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University awarded \$1 million grant from National Science Foundation

AUGUST 28, 2006

A recent government-commissioned study by one of the nation's leading scientific organizations concluded that the United States is losing its edge in the world marketplace.

Among other things, the National Academy's report to Congress revealed that America's advantages in science and technology have started to disappear, thanks in large part to a lack of people who have post-secondary training in these disciplines.

Georgia Southern University has responded to this impending crisis with a project that is designed to increase the number of students who graduate with bachelor's degrees in the STEM (Science, Technology, Engineering and Mathematics) fields.

Funded in part by a \$1 million grant from the National Science Foundation (NSF), the project has been dubbed ASPIRES, which stands for Advisement and Scholarship Promoting Inquiry-based Research Experiences in STEM.

Based in the Allen E. Paulson College of Science and Technology (COST), ASPIRES features five initiatives that seek to improve graduation rates by increasing the retention of STEM students and improving academic achievement in introductory science and math courses.

In the process, ASPIRES will address the Board of Regents' priority initiative to enhance student progress, which is known as Retention, Progression and Graduation (RPG).

According to Professor Mary Boyd the ASPIRES principal investigator who started the project and wrote the successful grant proposal the five ASPIRES initiatives are aligned with the Regents' goal to achieve national performance levels in retention and graduation rates.

'We want to encourage students to consider a major in one of the STEM disciplines, and then we want to make sure that they remain interested and engaged until they graduate,' said Boyd, the chair of the Department of Chemistry and the ASPIRES project director.

'By doing these things, we can help to ensure that our nation has the educated workforce in science and technology that we need to be competitive in the coming years.'

The demand for a highly trained workforce in the 21st century was one of the points emphasized by the National Academy in its report to Congress, which was titled 'Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future.'

Written by a panel that included two Nobel Prize-winning physicists, the report noted that 'the scientific and technical building blocks of our economic leadership are eroding at a time when many other nations are gathering strength. We fear the abruptness with which a lead in science and technology can be lost, and the difficulty of recovering a lead once lost, if indeed it can be regained at all.'

In its conclusion, the study made four recommendations to national policymakers. One of these recommendations encouraged the development, recruitment and retention of top students, scientists and engineers from both the U.S. and other countries.

Georgia Southern's answer to this challenge is ASPIRES, a five-year project that will focus on inquiry-based active learning, student support and academic achievement, student/faculty engagement, and faculty professional development.

'We want to keep students interested in the STEM disciplines by showing them how what they are studying relates to the real world and the career they are considering, and by challenging them in the classroom and the lab,' said Bret Danilowicz, the acting dean of COST.

Intended to provide each student with an inclusive cycle of engagement from their freshman year through their senior year, ASPIRES features three initiatives that seek to increase the retention of STEM students:

- A centralized advising center will be implemented to guide students and promote interaction between them and the faculty. Described by Boyd as 'one-stop shopping for students,' the center will pair students with faculty advisors from each department in COST. The advising center will also coordinate activities with Career Services, the Academic Success Center and the Minority Advisement Program.
- Students who live on campus will be engaged through Student Learning Communities in their residence halls. Groups of 25 students with similar academic interests will live together in the same hallway, and they will take many of the same classes. Also, an upperclassman will live in the residence hall to provide academic tutoring.
- Undergraduate research opportunities for freshmen will be promoted and implemented. According to Boyd, numerous studies have shown that undergraduate research is one of the most effective ways of promoting student/faculty engagement, which in turn promotes student retention within their major.

Two additional ASPIRE initiatives are designed to promote student learning and performance:

- A supplemental instruction program will be implemented to promote academic achievement. Most courses feature three hours of lecture per week, but supplemental instruction will give

students an additional hour each week in which they take a more active role in the learning process, such as group problem-solving sessions led by a peer mentor.

- Guided inquiry will engage students through active learning, critical thinking and problem solving. In guided inquiry, the instructor acts as a kind of 'coach' who leads the students through a series of exercises that allows them to discover the answers to questions for themselves.

According to the project proposal, the five ASPIRE initiatives will directly impact over 650 incoming first-year STEM students during each year of the project, and will eventually result in an additional 140 STEM graduates each year.

ASPIRES drew praise from Linda Bleicken, the University's provost and vice president for academic affairs.

'Thanks to the initiative and hard work of Dr. Boyd and her research team, Georgia Southern can leverage internal resources to contribute meaningfully to the production of additional STEM graduates,' Bleicken said. 'The University is proud of this team and anticipates the difference this effort can have for the state of Georgia.'

The \$1 million grant is part of the NSF Division of Undergraduate Research STEM Talent Expansion Program (STEP). The NSF evaluated 141 proposals for STEP grants in February 2006, but only about 15 of the proposals were funded by the NSF.

'This puts Georgia Southern in a very select group of institutions,' said Boyd, who noted that ASPIRES was lauded as a model proposal in the NSF panel review.

The NSF grant will not begin until Jan. 1, 2007, but ASPIRES has already received \$800,000 in matching funds from several sources, including the Board of Regents' RPG initiative. The matching funds also include contributions from the Office of the Provost, the Center for Excellence in Teaching, the Department of Housing and COST.

The matching funds will allow COST to proceed this fall and address various administrative and logistical issues related to ASPIRES, including the hiring of a director and staff for the centralized advising center.

Danilowicz, Associate Provost Amy Heaston, COST Office of Undergraduate Research Director and Associate Professor of Biology Bruce Schulte, and Professor of Mathematics David Stone will serve as co-principal investigators for ASPIRES.

Danilowicz and Heaston are responsible for the administrative integration of the project into departmental and student programs within COST and the University. Schulte is responsible for the

implementation of freshman research opportunities, and Stone is responsible for curricular initiatives within the Department of Mathematics.

ASPIRES also includes the following senior personnel:

- Associate Professor of Geology Pranoti Asher will assist the external evaluator in assessment activities.
- Associate Professor of Physics Cleon Dean and Assistant Professor of Physics Delena Gatch will develop guided inquiry and supplemental instruction materials for introductory physics courses.
- Associate Professor of Chemistry Brian Koehler and Assistant Professor of Chemistry Jessica Orvis will develop guided inquiry and supplemental instruction materials for introductory chemistry courses.
- Associate Professor of Biology Lissa Leege and Assistant Professor of Biology Michelle Zjhra will develop guided inquiry and supplemental instruction materials for introductory biology courses.
- Associate Professor of Mathematics Yan Wu will help Stone develop guided inquiry and supplemental instruction materials for pre-calculus, calculus and trigonometry courses.
- Professor of Biology John Parrish will provide advice and training for the development of the centralized advising center.