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The South East Alliance for Graduate Education and the Professoriate Program: Graduate Minority Retention and Preparedness for Academic Careers

Abstract

The South East Alliance for Graduate Education and the Professoriate (SEAGEP) is one of a national network of National Science Foundation (NSF) Alliances for Graduate Education and the Professoriate (AGEP). AGEPs have a mandate to catalyze institutional changes to produce an inclusive and supportive environment that will lead to sustained progress in diversifying the graduate student population and eventual placement in academic jobs. AGEPs are led by top level University administrators. In SEAGEP, the University of Florida (UF) serves as the lead institution in partnership with Clemson University (CU) and the University of South Carolina (USC) as primary partners. Secondary partners include the NSF Louis B. Stokes Alliances for Minority Participation (LSAMP) programs in Florida and South Carolina, as well as the University of The Virgin Islands (UVI). To provide opportunities for international exposure, SEAGEP has also developed a collaboration with the Latin American and Caribbean Consortium of Engineering Institutions (LACCEI). SEAGEP is a comprehensive minority graduate level program offering a variety of support to U.S. citizen or permanent resident students who are pursuing Ph.D. degrees in Science, Technology, Engineering and Mathematics (STEM) fields. Students are offered a variety of training experiences and opportunities to prepare them for academic careers.

At the UF, seventy-four students in 22 STEM departments have been directly served through monetary awards to support their studies and research, travel to professional conferences, professional development seminars, mentoring, and peer support. These students include 41 African American, 31 Hispanic, and 2 Native American students. At the end of the fifth year of the grant, the program had an 86% retention rate. To date, program participants have earned 12 Ph. D. and 7 Master’s degrees, and an additional 47 are currently enrolled and making progress towards their degrees. Minority graduate enrollments in STEM departments have increased 56% over the life of the grant, and it is expected that this will result in significant increases in the numbers of advanced degrees earned by minority students in the future. In addition, SEAGEP offers research experiences to minority undergraduate STEM students to increase their interest in and preparedness for graduate school. Specific program offerings and program evaluation results will be described, as well as recommendations on how faculty can become part of these programs across the country.

Introduction

The need to diversify the American scientific workforce has been well documented. The NSF has taken a leadership role in efforts to meet this need, by developing programs to directly address the issue through the Directorate for Education and Human Resources, as well as by requiring grantees in the scientific directorates to address their efforts to enhance diversity, as detailed in the broader impacts review criteria. NSF Director Dr. Arden Bement has referred to the building of a diverse scientific workforce as not only a priority for NSF, but “perhaps the
The LSAMP program is one NSF program which seeks to build productive capacity and output within institutions with significant enrollments of undergraduate minority populations underrepresented within STEM fields. LSAMP is designed to increase substantially the quality and quantity of students receiving baccalaureate degrees in STEM fields and who are well prepared for either doctoral study or professional practice in STEM fields. The success of the LSAMP program is clear. Since its inception in 1990, minority enrollment in STEM majors at more than 450 LSAMP-participating institutions increased from 35,670 in 1991 to more than 205,000 in 2003. Over 170,000 bachelor’s degrees have been produced by AMP institutions, almost 25,000 annually.

The lack of diversity among STEM faculty and the variables that impact retention of minority students in STEM doctoral programs are also well documented. There is no argument that there is the need to retain students in these programs and increase diversity among higher education STEM faculty. Building on the success of the LSAMP Program, in 1998 NSF awarded the first eight Minority Graduate Education (MGE) awards (Howard, Georgia Institute of Technology, The University of Michigan, The University of Alabama at Birmingham, The University of Missouri-Columbia, The University of Puerto Rico, Rice University, and the University of Florida. The goal of the five year MGE grants was to increase the diversity of students pursuing STEM PhDs and to prepare them with the skills necessary to enter an academic career. In 1999, the MGE Program was renamed the Alliance for Graduate Education and the Professoriate (AGEP) program. This reflected a shift from single institution efforts to a broader alliance approach. BEST (Building Engineering & Science Talent), an initiative of the Council on Competitiveness, (a nonprofit group established on the recommendation of the Congressional Commission on the Advancement of Women in Science, Engineering, and Technology) concluded that the change necessary to meet the challenge of diversifying the scientific workforce could not be achieved one campus at a time. Partnerships would be necessary, and this shift from the MGE to the AGEP model mirrored this understanding.

In 1998 and 1999, AGEP Institutions graduated almost 20% of STEM PhDs conferred nationwide. The goals of the AGEP program are to develop and implement innovative models for recruiting, mentoring, and retaining minority students in STEM doctoral programs and to develop effective strategies for supporting underrepresented minorities who want to pursue academic careers. AGEP’s have a mandate to serve as a catalyst for significant institutional change.

The MGE/AGEP program at the University of Florida

The University of Florida was in the first class of MGE awards, in partnership with the Florida-Georgia LSAMP program (FGLSAMP). The primary focus of the Phase 1 UF AGEP program was the graduate component, including support (both financial and personal) of 50 minority graduate students at UF. The Provost served as PI, signaling commitment to diversity from the highest levels of the administration. The program was designed to assist departments in recruiting and retaining underrepresented students. It also worked in partnership with the departments by providing funding for the students in Year 1, with a requirement that departments help students secure subsequent funding. AGEP produced institutional change at UF by uniting key personnel across the two largest colleges (Engineering and Liberal Arts and Sciences) in a
common effort to assist these students, resulting in an 86% retention rate at the end of the 5 year award. Key elements offered by the program were informed by the literature: as finances were a noted barrier to higher education for minority students, AGEP provided financial support in the first year; access to computer resources was also a barrier, and so the program provided each student with a laptop computer. Effective support, professional development activities, and mentoring were also built in to the program.

UF MGE scholars were in 13 departments (Materials Science & Engineering, Agricultural Engineering, Chemistry, Industrial & Systems Engineering, Aerospace Engineering, Civil Engineering, Electrical Engineering, Physics, Environmental Engineering, Chemical Engineering, Animal Sciences, Entomology, Microbiology & Cell Science). The group included 34 (68%) African Americans, 14 (28%) Hispanic Americans, one (2%) Native American, and one (2%) of mixed descent. Of these 50 students, 23 are currently enrolled in the program, 12 have graduated with a PhD, seven graduated with Master’s degrees, four transferred to other universities to continue their PhD, and four others left the program for personal reasons.

In 2005, UF was awarded a second AGEP, only given the shift in the national AGEP Program from single institution programs to multi-institution alliances, UF expanded its breadth by forming the South East AGEP (SEAGEP), recruiting the University of South Carolina (USC) and Clemson University (CU) as primary partners. In addition to FGLSAMP, the South Carolina AMP was also incorporated into the Alliance, as well as the University of the Virgin Islands (UVI). An informal partnership with the LACCEI was also included. The extension of the project to South Carolina institutions expands the reach of the program and has the potential to result in significant increases in minority STEM PhD production as South Carolina institutions graduate large numbers of STEM undergraduate students. SEAGEP has been the catalyst for strengthening the connections between the SCAMP program and CU and USC. In addition, UVI prepares students in the basic sciences but lacks engineering programs, graduate opportunities, and graduate students as role models for their students. Participating in SEAGEP will provide them with these opportunities.

An increase in depth occurred when the program at UF expanded to include participation from seven new departments. The first phase UF AGEP worked directly with 50 students and the primary focus was with the Materials Science and Engineering (MSE) Department that recruited 23 AGEP Scholars. SEAGEP has established new collaborations with faculty and students in Astronomy, Zoology, Geomatics, Geology, Forestry Resources and Conservation, Mathematics, and Biomedical Engineering, reaching STEM students in areas not previously directly supported by the program.

The SEAGEP goals are to:

- Increase the number of minority STEM PhD students and prepare them for successful entry into productive faculty careers
- Develop synergistic partner relationships for institutionalizing changes that will continue to promote diversity in STEM graduate education
- Increase the pool of undergraduates from underrepresented groups who are prepared for entry into graduate STEM fields
- Develop an evaluation model to investigate the effectiveness of partnerships
The SEAGEP strategic plan was guided by the eight design principles to expand higher education capacity described by BEST: institutional leadership, targeted recruitment, engaged faculty, personal attention, peer support, enriched research experience, bridging to the next level, and continuous evaluation. With regard to institutional leadership, it has been shown that support from top officials is crucial for the initiative to be successful. With this in mind, commitment to the goals of the alliance was secured from top officials at each of the partner institutions, providing the foundation upon which the collaboration has been built. A national 1999 survey of PhDs identified several areas of concern. Over one-third of the respondents reported that they did not receive adequate training to help them improve their teaching, that career guidance for academic careers was not available, and that their department did not provide supportive environments for underrepresented minorities. Each of these issues were addressed in SEAGEP.

Graduate Level Program Components

The Science, Engineering, and Mathematics Minority Professionals Network Seminar Series. This series is rotated among the three primary institutions, and utilizes video-conferencing capabilities to unite students across the institutions. Professional development topics included in this series have included portfolio development, how to effectively mentor undergraduate researchers, time management strategies, how to get an academic job, among others.

Career Shadowing. Another important component in preparing for the professoriate is exposure to academic careers at different types of institutions. The majority of PhDs are awarded by large research institutions, however the majority of faculty positions are at the community college level. Graduate student training does not always prepare students for faculty positions at liberal arts or community colleges, and training on the different expectations of different types of institutions is necessary. SEAGEP partners represent Research Extensive and Intensive Institutions as well as undergraduate teaching institutions, HBCU’s, and community colleges, and students are provided with the opportunity to shadow a faculty member to learn about alternate types of faculty placements. This past year, 2 Materials Science and Engineering students spent several days at UVI. They presented seminars and talked to the undergraduate students about pursuing engineering graduate degrees and were able to shadow professors at this undergraduate HBCU. Following the trip, the students were asked to comment on the experience, excerpted below:

- My career shadowing experience was quite enlightening and it really helped me to better comprehend more of the underlying differences between a Research I institute and a Research III institute.
- One of the main things that I noticed was the casual relationships that the students had with the professors. Because the class sizes are so small at UVI, the students and professors seem to have developed a totally different level of interactions/relationships than one would see at a large university like Florida.
- The atmosphere was so relaxed that I was almost surprised to see how they were able to keep the students motivated to stay off the beach and attend classes regularly. But at the same time, the relaxed atmosphere was just what led the students to form bonds with the professors that keep them coming to class and actively participating in lectures.
The most valuable aspect of the experience was the impact that it had in helping me to solidify what type of university that I want to work at. Before going to UVI, I was somewhat unsure of whether I wanted to focus more on research or on teaching. While my experience at UVI was quite pleasant, I realized that I want to continue the course of my career as a researcher and that a Research III university is not for me.

This experience helped me to understand more about what the faculty role is at a smaller university and allowed me to see what I want out of an academic career.

**Annual Meeting.** The first annual 2-day student conference was held in 2006 at Clemson and offered students Seminars on topics including demystifying the tenure and promotion process, getting published, writing proposals, “How People Learn”, among others. A student poster session allowed the students to network and learn about the breadth of research being conducted at the three institutions.

**International Experience.** SEAGEP recognizes the importance in international experience for students and faculty at all levels. A survey of doctoral students indicated that they felt the need for more global experience. To date, funding has been provided to support student research efforts studying Remote Sensing and Geographic Information Systems in Botswana and an Investigation of Natural and Anthropogenic Rates of Erosion in the Tropical Andes of Columbia. Students are encouraged to participate in the annual LACCEI meeting, and SEAGEP has facilitated students and faculty travel to international conferences.

**Financial Awards Programs.** SEAGEP has developed a funding partnership model with faculty and departments to help support funding for selected students. These awards include funding for beginning students (that includes contributions from faculty and departments), short-term retention awards, and dissertation awards for student in their last year of funding.

**Mentoring Workshop:** The primary graduate student mentoring activity this past year was a workshop entitled “Mentoring in a Multicultural Environment” conducted at UF in January 2006, focusing on helping the advisors of the SEAGEP students develop mentoring skills and learn how to bridge the cultural gap between their background and that of their students. Twenty-seven faculty members and students from all three primary institutions participated in this workshop.

**Postdoctoral Program.** To facilitate the transition of new STEM underrepresented PhDs into academic positions, SEAGEP makes 4 Post Doc awards each year. These are again partnerships with faculty, as faculty also contribute to the support of the new scientists. To date, SEAGEP has supported Post Doc positions in Microbiology and Cell Science, Chemistry, Materials Science and Engineering, Botany, and Zoology.

**Undergraduate Activities**

Research Experiences for Undergraduates. FG and SC AMP students are provided with the opportunity to hone their research skills by doing research at their home institution during the academic year. In addition, each primary partner offers residential summer research experiences for undergraduates.
A special initiative on the UVI campus was held in Summer 2006. UF SEAGEP offered a one-month Scientific Imaging mathematics REU program for 8 UVI students on their campus. UF faculty and graduate students brought a program to the home campus for student who might otherwise not be able to participate in such a program.

**Recruiting.** The need for targeted recruitment is crucial to the success of the program. At the Alliance level, primary partners collaborate with UVI and the FGLSAMP and SCAMP institutions to recruit undergraduates into graduate STEM disciplines. This involves recruiting at FGLSAMP and SCAMP annual meetings and elsewhere as appropriate.

**Evaluation and Assessment - AGEP**

Extensive formative and summative evaluation data was collected during the Phase 1 of the UF AGEP. Quantitative and qualitative data were collected through student surveys, interviews, portfolios and reflective writings, as well as a faculty and Deans surveys. In Fall 2002 a survey of the 27 AGEP scholars rated their level of agreement (1 = Strongly Disagree to 5 = Strongly Agree) with statements focused on the monthly meetings, the professional meetings they attended, the value of the computer and teaching experience/training they received, and exposure to role models. Data were analyzed using Statistical Package for the Social Sciences. Results showed a high level of agreement that (a) the AGEP meetings provided them with support from peers, (b) their AGEP sponsored attendance at professional meetings exposed them to research in their chosen fields and enhanced their communication and presentation skills, and (c) the computer resource positively contributed to their academic development.

Follow-up interviews of eight AGEP scholars in Fall 2002 probed into students’ perceptions of the AGEP experience. The participants (five males and three females), purposefully selected because they represented scholars at various stages of the program in diverse majors across colleges, were asked about their experiences. 30-minute interviews were tape-recorded, transcribed to yield over 30 pages of typed protocols that were analyzed. Participants appreciated the support that they received through the program and mentioned the different ways in which this support was demonstrated. The general feeling was that this combined “support system” of financial, academic, social, and emotional components facilitated students’ academic pursuits. When asked how the AGEP program differed from other fellowships, participants said the program helped them to become more involved in the life of the school and to not remain isolated by providing a supportive environment and by giving them the opportunity to succeed.

Survey data was collected from faculty who worked with AGEP scholars. Four open-ended questions allowed them to identify what they thought were important elements of the program. Responses from 18 participants in 10 departments were received. Thirty-nine percent perceived the value of the program to be (a) the funding support that it provided the students, (b) the diversity that the program brought to the department, and (c) its usefulness as a recruitment tool. With regard to institutional change, AGEP has enhanced the awareness of some departments of the need to increase diversity of the graduate student body, and to become proactive about minority recruiting.
In Spring 2004, 25 scholars (63%) completed a program evaluation questionnaire and 92% of the respondents indicated a good, very good, or excellent relationship with faculty.

**The Materials Science and Engineering Department – AGEP Collaboration – a case study in departmental transformation**

An AGEP program can have a transforming effect, if there is significant buy in from the department chair, faculty, and student services personnel involved. An example of this at UF is the partnership with AGEP and the Materials Sciences and Engineering (MSE) Department that developed during Phase 1. The MSE department was an early supporter of the goals of the UF Phase 1 AGEP, and of the 50 students supported in this phase, 23 were MSE students. This was a result of a commitment from the department chairs, vigorous recruiting at minority serving institutions, and a student services office committed to the retention and success of these students. Recruiting cohorts of students each year provided peer support at each level, and subsequently, more senior students who were available to mentor the newer. A critical mass of underrepresented students changed the climate of the department and enhanced subsequent recruiting efforts. Results of this close collaboration are demonstrated in Table 4. An additional institutional impact is that the student services coordinator responsible for these increases has now been given the responsibility to work with all 11 engineering departments, and it is expected that this will produce even more increases across the board in this college.

<table>
<thead>
<tr>
<th></th>
<th>% Change between 96-99 and 03-06 averages</th>
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<tbody>
<tr>
<td>Applications</td>
<td>+ 37%</td>
</tr>
<tr>
<td>Admits</td>
<td>+ 29%</td>
</tr>
<tr>
<td>Total PhD Enrollees</td>
<td>+ 81%</td>
</tr>
<tr>
<td>Advance to Candidacy</td>
<td>+ 69%</td>
</tr>
<tr>
<td>PhD Recipients</td>
<td>+ 40%</td>
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</tbody>
</table>

Table 4. Materials Science and Engineering PhD Data

**SEAGEP Results to date:**

Currently, 47 minority PhD students are receiving direct support from the UF SEAEGP office, 20 are being supported at the University of South Carolina, and 19 are receiving support at Clemson University. Minority doctoral student enrollment and PhD graduates data for UF, USC, and Clemson University are presented in Tables 1, 2, and 3. As the numbers are small and volatile from year to year, an average over the first three years and the past three years data has been collected.

<table>
<thead>
<tr>
<th>Total UF</th>
<th>1996-1996 Ave</th>
<th>2003-2006 Ave</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minority PhD Enrollments</td>
<td>170</td>
<td>231</td>
<td>+36%</td>
</tr>
<tr>
<td>Minority PhD</td>
<td>13</td>
<td>19</td>
<td>+46%</td>
</tr>
</tbody>
</table>
Table 1. UF SEAGEP PhD Enrollment and Graduates Data

The two new partners have shown significant increases in enrollments in the past three years and it is anticipated that similar increases in graduates will follow.

<table>
<thead>
<tr>
<th>Total USC</th>
<th>First 3 yrs Ave</th>
<th>Last Three yrs Ave</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minority PhD Enrollments</td>
<td>19</td>
<td>48</td>
<td>+152%</td>
</tr>
<tr>
<td>Minority PhD Graduates</td>
<td>3</td>
<td>4</td>
<td>+33%</td>
</tr>
</tbody>
</table>

Table 2. USC SEAGEP PhD Enrollment and Graduates Data

<table>
<thead>
<tr>
<th>Total Clemson</th>
<th>First 3 yrs Ave</th>
<th>Last Three yrs Ave</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minority PhD Enrollments</td>
<td>11</td>
<td>26</td>
<td>136%</td>
</tr>
<tr>
<td>Minority PhD Graduates</td>
<td>.33</td>
<td>2.3</td>
<td>600%</td>
</tr>
</tbody>
</table>

Table 3. Clemson University SEAGEP PhD Enrollment and Graduates Data

Exit surveys are given to students as they graduate with their Ph.D. to obtain additional information about their perceptions about the value of the AGEP experience. Exit survey responses from the SEAGEP Scholars who graduated indicated that they thought their experiences as SEAGEP Scholars supported them as they adjusted to graduate school and was beneficial to their professional development. The mean rating on both these items was 4.25 out of a possible 5.

When asked how they felt their college experience was different from someone who was not a SEAGEP Scholar, the responses show the high value they placed on the mentoring and financial support they received from the program and the opportunities for networking and professional development, as shown below:

- Someone who is a SEAGEP scholar gets extra help, extra push, and feels she is not alone
- The support network provided by SEAGEP was irreplaceable. We formed a network with faculty and students within UF as well as outside UF. There was also support in terms of providing laptops, sending us to conferences, and providing us a venue to showcase our work. We also received opportunities to mentor undergraduate students.
- Funding - ability to select project of choice, exposure to research, networking, support group activities.
- I think the peer-to-peer mentoring approach utilized by AGEP was a big factor in my successful matriculation to the Ph.D.
Summary

The NSF SEAGEP program has produced significant changes in minority participation at the University of Florida and is in the process of expanding regionally to include the University of South Carolina and Clemson University. The evaluation conducted during Phase 1 UF AGEP provided program administrators with insights into what program components were valued by the students and what types of services they require to successfully complete their programs. This knowledge was incorporated into the new program. It is expected that the program will have similar transformative effects on the two new campuses as well. There are currently 22 AGEPs across the country (http://nsfagep.org) and while each has developed a program unique to their alliance, many share basic common elements. Faculty and administrators who are interested in enhancing the diversity of their programs are encouraged to parent with this valuable NSF program.

References

16 Davis, Geoff and Fiske, P. Results of the 1999 PhDs.org Graduate School Survey Making Strides Vol 3 No 1, January 2006 p6-8.