

GEORGIA LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION (GA LSAMP)

IMPACT REPORT: 1997 – 2011

15 Years of Promoting and Advancing Minority Student Participation in Research



Alliance Partners

Clark Atlanta University (Lead Institution)

Atlanta Metropolitan State College

Georgia State University

Morehouse College

Paine College



The GA LSAMP project is funded under Grant Number HRD0503372

THE GEORGIA LSAMP PARTNER INSTITUTIONS



Georgia State University



Atlanta Metropolitan State College



Clark Atlanta University



Morehouse College



Paine College

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Introduction

The Georgia Louis Stokes Alliance for Minority Participation (GA LSAMP) project is one of forty-one LSAMP projects in the United States and its possessions. Each of these individual projects is managed by the national LSAMP program, headquartered in the National Science Foundation. The national LSAMP program exists to assist undergraduate science, technology, engineering, and mathematics (STEM) students to succeed in their undergraduate education, gain acceptance into a quality STEM graduate program, and keep in touch after entering their working careers. Individual LSAMP projects are organized according to the *LSAMP model*. The LSAMP model is based on Tinto's philosophy of advancement through faculty mentoring, research exposure, peer study groups, conferences, career awareness, tutoring, and summer academic enrichment.

GA LSAMP student participants who receive financial support from the project are known as LSAMP Level I scholars. Level II students are those who are impacted by the project but do not receive direct financial support. Level I scholars participate in summer and academic-year research projects, tutor their peers, mentor and serve as role models for high school and younger students, prepare for the GRE exam, present their research results in local and national forums, receive academic advising and research mentoring, and participate in skills-building workshops and seminars. Level II students can be STEM or non-STEM majors. They work with Level I scholars as project assistants and peer mentors.

Executive Summary

President Barack Obama stated, “Reaffirming and strengthening America’s role as the world’s engine of scientific discovery and technological innovation is essential to meeting the challenges of this century. That’s why I am committed to making the improvement of STEM education over the next decade a national priority.”

Principal Investigator for the GA
LSAMP and President of Clark Atlanta
University Carlton E. Brown, Ed.D.



A question was posed at the Minority Scientists Workshop in 1991: “What can be done to increase the number of underrepresented minorities in science?” Our answer was the GA LSAMP, with its focus on student retention, graduation, development, and research exposure since its inception in the 1997-1998 academic year. In addition to this focus, the Georgia Alliance cultivates faculty development and curriculum improvement. The Georgia Alliance was initially established with seven partner institutions: the Atlanta

Metropolitan State College (community college), Clark Atlanta University (lead institution/HBCU), Georgia State University, Morehouse College (predominantly male/HBCU), Paine College (HBCU), Morris Brown College (HBCU), and Spelman College (predominantly female/HBCU). However, in 2001 and 2009 the Alliance underwent restructuring. The Alliance continues to strongly impact the nation's minority STEM pool despite its loss of two partner institutions and a struggling U.S. economy.

The GA LSAMP prides itself on increasing the quality and quantity of underrepresented minorities in the STEM pipeline to augment the STEM workforce of the future. There have been nearly 1200 student scholar awards granted by the GA LSAMP project since 1998. Scholars in the GA LSAMP have contributed to STEM research at the community college, undergraduate, graduate, doctoral, and research career level. The current GA LSAMP partner institutions (Atlanta Metropolitan State College, Georgia State University, Morehouse College, and Paine College), led by Clark Atlanta University, have been committed to the LSAMP mission and continue to work toward the institutionalization of the LSAMP model on each partner campus. Our scholars approach their career and research opportunities with greater confidence as a result of the presence of the LSAMP project on their campus. In addition to participating in LSAMP activities during the academic year and external internships in the summer, our scholars have benefited from an internal summer enrichment program called the Summer Research Explorer. This program was created during the restructuring of the GA LSAMP in 2009.

The Georgia Alliance is strengthened by the fact that each of the Presidents/Provosts in the GA LSAMP Governing Board includes student-centered academic and career readiness in their institution's strategic plan. The LSAMP Campus Coordinators know they have the Governing Board's continued support as the team advances forward in stimulating the minds of the next generation of the nations' leaders in STEM research. Because of this support, they have enthusiastically invested quality time beyond their normal duties. The time and effort put in by all involved in the GA LSAMP project is indeed yielding high dividends. In a sample of 333 students surveyed recently, it was found that over 62% of the scholars who have completed a STEM baccalaureate degree are currently attending a STEM graduate program, attending a professional school program, or are working in STEM fields.

History

The GA LSAMP began in 1997 with Clark Atlanta University (CAU) as the lead institution. Under the initial direction of Dr. Thomas W. Cole, then President of Clark Atlanta University, the Alliance, known as the Georgia-United Negro College Fund Alliance for Minority Participation (GA-UNCF AMP), focused on promoting student-centered STEM instruction among its members. Strategies included the implementation of workshops on teaching and learning for AMP faculty members, revision of curricula in undergraduate STEM courses, and faculty instruction in specialized pedagogical skills such as classroom multimedia presentations and expanded usage of computers in the classroom and laboratories.

The second phase of the GA LSAMP project began in 2005. Project emphasis shifted from instruction and faculty development to individual scholar progression towards graduation with a STEM baccalaureate degree. Faculty workshops and curriculum revisions continued during this phase, but greater emphasis was placed on scholar career development, integration into the scientific research community, participation in

faculty research activities, summer research experiences, and presentation of research results in professional conferences and the GA LSAMP biannual research symposium.

Since its beginning 14 years ago, the Georgia Alliance has undergone some changes but has never wavered from its goal to increase the number of minorities in the area of STEM research. The quality of research development within the Georgia Alliance has been superb, as shown by the number of students who have won awards for their research at both internal symposia and conferences external to the LSAMP community. Our Alliance students have won first and second place STEM awards in the GA LSAMP biannual research symposium and other conferences, such as the Emerging Researchers National Conference.

The GA LSAMP has supported 556 STEM scholars during the last 14 years. The majority of these students participated for multiple years, so the sum of the number of scholars supported year-by-year (a total of 1192, approximately 85 per year) exceeds this value. The GA LSAMP has impacted multiple thousands of STEM majors through curriculum revisions in undergraduate STEM and general education science courses. The GA LSAMP, made up of five institutions, boasts of having three of the strongest Historically Black Colleges and Universities (HBCU) in the country, and has been able to produce some of our country's leading scientists.

The GA LSAMP model continues to be one of the most effective programs for increasing the quality and quantity of underrepresented minorities in STEM fields in Georgia, the Southeast, and around the country. Our students have shown that they can produce and compete at the highest level of excellence in the country.

Activities Overview

Although the GA LSAMP project is active in all aspects of the LSAMP model, it stands apart from other alliances in three areas: (1) biannual scholar research symposium, (2) successful summer bridge/research training program, and (3) scientific field trips. The biannual scholar research symposium takes place in the spring and fall semesters and brings together LSAMP scholars and faculty from the GA LSAMP, the Peach State LSAMP, and Atlanta University Center research students. Each symposium allows scholars to present their research, participate in career development activities, and receive awards for outstanding work.

The Summer Research Explorer (SRE) program recruits students from the GA LSAMP community college partner (Atlanta Metropolitan State College) as well as from the other partners. The recruited scholars enter the program either to prepare for research during the academic year or to enhance their research abilities. The five-week program serves as a bridge to the four-year partner institutions by integrating these scholars with their four-year counterparts and challenging them with projects designed to prepare them for success in university-level research laboratories.

The scientific field trips are conducted in collaboration with students from freshmen and graduate level geoscience courses taught at the lead institution. The scholars act as mentors for the undergraduate students and as colleagues for the teachers who are enrolled in the graduate earth system science course. The field trips serve as a less formal way to integrate scholars into both the STEM academic and research communities. The focus of these trips is earth, space, and atmospheric sciences. SRE scholars mingle during the summer field trips with undergraduate and high school students from other STEM programs, such as Clark Atlanta University's PACE (Post Freshman Academic Consolidation and Enhancement project,

sponsored by the National Science Foundation's HBCU-UP program), Summer High School Bridge, and the U.S. Department of Transportation's Summer Transportation Institute. Students and teachers from community activities such as Atlanta's SMART (Science, Mathematics, and Research Training) Academy are also mentored by the SRE scholars.

Best Practices

The GA LSAMP project operates through five unifying themes: (1) recruitment; (2) progression to the STEM baccalaureate; (3) scholar research; (4) placement in STEM graduate programs or the STEM workforce; and (5) professional development of students, faculty and staff.

The recruitment activities include high school students and STEM students enrolled at participating LSAMP institutions. LSAMP faculty and scholars visit local high schools to offer scientific demonstrations, conduct classroom experiments, tutor, and collect contact information from students who would like to receive literature about STEM programs at Alliance institutions. Faculty, staff and scholars also participate in local science fairs, high school bridge programs, and outreach activities at local centers of informal learning.

Progression to the baccalaureate incorporates intervention, advisement, mentoring, workshops, field trips, and other activities designed to increase STEM student retention. Among these activities is the Summer Research Explorer program that provides research training opportunities for community college and four-year college students.

Scholar research takes place during the academic year when students collaborate with faculty mentors in funded and non-funded research projects. The GA LSAMP assists these scholars to secure summer internships off campus, on campus, or in the Summer Research Explorer program. For reporting year 2011, 61% of GA LSAMP scholars took advantage of summer research internships or research training experiences, 85% were involved in research or research training either during the academic year or summer, and 15% were exposed to research but did not work on a specific project. All LSAMP scholars either participate in research projects or receive research exposure in other ways.

Graduate placement offices on each of the four-year campuses, faculty networking, and LSAMP mentors work together to place graduates in STEM graduate programs. Career centers help other graduates find professional STEM employment.

Professional development of students, faculty, and staff takes place at conferences, meetings, workshops, and seminars. Faculty mentors often accompany their scholars to these activities. The GA LSAMP offers a research symposium every spring and fall semester. Scholars typically present their summer research activities and results at the fall symposium and their academic-year efforts at the spring symposium. More than 130 scholars participated in these symposia in 2010 and 2011. Scholars also travel to neighboring LSAMP conferences to network and present their research.

Alliance Outcomes and Impact

Economic Impact Locally and Across North Georgia

The GA LSAMP institutions produce a significant impact on their local and state economies. This impact is felt not only by the income and sales produced, but also from contributions made by graduates who secure STEM employment in Atlanta and Augusta. The GA LSAMP creates national economic impact through graduates employed in the U.S. outside of Georgia. Based on internal analysis and data from the University System of Georgia Institutions economic impact report for FY 2012, the impact of Georgia Alliance institutions can be measured in terms of output, value added, labor income, and employment. The combined impact of Alliance institutions in FY 2011 is detailed in Table 1 and amounts to a total monetary value of \$5,159,055,574 as well as an employment value of 23,130 full and part-time jobs. The breakdown of this impact on the local and state economies amounts to almost \$2.5 billion in output (sales), more than \$1.6 billion in value added (gross regional product), more than \$1 billion in labor income, and more than 23,000 full and part-time jobs.

Table 1. Economic Impact of GA LSAMP Institutions

Alliance Institutions	Output Impact	Value Added	Labor Income	Full & Part-time Jobs
Atlanta Metropolitan State College	\$106,877,867	\$71,955,429	\$43,766,457	1,007
Clark Atlanta University	\$239,813,825	\$142,733,691	\$99,296,830	2,904
Georgia State University	\$1,542,154,286	\$1,085,855,160	\$720,206,413	13,201
Morehouse College	\$536,306,705	\$290,467,182	\$192,061,299	5,447
Paine College	\$45,284,861	\$25,157,522	\$17,118,047	571
Total	\$2,470,437,544	\$1,616,168,984	\$1,072,449,046	23,130

Source for University System of Georgia 2011 information: Selig Center for Economic Growth, Terry College of Business, University of Georgia (www.selig.uga.edu) May, 2012

Enrollment

As can be seen in Figure 1, the Georgia Alliance has maintained a fairly constant undergraduate enrollment since its first year in 1998. As seen in Figure 2, the Alliance STEM minority enrollment during Phase II of the GA LSAMP project (2005 to present) shows a similar behavior. On the other hand, the Alliance minority undergraduate enrollment and the Alliance STEM minority enrollment are both seen in the charts

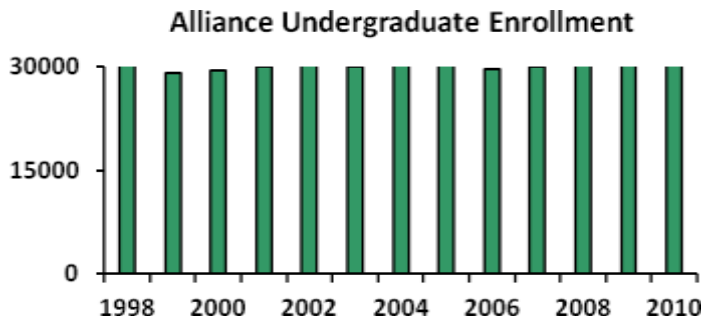


Figure 1. Alliance undergraduate enrollment from 1998 to 2010

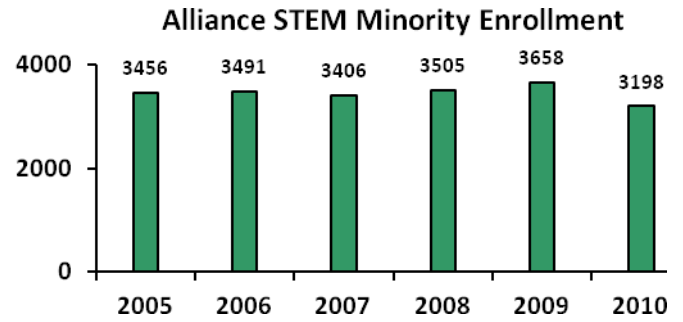


Figure 2. Alliance STEM minority undergraduate enrollment during Phase II

below to have increased significantly since the beginning of the project. Figure 3 shows that the Alliance minority undergraduate enrollment increased from 14,716 to 18,899 during the period 1998 to 2010. This is an overall increase of 22%, or an average increase of 1.7% per year. Figure 4 shows that the Alliance STEM minority enrollment grew from 3,205 to 3,658 during the period 1999 to 2009. This is an overall increase of 14%, or an average increase of 1.3% per year. The reasons for the drop in STEM minority enrollment in 2010 were a weak national economy and high unemployment in Georgia. The Alliance draws students from across the United States, with the larger fraction originating in Georgia.

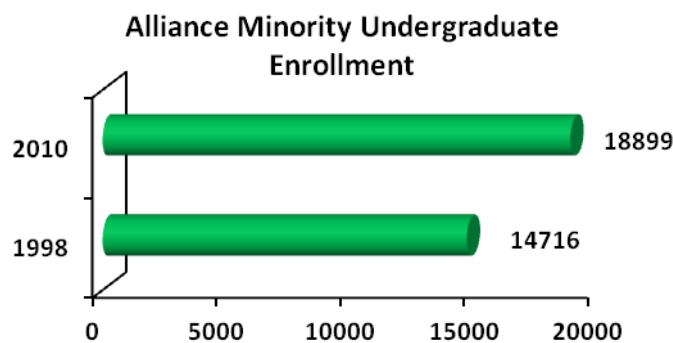


Figure 3. Increase in Alliance minority undergraduate enrollment from 1998 to 2010

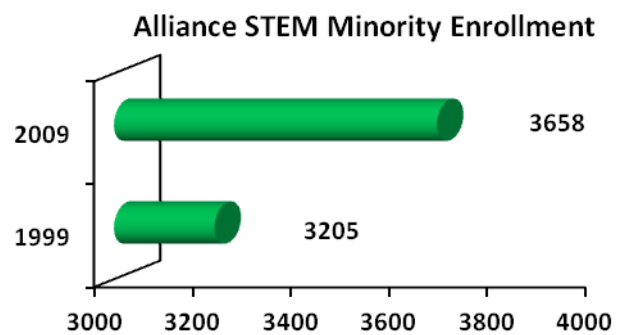


Figure 4. Increase in Alliance STEM minority undergraduate enrollment from 1999 to 2009

The annual number of Alliance scholars supported by the GA LSAMP project is shown in Figure 5 to average 85 for the period 1998 to 2010. A decrease occurred in 2005 when Phase II of the GA LSAMP began and the number of supported positions was reduced from the Phase I value. A second decrease occurred in 2009 when the GA LSAMP underwent a temporary funding lapse and was reorganized to provide enhanced opportunities for scholars. However, by the next year the scholar count had recovered. Figure 6 shows that the number of Alliance STEM scholars increased from 62 to 92 during the period 1998 to 2010. This is an overall increase of 48%, or an average increase of nearly 4% per year.

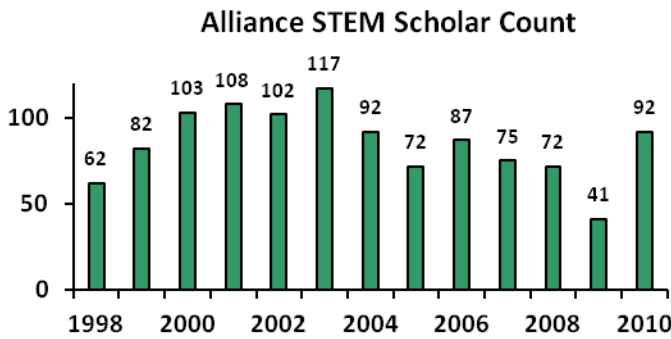


Figure 5. Annual number of Alliance scholars supported from 1998 to 2010

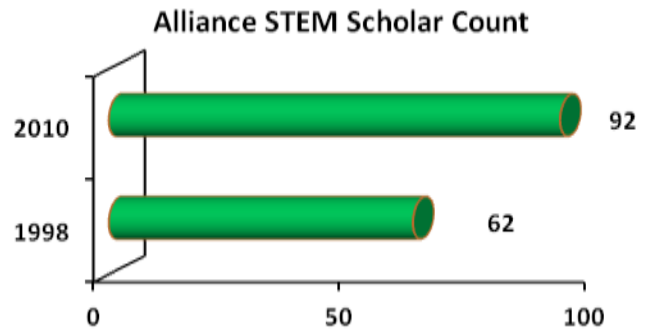


Figure 6. Increase in the annual number of Alliance scholars supported from 1998 to 2010

As the number of LSAMP alliances across the nation has increased during the last 20 years, the impact of *an individual alliance* on the whole should be expected to decrease over time. For the 6-year period 2005 to 2010, the GA LSAMP STEM minority enrollment remained relatively constant ($3,452 \pm 137$, 1σ ; see Figure 2), but Figure 7 shows that the *ratio* of that enrollment to the national LSAMP STEM minority enrollment during the same period *decreased* from 1.7% to 1.2%, or by 29% (almost 5% per year). However, the ratio of GA LSAMP annual minority *scholar count* to the national LSAMP minority *scholar count* from 2005 to 2010 *increased* from 0.4% to 0.5%, or by 25% (4.2% per year). *These three trends point to the fact that although the impact of the GA LSAMP minority STEM enrollment on the national LSAMP program has been decreasing for the last few years, the impact of the number of supported minority scholars has been increasing.*

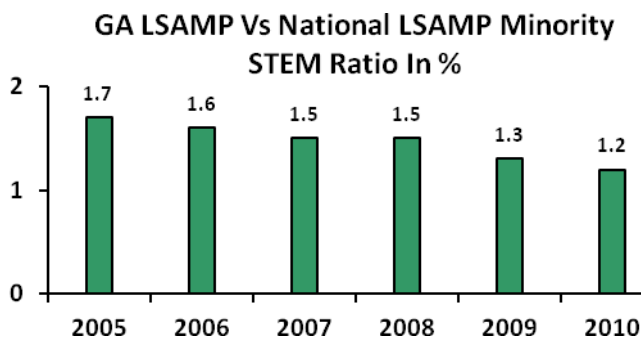


Figure 7. Ratio in percent of Alliance STEM minority enrollment to national LSAMP STEM minority enrollment during Phase II

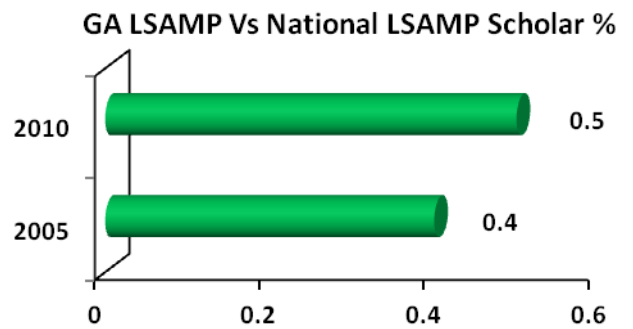


Figure 8. Ratio in percent of annual Alliance minority scholar count to national LSAMP minority scholar count during Phase II

Graduation Rate

As shown in Figure 9 below, the Alliance STEM graduation rate has fluctuated with time. Figure 10 shows that the Alliance scholar graduation rate has done likewise.

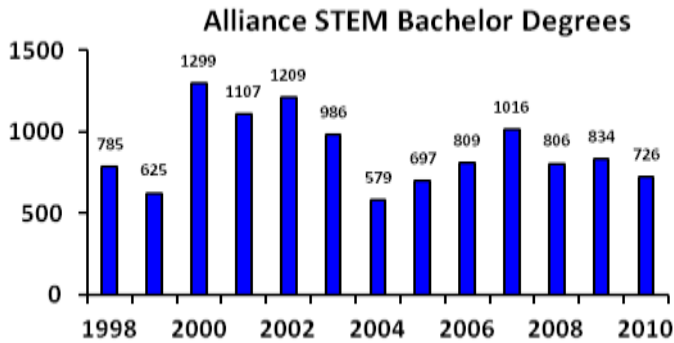


Figure 9. Annual number of Alliance bachelor degrees awarded per year

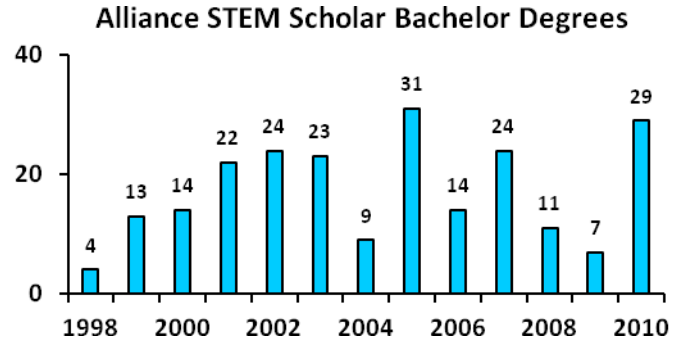


Figure 10. Annual number of Alliance scholar bachelor degrees awarded per year

Figure 11 shows the increase in the Alliance STEM scholar graduation rate during the period 2000 to 2010, from 14 to 29, or an increase of 107% (almost 11% per year).

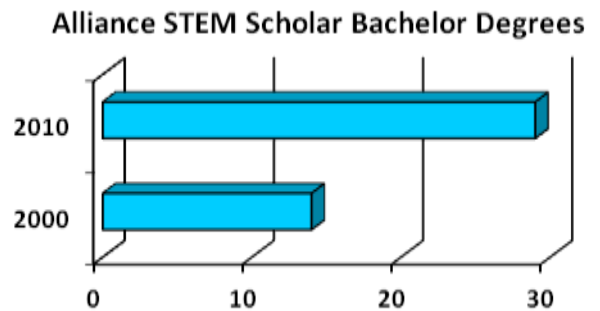


Figure 11. Increase in Alliance scholar graduation rate from 2000 to 2010

Retention

Figure 12 compares the first-year retention rate for Alliance STEM majors to the rate of persistence of Alliance STEM scholars. The Alliance STEM retention rate for the period 2009 to 2010 is 66%. This is also the retention rate averaged over the period 2007 to 2010 for Alliance STEM majors. The average rate of persistence of Alliance STEM scholars for the period 2009 to 2010 is 74%. In this calculation, persistence represents the mean of the rates of retention of scholars for each Alliance partner for the period 2009 to 2010.

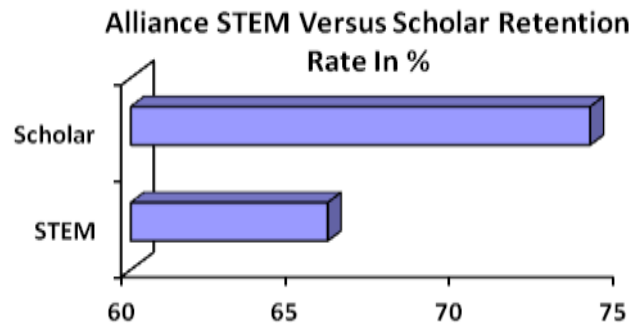


Figure 12. Alliance scholar persistence exceeds Alliance STEM first-year retention rate for the period 2009 to 2010

After Graduation

In 2011 the GA LSAMP conducted a survey of past and current LSAMP scholars. This survey sampled 333 of the 556 scholars supported by the project. Of these 333 scholars, 228 have completed a STEM baccalaureate degree, and 90% either completed the same or were actively pursuing it. More than 62% of those who have completed a STEM baccalaureate degree are attending a STEM graduate program, attending a professional school program, or engaged in the STEM workforce. The breakdown is shown in Table 2.

Table 2. Post-Baccalaureate Status of Alliance Scholars

Post-Baccalaureate Status	Number
Completed STEM M.S. Degree	52
Pursuing STEM M.S. Degree	15
Completed STEM Ph.D. Degree	7
Pursuing STEM Ph.D. Degree	20
Completed Professional Degree	13
Pursuing Professional Degree	10
B.S. Graduates who have Entered STEM Workforce	9
M.S. Graduates who have Entered STEM Workforce	9
Ph.D. Graduates who have Entered STEM Workforce	3
Professional School Graduates who have Entered STEM Workforce	4

Based on the survey data, 40% of scholars who completed a STEM baccalaureate degree have either completed a STEM graduate program or are making progress toward completion of a STEM graduate degree. More than one-third (16 out of 47, or 34%) of STEM transfers of scholars from the community college have continued their studies in institutions of the Georgia Alliance.

Dissemination and Scholar Development

In keeping with the national mission of LSAMP to produce greater numbers of STEM career scientists and research engineers, the GA LSAMP encourages its scholars to attend professional and academic development seminars, workshops, and conferences. Participation of Alliance scholars in these career-enhancing activities is nearly 100%, which indicates recognition of the value of the LSAMP mentoring model.

To the right is a group photograph of scholars, faculty mentors, and staff members of the U.S. House of Representatives in attendance at the 22 July 2010 "Poster Session on the Hill." The poster session took place in the Rayburn House Office Building. Representatives from all 41 LSAMP alliances were invited to present their achievements to members of the U.S. House of Representatives and their staff. Two students from the Georgia Alliance and their teacher mentor presented their summer research to invited faculty and congressional staff.



Clark Atlanta University scholar Henry Patterson presented his research on spectral responses of tree behavior to impulsive rainfall events at the 2010 "Poster Session on the Hill".



Georgia State University scholar Patrick Major presented his research on rates of water diffusion from a tree at the 2010 "Poster Session on the Hill."



Morehouse College biology scholar Conner Carter standing beside Frank Davis, Professional Staff member, Congressional Oversight and Government Reform Committee, at the 2010 "Poster Session on the Hill."

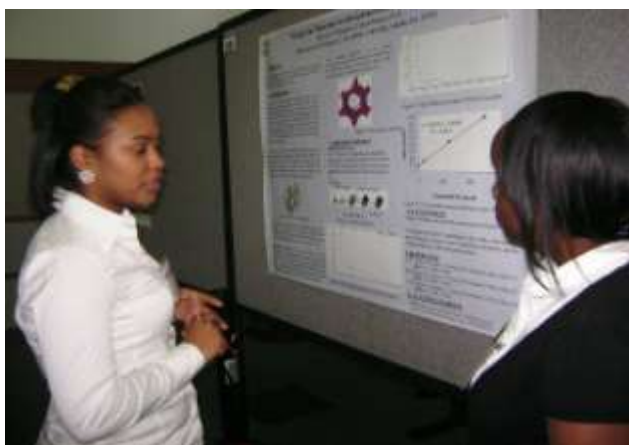
Individual Institution Highlights

GA LSAMP coordinators, faculty members, LSAMP alumni, scholars, and administrators work as a team to communicate events and opportunities within the Alliance community. The GA LSAMP utilizes Facebook, the GA LSAMP URL, clubs, meetings, email, and voicemail to disseminate information on upcoming symposia, workshops, seminars, training opportunities, and special events.

The promotion of scholar research and related experiences is at the heart of the GA LSAMP model. An average of 85 scholars from the five partner institutions conduct research during each academic year and summer or are exposed to research methodologies and practices through research courses.

GA LSAMP scholars and advisors benefit from collaborations with laboratories and academic institutions, both national and international. Funding for scholar and advisor/mentor activities comes from institutions and programs which include: Pace University, NASA CREST-ME, NASA, the University System of Georgia, the National Science Foundation, the National Institutes of Health, Howard Hughes Medical Institute (HHMI Biotech Scholars Program), the Department of Defense, the Department of Energy, HBCU-UP, MBRS-Rise, Hopps Research Scholars Program (DOD), and the Naval Research Laboratory.

Research collaborators and trainers include: National Science Foundation, National Institutes of Health, Georgia Institute of Technology, Harvard University, Louisiana State University, Emory University, Morehouse School of Medicine, Morehouse Research Institute, Universidad de Federal de Sao Carlos in Brazil, Texas A&M University, UC-Berkley, the University of Louisville, Indiana University, University of Maryland, University of Iowa, Budapest Semester in Mathematics (Hungary), Reed College, Brown University, Georgia Health Science University, Department of Energy, University of Alabama (Birmingham), University of Nebraska, and the Savannah River Site. Recruitment and development collaborations took place with the Educational Advancement Alliance, Inc.; Florida A&M University; and the Florida-Georgia and Peach State LSAMP projects.



GA LSAMP Student with poster presentation at a Florida-Georgia Symposium.



Students from GA LSAMP's Paine College show strong presence at Peach State Symposium.

Clark Atlanta University (Lead Institution)

Clark Atlanta University is a private coeducational institution of predominately Black American heritage, formed July 1, 1988 by the consolidation of Atlanta University (founded in 1865) and Clark College (founded in 1969). CAU offers undergraduate, graduate, and professional degrees, as well as non-degree programs to students of diverse racial, ethnic, and socioeconomic backgrounds. The current undergraduate enrollment is approximately 99% Black. CAU is one of only two private historically Black comprehensive universities in this country that awards the doctorate degree in four or more disciplines. In the sciences, the doctorate is offered in biology and chemistry.

As an alliance leader, CAU has developed a substantial number of activities for the development of curriculum, students, faculty, and outreach that involves all the alliance partners. Activities which cross over alliance boundaries include pre-college STEM programs, summer bridge and research programs, and science symposiums that afford LSAMP students from within and outside the alliance an opportunity to present papers and posters that are based on their academic-year and summer research experiences. Students at CAU conduct research in the fields of biology, chemistry, computational science, physics, mathematics, and geosciences.

In 2004 construction was completed on a \$6 million, 13,000 square-foot, three-level Environmental Science Research and Technology Center Annex. This provided additional space for research labs in biology, chemistry, physics, computer science, and environmental science.



Clark Atlanta University

Charisma D. Edwards is a doctoral candidate in Electrical Engineering at Louisiana State University in Baton Rouge, Louisiana. Her research is in digital signal processing with a focus in neurological signal classification, which was inspired by her work in neuroimaging at Emory University in Atlanta, Georgia. Ms. Edwards has gained recognition as a leader of the Black Graduate and Professional Student Association at LSU and was recently nominated for Graduate Student Leader of the Year. She earned her B.S. in Engineering from Clark Atlanta University in 2004 and her M.S. in Electrical Engineering from LSU in 2007. Ms. Edwards expects to receive her Ph.D. in Electrical Engineering in December 2011.



Mr. Tony Price is a doctoral candidate in the Department of Electrical Engineering at the University of South Florida (USF). He is a native of the Detroit, MI area, where he attended high school and participated in the Project Upward Bound prior to enrolling at Clark Atlanta University. He earned his B.S. in Electrical Engineering at Clark Atlanta University in 2004. Mr. Price has been the recipient of several prestigious fellowship awards, including the **NSF Florida-Georgia Louis Stokes Alliance for Minority Participation (FGLSAMP)** Bridge to the Doctorate Fellowship, NSF GRFP Fellowship, NSF S-STEM Fellowship, Sloan Minority Graduate Fellowship, and McKnight Doctoral Fellowship. Mr. Price's research interests are in the area of microwave/RF devices and materials. He was awarded a best student poster award during the 10th Annual IEEE Wireless and Microwave Technology (WAMICON) conference in Clearwater, FL (April 2009). In 2006, he completed an industry research internship with the Aerospace Corporation in El Segundo, California. He has served at USF as a student ambassador, panelist, and mentor during various outreach activities (Young Scholars High School Research Program, NSF HBCU-UP Conference, NSF FGLSAMP, NSF REU Research Day, Project Upward, etc.). Mr. Price is on track to complete his dissertation by May 2012

Atlanta Metropolitan State College

Atlanta Metropolitan State College (AMC) is a coeducational two-year non-residential unit of the University System of Georgia. Authorization by the Board of Regents of the University System of Georgia in June 1965 made Atlanta Metropolitan State College the thirty-first institution of the University System.

Classes at AMC began in September 1974, and the College has become accredited by the Southern Association of Colleges and Schools. Approximately 97% of the students enrolled at the two-year institution are of African descent. The college was recently authorized by the Board of Regents to offer a B.S. degree in biology. Although this second phase of its expansion will begin in the Fall of 2012, the college will remain a predominantly two-year institution.

The GA LSAMP project at AMC has been a critical component in increasing the number of STEM students engaged in laboratory projects. The areas of investigation for LSAMP students at AMC are primarily focused on the identification and detection of micro-organisms, personal care products, endocrine disrupters, and prescription and abused drug metabolites in wastewater samples from local wastewater facilities.

An increase in the scope of laboratory research conducted at the college has generated a need for additional laboratory space and facilities. The GA LSAMP has had a major economic impact on the AMC campus in this respect. In 2011 work was begun on a new Academic Science Building that will serve the increasing number of math and science majors. There will be nearly 17,000 square feet of general classroom space, 15,000 square feet of laboratory space, 8,000 square feet of general purpose/assembly space, and 10,000 square feet of administrative space. The facility is being funded by the Board of Regents at a projected cost of more than \$12,000,000.



Atlanta Metropolitan State College



Cedrick M. Daphney, a faculty member at AMC, began his academic career at AMC and received two associates degrees: Psychology (2001) and Biology (2002). He gained research experience while completing the Biology A.S., and he later enrolled at Georgia State University (GSU) as an undergraduate chemistry major. He participated in the Ronald E. McNair Scholars' Program. Mr. Daphney earned an M.S. degree in Analytical Chemistry at GSU, then returned to AMC. While at AMC, Mr. Daphney has mentored LSAMP scholars and attended the Emerging Researchers National 2010 conference with two AMC scholars.



AMC Campus Coordinator, Alvin Harmon, judges an LSAMP scholar's poster presentation at a biannual GA LSAMP Research Symposium

Georgia State University

Georgia State University, located in downtown Atlanta, is the designated urban university in the University of Georgia System of 34 institutions. Classified as a Research Extensive University, GSU has an enrollment of nearly 40,000 students, of which approximately 20,000 are undergraduates. It is considered one of the country's leading urban research universities. Students come from every county in Georgia, every state in the country, and, additionally, from over 160 countries around the world.

The diversity of the university has been basically stable during the past five years with 50% being white, 32% Black, 3% Hispanic/Latino, 11% Asian, 0.2% Native American, and about 4% mixed. The goal of the University is to provide access to quality education for diverse groups of students and to prepare citizens for lifelong learning in a global society.

At GSU all GA LSAMP scholars engage in the research fields of biology, chemistry, geosciences, neurobiology, mathematics, physics, or astronomy. GSU LSAMP scholars usually attend the Howard Hughes Medication Institute Biotech Scholars meetings during the Fall or Spring terms in order to be engaged in scientific discussions and presentations. There they receive advice on STEM graduate school selection and the admission processes involved in the pursuit of advanced degrees.

The greatest economic impact of the LSAMP project at our partner institutions can be seen at GSU. Not only has the enrollment of STEM students increased during the past several years, but programs such as the GA LSAMP have contributed greatly to the retention and graduation of a larger number of students than in the past. This has required new additions to existing math and science buildings such as construction of the Parker H. Petit Science Center, a \$150 million construction project, built in 2010. This center was recently named one of the best new facilities by Southeast Construction magazine. The 350,000 square-foot facility, which opened on March 29th, houses research and education programs in biology, chemistry, nursing, nutrition, physical and respiratory therapies, public health, and the Neuroscience Institute.



The Center is home to scientists from the University's Center for Diagnostics and Therapeutics, who are working on treatments and diagnostics for diseases. The Petit Science Center also houses biologists exploring a wide range of areas, including those of the Molecular Basis of Disease initiative. Starting in January 2011, the Petit Science Center will be home to the new Center for Inflammation, Immunity and Infection, which will investigate treatments for infectious diseases and inflammation. The building also houses a large, 200-million pixel array of computer screens called a "visualization wall," where scientists and faculty are viewing vast amounts of data in large-scale research projects, from public health to geography. Six general classrooms, a 100-plus seat auditorium and 32 department-specific teaching labs and classrooms occupy the first through fourth floors of the building, through which more than 2,000 students pass through each day.

Georgia State University



Bianca N. Islam obtained her B.S. degree in Biological Sciences from GSU in 2011, and graduated with magna Cum Laude and Advanced Research honors. Ms. Islam participated in the McNair Program and a Biotech Program funded by the Howard Hughes Medical Institute. She works in a Microbiology Laboratory under the direction of Dr. Eric Gilbert and also in a Molecular Laboratory under the direction of Dr. Chung Dar Lu. She is expecting to receive an M.S. in Biology in May 2012. Her career goal is to pursue an MD/PhD, studying internal medicine and infectious diseases.

Dr. Darkeyah Reuven received his B.S. degree in Chemistry from GSU in 1999 and his M.S. degree in Health Care Management from Mercer University in Atlanta, Georgia. Dr. Reuven completed his Doctorate in chemistry at CAU in 2009, with a research focus on the synthesis, modification and characterization of electroconductive polymers for biosensor applications. He worked in the research laboratory of Dr. Ishrat Khan. Dr. Reuven was a NSF-CREST Post-Doctoral Fellow at the Center for Functional Nanoscale Materials in the research laboratory of Dr. Michael D. Williams at CAU. Darkeyah Reuven is now a Post-Doctoral Fellow at the center for Partnership for Research and Education in Materials (PREM) in the research laboratory of Dr. Xiao Qian Wang at CAU. His research involves the development of graphene-based electrochemical sensors and biosensors for direct use in enzyme electrochemistry.



Deeyaa Blessing, an alumna of GSU, completed both her Bachelor of Science and Master of Science in chemistry with a concentration in biotechnology. Ms. Blessing entered the University of Maryland's Ph.D. program in Chemistry in the fall of 2011. As a first year student, Ms. Blessing was awarded a Dolphus E. Milligan Fellowship which allowed her to participate in a summer internship at the National Institute of Standards and Technology. Ms. Blessing is grateful for the opportunities that LSAMP provide her. She was a Level I LSAMP research scholar and presented research posters at conferences.

Morehouse College

Morehouse College is an independent, fully accredited, predominantly Black liberal-arts college for men with an enrollment of approximately 3000 students. While basically a liberal arts college, Morehouse College is an HBCU where a large fraction (40%) of the student body majors in STEM.

Dansby Hall is where the Mathematics, Physics, and Psychology Departments are located. The building was renovated in 2008 at a cost of over \$2,000,000. All classrooms were upgraded with new air conditioning/heating units along with the installation of new computer equipment and projection controls for presentation activities.



Additional buildings have recently been completed, including the Leadership Center Building (2007). This building is equipped with state-of-the-art classrooms that are equipped electronically to accommodate a variety of presentation technologies. There are several seminar rooms that GA LSAMP students use for research activities and study sessions. The Leadership Center has one large amphitheater used for a variety of conference sessions for large audiences.



Morehouse College Campus Coordinator Abdelkrim Brania judges an LSAMP scholar's poster presentation at a biannual GA LSAMP Research Symposium

At Morehouse College the research and educational goals of the GA LSAMP project are to strengthen the research skills of LSAMP scholars in STEM fields, support and increase the numbers of students who major in STEM fields, develop the STEM curriculum by expanding the Peer Led Team Learning (PLTL) model, and support tutoring and mentoring programs.

Morehouse College's research objectives are to promote participation in research training programs, summer research experiences, research conferences, symposia, and seminars. The educational objectives include the deployment and implementation of the PLTL workshop model in college algebra and computer science courses, the offering of tuition support scholarships for needy LSAMP scholars to continue their studies in STEM, and the support of tutoring and mentoring in STEM fields.

Morehouse College



Matthew Temba graduated from Morehouse College in May 2010 with a B.S. Degree in Mathematics. While an undergraduate student, he participated in several summer research experiences in mathematics and mathematical physics. A highlight of these experiences was a program sponsored by the Georgia Institute of Technology where he conducted research in Metz, France. Mr. Temba is currently a graduate student at the University of Maryland in College Park, studying Operations Research.

Bobby Wilson graduated in May 2010 with a B.S. in Mathematics and was recruited by top Ph.D. programs in the field. He is in the second year of a doctoral program at University of Chicago. While at Morehouse College, Mr. Wilson participated in several prestigious undergraduate summer research experiences, and in the spring of 2009 he spent the semester in the Budapest Program in Mathematics, where he took several advanced courses. Mr. Wilson is expected to complete his Ph.D. in 2015.



Conner Carter is a 2011 graduate of Morehouse College with a Bachelor of Science in Biology. During his matriculation at Morehouse, he gave oral and poster presentations at several symposia as well as at national conferences such as the LSAMP Symposium on Capitol Hill (2010) and the Emerging Researchers National Conference in 2011. He conducted research on the RNase J protein at his home institution and during his summer internship at Emory University. Upon graduation, Mr. Carter accepted a research position at Emory University. He is grateful for the opportunities that LSAMP has provided, particularly the extensive network and opportunities to present his work at national conferences.

Paine College

Paine College, founded in 1882, is a private, nonprofit four-year HBCU located in Augusta, Georgia. The college is supported by the United Methodist and Christian Methodist Episcopal Churches. It is a member of the United Negro College Fund (UNCF). Paine offers baccalaureate degrees in five Divisions: Business Administration, Education, Humanities, the Natural Sciences and Mathematics, and the Social Sciences. Since 1903, Paine College has prepared primarily students of African descent and other minority students for advanced careers in the sciences. The College is historically bi-racial in its establishment and leadership but predominantly Black (97%) in enrollment. The present student body is 65.7% female and 34.3% male. More than half are first generation college students.

The Division of Natural Sciences and Mathematics guides and supports students and faculty in the achievement of their academic and professional goals, including service to the community, in which the natural sciences (biology, chemistry, physics, and environmental science), mathematics, and technology are essential components. Each department in this Division allows for both a major and minor in at least one program of study, and offers B.S. degrees.

GA LSAMP research and educational activities at Paine College are designed to engage students in areas such as developing research skills and experiences, peer-to-peer mentoring, faculty-student mentoring, and graduate school preparation initiatives for GRE and other standardized examinations. GA LSAMP scholars at Paine College are engaged in research activities funded by NSF and the Department of Energy. Scholars also collaborate with the Georgia Health Science University in conducting research.

Dominique Morgan is a 2007 Graduate of Paine College. He is enrolled at Clemson University in a Ph.D. program in Mathematics. During his matriculation at Paine College he was a mentor and mathematics tutor. He graduated Magna Cum Laude. Mr. Morgan selected Mathematics as his major because he does well in it and truly enjoys it.



Danielle Daniely-Wilson, Ph.D. graduated 2004 from Paine College where she was a GA LSAMP scholar who earned Summa Cum Laude honors. She has conducted extensive research at the Medical College of Georgia in cell biology during her undergraduate matriculation. Dr. Daniely-Wilson obtained her Ph.D. from the Medical College of Georgia in cell and molecular biology. She is currently teaching and conducting research at the Medical College of Georgia.

Student Research Symposium

In 2010 the Georgia LSAMP began the biannual LSAMP research symposium where scholars are able to meet, present their research, compete for awards, and receive career mentoring.

On 17 April 2010 the first bi-annual Research Symposium was held on the campus of Clark Atlanta University. Thirty-nine GA LSAMP undergraduate scholars participated in the event. All GA LSAMP institutions were represented at the symposium: Atlanta Metropolitan State College, Clark Atlanta University, Georgia State University, Morehouse College, and Paine College.

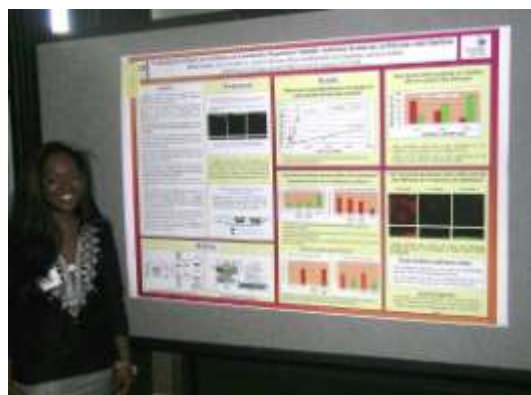


Six oral and nineteen poster presentations were judged by a panel of LSAMP Campus Coordinators, Interdisciplinary Faculty Team members, and the GA LSAMP Project Coordinator. Eight awards were presented to six individuals and one team of two scholars. Presentations covered the fields of biology, chemistry, computer science, mathematics, and physics.

Besides the student presentations, afternoon student breakout sessions involved lively discussions about ways the LSAMP project could improve scholars' research and academic experiences, and cultural growth. Each breakout session sponsored student representatives who summarized the work of their group and made recommendations about activities and attitudes that would enhance student progress through their STEM academic programs.



The Fall 2010 Research symposium was also held on the campus of Clark Atlanta University and had 71 participants. Among the attendees were LSAMP scholars, other STEM majors, award judges, and visiting faculty. Awards were presented to winners at three levels in the poster and oral categories.



Student Research Symposium

There were 56 participants in the Spring 2011 Research Symposium. As in the other symposia, all five alliance institutions were represented in the event, which was held on 9 April 2011. The symposium featured significant career-development training activities, oral and poster presentations, a chance for all participants to lay the foundation for an all-alliance STEM Student Council, and an award ceremony for best research presentations.

The featured speaker was Dr. Mahour Mellat Parast, an Assistant Professor of Decision Sciences at the School of Business at the University of North Carolina-Pembroke. Dr. Parast has served as a reviewer for the NSF CAREER award and as a panelist for the NSF Environmental Sustainability and Engineering Education Divisions.

Eight awards were presented to scholars: Best Poster, Best Oral Presentation, Best Poster Presentation, Best Biology Poster, Best Chemistry Poster, Best Computer Science Poster, and Best Physics Poster.



Summer Research Explorer Program



In its ongoing efforts to improve the research environment and opportunities for STEM research students, the GA LSAMP in 2010 created the Summer Research Explorer (SRE) program. The program began with two students and one teacher. The purpose of the program is to provide research training experiences for students at the community college as well students at the four-year institutions who would like additional research training in the summer. The program has served as a bridge for GA LSAMP community college scholars. Faculty mentors offer formal training and research guidance in computing, robotics, geoscience, and environmental science.

During the summer of 2010 two students and one teacher entered the pilot program and were trained in environmental research. The scholars received formal instruction, practical training in data analysis methods, and training in research poster development and presentation. Both students presented posters at the *LSAMP National PI/PD Meeting and Student Poster Presentation Session* on 22 July 2010 in Washington, DC. One of the students, Mr. Patrick Major was a chemistry sophomore at Georgia State University. The other student, Mr. Henry Patterson, was a physics junior at Clark Atlanta University.

In 2011 the number of faculty mentors increased to two and the scope and breadth of the research training was expanded to include computer interfacing, robotics and earthquake analysis. The program took place from 27 June through 29 July. Twelve scholars from three of the five Alliance institutions attended.



In the second year of the program, teams of student researchers were divided among several different projects. Two scholars from AMC learned how to conduct case studies of significant earthquakes using graphical methods. Four scholars from CAU and GSU extended the analysis of evapotranspiration from a tree stand that was begun in the previous summer. The remaining six scholars from AMC and CAU received instruction in research methodologies and training by utilizing computer applications. This group programmed embedded devices for data collection and network protocols to query sensor nodes for collecting or sending data, and developed user interfaces for web browsers and mobile devices.

Summer Research Explorer Program

During the second year of the SRE, scholars attended lectures, worked in groups and individually, and participated in scientific field trips which most indicated enhanced their research knowledge and broadened their exposure to numerous fields in research applicable to their major. The consensus (100%) indicated that they would recommend the SRE to other students.



SRE scholars attending formal instruction in computer programming basics, computer architecture, and interfacing to data acquisition and control modules.

SRE scholars preparing for a field trip and reviewing basic concepts of earthquake magnitude, waveform analysis, location by triangulation, and seismic hazard.



The educational philosophy of the SRE is the integration of lecture, laboratory and field experiences. As the themes of the program are heavily dependent on computation, modeling, instrument interfacing, and data analysis, the laboratory projects are primarily computational in nature. The field experiences emphasize the geology and natural environment in and around Atlanta, Georgia. The scientific field trips expand the participant's environmental knowledge, are physically challenging, develop new and stronger friendships, and provide unique opportunities to experience what nature has to offer. Students on the field trips learn how to identify rocks and minerals characteristic of the southern Appalachian Mountains, how to measure rock structures to understand their origin, how stream flow cuts banks and produces point bars, how Stone Mountain, Georgia, and the Atlanta Group of metamorphic rocks came about, how to identify weather sensors, and how meteorites are classified.

Summer Research Explorer Program



SRE scholars recovering after a grueling hike up the east face of Stone Mountain.

Over 18 scholars from all the alliance schools have expressed interest in participating in the 2012 SRE program. Participants will receive intensive training in high-performance computing, field measurements of the urban forest canopy at the Fernbank Science Center, and earthquake seismology. The computational students will attend the 2012 XSEDE (Extreme Science and Engineering Discovery Environment) Conference in Chicago.

The Fernbank Science Center maintains an urban forest that is specially accessible to LSAMP scholars for field trips and research studies. The 140-foot meteorological tower will be refurbished by LSAMP scholars during the next two summers. This facility will be used for training in urban environmental studies, and for research in energy transfer relationships within and above the forest canopy.

An industry/university partnership is being developed that integrates the educational outreach of the Fernbank Science Center and the Fernbank Museum of Natural History with research activities of LSAMP scholars and faculty.

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Pictures that Tell the Story



Pictures that Tell the Story



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STEM Scholarship has its responsibilities and privileges at the Georgia Louis Stokes Alliance for Minority Participation

Our scholars:

- Receive faculty mentoring
- Gain research exposure, experience and competency in laboratories
- Attend, present and place at research symposia (national and LSAMP)
- Tutoring and tutor opportunities
- Lead and participate in STEM major and national organization clubs
- Gain access to research and internship opportunities
- Benefit from opportunities in community service, field trip learning experiences, and professional development