic Impacts for Year 2

Many consortium members will integrate the Internet as a research and education tool for most undergraduates and faculty via curriculum enrichment. Substantial development of Internet multimedia applications, such as the World Wide Web, JAVA, and videoconferencing, will be incorporated at the local institu-

tions (K–12) supportive of research and education initiatives identified in the annual report.

Principal Investigator

Dr. Shermane Austin, City College of New York

Co-Investigators

Medgar Evers College, Mohammed Nematollahi
LaGuardia Community College, Milton Pesily
A. Phillip Randolph High School, Mark Neidorff
Bronx High School of Science, Steven Kalin
Queensborough Community College, Miguel Cairol
York College, Che-Tsao Huang
George Washington High School, Reno Gitz
MAST High School, William Johnson

Expanded Co-Investigator Sites

Pride Academy
Samuel Gompers High School
Brandeis High School
JHS 43
Additional 12 K–12 sites

Elizabeth City State University Network Resource and Training Site

Dr. Linda B. Hayden
Elizabeth City State University
Box 672 ECSU
1704 Weeksville Road
Elizabeth City, North Carolina 27909
Telephone: (919) 335-3617

Year One Report Summary

The objective of this site is to establish a Regional Network Resource and Training Site at Elizabeth City State University (ECSU) to serve the Northeastern North Carolina Region and the Eastern Virginia Region. The NRTS at ECSU will provide network training and facilitate HBCU/MI network opportunities in research and education for MSET faculty and students and for the teachers of predominantly minority-attended elementary and secondary schools in ECSU's region.

Technological Accomplishments for Year 1

Lester Hall, which houses the Mathematics and Computer Science Department, has undergone a complete infrastructure enhancement with Internet connectivity in every classroom, anchored by a new research and training lab with 15 high-end workstations. While cabling to other SMET departments is being completed, high-speed mod lines provide Internet access to these departments. Asynchronous Transfer Mode (ATM) infrastructure has been requisitioned and 45 percent of installation completed. This should be available by the beginning of the fall semester to support the growing bandwidth demands for training large groups on multimedia and publishing applications.

Programmatic Impacts for Year 1

The new lab provided the capability for hosting 13 Internet/multimedia workshops. The total attendance for these workshops has surpassed the 500 mark, with participation from all the consortium members and other NRTS Principal Investigators.

Technological Plans for Year 2

All ECSU SMET connectivity should be completed and leveraged on for education and research. Fully functional ATM infrastructure should be available. There will be a major investment in all partner infrastructure, including upgrading of Internet bandwidth, campus wiring, and computing resources.

Expected Programmatic Impacts for Year 2

Because of the overwhelming number of participants during Year 1, the collaboration and education initiatives for Year 2 is expected to be enormous. A major 4-week precollege summer

program has been scheduled, with participation from NASA's Goddard Space Flight Center and Langley Research Center and all the consortium precollege members, along with new participants from the planned expansion of partners. Three new programs will leverage the precollege investments: Affordable Technology to Link America's Schools (ATLAS), Global Learning and Observations to Benefit the Environment (GLOBE), and Skymath provided by University Corporation for Atmospheric Research.

Principal Investigator

Dr. Linda Hayden, Elizabeth City State University

Co-Investigators

ECSU Talent Search Program (K–12), Dr. Cheryl Lewis
Bennett College, Mary Stuart
Fayetteville State University, Leo Edwards
Hampton University (Virginia), Mary Ellis
Norfolk State University (Virginia), Jim Kung
Pembroke State University, Jose D'Arruda
Virginia State University (Virginia), H. Moadab
Douglass Park Earth and Space Elementary School, Louise Jones
Emily Spong Elementary School, Stephanie Johnson
I.C. Norcom High School, Anne Gunter
NASA's Langley Research Center, Jeff Seaton (ATLAS)

Proposed Expansion

Elizabeth City Middle School
W.E. Walters Middle School (Virginia)
Hunt-Mapp Middle School (Virginia)
Lakeview Elementary School (Virginia)
Roanoke River Valley Consortium Schools (NC-35 schools)

Dr. Linda Hayden, NRTS Principal Investigator, gives instruction on electronic presentations to teachers at Emily Spong Elementary School (K–12 partner) on Macintosh notebook computers provided by the NRTS.

Morgan State University Network Resource and Training Site

Dr. William Lupton
Morgan State University
1700 East Cold Spring Lane
Baltimore, Maryland 21239
Telephone: (410) 319-3962

Year One Report Summary

Morgan State University established an urban consortium of members involved in a variety of major programs supported by both the Board of Education for Baltimore City and the National Science Foundation. This consortium is leveraging funds, coupled with Internet connectivity, that will stimulate a major change in the way science and math is disseminated to this underrepresented community. Network services, such as electronic mail, the World Wide Web, and Telnet, will be deployed at the participating sites. This will provide access to faculty, staff, and students in the local area in support of ongoing science and education programs in collaboration with the National Science Foundation, the National Technical Association, the Baltimore Urban System Initiative, and other organizations.

Technological Accomplishments for Year 1

Most of the NRTS members received, for the first time, dedicated 24-hours, 7-day-a-week high-speed computer network access in the Internet. Initially, 75 percent of the consortium institutions had none and/or very low-speed access to the Internet.

Programmatic Impacts for Year 1

Collectively among the consortium members, at least eight new science computer labs were created, and at least five science computer labs were enhanced.

Technological Plans for Year 2

This NRTS anticipates doubling network connectivity for at least 50 percent of the consortium members to handle expected increases in information exchanges with collaborators throughout the Internet. In addition, another two to four new institutions will be added to the consortium and for the first time receive dedicated connectivity to the Internet and network training.

Expected Programmatic Impacts for Year 2

Scientific modeling and data analysis teams centering around the Cray J916 at Morgan State University will be established as a computational engine for minority institutions within the consortium and throughout the Internet because of the increased wide area network connection at Morgan State. There will be substan-

tial development of Internet multimedia applications, such as the World Wide Web and videoconferencing, at the local institutions supportive of research and education initiatives identified in the annual report.

Principal Investigator

Dr. William Lupton, Morgan State University

Co-Investigators

Univ. of Maryland–Eastern Shore, Dr. Eddie Boyd
Harlem Park Middle School, Delores Jones
Central State University, Dr. Kamyar Dezghosha
Coppin State University, Dr. Gilbert Ojonji
Baltimore City Community College, Joan Fucci
Frederick Douglass School, Rose Davis
Sojourner-Douglass College, Dr. Kareem Aziz
Gwynn Falls Elementary School, Marion Boston
Central State University, Dr. Kamyar Dezgosha
Bowie State University, Dr. Nagi Wakim

Expanded Co-Investigator Sites

Southern High School
Northern High School
Matthew A. Henson Elementary School
Columbia Park Elementary School
Glenarden Woods Elementary School

Prairie View A&M University Network Resource and Training Site

Dr. John Williams
Prairie View A&M University
P.O. Box 2579
Prairie View, Texas 77446
Telephone: (409) 857-3910

Year One Report Summary

The purpose of this site is to establish a NASA Southwest Regional Network Resources and Training Site to serve Prairie View A&M and its collaborators in southeast Texas, Louisiana, New Mexico, and Oklahoma. Through the efforts of this NRTS, a high-speed digital network consisting of data and video channels linking a series of remote sites will be developed, resulting in the creation of a virtual university for the sharing of resources by all participants in the project as well as a larger adult community in this region.

Technological Accomplishments for Year 1

Prairie View A&M has completed local area network connectivity for all SMET departments on campus and cooperatively with the Information Processing Department and the Business Department and configured a 40-station training laboratory that hosts all NRTS-based training. In addition, Prairie View A&M has provided full T1 connectivity to all institutions for which T1 connectivity was budgeted for Year 1 or for which the Principal Investigators of this institution lacked previous access. These institutions include Navajo Community College, Southern University at New Orleans, Hempstead High School, and Charles Drew Middle School Academy.

Programmatic Impacts for Year 1

Because of the availability of the new resources and the cooperative working relationship between Prairie View A&M and MU-SPIN, 26 Internet-related workshops were provided for Prairie View A&M, Prairie View NRTS collaborators, and Prairie View community faculty and staff. During these workshops, valuable strategic alliances were created, and education plans for the future were discussed. In addition, all the partners mentioned above were able to create their very first World Wide Web pages introducing the inclusion of their institutions into the information superhighway.

Technological Plans for Year 2

Plans are to provide T1 connectivity, where applicable, or provide further infrastructure enhancements for the Principal Investigators at Langston University, Jarvis Christian College, Texas College, Wiley College, Paul Quinn College, and Houston-Tillotson College. The distance learning concept that was pro-

posed will undergo its initial funding for infrastructure. Plans are to have every HBCU in Texas connected.

Expected Programmatic Impacts for Year 2

Proposed Year 2 connectivity will double the electronic collaboration of partners. Week-long partnership training provided by Texas A&M at Corpus Christi designed during Year 1 workshops should not only set the tone for the sharing of training responsibilities for the consortium, but should also help define distance learning requirements. The distance learning initiative will provide for virtual Texas HBCU education. A meeting in July is scheduled to discuss cross-university registration and education via distance learning.

Principal Investigator

Dr. John R. Williams, Prairie View A&M University

Co-Investigators

Houston-Tillotson College, Dr. General Marshall
Jarvis Christian College, Ronald J. Wright
Langston University, Elijah Martin
Navajo Community College, Mark Bauer
Paul Quinn College, Dr. Joseph Esin
Southern University (Louisiana), Sharon Stevens
Texas A&M at Corpus Christi, Patrick Michaud
Texas College, Dr. Harlee Wright
Wiley College
Shiprock Independent School System (New Mexico), Dr. Stanley Bippus
Charles Drew Academy of Math, Science and Fine Arts, David Baxter
Hempstead High School, Beverly Hardee

Proposed Expansion

Texas Southern University, Mr. James Douglas
Waller Independent School District (Waller, Texas), Sharon Clark
North Forest Independent School District

South Carolina State University Network Resource and Training Site

Dr. Donald Walter
South Carolina State University
P.O. Box 7296
Orangeburg, South Carolina 29117
Telephone: (803) 533-3773

Year One Report Summary

South Carolina State University established a rural consortium of members involved in a variety of environmental programs sponsored by the U.S. Department of Agriculture (USDA) to support not only the local educational system but also the community farmers dependent on accurate environmental information for their livelihood. Network services such as electronic mail, the World Wide Web, and Telnet will be accessible to the academic and nonacademic residents of this rural regional hub in support of an assortment of environmental and community outreach programs supported by numerous Federal and local agencies, such as the U.S. Environmental Protection Agency, the U.S. Department of Energy, USDA, the National Science Foundation, and NASA.

Technological Accomplishments for Year 1

Most of the NRTS members received, for the first time, dedicated 24-hour, 7-days-a-week high-speed computer network access in the Internet. Initially, 85 percent of the consortium institutions had absolutely no connectivity prior to this initiative.

Programmatic Impacts for Year 1

Collectively among the consortium members, at least 12 new science computer labs were created, and at least five science computer labs were enhanced.

Technological Plans for Year 2

Internet applications will be fully deployed and well integrated at the satellite sites as a research and education tool for SMET. Another two to five new institutions will be added to the consortium and for the first time receive dedicated connectivity to the Internet and network training.

Expected Programmatic Impacts for Year 2

Many consortium members will integrate Internet activities as a requirement for most undergraduates via curriculum enrichment. Substantial development of Internet multimedia applications, such as the World Wide Web and videoconferencing, will be incorporated at the local institutions (K–12) supportive of research and education initiatives identified in the annual report.

NRTS Awards

Principal Investigator

Dr. Donald Walter, South Carolina State University

Co-Investigators

Allen University, Wanda Crenshaw
Benedict College, Julian Gayden
Bowman Middle School, Bennie Brown
Claflin College, Shingara Sandhu
Felton Laboratory School, Willie Woodbury
Florida International University, Dr. M.A. Ebadian
Morris College, Dorothy Cheagle
Howard Middle School, Iris Arant
Orangeburg-Wilkinson High School, Janet Gilchrist
Voorhees College, Samuel Blackwell
Morris Brown College, Fred Okoh

Expanded Co-Investigator Sites

Five K–12 institutions among the counties of Bamberg, Calhoun, and Orangeburg will be named after the school districts are consolidated.

Tennessee State University Network Resource and Training Site

Dr. Willard Smith
Tennessee State University
TSU Box 139, Williams Campus
Nashville, Tennessee 37203
Telephone: (615) 963-7012

Year One Report Summary

Tennessee State University established an urban/statewide/multi-state consortium of members involved in a variety of scientific, educational, and community-based outreach programs sponsored by state and Federal sources whose quality of information and knowledge will be enriched with Internet connectivity. Network services such as electronic mail, World Wide Web, and Telnet will be accessible to an enormous number of faculty, staff, and students in the local and regional areas of Tennessee in support of ongoing multimillion dollars space science grants in collaboration with NASA Headquarters and NASA's Marshall Space Flight Center and several educational initiatives supported by the local/state K–12 communities.

Technological Accomplishments for Year 1

Numerous NRTS members received, for the first time, dedicated 24-hour, 7-days-a-week high-speed computer network access in the Internet. Initially, 50 percent of the consortium institutions had absolutely no connectivity prior to this initiative.

Programmatic Impacts for Year 1

Collectively among the consortium members, at least 68 science computer labs were created, and at least 10 science computer labs were enhanced.

Technological Plans for Year 2

Internet applications will be fully deployed and well integrated at the satellite sites as a research and education tool for SMET. Another 21 new institutions will be added to the consortium and for the first time receive dedicated Internet support and network training.

Expected Programmatic Impacts for Year 2

Many consortium members are able, for the first time, to use the NRTS program as leverage for new research and education initiatives as well as receive funds from their respective jurisdictions for infrastructure support. Substantial development of Internet multimedia applications such as the World Wide Web and videoconferencing will be incorporated at the local institutions (K–12) supportive of the research and education initiatives identified in the annual report.

NRTS Awards

Principal Investigator

Dr. Willard Smith, Tennessee State University

Co-Investigators

Fisk University, Dr. John Springer
Kentucky State University, Tom Hughes
Knoxville College, Dr. Mark Rader
Lane College, Darlene D. Brook
LeMoyne-Owen College
Kings Lane Middle School, Bruce Howell
Pearl-Cohn High School, Elton Pedersen

Expanded Co-Investigator Sites

Twenty-one K–12 institutions in the Nashville/Davidson metropolitan area are designated as 21st century schools. The local government will bear the cost of providing network connectivity to all schools via 64 kilobytes per second.

University of Texas at El Paso Network Resource and Training Site

Dr. Michael Kolitsky
University of Texas at El Paso
Wiggens Road, P.O. Box 68651
El Paso, Texas 79912
Telephone: (915) 747-5058

Year One Report Summary

The purpose of this NRTS is to establish a Network Resources and Training Site at the University of Texas at El Paso (UTEP) that will substantially increase the access to the Internet and the use of Internet resources by faculty and students in SMET throughout the southwest Texas, southern New Mexico, and partnering institutions in North Carolina and southern California.

Technological Accomplishments for Year 1

UTEP has expanded its current networking connectivity by installing an HP9000 at the computer center, and one to two workstations and/or X-terminals have been configured in each of the SMET departments on campus. All SMET departments received some type of high-end personal computer to be used for publishing (web pages) or application support (word processing, graphics, and so on). ISDN connectivity for the middle school partners has been established. Faculty members supporting the NRTS at UTEP and the middle schools have been set up with PPP accounts for dialup from home. California State University at Los Angeles has purchased a server and five personal computer stations to configure a training lab for a summer-long Internet training initiative.

Programmatic Impacts for Year 1

Prior to the grant, all UTEP SMET departments reported limited use of e-mail, World Wide Web, or Internet resources in course development. The application of the NRTS grant within the departments has had a major effect on the availability and use of Internet resources, both directly in terms of resources and equipment and in terms of focus. All three middle schools are preparing for participation in two Internet educational programs, Skywatch at University Corporation for Atmospheric Research, and Kids Writing Internet Curricula implemented by regional El Paso school district educators. Two middle schools a 3-hour drive away joined the spring workshop via videoconference. California State University at Los Angeles has adopted two ethnic high schools for Internet education and has developed a major summer training initiative for Internet education in support of its NASA-funded Urban Environment Initiative.

Technological Plans for Year 2

A new 25-station personal computer or Macintosh computer laboratory with full Internet connectivity will be configured to support an expected growth in training demands by the SMET faculty and students of the consortium and community. Video routing equipment and multiplexer will be acquired. Three new middle schools will be brought on board and equipped with ISDN connectivity and videoconference capability, along with hardware and software for web home page production.

Programmatic Impacts for Year 2

UTEP expects its consortium training to quadruple in Year 2. The new personal computer lab will enable it to provide more hands-on accessibility for training. This year's workshops were characterized by the sharing of computers by participants. The videoconferencing infrastructure is planned to support not only bidirectional training by all partners, but a more frequent monthly training schedule over a vast region. This would not be feasible if travel costs were to be continually incurred. California State University at Los Angeles' Urban Environment Initiative program is expected to be considered by all regions as a viable computer/Internet-based education tool for academia and government. New Mexico State University has high-end digitizing and imaging expertise that will be introduced in Year 2.

Principal Investigator

Dr. Michael Kolitsky, University of Texas at El Paso

Co-Investigators

California State University at Los Angeles, Dr. Ali Modarres
El Paso Community College, Dave Hoyt
New Mexico State University, Charles J. "Jeff" Harris
University of Texas–Pan American, John Villa and Terry Hartman
North Carolina A&T State University, Dr. John Kelly
Charles Middle School, Pam Cook and Richard Hayden
Lincoln Middle School, Helen Bell
Wiggs Middle School, Alan Hodson

Expanded Co-Investigator Sites

San Elizario Middle School (Texas)
Dell City Middle School (Texas)
Marshall Fundamental Middle School (California)

Other Awards

The NASA publication *Science in Air and Space: NASA's Science Policy Guide* states:

> "NASA affirms that it will provide opportunity for all individuals and institutions to compete fairly for participation in NASA programs, and that it will actively seek to expand the group of qualified individuals and institutions to invigorate broader and more inclusive competition."

It is NASA policy to encourage and promote the involvement of women, underrepresented minorities, and individuals with disabilities in NASA research programs and missions. Special attention will be paid to increasing the contact of women, minority students, and individuals with disabilities. In carrying out such programs, NASA will consult with leaders, educators, and university faculty and staff from these communities to learn about the environment in which they work, to build strategies and partnerships to maximize the contributions that NASA research experts might bring to education and outreach programs, and to enhance the participation of underrepresented groups and minority institutions in NASA research programs and missions.

MURED has networked with a variety of educational and community service organizations to fulfill the mandate noted above. MURED's involvement is twofold: to disseminate information about NASA programs and research and to ascertain how NASA can further its investment in the community. Some of the agencies with which NASA MURED has networked are listed to the right.

Another type of award that falls into this category is the combination award, which spans more than one category as outlined in this report. For example, the Southeastern Consortium for Minorities in Engineering (SECME) manages a comprehensive effort that includes Precollege, Bridge, and Teacher Training components. These combination efforts include the entities listed on at the right.

MURED

American Council on Education Office of Minorities in Higher Education
American Indian Higher Education Consortium (AIHEC)
Association on Higher Education and Disability
Hispanic Engineer National Achievement Awards Conference (HENAAC)
National Action Council for Minorities in Engineering (NACME)
National Association of Minority Engineering Program Administrators (NAMEPA)
National Society of Black Chemists
National Society of Black Physicists
Quality Education for Minorities (QEM)
Society for the Advancement of Chicanos and Native Americans in Science
United Negro College Fund

Combination

American Association for the Advancement of Science
NAFEO Services, Inc. (Faculty Development Workshops)
New Mexico Highlands University (AISTEC Education Consortium)
Norfolk State University
Southeastern Consortium for Minorities in Engineering (SECME)

Dr. Virginia Stern
American Association for the
Advancement of Science
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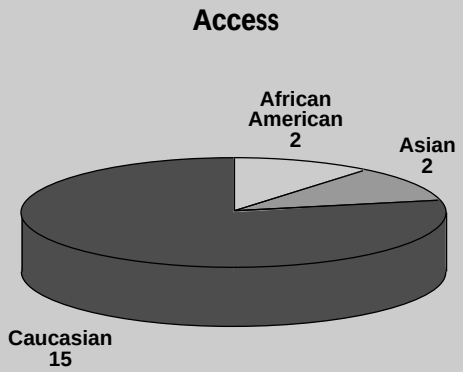
Telephone: (202) 326-6670



Fourteen different disabilities were represented among the 19 students.

Other Awards

American Association for the Advancement of Science ACCESS

Program Overview

In 1997, the American Association for the Advancement of Science (AAAS) managed ACCESS (Achieving Competence in Computing, Engineering, and Space Science), a NASA Agencywide program to discover and develop talent among college students with disabilities who are pursuing technical disciplines. Building on a highly successful 1996 pilot project at NASA's Goddard Space Flight Center, AAAS expanded the program to include a total of seven NASA sites offering summer internships for a total of 10-12 weeks.

Objectives

In addition to expanding the ACCESS program, the objectives for the summer of 1997 were as follows:

- Increase the participation of college students with disabilities in NASA internship programs
- Increase the diversity in culture, discipline, and gender among students with disabilities who would participate in the ACCESS program
- Afford opportunities for college students with disabilities to utilize and develop their talents by working with scientists in highly technical research programs at NASA Centers
- Work with NASA Centers to provide the assistive technology, such as computer peripherals, large print documents, or sign language interpreters, required by some students with disabilities for executing their job responsibilities with minimal assistance from others
- Prepare college students with disabilities for the rigorous work in an environment such as NASA and to assist the students to adjust to and cope with the social and personal responsibilities of an offcampus living arrangement

Enrollment Data

The total number of college students with disabilities who participated in the 1997 ACCESS internship program was 19. Of this total, 13 were undergraduates, and 6 were graduates; 7 were females, and 12 were males. There were two African Americans, two Asians, and 15 Caucasians. Fourteen different disabilities were represented among the 19 students.

Other Awards

Recruitment Strategies

AAAS mailed ACCESS brochures to directors of Disabled Student Services Offices at colleges and universities around the country and to the dean of every engineering school in the United States. ACCESS announcements were placed on electronic listservers that reached programs for persons with disabilities funded by the National Science Foundation, HCBU's, vocational rehabilitation counselors, private organizations serving people with disabilities, job banks, and career centers.

Outcomes to Date

In 1996, seven college students with disabilities participated in the pilot internship project at NASA's Goddard Space Flight Center. In 1997, 19 college students participated in the ACCESS program, which expanded to seven sites around the country.

An article featuring the ACCESS program, "Aptitude and Attitude Outweigh Disabilities," appeared in the July 25, 1997, issue of *Science* magazine, a weekly peer-reviewed journal published by AAAS. The magazine is distributed to the 144,000 members of the association.

NASA installations around the country have worked for many years to achieve a workforce diverse in discipline, gender, culture, and race. The addition of college students with disabilities has greatly contributed to this diversity, bringing attention to the talents and abilities of a minority population often underrepresented in scientific initiatives. The ACCESS program has proven that a high caliber of qualified students with disabilities can enter and succeed in highly technical research jobs that are so crucial to NASA's success.

Student Achievements

In 1996, one of the seven student interns received an award for an outstanding presentation of his work during the final presentation week at Goddard Space Flight Center. In 1997, two students from the ACCESS program received awards; both were undergraduate and African American students with disabilities, interning at Goddard. Three of the 1996 interns with disabilities returned to other summer programs at Goddard.

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New Mexico Highlands University American Indian Science Technology Education Consortium (AISTEC)

Program Overview

AISTEC is a NASA-sponsored partnership among traditional colleges serving large Native American populations and four tribal colleges, which are also members of the 29-college American Indian Higher Education Consortium (AIHEC). The guiding philosophy of AISTEC has been, within agency guidelines, to allow each consortium member to focus on those activities that would best assist each college to serve its Native American constituency. The approaches taken by consortium members are broad and range from recruitment and building precollege skills to developing community relations. Taking a variety of local approaches is supported by educational research that indicates that the factors preventing success in mathematics and science by Native American students are also varied and complex.

Enrollment Data	Target Grade Level(s)
4,200 students impacted as of 1997	K–College
Category of Students Targeted	**FY 1997 Funding**
Male and female Native American students	$1,400,000

Program Implementation Strategies

Year-round enrichment; strong academic component; mentoring relationships; academic-year component; involvement of teachers, school counselors, and administrators; tutoring; research component; use of technology; hands-on learning; problem solving; and skill development.

Summary of Consortium Members Programs:

- Arizona State University—To improve the preparation of Native American students in math and science by: (1) improving communication between the university faculty and teachers/faculty at both reservation schools and tribal colleges; and (2) improving mathematics and science preparation at both reservation schools and tribal colleges.

Other Awards

- D-Q University—To improve the science infrastructure; training of faculty; research and employment opportunities for science students; assessment and improvement of student transfer rates; and development of cultural course materials that supplement and integrate into traditional courses.

- Navajo Community College at Shiprock—To increase positive learning approaches to math and science by linking relationships between scientific fields and traditional Navajo teachings with 8th and 9th grade students.

- New Mexico Highlands University—To increase the math skills and interest in SEM within an educational model managed and influenced by community members, teachers, and students at the secondary and tribal college levels while building articulation agreements at each intersection of the educational pipeline.

- Salish Kootenai College—To develop peer mentoring and tutoring skills that will improve Native American entry and access in secondary and first-year college math and science careers.

- South Dakota School of Mines and Technology—To develop a telecommunications infrastructure that incorporates a computer-accessible data base of Native American math and science curriculum information, models, and resources from within as well as outside of AISTEC.

- University of New Mexico—To increase Native American student participation rates in graduate school.

- University of Washington—To increase the recruitment of Native American students to 4-year institutions and graduate programs in SEM, and to increase American Native success rates at 4-year and graduate institutions.

Southeastern Consortium for Minorities in Engineering (SECME), Inc. NASA Training Grant

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Program Overview

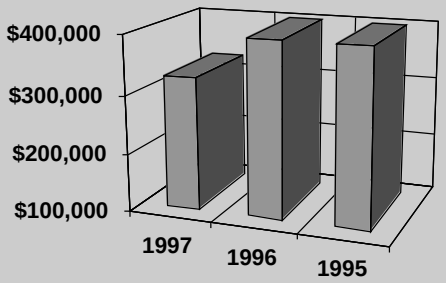
Since 1975, SECME has recognized the need to provide exceptional preparation in mathematics and science for K–12 students. SECME's goal is to increase the pool of minorities (African American, Hispanic and Mexican American, and Native American) who are prepared to enter and complete postsecondary studies in science, mathematics, engineering, and technology (SMET). SECME is an inclusive organization that encourages precollege students of all ethnicities to participate. SECME has successfully sustained the collaboration of 38 universities, 65 industries and governmental agencies, 99 school systems, 21,299 students, and 685 K–12 schools working in the communities of 13 states and the District of Columbia to impact student learning. Interdisciplinary team building is encouraged and permeates throughout the program from individual schools and school systems to universities and communities. These collaborations have broken down barriers between disciplines and influenced students to learn how to be adaptable and work in team—skills that are vitally needed for tomorrow's global economy.

SECME has established a sound program in effectively training teachers and promoting mathematics and science enrichment at the precollege level. As SECME prepares and produces technological graduates for the 21st century, there is an urgent need for SECME to continue to implement the goals of its strategic plan. With NASA funding, SECME has implemented the following initiatives:

- Strengthen and expand the SECME model
- Implement SECME's program components
- Design new forums to meet the changing needs of SECME's stakeholders
- Enhance SECME's dissemination and public relations efforts
- Sustain and expand data management and evaluation measures

SECME has implemented these initiatives throughout the school year and at its Summer Institute.

Funding History—SECME



Other Awards

Strengthen and Expand the SECME Model

The SECME model is replicable and represents a process that leverages its resources to promote academic success in SMET. SECME has continually strengthened and expanded its programs in all of its 13 states (Alabama, Arkansas, Georgia, Florida, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia) and the District of Columbia. With NASA funding, strengthening and expanding the SECME model have broadened the scope of SECME from a regional program to a national program.

Implement SECME's Program Components

SECME's principal components include the Summer Institute, the Leadership Academy, regional workshops, minigrants, and national student competitions. Funding from NASA supports implementation of these program components and promotes important teacher training and academic excellence in education. The Summer Institute trains teachers and counselors to be effective in identifying, encouraging, and influencing students to take advanced mathematics and science courses to become scientists and engineers. It enables more than 200 K–12 teachers and counselors to learn new teaching strategies and motivational techniques, interact with university and industry SECME members, network and exchange ideas with colleagues, and earn graduate credits.

The Summer Institute is unique in that it is hosted by a SECME member university and the curriculum is developed by engineering and education faculty, SECME staff, and master teachers. This teacher-centered approach is the only precollege engineering program in the Nation that has consecutively sponsored an institute for 22 years and directly trained more than 2,900 educators. By enhancing the skills of teachers, entire classes of students benefit year after year. This approach also allows SECME to maximize its resources more effectively while improving the quality of education for all students.

The Leadership Academy for School System Administrators trains superintendents, principals, mathematics and science supervisors, SECME program directors, and school board members to assist the SECME team in establishing strong and successful programs. Through the Leadership Academy, SECME successfully involves education and corporate entities to work with schools and teachers who will influence a large number of students.

Regional workshops and teacher minigrants reinforce teaching strategies and strengthen student programs and activities that encourage scientific thought. Regional workshops also reinforce the Summer Institute experience and allow for a followup of implementation plans. Topics covered in these workshops include

Southeastern Consortium for Minorities in Engineering (SECME), Inc.
NASA Training Grant

strategic planning, learning styles, curriculum development, guidance activities, and student competitions. Minigrants have been awarded to SECME schools for the advancement of mathematics and science achievement since the program's inception. These funds enable educators and counselors to manage their SECME programs and offer enrichment activities to their students. The national student competitions honor SECME students for their engineering design projects. These competitions have played an important role in reinforcing scientific and engineering principles. Competitions are held annually at the university and state levels where student participation in SECME regional competitions has dramatically increased. More than 150 middle and high school team winners (accompanied by 30 teacher chaperons) participate in SECME's annual national competition during the Summer Institute.

Design New Forums to Meet the Changing Needs of SECME's Stakeholders

Forums for school administrators, engineering faculty consultants, and minority engineering program directors have institutionalized the SECME program and established a level of uniformity for SECME at the university and state levels.

Enhance SECME's Dissemination and Public Relations Efforts

Disseminating information and enhancing public relations efforts are vital to make others aware of the opportunities in SMET education. These efforts have leveraged SECME for partnering opportunities and introduced other educational organizations, engineering universities, and scientific corporations to SECME.

Sustain and Expand Data Management and Evaluation Measures

SECME has established extensive data collection mechanisms and evaluation measures. Longitudinal data are collected for each student identified in the SECME program. This data base of more than 21,000 students is updated annually and maintained to evaluate SECME's program effectiveness. NASA funding directly supports SECME programs that include 14,483 African-American, 110 Native American, 136 Hispanic American, and 6,561 other students in grades K–12. Nominations for student participation come from teachers and counselors and include both students who are achieving and students with the potential to achieve. Consistently, more than 90 percent of graduating SECME seniors attend a college or university and more than half select SMET-based majors.

Other Awards

Outcomes to Date

The SECME model has moved from a regional program to a national program. This transition prompted the name change from the Southeastern Consortium for Minorities in Engineering (SECME) to SECME, Inc. In 1997, SECME's mission was validated by receiving the prestigious Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring, awarded by the White House Office of Science and Technology Policy through its National Science and Technology Council. This award was established to recognize individuals and organizations most influential in increasing the number of students underrepresented in science, mathematics, and engineering.

Student Achievements

Three SECME alumni scholars were selected as NACME TechForce Scholars. BellSouth awarded $10,000 in scholarships to 13 SECME State Scholars. SECME seniors planning to pursue SMET majors have an average SAT score (1,060) that is 203 points higher than U.S. African-American SAT scores and 151 points higher than U.S. Hispanic SAT scores.

Partnering

The SECME model is based on constructing and maintaining effective partnerships with funding sources. NASA and the U.S. Department of Energy have been two of the major supporters. Several corporations and foundations annually support SECME program implementation. All of these partners recognize the need for an exceptionally prepared workforce in the new millennium.

1997 SECME/BellSouth State Scholars.

SECME team member launching mousetrap car at Summer Institute.

Appendices

Alphabetical Index by Institution — Appendix A

Index by Institution Type — Appendix B

Index by State — Appendix C

Index by Principal Investigator — Appendix D

Index by Program Type — Appendix E

Appendix A

Alphabetical Index by Institution

Alabama A&M University–FAST Program	PRECOL	Future Assets Student Talent, Inc. (FAST)	12
American Assoc. for the Advancement of Science (ACCESS)	OTHER	ACCESS	234
American Indian Science and Engineering Society (AISES)	TEACHTR	Teacher Enhancement in Science and Mathematics Project	137
American Society for Engineering Education –Helen T. Carr Fellowship Program	FELLOWS	Helen T. Carr Fellowship Progam	128
Bennett College	MASTAP	Mathematics, Science and Technology Awards for Teachers and Curriculum Enhancement Program	139
Bennett College	PACE	PACE/MSET	171
Bethune-Cookman College	PRECOL	Precollege Readiness Program	14
Bowie State University	PARTNER	Excellence in Technology, Engineering & Science (ExciTES)	214
Bowie State University	BRIDGE	Bowie State's Science, Engineering, and Mathematics Education	82
Bowie State University	SCHOLARS	Model Institutions for Excellence	108
California State University–Los Angeles	PARTNER	Bowie State's Satellite Operation & Control Center (BSOCC)	214
California State University–Los Angeles	PARTNER	The Science Ambassador Distance Learning	214
California State University–Los Angeles	MASTAP	MASTAP FAST	141
California State University–Los Angeles	PACE	Precollege Awards for Excellence in Mathematics, Science, Engineering and Technology	173
California State University–Los Angeles	PRECOL	Math, Engineering, Science Achievement Program	16
California State University–Los Angeles	PRECOL	Summer Chemistry Program	18
Capitol College	PRECOL	Precollege Minority Engineering Program	19
City University of New York-City College	NRTS	Network Resource and Training Site	218
CUNY–Lehman College	PACE	University Preparatory Program	176
CUNY–Medgar Evers College	BRIDGE	GISS-CUNY Institute of Climate and Planets	85
CUNY–Medgar Evers College	MASTAP	Science and Technology Teachers for the Next Millennium	144
Cuyahoga Community College	PARTNER	CSLA/JPA Partnership to Ensure Disadvantaged Students Become Scientists and Engineers	214
Cuyahoga Community College	PRECOL	Science, Engineering, Mathematics and Aerospace Academy (SEMAA)	22
Edward Waters College	PARTNER	Mobile Aeronautics Education Laboratory (MAEL) Replication	214
Edward Waters College	PRECOL	Mathematics, Science, and Technology Intervention	24
Elizabeth City State University	NRTS	Network Resource and Training Site	220
Elizabeth City State University	PACE	Mathematics, Science and Technology with Excellence in Research: A Science and Technology Entry Program (MASTER-STEP)	177
Fayetteville State University	PACE	Precollege Awards for Excellence in Mathematics, Science, Engineering and Technology	180
Fayetteville State University	PARTNER	Classroom of the Future Center (COTF) Master Science Teacher Certification (MTCP) Program	214
Fayetteville State University	TEACHTR	Teacher Training Workshop–Graphics Calculator	147
Florida A&M University	BRIDGE	Engineering Concepts Institute	88
Florida A&M University	PARTNER	A Preservice/Inservice/Model for Teaching Integrated Math Science with Technology (TIMS/T)	214

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Florida A&M University–FAMU-FSU Colleges of Engineering	FELLOWS	FAMU Graduate Fellowship Program	129
Florida A&M University–FAMU-FSU Colleges of Engineering	SCHOLARS	Project IMAGE	111
Florida International University	PARTNER	Project Discover	214
Florida International University	MASTAP	Minorities Achieving Success in Teaching Mathematics and Science Project	149
Fort Belknap College	PACE	MSEN Precollege Program	184
Hampton University	PACE	Preserving the Past and the Future	186
Hampton University	TEACHTR	Teacher Training	153
Hispanic Association of Colleges and Universities (HACU)	PRECOL	Proyecto Access	26
Jackson State University	PACE	Precollege Awards for Excellence in Mathematics, Science, Engineering and Technology	188
Jarvis Christian College	PACE	Precollege Awards for Excellence in Mathematics, Science, Engineering and Technology	190
Lincoln University	PACE	NASA Center for Academic Excellence	193
Lincoln University	PRECOL	ExCITE Program	29
Midtown Educational Foundation (MEF)	PRECOL	One on One & Metro Achievement	32
Mississippi Valley State University	PARTNER	Project S.P.A.C.E.	215
Morehouse College	BRIDGE	Project SPACE	90
Morehouse College	SCHOLARS	Project SPACE	113
Morgan State University	NRTS	Network Resource and Training Site	222
Mount Holyoke College	PRECOL	SummerMath	35
NAFEO Services, Inc.	SCHOLARS	Student Researchers Consortium	115
National Consortium for Graduates	FELLOWS	Graduate Degrees for Minorities in Engineering and Science, Inc. (GEM)	131
National Hispanic University	PARTNER	Incorporating Information Technology to Enterprise Zones and Empowerment Community School Systems	215
National Hispanic University	PARTNER	Learning Innovative Mathematics, Science with Technology	215
National Hispanic University	PACE	Lincoln Advanced Science and Engineering (LASER) Program	195
National Physical Science Consortium (NPSC)	FELLOWS	Graduate Fellowships	132
Navajo Community College	PARTNER	Minority Educators Neurolab Training for Excellence in Science	215
Navajo Community College	PARTNER	Science Enrichment Activities	215
New Mexico Highlands University	PRECOL	An Integrated Approach to Engineering in a Minority Community	37
New Mexico MESA, Inc.	PRECOL	NASA Senior Incentive Field Trip & K–5 Buddies Program	39
Nonprofit Initiatives, Inc.	PRECOL	El Ingeniero	41
Norfolk State University	PARTNER	American Indian Network Information Center (AINIC)	215
Norfolk State University	PARTNER	The “Science and Math for Everyone” Project	215
Norfolk State University	PRECOL	Cooperating Hampton Roads Organizations for Minorities in Engineering (CHROME)	43
North Carolina A&T State University	FELLOWS	Ronald E. McNair Graduate Research Fellowship Program	133
Northern Arizona University	SCHOLARS	Sacred Mountain Scholars	118
Northern Arizona University	BRIDGE	Multicultural Engineering Program	92
Northwest Indian College	PACE	Cientificos 2	198
Oglala Lakota College	PARTNER	Rural Outreach Project	215
Pasadena City College	PACE	Seaquest Phase II	201
Pasadena Unified School District	PRECOL	The Saturday Academy	46

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Prairie View A&M University	NRTS	Network Resource and Training Site	224
Salish Kootenai College	PARTNER	Project "SMASH" (Student Math & Science Healthcare Initiatives)	216
San Antonio College & Our Lady of the Lake University	PARTNER	NASA Aeronautical Ambassador Program for American Indians (NAAPAI)	216
Shaw University	MASTAP	Mathematics, Science and Technology Awards for Teachers and Curriculum Enhancement Program	154
South Carolina State University	MASTAP	SWAPOP Project	157
South Carolina State University	NRTS	Network Resource and Training Site	226
South Dakota School of Mines and Technology	BRIDGE	Scientific Knowledge for Indian Learning and Leadership (SKILL) Program	95
Southeastern Consortium for Minorities in Engineering (SECME)	OTHER	SECME, Inc.	236
Southern University–New Orleans	PARTNER	Teaching Learning Model for Middle School Geoscience	216
Southwestern Indian Polytechnic Institute	PACE	Precollege Awards for Excellence in Mathematics, Science, Engineering and Technology	204
Spelman College	BRIDGE	Summer Science and Engineering Program	98
Spelman College	SCHOLARS	Women in Science and Engineering (WISE) Scholars Program	121
Spelman College	SCHOLARS	Minority Institutions for Excellence	124
St. Augustine's College	PACE	Summer Science Camp	206
Stillman College	PACE	Precollege Awards for Excellence in Mathematics, Science, Engineering and Technology	209
Tennessee State University	NRTS	Network Resource and Training Site	228
Texas A&M University–Kingsville	PRECOL	College Outreach Programs in Science, Engineering, and Math	48
Trenholm State Technical College	PRECOL	High School Science Enrichment Program	51
Turtle Mountain Community College	BRIDGE	Recruitment and Retention of Indians in Science and Engineering	100
United Cerebral Palsy of Prince George's & Montgomery Counties	PRECOL	HIGH SCHOOL/HIGH TECH	55
University of Central Florida	PRECOL	Success Programs for Academic Careers in Engineering	59
University of Cincinnati–College of Engineering	PRECOL	Emerging Ethnic Engineers (E3)	60
University of Maryland–Baltimore County	PRECOL	Engineering and Preengineering Programs	63
University of New Mexico	SCHOLARS	NASA Training Project	126
University of North Carolina–Pembroke	MASTAP	Minorities in Science and Mathematics Education	159
University of Puerto Rico–Mayaguez	MASTAP	MASTAP	162
University of Puerto Rico–Humacao	MASTAP	Mathematics, Science and Technology Awards for Teachers and Curriculum Enhancement Program	160
University of South Florida	PRECOL	Yes, We Care! Minority Engineering Program	65
University of South Florida	BRIDGE	Minority Engineering Program	101
University of Texas–Brownsville	PRECOL	South Texas Engineering, Math and Science (STEMS)	67
University of Texas–Brownsville	TEACHTR	Minority Institutions for Excellence	164
University of Texas–Brownsville	PRECOL	K–12 Science Outreach	70
University of Texas–Brownsville and Texas Southmost College	PRECOL	Hispanic Mother-Daughter Program	72
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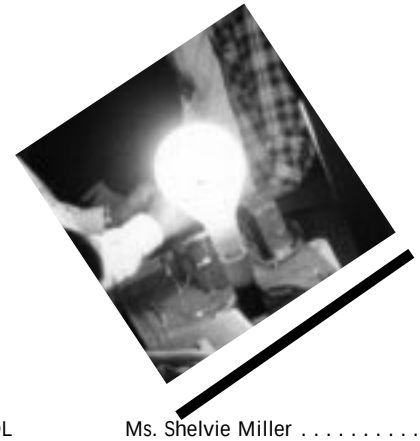
University of Texas–El Paso	PACE	Summer Science Camp	210
University of Texas–El Paso	PARTNER	NASA/SUNO Partnership for Excellence in Mathematics Education	216
University of Texas–San Antonio	PRECOL	Saturday Academy	74
University of the District of Columbia	PRECOL	Engineering Preparatory Project for Hispanics High School Students	76
University of the District of Columbia	TEACHTR	Scientific Renewal	166
University of Turabo	PARTNER	Distance Learning Strategies Promoting Minority Access To Internet Tools and Resources	216
University of Turabo	PRECOL	Engineering Preparatory Project for Hispanics High School Students	78
Voorhees College	PARTNER	Voorhees College GIS Center	216
Xavier University of Louisiana	BRIDGE	Stress on Analytical Reasoning (SOAR) Program	103
Xavier University of Louisiana	MASTAP	Project Teach	168
Xavier University of Louisiana	PARTNER	Project Kaizen	216

Appendix B

Index by Institution Type



Historically Black Colleges and Universities (HBCU's)

Alabama A&M University–FAST Program	AL	PRECOL	Ms. Shelvie Miller	12
Bennett College	NC	MASTAP	Dr. Donna Oliver	139
Bennett College	NC	PACE	Dr. Michael Cotton	171
Bethune-Cookman College	FL	PRECOL	Prof. Theodore Nicholson, Sr.	14
Bowie State University	MD	PARTNER	Dr. NagiWakim	214
Bowie State University	MD	BRIDGE	Prof. Nagi Wakim	82
Bowie State University	MD	SCHOLARS	Prof. Nagi Wakim	108
Edward Waters College	FL	PARTNER	Ms.Doris Brown	214
Edward Waters College	FL	PRECOL	Dr. Doris Brown	24
Elizabeth City State University	NC	NRTS	Dr.Linda B.Hayden	220
Elizabeth City State University	NC	PACE	Dr. Sohindar Sachdev	177
Fayetteville State University	NC	PACE	Dr. Leo Edwards	180
Fayetteville State University	NC	PARTNER	Dr. Leo Edwards	214
Fayetteville State University	NC	TEACHTR	Dr. Leo Edwards	147
Florida A&M University	FL	BRIDGE	Dr. Sybil Mobley	88
Florida A&M University	FL	PARTNER	Dr. Bennie Samuels	214
Florida A&M University–FAMU-FSU Colleges of Engineering	FL	SCHOLARS	Dr. Fred Foreman	111
Florida A&M University–FAMU-FSU Colleges of Engineering	FL	FELLOWS	Dr. Fred Foreman	129
Hampton University	VA	PACE	Dr. Morris Morgan, III	186
Hampton University	VA	TEACHTR	Dr. Cathine Garner-Gilchrist	153
Jackson State University	MS	PACE	Dr. Abdul Mohamed	188
Jarvis Christian College	TX	PACE	Dr. Mary McKinney	190
Lincoln University	PA	PACE	Dr. Robert Langley	193
Lincoln University	PA	PRECOL	Dr. David Royer	29
Mississippi Valley State University	MS	PARTNER	Dr. Stacy J. White	215
Morehouse College	GA	BRIDGE	Dr. Gregory Battle	90
Morehouse College	GA	SCHOLARS	Dr. Gregory Battle	113
Morgan State University	MD	NRTS	Dr. William Lupton	222
Norfolk State University	VA	PARTNER	Dr. Moses Newsom, Jr.	215
Norfolk State University	VA	PARTNER	Dr. Clarence Coleman	215
Norfolk State University	VA	PRECOL	Dr. Patricia Ramsey	43
North Carolina A&T State University	NC	FELLOWS	Dr. John Kelly	133
Prairie View A&M University	TX	NRTS	Dr. John Williams	224
Shaw University	NC	MASTAP	Dr. Joyce Keyes	154
South Carolina State University	SC	MASTAP	Dr. Joseph Fuller, III	157
South Carolina State University	SC	NRTS	Dr. Donald Walter	226
Southern University–New Orleans	LA	PARTNER	Dr. Penney Heath	216
Spelman College	GA	BRIDGE	Dr. Etta Falconer	98
Spelman College	GA	SCHOLARS	Dr. Etta Falconer	121
Spelman College	GA	SCHOLARS	Dr. Etta Falconer	124
St. Augustine's College	NC	PACE	Dr. Yvonne Coston	206
Stillman College	AL	PACE	Dr. James Christian	209
University of New Mexico	NM	SCHOLARS	Dr. Joseph Torres	126
University of the District of Columbia	DC	PRECOL	Dr. Winson Coleman	76
University of the District of Columbia	DC	TEACHTR	Dr. Winson Coleman	166
Voorhees College	SC	PARTNER	Dr. Jun Qin	216
Xavier University of Louisiana	LA	BRIDGE	Dr. George Baker	103
Xavier University of Louisiana	LA	MASTAP	Dr. Etim Eduok	168
Xavier University of Louisiana	LA	PARTNER	Dr. Etim Eduok	216

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Hispanic Serving Institutions (HSI's)

California State University–Los Angeles	CA	PARTNER	Dr. T. Jean Adenika-Morrow	214
California State University–Los Angeles	CA	PARTNER	Dr. Martin Epstein	214
California State University–Los Angeles	CA	MASTAP	Dr. T. Jean Adenika-Morrow	141
California State University–Los Angeles	CA	PACE	Dr. William Taylor	173
California State University–Los Angeles	CA	PRECOL	Dr. Milton Randle	16
California State University–Los Angeles	CA	PRECOL	Dr. Donald Young	18
City University of New York-City College	NY	NRTS	Dr. Sherman Austin	218
CUNY–Lehman College	NY	PACE	Dr. Anne Rothstein	176
Florida International University	FL	PARTNER	Dr. Gustavo Roig	214
Florida International University	FL	MASTAP	Dr. Carlos Brain	149
Hispanic Association of Colleges and Universities (HACU)	TX	PRECOL	Dr. Manuel Berriozabal	26
National Hispanic University	CA	PARTNER	Dr. Raul Cardoza	215
National Hispanic University	CA	PARTNER	Ms. Maria C. de Marin	215
National Hispanic University	CA	PACE	Dr. Raul Cardoza	195
New Mexico Highlands University	NM	PRECOL	Dr. Bill Taylor	37
New Mexico MESA, Inc.	NM	PRECOL	Dr. Evangeline Sandoval Trujillo	39
San Antonio College & Our Lady of the Lake University	TX	PARTNER	Ms. Cecilia V. Gonzales	216
Tennessee State University	TN	NRTS	Dr. Willard Smith	228
University of Puerto Rico–Humacao	PR	MASTAP	Dr. Alberto Caceres	160
University of Puerto Rico–Mayaguez	PR	MASTAP	Dr. Betty Ramirez	162
University of Texas–Brownsville	TX	PRECOL	Dr. Reynaldo Ramirez	67
University of Texas–Brownsville	TX	TEACHTR	Dr. Reynaldo Ramirez	164
University of Texas–Brownsville	TX	PRECOL	Dr. Lawrence Lof	70
University of Texas–Brownsville and Texas Southmost College	TX	PRECOL	Ms. Maria Escobedo	72
University of Texas–El Paso	TX	NRTS	Dr. Michael Kolitsky	230
University of Texas–El Paso	TX	PACE	Dr. Juan Herrera	210
University of Texas–El Paso	TX	PARTNER	Dr. Juan Herrera	216
University of Texas–San Antonio	TX	PRECOL	Dr. Manuel Berriozabal	74
University of Turabo	PR	PARTNER	Ms. Belisa Marrero	216
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Capitol College	MD	PRECOL	Dr. H. Judith Jarrell	19
CUNY–Medgar Evers College	NY	BRIDGE	Dr. Leon Johnson	85
CUNY–Medgar Evers College	NY	MASTAP	Dr. Leon Johnson	144
Cuyahoga Community College	OH	PARTNER	Mr. J. Thomas McManamon	214
Cuyahoga Community College	OH	PRECOL	Mr. J. Thomas McManamon	22
Midtown Educational Foundation (MEF)	IL	PRECOL	Dr. Jim Palos	32
Mount Holyoke College	MA	PRECOL	Dr. James & Charlene Morrow	35
NAFEO Services, Inc.	DC	SCHOLARS	Ms. Andrea Mickle	115
National Consortium for Graduates	IN	FELLOWS	Dr. George Simms	131
National Physical Science Consortium (NPSC)	CA	FELLOWS	Ms. L. Nan Snow	132
Nonprofit Initiatives, Inc.	MD	PRECOL	Ms. Lucy Negron-Evelyn	41
Northern Arizona University	AZ	SCHOLARS	Ms. Grace Boyne	118
Northern Arizona University	AZ	BRIDGE	Ms. Grace Boyne	92
Pasadena City College	CA	PACE	Dr. Joe Conner	201
Pasadena Unified School District	CA	PRECOL	Dr. Yvonne Mizell	46
South Dakota School of Mines and Technology	SD	BRIDGE	Dr. Phillip Huebner	95
Southeastern Consortium for Minorities in Engineering (SECME)	GA	OTHER	Dr. R. Guy Vickers	236
Texas A&M University–Kingsville	TX	PRECOL	Dr. Jorja Kimball	48
Trenholm State Technical College	AL	PRECOL	Dr. Elizabeth Ross	51
Turtle Mountain Community College	ND	BRIDGE	Dr. Sunil Karnawat	100
United Cerebral Palsy of Prince George's & Montgomery Counties	MD	PRECOL	Mr. Charles McNelly	55
University of Central Florida	FL	PRECOL	Dr. Jacqueline Smith	59
University of Cincinnati–College of Engineering	OH	PRECOL	Dr. Edward Prather	60
University of Maryland–Baltimore County	MD	PRECOL	Dr. Freeman Hrabowski	63
University of North Carolina–Pembroke	NC	MASTAP	Dr. Jose D'Arruda	159
University of South Florida	FL	BRIDGE	Dr. Joy O'Sheilds	101
University of South Florida	FL	PRECOL	Dr. Joy O'Shields	65

Tribal Colleges and Universities (TCU's)

American Indian Science and Engineering Society (AISES)	CO	TEACHTR	Ms. Suzanne Benally	137
Fort Belknap College	MT	PACE	Dr. Mary John Taylor	184
Navajo Community College	AZ	PARTNER	Dr. Mark C. Bauer	215
Navajo Community College	AZ	PARTNER	Mr. Alvino Sam	215
Northwest Indian College	WA	PACE	Dr. Kate Yamamoto	198
Oglala Lakota College	SD	PARTNER	Dr. Donna J. Demarest	215
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Northern Arizona University	SCHOLARS	Flagstaff	118
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California

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National Hispanic University	PARTNER	San Jose	215
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Pasadena City College	PACE	Pasadena	201
Pasadena Unified School District	PRECOL	Pasadena	46

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American Indian Science and Engineering Society (AISES)	TEACHTR	Boulder	137

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American Society for Engineering Education– Helen T. Carr Fellowship Program	FELLOWS	Washington	128
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University of South Florida	BRIDGE	Tampa	101
Bethune-Cookman College	PRECOL	Daytona Beach	14
Edward Waters College	PARTNER	Jacksonville	214
Edward Waters College	PRECOL	Jacksonville	24
Florida A&M University	BRIDGE	Tallahassee	88
Florida A&M University	PARTNER	Tallahassee	214
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University of South Florida	PRECOL	Tampa	65

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Nonprofit Initiatives, Inc.	PRECOL	Columbia	41
United Cerebral Palsy of Prince George's & Montgomery Counties	PRECOL	Bowie	55
University of Maryland–Baltimore County	PRECOL	Baltimore	63

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Montana

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Fayetteville State University	PACE	Fayetteville	180
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North Carolina A&T State University	FELLOWS	Greensboro	133
Shaw University	MASTAP	Raleigh	154
St. Augustine's College	PACE	Raleigh	206
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North Dakota			
Turtle Mountain Community College	BRIDGE	Belcourt	100
New Mexico			
University of New Mexico	SCHOLARS	Albuquerque	126
New Mexico Highlands University	PRECOL	Las Vegas	37
New Mexico MESA, Inc.	PRECOL	Albuquerque	39
Southwestern Indian Polytechnic Institute	PACE	Albuquerque	204
New York			
City University of New York-City College	NRTS	New York	218
CUNY–Lehman College	PACE	Bronx	176
CUNY–Medgar Evers College	BRIDGE	Brooklyn	85
CUNY–Medgar Evers College	MASTAP	Brooklyn	144
Ohio			
Cuyahoga Community College	PARTNER	Cleveland	214
Cuyahoga Community College	PRECOL	Cleveland	22
University of Cincinnati–College of Engineering	PRECOL	Cincinnati	60
Pennsylvania			
Lincoln University	PACE	Lincoln	193
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Jarvis Christian College	PACE	Hawkins	190
Prairie View A&M University	NRTS	Prairie View	224
San Antonio College & Our Lady of the Lake University	PARTNER	San Antonio	216
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University of Texas–Brownsville	PRECOL	Brownsville	67
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University of Texas–Brownsville	PRECOL	Brownsville	70
University of Texas–Brownsville and Texas Southmost College	PRECOL	Brownsville	72
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Dr. Gregory Battle	Morehouse College	BRIDGE	90
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Dr. Mark C. Bauer	Navajo Community College	PARTNER	215
Ms. Suzanne Benally	American Indian Science and Engineering Society (AISES)	TEACHTR	137
Dr. Manuel Berriozabal	Hispanic Association of Colleges and Universities (HACU)	PRECOL	26
Dr. Manuel Berriozabal	University of Texas–San Antonio	PRECOL	74
Ms. Grace Boyne	Northern Arizona University	SCHOLARS	118
Ms. Grace Boyne	Northern Arizona University	BRIDGE	92
Dr. Carlos Brain	Florida International University	MASTAP	149
Ms. Doris Brown	Edward Waters College	PARTNER	214
Dr. Doris Brown	Edward Waters College	PRECOL	24
Dr. Alberto Caceres	University of Puerto Rico–Humacao	MASTAP	160
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Dr. Clarence Coleman	Norfolk State University	PARTNER	215
Dr. Winson Coleman	University of the District of Columbia	PRECOL	76
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Dr. Joe Conner	Pasadena City College	PACE	201
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Dr. Donna J. Demarest	Oglala Lakota College	PARTNER	215
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Dr. Martin Epstein	California State University–Los Angeles	PARTNER	214
Ms. Maria Escobedo	University of Texas–Brownsville and Texas Southmost College	PRECOL	72
Dr. Etta Falconer	Spelman College	BRIDGE	98
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Dr. Joseph Fuller, III	South Carolina State University	MASTAP	157
Dr. Cathine Garner-Gilchrist	Hampton University	TEACHTR	153
Ms Judy Gobert	Salish Kootenai College	PARTNER	216
Ms. Cecilia V. Gonzales	San Antonio College & Our Lady of the Lake University	PARTNER	216
Dr. Linda B. Hayden	Elizabeth City State University	NRTS	220
Dr. Penney Heath	Southern University–New Orleans	PARTNER	216
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Dr. Joan Johnson	Southwestern Indian Polytechnic Institute	PACE	204
Dr. Leon Johnson	CUNY–Medgar Evers College	BRIDGE	85
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Dr. Sunil Karnawat	Turtle Mountain Community College	BRIDGE	100
Dr. John Kelly	North Carolina A&T State University	FELLOWS	133
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Dr. Jorja Kimball	Texas A&M University–Kingsville	PRECOL	48
Dr. Michael Kolitsky	University of Texas–El Paso	NRTS	230
Dr. Robert Langley	Lincoln University	PACE	193
Dr. Lawrence Lof	University of Texas–Brownsville	PRECOL	70
Dr. William Lupton	Morgan State University	NRTS	222
Ms. Belisa Marrero	University of Turabo	PARTNER	216
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Dr. Mary McKinney	Jarvis Christian College	PACE	190
Mr. J. Thomas McManamon	Cuyahoga Community College	PARTNER	214
Mr. J. Thomas McManamon	Cuyahoga Community College	PRECOL	22
Mr. Charles McNelly	United Cerebral Palsy of Prince George's & Montgomery Counties	PRECOL	55
Ms. Andrea Mickle	NAFEO Services, Inc.	SCHOLARS	115
Ms. Shelvie Miller	Alabama A&M University–FAST Program	PRECOL	12
Dr. Yvonne Mizell	Pasadena Unified School District	PRECOL	46
Dr. Sybil Mobley	Florida A&M University	BRIDGE	88
Dr. Abdul Mohamed	Jackson State University	PACE	188
Dr. Morris Morgan, III	Hampton University	PACE	186
Dr. James & Charlene Morrow	Mount Holyoke College	PRECOL	35
Ms. Lucy Negron-Evelyn	Nonprofit Initiatives, Inc.	PRECOL	41
Dr. Moses Newsom, Jr.	Norfolk State University	PARTNER	215
Prof. Theodore Nicholson, Sr.	Bethune-Cookman College	PRECOL	14
Dr. Donna Oliver	Bennett College	MASTAP	139
Dr. Joy O'Sheilds	University of South Florida	BRIDGE	101
Dr. Joy O'Shields	University of South Florida	PRECOL	65
Dr. Jim Palos	Midtown Educational Foundation (MEF)	PRECOL	32
Dr. Edward Prather	University of Cincinnati–College of Engineering	PRECOL	60
Dr. Jun Qin	Voorhees College	PARTNER	216
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Dr. Reynaldo Ramirez	University of Texas–Brownsville	PRECOL	67
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Dr. Patricia Ramsey	Norfolk State University	PRECOL	43
Dr. Milton Randle	California State University–Los Angeles	PRECOL	16
Dr. Gustavo Roig	Florida International University	PARTNER	214
Dr. Elizabeth Ross	Trenholm State Technical College	PRECOL	51
Dr. Anne Rothstein	CUNY–Lehman College	PACE	176
Dr. David Royer	Lincoln University	PRECOL	29
Dr. Sohindar Sachdev	Elizabeth City State University	PACE	177
Mr. Alvino Sam	Navajo Community College	PARTNER	215
Dr. Bennie Samuels	Florida A&M University	PARTNER	214
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Dr. William Taylor	California State University–Los Angeles	PACE	173
Dr. Bill Taylor	New Mexico Highlands University	PRECOL	37
Dr. Mary John Taylor	Fort Belknap College	PACE	184
Dr. Joseph Torres	University of New Mexico	SCHOLARS	126
Dr. R. Guy Vickers	Southeastern Consortium for Minorities in Engineering (SECME)	OTHER	236
Dr. Nagi Wakim	Bowie State University	PARTNER	214
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Dr. Donald Walter	South Carolina State University	NRTS	226
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Northern Arizona University	Flagstaff	AZ	92
South Dakota School of Mines and Technology	Rapid City	SD	95
Spelman College	Atlanta	GA	98
Turtle Mountain Community College	Belcourt	ND	100
University of South Florida	Tampa	FL	101
Xavier University of Louisiana	New Orleans	LA	103

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National Physical Science Consortium (NPSC)	San Diego	CA	132
North Carolina A&T State University	Greensboro	NC	133

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CUNY–Medgar Evers College	Brooklyn	NY	144
Florida International University	Miami	FL	149
Shaw University	Raleigh	NC	154
South Carolina State University	Orangeburg	SC	157
University of North Carolina–Pembroke	Pembroke	NC	159
University of Puerto Rico–Humacao	Humacao	PR	160
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Lincoln University	Lincoln	PA	193
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Edward Waters College	Jacksonville	FL	214
Fayetteville State University	Fayetteville	NC	214
Florida A&M University	Tallahassee	FL	214
Florida International University	Miami	FL	214
Mississippi Valley State University	Itta Bena	MS	215
National Hispanic University	San Jose	CA	215
National Hispanic University	San Jose	CA	215
Navajo Community College	Shiprock	AZ	215
Navajo Community College	Tsaile	AZ	215
Norfolk State University	Norfolk	VA	215
Norfolk State University	Norfolk	VA	215
Oglala Lakota College	Kyle	SD	215
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Capitol College	Laurel	MD	19
Cuyahoga Community College	Cleveland	OH	22
Edward Waters College	Jacksonville	FL	24
Hispanic Association of Colleges and Universities (HACU)	San Antonio	TX	26
Lincoln University	Lincoln	PA	29
Midtown Educational Foundation (MEF)	Chicago	IL	32
Mount Holyoke College	South Hadley	MA	35
New Mexico Highlands University	Las Vegas	NM	37
New Mexico MESA, Inc.	Albuquerque	NM	39
Nonprofit Initiatives, Inc.	Columbia	MD	41
Norfolk State University	Norfolk	VA	43
Pasadena Unified School District	Pasadena	CA	46
Texas A&M University–Kingsville	Kingsville	TX	48
Trenholm State Technical College	Montgomery	AL	51
United Cerebral Palsy of Prince George's & Montgomery Counties	Bowie	MD	55
University of Central Florida	Orlando	FL	59
University of Cincinnati–College of Engineering	Cincinnati	OH	60
University of Maryland–Baltimore County	Baltimore	MD	63
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