

## Prairie View A&M University SMET Enhancement Program

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### SMET Enhancement Program Overview

The National Science Foundation (NSF) – Prairie View A&M University (PVAMU) Science, Mathematics, Engineering and Technology - Enhancement Program (SMET-EP) has as its goal the significant increase in the number of students enrolling and successfully completing an undergraduate degree within SMET-related disciplines at Prairie View A&M University. The program is funded under the NSF Historically Black Colleges and Universities - Undergraduate Program (HBCU-UP). The first three years of the program have been highlighted by the achievement of stated goals for attracting more students and raising achievement levels among participants. Recruitment and retention of underrepresented student groups within SMET disciplines and general strengthening of the educational and research infrastructure are among the primary objectives. Partnerships with high schools, academic institutions, corporations and industrial/governmental laboratories have all played a vital role in the success of the program. Major components have been mentoring and monitoring programs, which keep students informed and well prepared for the transition from high school, through the undergraduate curricula and on to graduate school and industry.

The NSF throughout the nation is expanding similar programs. For example, a NSF study of six diverse universities participating in the Model Institutions for Excellence (MIE) Program confirmed that activities focused on science, engineering and mathematics significantly increased both enrollment and bachelor degree production by underrepresented minority student populations.<sup>1</sup> Compared with the baseline numbers from 1994-95, enrollment by underrepresented student populations on MIE campuses increased 33.7 percent by the 2000-01 year. That compares with a rise of 20.1 percent for all university students enrolled in science, engineering and mathematics (SEM) initiatives.

### PVAMU Course Lectures/Seminar Series

An Evening Lecture/Seminar Series has been developed at PVAMU that integrates and illustrates mathematics applications through follow-on courses. The early introduction of applications for theoretical mathematics enhances student recognition and application of various techniques of problem solving. Lectures/seminars provide student reinforcement and are conducted daily during the SMET Summer Institute and once a week during the fall and spring semesters. Lectures/seminars are considered vital components of academic enhancement and student success.

The SMET Summer Institute is an eight-week, academic intensive program used to provide dedicated instruction, attention and resources to incoming freshmen students. The PVAMU SMET Summer Institute is a proven, viable program to develop the mathematics, computer, communications and professional skills of recent high school graduates to college levels.

Included in the PVAMU SMET Program is a team-building effort in which carefully selected professors and advanced students teach, monitor and maintain educational activities in SMET disciplines. Advanced students are assigned to specific professors to help bridge the “uncertainties” which exist between incoming freshmen and college professors. Professors, in turn, work together to teach and track the cohort group and to extend SMET activities throughout various departments.

An active Mentor Program uses advanced students to mentor and counsel in separate groups of six SMET participants (one mentor per six participants). The advanced students mentor, tutor and solve small problems in a big brother or big sister atmosphere and provide on-going counseling and encouragement for participants.

#### Replication of Courses and Methods

The added lectures/seminars have influenced the initiation of similar lecture/seminar components in physics, chemistry and throughout the entire PVAMU Mathematics Department. The lectures/seminars present an informal classroom setting and invite students to become more involved in asking questions and in problem solving. The Summer Institute has now been replicated in the Biology Department, School of Architecture and at University College. Since the Institute focuses on the challenges faced by incoming freshman students, a favorable learning environment is immediately established leading to student development and success.

#### Effectiveness

The Calculus Readiness Test, used to assess the aptitude in mathematics of a new SMET participant, is a strong indicator of the success of the program. Students are tested at the beginning and end of the Summer Institute. Forty-five students taking the test the first year (2000) experienced a 78 point class average improvement in test scores after the eight-week institute. In the summer of 2001, the class average improved 89 points over their average entry-level Calculus Readiness Test. A perfect score for the exam is 200 points.

Student pass rates and grade distributions are the primary metrics used to evaluate student and professor performance in SMET gate-keeping courses – calculus, chemistry and physics. The PVAMU program continues to be enhanced through:

- Instructor-conducted seminars/lectures
- Seminars/lectures integrate real applications of theory
- Frequent student evaluations and examinations monitor progress
- Student-conducted problem and study sessions

- Bi-weekly meetings for student feedback

Course syllabi have been extensively modified for prerequisite mathematics courses to better prepare students for SMET gate-keeper courses. Course content has been reorganized to provide subject foundation within the course itself and curriculum modifications are continually under evaluation. Joint planning activities between SMET program officials and other PVAMU departments help to promote recruitment, retention and academic excellence.

#### Enhanced SMET Courses

Revisions of gate-keeper course syllabi were completed during the Fall 2000 through Fall 2001 semesters. Course revisions ensured that the course content was appropriate and the order of presentation was optimal for student learning. Curriculum modifications are continually under evaluation. For example, an on-going initiative is to ensure that students enrolled in Engineering Physics II have passed Differential Equations I or be enrolled as a co-requisite. Students are also encouraged to satisfy College Algebra requirements before enrolling in General Chemistry.

The PVAMU course revision process has resulted in enhanced performance for students. Activities and procedures that have proven valuable to the process are shared with other institutions. Because of our past success, the PVAMU team was requested to give a special presentation on “Mathematics Reform for Gate-Keeper Courses” at the annual meeting for Program Directors and Principal Investigators at National Science Foundation. Over thirty sets of revised course syllabi in mathematics were shared with other HBCU-UP member institutions.

#### Educational Techniques and Practices

Prairie View A&M University faculty members have continued to engage in a variety professional activities to learn of techniques and practices that have the potential for improving the success of the PVAMU HBCU-UP.

- Six SMET team members attended the “Reforming the Core Mathematics Program” at West Point, NY. SMET team members continue to meet regularly to coordinate mathematics reform throughout the department.
- SMET Program Manager attended the “Minorities in Higher Education: Impact on the National Workforce” NASA Administrator’s Fellowship Program and Professional Development Institute. The workshop focused on ways to increase the production of underrepresented populations with degrees in SMET.
- The Program Manager also attended the annual “Quality Education for Minorities (QEM) Network” conference to participate in a presentation by a representative of the Department of Education on the importance of SMET disciplines for minority students.
- A three-member QEM Network Team, representing the NSF HBCU-UP, conducted an on-site review of the PVAMU SMET Enhancement Program (HBCU-UP) during January 2001. The team provided suggestions on sharing the PVAMU curriculum reform efforts in

mathematics and encouraged the development of a faculty “buy-in” concept to help spread the success throughout the university.

- PVAMU instituted a carefully selected team to help facilitate a faculty “buy-in” concept in SMET disciplines. The Principal Investigator heads the 11-member team. The team includes professors involved in SMET disciplines of engineering, mathematics, chemistry and physics. The buy-in was implemented with selected faculty members in mathematics conducting evening lectures/seminars and were financially compensated. The discussions of how grades improved helped to encourage faculty in chemistry and physics to also conduct lectures/seminars.
- The Program Manager has taken the opportunity on numerous occasions to collaborate with persons of similar responsibility and expertise from other HBCU-UP Universities across the United States during past NSF-sponsored workshops and seminars.

### Assessing the Effectiveness of Techniques and Practices

PVAMU has a plan in place to assess the effectiveness of various areas of the SMET initiative. The areas include outcomes from the educational and mentoring techniques developed under the enhancement program. The effectiveness is assessed based on student performance data gleaned from the Summer Program Institute and follow-on gate-keeping courses. Student and professor performance in courses, with additional SMET lectures and seminars, is compared with like courses without additional lectures and seminars. The outcome provides data to quantify the benefits of the added lectures and seminars as well as the impact of student tutorials that are an integral part of the overall initiative.

In all cases, student pass rates and grade distributions serve as the primary metrics to evaluate the success of the program. Specifically, student cumulative grade point averages (GPAs), first time pass rates (FTPRs) and percentages of A-B-C grades in gatekeeper courses help to quantify and qualify program effectiveness.

### Supported Undergraduate Research Opportunities

PVAMU offers numerous faculty-supervised research opportunities for SMET-track students. Baseline research identified an excess of one hundred (100) undergraduate research positions. The objective of the SMET Program is to promote twenty (20) participants for undergraduate research each year. SMET students are offered research opportunities on the PVAMU campus and with various industrial partners including:

- PVAMU-NASA Research Center and Programs
- PVAMU-NASA Software Engineering Initiative (SEI)
- PVAMU Thermal Science Research Center
- General Electric
- NASA-Johnson Space Center
- Ford Motor Company
- Reliant Energy

- Duke Energy
- University of Texas at Austin
- Carnegie Mellon University
- Caterpillar, Incorporated

The NSF is working along other innovative fronts to expand research opportunities. Last year, NSF established five new Centers for Learning and Teaching to answer the need for a new generation of professionals who can inspire and challenge students while engaging in research on how students learn.<sup>2</sup>

Established at the American Association for Advancement of Science (AAAS) in Washington DC, Washington University at St. Louis and at the Universities of Wisconsin, Washington and Georgia, each higher education institution will receive \$10 million over the next five years. This higher education component of the on-going NSF initiative will provide for coordinated reform of teaching and learning through a wide array of research, faculty professional development, and education practice.

#### Support for Student and Faculty Research

The Senior Design Project Classes are designed to promote the multi-disciplinary, teaming concept within SMET disciplines. Students from different SMET disciplines or departments are grouped together for one academic year to complete a senior project. The senior project introduces the group to research and project/product development. Students must prepare and present a research and project proposal to a team of professors and their classmates for evaluation. Undergraduate students deliver research proposals and presentations utilizing equipment purchased with HBCU-UP funding. Students in the Senior Design Project Classes and student research assistants provide professional presentations, while integrating research within the classroom and extending research activities outside the laboratories.

PVAMU students are also able to capture images from the Scanning Electron Microscope, Atomic Force Microscope, the Internet and other sources for inclusion in presentations. Such images are then displayed before the class with the multi-media projection systems. This method of integrating and bring research to the classroom has been very effective.

The Chemistry, Biology and Physics Departments, located in our new \$27 million Science Building, are using the multi-media equipment, with access to a satellite link within a computer instruction laboratory. The system allows the departments to view research and medical operations in real time, which may be broadcast from any location in the world. The capability is very impressive and generates a lot of student interest in science and technology.

As an added benefit, the use of transportable equipment gives students additional opportunities to move their activities outside the classroom and to make professional public presentations before interested audiences on technical and general knowledge

topics.

### Active Partnerships Strengthen SMET Program

PVAMU has a strong and ever-widening partnership program supporting the institution of the SMET-EP. The SMET-EP is not responsible for the partnerships, but helps to strengthen the partnerships by providing well-qualified students to fulfill various industrial and academic personnel needs. The university continues to strengthen partnerships with nearby institutions to provide undergraduate and graduate student research, educational and industrial opportunities such as:

- Research opportunities at the University of Texas Health Science Center, Houston, TX
- Medical School opportunities at UT Health Science Center, Houston, TX
- Joint Ph.D. program with Texas A&M University, College Station, TX
- Joint Masters program with Texas Tech University, Lubbock, TX
- Research opportunities at Texas A&M University, College Station, TX
- Research opportunities at the University of Houston, Houston, TX
- PVAMU is currently pursuing a joint degree program in Nuclear Engineering with Texas A&M University at College Station and Texas A&M University at Kingsville, TX

PVAMU continues to take positive steps to engage industry partners to help meet the goals of the SMET-EP. The current list of partners includes, but is not limited to:

- Texas Instruments Incorporated
- Raytheon Systems
- Central Intelligence Agency
- Caterpillar Foundation
- General Electric Corporation
- Andersen Consulting - Accenture

In addition, PVAMU's Advisory Board for the SMET Enhancement Program includes active representatives from:

- DuPont Industries
- Tellabs Operation, Inc.
- Southwestern Bell Telephone
- Dow Chemical
- Compaq/Hewlett Packard Computer Corporation

PVAMU also has a "Cluster Organization" which consists of over fifty (50) industrial partners committed to the development of the institution, students and faculty. The Cluster Organization has an annual conference at Prairie View A&M University to carry out the goals and objectives of the organization. Each cluster corporation pays membership fees and makes annual contributions to support institutional development activities.

In addition, PVAMU has partnership programs with local High Schools and Community/Junior Colleges. At the High Schools, PVAMU is working to inform students of careers in SMET disciplines and to ensure students are aware of scholarship opportunities and various prerequisites for college. The SMET-EP reaches over 200 Texas High Schools to inform students of opportunities and requirements for careers in SMET disciplines.

#### Collaborations Provide Valuable Foundation for Continued Growth

The SMET Enhancement Program maintains direct links with two NSF-sponsored programs – the Texas Louis Stokes Alliance for Minority Participation (LSAMP) and the Comprehensive Partnerships for Mathematics and Science Achievement (CPMSA) at Beaumont Independent School District, in Beaumont, Texas.

The Texas AMP System Central Office is at Texas A&M University, 40 miles from Prairie View A&M University. Prairie View A&M University is a “Partner Institution” under the Texas LSAMP that provides continuation scholarships and stipends, on a competitive basis, to qualified students recruited under the SMET Enhancement Program. Financial support from the SMET-EP is available to qualified students for the freshman and sophomore years (up to 60 credit hours). After the sophomore year, SMET students compete for continued financial support from the LSAMP program.

One very strong High School partnership is with the Beaumont Independent School District, Comprehensive Partnerships for Mathematics and Science Achievement (CPMSA) Program. The Beaumont CPMSA Program is linked to the SMET Enhancement Program through activities of the Program Coordinator. In addition to teacher training and development, the program coordinator conducts special seminars to introduce students and teachers to innovative and dynamic methods of teaching and learning mathematics. These are excellent recruitment mechanisms to attract qualified students to the SMET-EP at Prairie View A&M University.

#### HBCU-UP and Non-NSF Programs Broaden Scope of SMET-EP

Prairie View A&M University has several research programs sponsored by agencies such as NASA, Air Force and Department of Energy. The programs include the PVAMU-NASA Center for Applied Radiation Research (CARR), the Thermal Science Research Center, the Solar Observatory, the Future Aerospace, Science and Technology (FAST) Center and the NASA-PVAMU Software Engineering Initiative (SEI). The SMET-EP has been the primary mechanism for early identification of top undergraduate students in SMET disciplines for undergraduate research. In turn, the sponsored research programs provide added experience and research opportunities for the SMET participants. The programs and sponsors have formed a partnership to help align undergraduate student interest with research requirements.

University College is a freshman program sponsored by the State of Texas and PVAMU to establish the ideal learning environment for college freshmen. The University College and the SMET-EP form a team to monitor, mentor, maintain and enhance student learning. The team provides an environment that quickly identifies any problem areas and immediately introduces a solution. This team effort has been vital in protecting SMET participants from the many academic hardships often experienced by first-time, first-term college students.

### Outreach and Dissemination

For the early years of the SMET-EP, pre-college (high school) and freshman activities have been the primary focus of the PVAMU program. The emphasis on graduate school increases, as the initial SMET cohort commences its junior year of college. Activities with the pre-college community include:

- Conduct annual student search through the National College Board targeting 500 to 600 candidates who meet the desired SMET participant profile.
- Mail over 1,000 SMET application/information packets annually, containing program brochures and general college admission information to feeder high schools and candidates identified through recruitment activities.
- Host visits of Junior Chapters (high school) of the National Society of Black Engineers (NSBE) to attract students to the SMET disciplines as a career choice.
- Maintain joint Explorer Posts (Boy Scouts of America) with two local high schools where emphasis is on mathematics, science, engineering, technology and the environment.
- Conduct annual recruitment visits by SMET Project team members to numerous Texas high schools.
- Coordinate joint efforts of the SMET project team, department heads and the university recruitment office to reach high schools throughout Texas with information on the SMET-EP.
- The SMET brochure is continually under revision and is also available in Spanish to help attract more Hispanic candidates.
- SMET team members often serve as guest speakers to inform the public of the SMET-EP and motivate high school students to attend college and consider SMET disciplines as a career choice.
- Maintain over 200 high schools on the SMET mailing list to reach students with information about their transition from high school to college life in Texas and to provide general information concerning careers in SMET disciplines.
- Currently publishing the first annual SMET Newsletter to disseminate throughout the SMET recruitment community.

### Reports and Publications Developed Through SMET-EP

The following educational materials have been developed as part of the SMET-EP project:



- New Course Syllabus for MATH 1113, College Algebra
- New Course Syllabus for MATH 1123, Trigonometry
- New Course Syllabus for MATH 1115, Algebra and Trigonometry
- New Course Syllabus for MATH 1124, Calculus with Analytic Geometry I
- New Course Syllabus for MATH 2024, Calculus with Analytic Geometry II
- Web-based course material for CHEM 1033, General Chemistry
- New Course Syllabus for MATH 2043, Differential Equations I

Continuing work is ongoing on the following educational materials with completion expected in the near future:

- New Course Syllabus for CHEM 1033, General Chemistry
- Seminar and Lecture Series for College Algebra
- Seminar and Lecture Series for Calculus I
- Seminar and Lecture Series for Calculus II
- Seminar and Lecture Series for Differential Equations I

Three Prairie View A&M University professors of Chemistry 1033, a gate-keeper course, invested several months to upgrade the course with web-supported materials and information. A PVAMU professor of Physics 2013, another gate-keeper course, migrated the course to a web-supported environment. Both web-related efforts provide easy access to course syllabi, homework assignments and solutions, quizzes and exams, references and links to relative information and application, along with contact information for assistance.

#### Evaluation Criteria for SMET-EP

The initial evaluation of the program was conducted in 2001 by the Quality Education for Minorities (QEM) Network. Three representatives from QEM Network conducted an on-site evaluation of the program under the concept of a technical assistant visit. Strengths and weaknesses of the program were documented and reported to the NSF. The on-site visit helped to guide the SMET-EP to the success we currently experience today.

At the program level, continuous evaluation and improvement is the concept of the program. Evaluation data are recorded, updated regularly and assessed on an ongoing basis by SMET officials. The data are converted into spreadsheets, charts and graphs, as needed, to assist with the assessment process. The PVAMU Department of Institutional Research provides the raw data used to develop charts and graphs.

#### Significant Program Accomplishments

There are numerous accomplishments of the SMET-EP at Prairie View A&M University. Some successes stand out in great detail.<sup>3</sup>

During the first two years of the program, PVAMU achieved its goal of increasing enrollment from the baseline (1998) year for students in selected SMET disciplines.

- In 2000, a 10 percent increase was obtained, over the baseline year.
- In 2001, a 15 percent increase was achieved over the baseline year, which compiled an aggregate 25% increase over the baseline year.

The Calculus Readiness Test, used to assess a student's aptitude in mathematics, is a strong indicator of the success of the Summer Institute. Students are tested at the beginning of summer and at the end of summer instructions.

- In 2000 (the first year of the program), the scores of 45 students improved an average of 78 point at the end of the eight-week period.
- In 2001 (the second year of the program), the scores of 51 students indicated an average increase of 89 points after the eight-week institute.

SMET-EP participants in gate-keeper courses had substantially higher success rates than either the general university population or the student population involved in SMET disciplines as a whole.

- For CHEM 1003, SMET students had a 28 percent higher success rate than the SMET population (first-time pass rate).
- For MATH 1115, SMET students had a 26 percent higher success rate than the SMET population.
- For MATH 1124, SMET students had a 37 percent higher success rate than the SMET population.
- For PHYS 2013, SMET students had a 12 percent higher success rate than the SMET population.

Since the aptitudes of the groups of SMET participants and selected non-participants are close (900+ on SAT or 19+ non ACT), increases in cumulative GPA can reasonably be attributed to the individualized treatment, which SMET students receive compared to non-SMET counterparts.

- In Fall 2000, the SMET Cohort achieved a cumulative GPA of 3.03 compared with a GPA of 2.66 for non-participants.
- In Fall 2001, the SMET Cohort achieved a cumulative GPA of 3.21 compared with a GPA of 2.55 for non-participants.

Full-time enrollment is another measurement of PVAMU success in SMET disciplines.

- In 2001, full-time freshman enrollment in SMET disciplines increased by 49.3 percent, rising from 286 students in 2000 to 427 students in 2001. A gain of just 8.3 percent, in freshman enrollment only, was recorded the previous year.

- Of the 55 graduates obtaining SMET-related degrees in the fall of 2001, there was a 40 percent increase in the number of graduates achieving a 3.00 or higher GPA when compared to the previous year. This item of success cannot be attributed to the SMET-EP alone.

While it will take one more years for graduation rates to increase as the result of the SMET-EP Program, there is evidence that the enhanced quality of education offered SMET students is already in place. While enrollment in SMET disciplines had declined over several years before the NSF-sponsored SMET program, enrollment began to increase in 1999 and continues to do so today. Documentation in the program's first two years strongly indicates that retention efforts are working to keep students challenged and firmly rooted in SMET disciplines.

- In 2000, only seven (7) students in the first year's cohort were lost to attrition and, of those, only one changed to a major outside the SMET disciplines. Two suffered from financial shortfalls and two left because of academic probation. The other two transferred to community colleges near their homes and one has returned to PVAMU this year.
- In 2001, only one member of the cohort changed her major to education. Three others who failed to return did not return to the university environment at all.

#### Challenges to Program Implementation and Next Steps

Currently, there are no major challenges or barriers to program implementation. PVAMU Executives, Deans and Department Heads have provided the necessary support to make the program a success. The challenges rest with student preparation from the various high schools. As a next step, PVAMU is planning to submit a proposal for the NSF Mathematics and Science Partnership (MSP) Program to help influence high school student preparation for college. The primary challenges are:

- Must confirm teacher preparation and knowledge of mathematics for students preparing to attend college in SMET disciplines.
- Must facilitate opportunities for mathematics and science teachers to receive continuing education and incentives to pursue advanced degrees.
- Must inform, encourage and help prepare high school students to pursue the college track of their high school curriculum.
- Must assist school districts in preparing students to pass college entrance exams required in the State of Texas.
- Must provide outside assistance to help prepare the underrepresented populations to achieve higher test scores on the SAT and ACT.

The items identified above are viewed as the primary components that influence students of underrepresented populations to pursue or not to pursue a college education. In addition, mathematics and science are also considered the more challenging subjects. Too many students have the tendency to avoid careers in mathematics and science because of the perceived difficulty. Too often, the teacher does not have the combination of knowledge and resources required to significantly increase the student's knowledge and

confidence in mathematics and science. PVAMU must participate in the process to improve the enrollment and performance of native high school students in mathematics and science related career fields.

Financial considerations also play a role in attracting underrepresented undergraduates into college programs. Prairie View A&M University's own figures confirm the need for financial assistance.<sup>4</sup> In 1995, there were 4,178 PVAMU undergraduates and graduate students receiving \$11.4 million in financial aid for their fall semester of studies.

In 2000, there were 5,620 PVAMU students assisted by \$21 million in financial aid. Of that, \$12.4 million came from grants and another \$5.4 million was in scholarships. Work study programs and waivers made up the rest.

Nationwide, about 7.1 million full-time college students receive some form of financial aid to help pay for education, according to the Commerce Department's Census Bureau. Six in ten students get help outside their families to pay for education and almost half receive aid from more than one source.

#### Summary

Prairie View A&M University SMET-EP Program goal: "To increase significantly the numbers of students enrolling in, and successfully completing, quality SMET baccalaureate programs, which will prepare them to pursue doctoral degrees in SMET disciplines and enter the SMET workforce." Prairie View A&M University SMET-EP objectives:

- Develop and maintain a diverse and intellectually vigorous faculty committed to the improvement of undergraduate education;
- Strengthen SMET curricula, courses and laboratories through the incorporation of advances in research-based teaching and learning in SMET disciplines;
- Develop appropriate partnerships with other academic institutions and industrial laboratories, as well as NSF-supported research centers, to ensure quality research experiences that complement student academic programs;
- Ensure that students are aware of, and well prepared for, graduate school matriculation, including an understanding of non-academic factors that are critical to success in graduate school;
- Stimulate faculty, professional organizations and business, and industry involvement in mentoring undergraduate SMET students, motivating them to successfully complete their undergraduate degrees and pursue graduate studies; and
- Function in a complementary and collaborative way with other related NSF-funded educational initiatives within the grantee institution and the region, such as the Louis Stokes Alliances for Minority Participation (LSAMP), Centers of Research Excellence in Science and Technology (CREST), Minority Graduate Education (MGE), and Integrative Graduate Education and Research Training (IGERT) programs.

- <sup>1</sup> Source: *Model Institutions for Excellence Fact Book 2001, Historically Black Colleges and Universities- Undergraduate Program Self-Evaluation Indicator System Workshop, May 16-17, 2002, Atlanta, GA.*
- <sup>2</sup> Source: "NSF Establishes Five New Centers to Develop Teaching Leadership in Science and Mathematics," *National Science Foundation, Washington, D. C., October 23, 2002.*
- <sup>3</sup> Source: *SMET Enhancement Program 2002 Annual Report, Prairie View A&M University, Section IV, July 26, 2002.*
- <sup>4</sup> Source: *PVAMU 1995-2000 Fact Book, Office of Institutional Effectiveness, Research and Analysis, August 30, 2002.*

## Biography

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