1994 to 2011

Greater Philadelphia Region Louis Stokes Alliance for Minority Participation

PROJECT IMPACT REPORT

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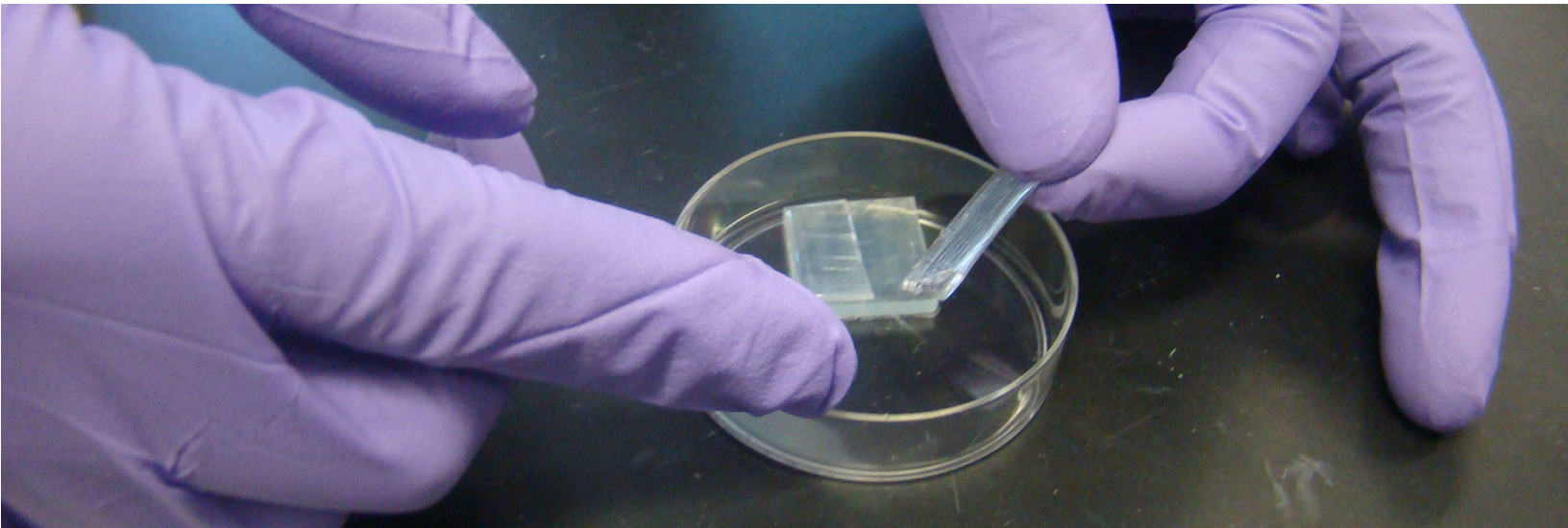


MESSAGE FROM THE PROJECT MANAGEMENT

PRESIDENT JOHN FRY
Drexel University

Chairman, Governing Board of Presidents
Greater Philadelphia Region LSAMP

Drexel University is honored to be the lead institution for the Greater Philadelphia Region Louis Stokes Alliance for Minority Participation. One of the critical issues facing the nation, our ability to compete technologically on a global scale, is determined by the number and quality of the talented professionals that we graduate from our institutions of higher education. In light of the challenges faced by so many of the able students being educated in our large urban centers, the commitment of the institutions working together in the Stokes AMP alliance to identify and educate students talented in science, technology, engineering and mathematics has become even more crucial to our long term national strength and capacity to remain at the forefront in innovation. The success in bringing together nine institutions across three adjacent states, exemplifies the talent of the central AMP leadership team and the dedication of the Presidents and senior academic leaders of the partnering institutions. There is no more important work than providing a quality education in STEM for the students in the region and the nation-- particularly those students who have been traditionally underserved.

As an Alliance we are poised to continue to build on our past experiences and the importance of the work we do for deserving students and their nation. We remain committed to expanding opportunities for qualified underrepresented students, ensuring that they assume their rightful professional roles as leaders of the next generation of great American innovators, scientists, educators, and intellectual leaders.

PROVOST MARK GREENBERG
Senior Vice President of Academic Affairs
Drexel University

Principal Investigator
Greater Philadelphia Region LSAMP

At Drexel we are enormously proud of the spirit engendered by the Greater Philadelphia Region Louis Stokes Alliance for Minority Participation. It represents a closely-bonded consortium of higher education institutions dedicated to a common mission focused on significantly increasing the number of students who traditionally were underrepresented in the sciences, engineering, mathematics, and technology. This close collaboration and unique commitment to working cooperatively has fostered new relationships among institutions, faculty, and students. The net result is the enormously gratifying production of talented and qualified scientists for the region. Of course, our collaborative work has had a profound impact on the economy and wealth production for the tri-state region. Congratulations to the Presidents and senior management of the partner institutions as well as their academic leaders and faculty. Our LS AMP collaboration represents a model for the nation in meeting the challenges that face the region and nation and the world. Through it, we can overcome enormous obstacles through strategic planning and dedication to our task. Finally, we believe that this LSAMP model / mechanism could have significant impact on how we engage under-represented students in all disciplines throughout the nation. It is an honor to participate in this consortium and in helping educate able students in service to the nation.

MESSAGE FROM THE CO-PI & PROJECT COORDINATOR

DR. STEPHEN R. COX
Director, Regional Alliance
Drexel University

Co-Principal Investigator,
Project Director
Greater Philadelphia Region LSAMP

22 years ago I was asked if I could increase significantly the number of minority students who have interest in scientific and engineering disciplines if money was no object. My immediate response was that money is always a common denominator but, given the appropriate resources, I could assemble a team that could not only increase the interest of urban students, but raise the level of success for African-American and Latino students in the region. As a scientist and engineer raised in the heart of the Philadelphia experience, I was keenly aware of the challenges that many students face with regard to career opportunities and the disbelief of many teachers and industrialist regarding urban student's competency.

That discussion brought a coalition of dedicated educators and scientific stakeholders together to discuss the dire state of affairs which existed in the region and the nation regarding the participation of minority students in science, engineering, mathematics and technology curricula and professions.

The following document will clarify and demonstrate the significant impact that dedication and strategic planning can produce. This mechanism has established a strategic methodology to improve STEM education to underrepresented students in the city, region and the nation. I am excited to present the Philadelphia AMP Story.

MS. VENIECE KEENE
Senior Research Specialist
Drexel University

Project Coordinator
Greater Philadelphia Region LSAMP

The Greater Philadelphia Region Louis Stokes Alliance for Minority Participation (LSAMP) was founded on the belief that all students, with the appropriate support, possess the ability to be successful. As a direct result of this guiding principle, its students soar.

ALLIANCE OVERVIEW

22 years ago, a consortium of dedicated educators and scientific stakeholders came together to discuss the dire state of affairs which existed in the region and the nation regarding the participation of underrepresented students in science, engineering, mathematics and technology (STEM) curricula and professions. In 1989, the consortium established The Comprehensive Regional Center for Minorities (CRCM) funded by the National Science Foundation. With input from all the participating stakeholders, a blueprint was developed, shaping a comprehensive pipeline from K through 16 that would mitigate the diminished scientific capacity of the region. This became the consortium's operational plan for the next six years.

In November 1994, the Greater Philadelphia Region Louis Stokes Alliance for Minority Participation (Philadelphia AMP) emerged from the focus and energy of the CRCM to sustain the increased baccalaureate degree productivity across this nine university consortium with geographic influences in three adjoining states: New Jersey, Pennsylvania and Delaware. From that day to the present, in the fulfillment of the promise made by committed educators and community activists, who pledged to collaborate in the development of a consortium that would be dedicated to the improvement and increased inclusion of underrepresented students in the scientific enterprise in the Greater Philadelphia Region, intellectual, financial and material resources have been provided to achieve the stated objective. As a result of Philadelphia AMP's efforts, a mechanism has been developed to catalyze changes in institutional, departmental, and organizational culture and the practices that have resulted in significant increases in recruitment, including 2yr – 4yr matriculation, retention, STEM degree production, and graduate school entry for underrepresented students, as well as for the benefit of all students.

Historical Perspective

Philadelphia AMP, now in its seventeenth year of operation represents a diverse tri-state partnership of public and private, 2- and 4-yr, research and non-research, Historically Black Colleges and Universities (HBCUs) and majority institutions. The Alliance's mission is to substantially increase the quantity and quality of African American, Hispanic and Native American students earning baccalaureate and advanced degrees in science, technology, engineering and mathematics (STEM). The participating institutions include:

- Cheyney University of Pennsylvania
- Community College of Philadelphia
- Delaware State University
- Drexel University
- Lincoln University of the Commonwealth of Pennsylvania
- New Jersey Institute of Technology
- Temple University
- The University of Delaware
- University of Pennsylvania

Synergistic collaboration has been a unifying operational philosophy that informs practices across the Alliance with regard to minority undergraduate enrollment, retention and the promotion of graduate study. In addition, the Alliance continues to increase the involvement of tenured STEM faculty, academic department heads, and senior administrative personnel in the implementation of the Philadelphia AMP which has positively impacted STEM departments and minority student retention at partner institutions. This steady increase in participation has also attributed to the successful implementation of our Bridge to the Doctorate (Cohorts I-IX) programs.

Philadelphia AMP has centered its efforts on catalyzing changes in institutional, departmental, and organizational culture and practices in order to achieve sustainable and significant increases in recruitment, retention, and degree attainment in STEM disciplines for underrepresented students. The initial impact occurred at the institutional level. As we organized to facilitate the improvements in resources on campuses for underrepresented students, partner institutions reorganized their plans and operations utilizing the best practices of the regional partners.

As a new Alliance from 1994 – 98, Philadelphia AMP focused on short-term or non-permanent ways to increase its annual minority STEM degree production immediately. It setup infrastructure to monitor and manage activities that were mainly

supported by AMP funds. These activities were primarily support services in nature and resided outside of the learning environment or classroom. In addition, recruitment at the pre-college level was emphasized. As a result, AMP drop-in centers were established, student support services realigned, and extensive tutorial services were provided through the AMP drop-in centers.

By June 1999, the Alliance increased its minority STEM degree productivity from 201 degrees to 475 degrees in 1999, thus achieving 81% of its 558 degree minority STEM degree production goal, and dramatically improved the retention rate of AMP minority STEM students. Based on the Alliance's Fall 1994 freshman cohort study conducted in 1999, AMP minority STEM students were retained at a higher level (80%) than Non-AMP minority STEM students (40%) and than Non-minority STEM students (75%) over a four-year period. Additional analysis showed that the retention / graduation rate of AMP minority STEM students (74%) continued to exceed that of Non-AMP minority students (35%), and was similar to that of Non-minority students (72%) over a five-year period. The refinement of support programs and the success of the target population raised the interest of administrators and faculty that stimulated outreach to LSAMP administrators and created cross-alliance collaboration.

During the mid-level years of its development from 1999 – 2004, the Alliance focused on long-term or permanent ways to maintain the initial increase in its annual minority STEM degree production over time. Its purpose was to increase retention and performance of students within the learning environment or classroom. Activities included curricular modifications, institutional reorganization, shifts in teaching practices and operational practices which were supported by the colleges/universities as part of their general operating costs. In addition, retention and articulation, especially from Community College of Philadelphia were emphasized. These efforts resulted in a sustained increase of the minority STEM B.S. degree productivity rate of 500+ degrees annually for eight years from 2000 - 2007. In addition, the Alliance increased the number of community college students involved in research, graduate school matriculation and doctoral STEM degree completion.

As a senior level Alliance from 2005-present, the Philadelphia AMP continues to integrate the cumulative knowledge base gained through its development to senior level Alliance status to further strengthen the institutionalization of best practices, the preparation and transition of students from community colleges to 4-year institutions and from 4-year institutions to graduate study, and the participation of students in national and international research experiences. These efforts have resulted in increased undergraduate and graduate STEM degree productivity. From its inception through 2010, Philadelphia AMP has provided support to 10,522 students.

Sustained increases in the quality and quantity of minority students in undergraduate and graduate STEM degree programs require not only a re-engineering of the educational system at all levels, but also a sustained mechanism which revisits the curricular adjustments to accommodate the demands of industry and the academy. These adjustments will result in permanent changes in the institutional learning environment, as well as in its policies and practices in terms of allocations of finances, personnel, recruitment, and admissions. As part of its institutionalization efforts, the infrastructure of the Philadelphia AMP Initiative has created such a mechanism, and as a result has begun the re-engineering of the undergraduate and graduate educational system at partner institutions as it relates to the advancement and participation of underrepresented students in STEM education. This re-engineering has primarily occurred through the following:

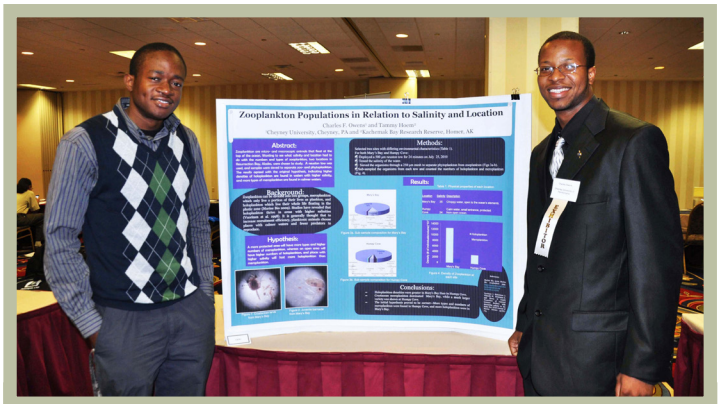
- Strategic leveraging of NSF funding to revamp STEM education, to bolster the research infrastructure of our HBCU institutions, to expand academic support and monitoring, and to increase scholarship funding and research opportunities for Philadelphia AMP students.
- Shifting of NSF funded program operating expenses to institutional budgets, and the movement of AMP objectives to the strategic missions of partner institutions.
- Expansion and diversification of institutional recruitment efforts at the undergraduate and graduate levels that broaden the opportunity for minority students to gain admission to the university.
- Institutional realignments, and the creation of new administrative positions to manage institutional enrollment in support of diversity.
- Adoption / replication of AMP program practices institution and Alliance-wide.
- Reorganization and centralization of student support services, the creation of supplemental sections for gatekeeper courses, and enhanced / specialized tutoring and academic advising.
- Reorganization and enhancement of STEM curricula, the creation of new BS/MS inter-institutional

program offerings, and the realignment of 2-yr to 4-yr articulation agreements.
- Expansion of undergraduate research activity, and the creation of inter-institutional faculty to faculty linkages and research partnerships.
- Cross-Alliance sharing of research equipment and facilities, and technical expertise.

The impact of this Alliance of nine institutions dedicated to increasing minority STEM student B.S. degree productivity has also increased the collective institutional consciousness and has informed methodologies for correction of previously existing barriers. Some of the "cultural dis-affinity" characterized in previous years, across this diverse Alliance, has now created opportunities for institutions to collaborate as full partners in all aspects of the educational enterprise. Looking at the Alliance in retrospect starting with the Community College of Philadelphia, each element of our consortium has created areas of intersection with the four-year institutions and the Research One institutions, supporting the seamless transition of students, and faculty working in collaboration to achieve the desired result, broadening the participation of underrepresented students in the STEM enterprise.

2010 LSAMP JAM Poster Session: (from left to right) Stephen Cox and Veniece Keene accompany Bridge to the Doctorate students, Yolanda Williams-Bey, Virginia Kocieda, and David Delaine as they present their research to members of Congress.

Philadelphia AMP STEM Transfer Fair: Dr. Douglas Baird, Temple University speaks to students from Community College of Philadelphia about STEM program offerings.



13th Annual Research Symposium and Mentoring Conference: Charles Owen, Cheyney University (right) presents his research to a fellow LSAMP student during the conference.

Bridge to the Doctorate Retreat 2010: Students from the Bridge to the Doctorate and HBCU STEM fellowship programs participate in professional development workshops during the retreat.

METRICS

Highlight of Accomplishments

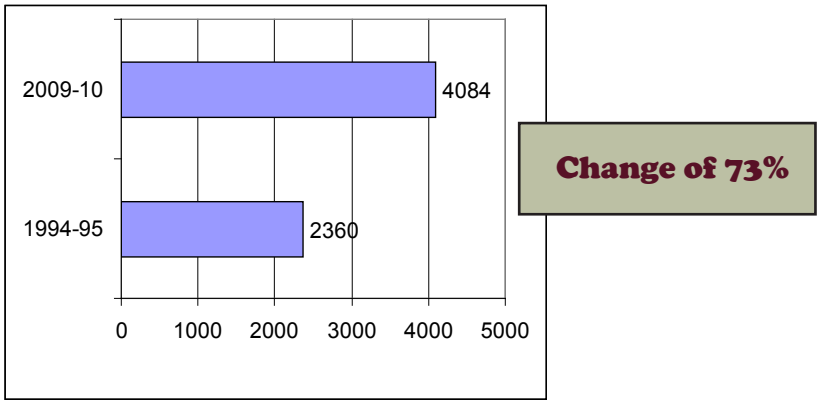
The Philadelphia AMP has been responsible for the philosophical and strategic change in the productivity associated with the increase of underrepresented students majoring and graduating in STEM disciplines at the participating institutions and the larger higher education community in the region. While each institution has developed a programmatic strategy to improve the quality of STEM on their respective campuses, a specific plan driven by research and data has engaged the higher education community, government agencies, the regional school districts and major corporate interests to support this increasingly diverse science and engineering talent pool. Specific accomplishments are noted below:

Increased Enrollment of Underrepresented Undergraduate Students in STEM Disciplines:

Currently, approximately 4,084 minority STEM students are enrolled at Alliance institutions, which constitutes approximately 19.3% of the Alliance's total STEM population (21,175 students). The ethnic distribution of these students is as follows: 63% African American, 35% Hispanic, and 2% Native American. In terms of gender, 61% are males, and 39% are females.

As noted below in ***Figure 1***, enhanced recruitment efforts have increased the minority STEM undergraduate enrollment at partner institutions. Between the 1994-95 and 2009-10 academic years, **the Alliance's minority STEM enrollment has increased by 73%**

Figure 1: Philadelphia AMP Minority STEM Undergraduate Enrollment Between 1994 and 2010.



Increased Support Services For Underrepresented STEM Students:

As noted in ***Figures 2*** below, between the 1994-95 and 2009-10 academic years, Philadelphia AMP has increased the number of African American, Hispanic and Native American students it has supported from 349 to 1,857 students annually. The Alliance is now providing support to **45% of the Alliance's total minority STEM population of 4,084 students**. The ethnic distribution of the students served during these periods is included in ***Figure 3***.

Figure 2: Philadelphia AMP Students Who Received Direct Support Between 1994 and 2010.

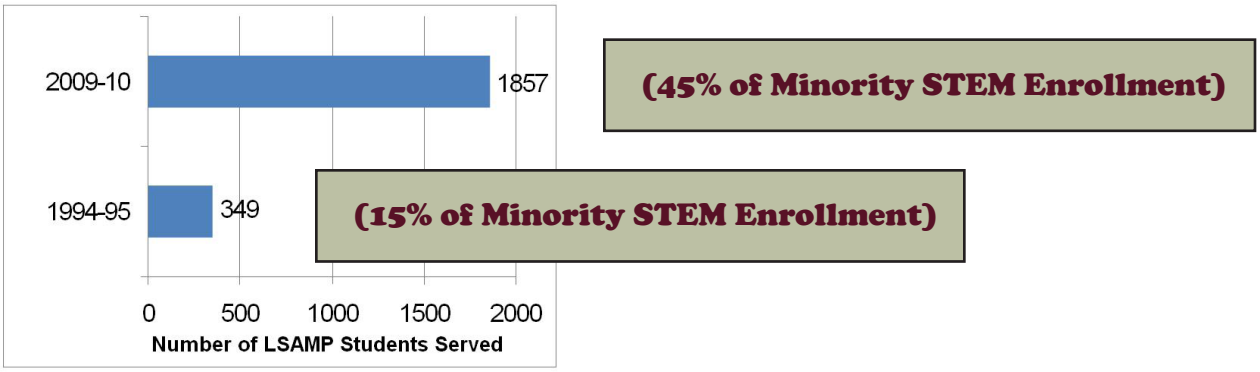


Figure 3: Philadelphia AMP Students Who Received Direct Support Between 1994 and 2010 by Race / Ethnicity.

Race/Ethnicity	Academic Year		% Increase from 1994-95
	1994-95	2009-10	
African American	307	1290	320%
Hispanic	40	544	1260%
Native American	2	23	1050%
Total	349	1857	432%

From its inception through August 2010, Philadelphia AMP has provided support to 10,522 students. A summary of the number of students supported by institution and race/ethnicity is included in ***Figure 4***. Throughout the Alliance, students are able to participate in a wide variety of programs, such as summer pre-freshman bridge and academic year support, academic counseling and advising, enhanced tutoring, mentoring activities, career awareness and preparation for graduate school, internships with industry sponsors, learning communities, national and international research, training and symposia, programs to facilitate the transition from high school to college, from community college to four-year institutions, and four-year institutions to graduate matriculation. Book stipends and scholarship/fellowship support is also provided.

Figure 4: Philadelphia AMP Students Who Received Direct Support Between 1994-2010 by Institution

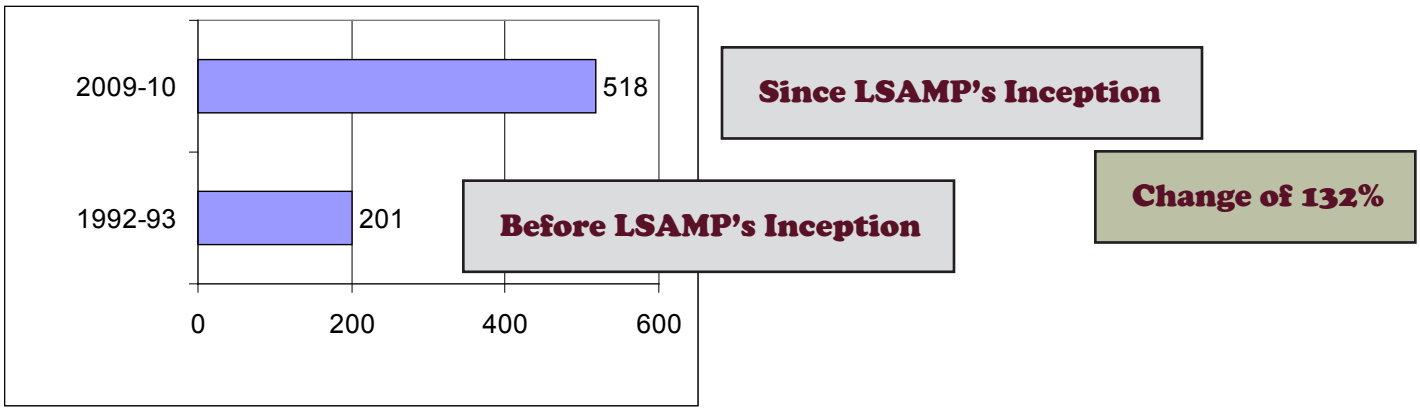
School Name	African American	Native American	Hispanic	**Total**
Community College of Philadelphia	722	6	80	**808**
Cheyney University of Pennsylvania	296	0	4	**300**
Delaware State University	406	0	11	**417**
Drexel University	938	12	347	**1297**
Lincoln University	459	0	5	**464**
New Jersey Institute of Technology	736	0	951	**1687**
Temple University	2954	51	474	**3479**
University of Delaware	874	22	451	**1347**
University of Pennsylvania	385	8	330	**723**
Total	7770	99	2653	**10522**

Increased Annual Rate of Minority STEM B.S. Degree Productivity:

Through the support of the National Science Foundation and the dedication of the presidents, faculty, students and industries in the region, **the Alliance has more than doubled its minority science, technology, engineering and mathematics (STEM) B.S. degree production from 201 to, on average, over 500 degrees annually**, and produced 8,457 minority STEM B.S. degrees, 1,901 minority STEM M.S. degrees, and 246 minority STEM Ph.D. degrees over the last 17 years of its inception. The Alliance's change in its minority STEM B.S. degree productivity before AMP's inception and since its inception to 2010 is noted in ***Figure 5***.

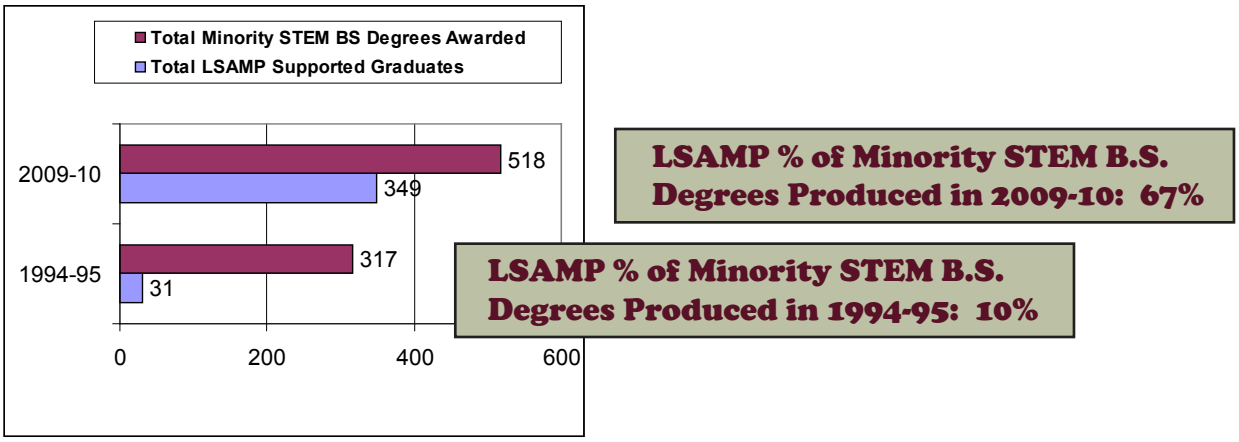
METRICS

Figure 5: Comparison of Philadelphia AMP Minority STEM B.S. Degrees Awarded Between 1992-93 and 2009-10.



The aforementioned increases in minority STEM B.S. degree productivity can be greatly attributed to the retention efforts of Philadelphia AMP. In general, Philadelphia AMP students who receive support through its LSAMP program are being retained at 35-40% higher than Non-AMP minority STEM students. As noted in ***Figure 6***, **as of the 2009-10 academic year, Philadelphia AMP provided support to 67% of the total minority STEM B.S. degree recipients.**

Figure 6: Comparison of LSAMP Supported Graduates and Minority STEM B.S. Degrees Awarded Between 1994-95 and 2009-10.



Increased STEM Faculty Engagement in the Broadening Participation Agenda:

Since its inception, Philadelphia AMP has continued to increase the involvement of tenured STEM faculty, academic department heads, and senior administrative personnel in the implementation of the Philadelphia AMP which has positively impacted STEM departments and minority student retention at partner institutions. As noted in ***Figure 7***, of the 423 persons currently involved in this initiative, 338 hold a faculty rank position of Professor (128 persons), Associate Professor (85 persons), or Assistant Professor (125 persons). This steady increase in participation has also attributed to the successful implementation of our post-baccalaureate LSAMP Bridge to the Doctorate (Cohorts I-IX) programs.

In addition, the increased involvement of faculty in the research environment with students has also stimulated the following: 1) faculty becoming mentor-role models in environments that had non-ethnic parity, and 2) faculty that have gained a new appreciation for the capacity and capability of underrepresented students to perform at the top of the class. As a result of the latter, faculty are actively engaged in the recruitment and matriculation process of underrepresented students to graduate study in STEM disciplines, as well as their retention. The latter, as well as additional NSF funding

through the LSAMP Bridge to the Doctorate program have greatly contributed to increases in the Alliance's M.S. and Ph.D. minority STEM degree productivity as noted below in ***Figures 8 and 9***.

Figure 7: Philadelphia AMP Involvement of STEM Faculty by Rank Between 1994-95 and 2009-10.

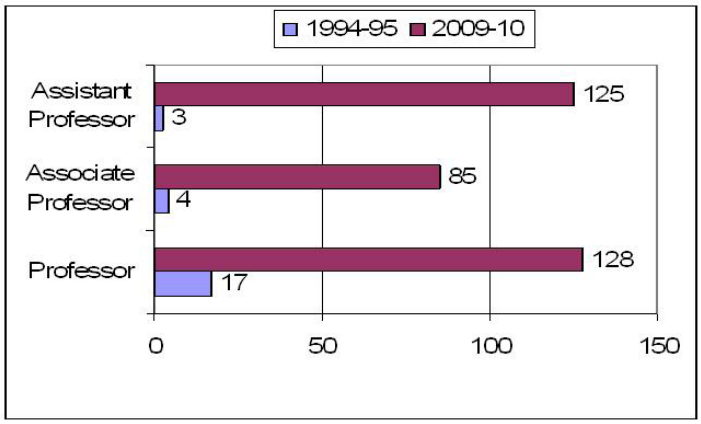


Figure 8: Comparison of Philadelphia AMP Minority STEM M.S. Degrees Awarded Between 1994-95 and 2009-10.

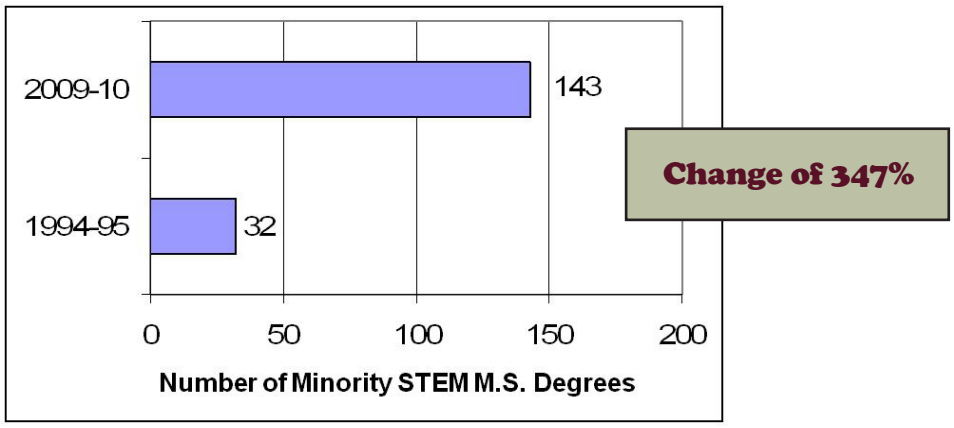
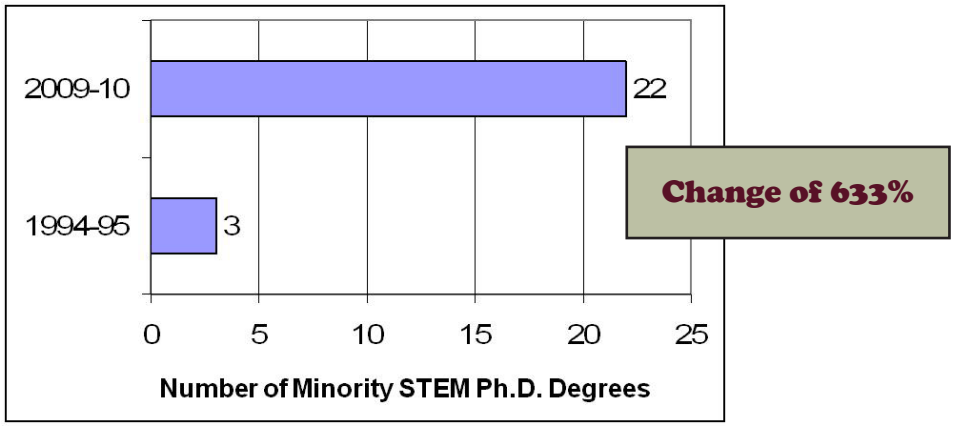


Figure 9: Comparison of Philadelphia AMP Minority STEM Ph.D. Degrees Awarded Between 1994-95 and 2009-10.



AMP ACCOMPLISHMENTS

Increased Post Baccalaureate Activity / LSAMP Bridge to the Doctorate Program:

Since 2003, the LSAMP Bridge to the Doctorate program funded by the National Science Foundation has played a major role in the embedding of the Philadelphia AMP philosophy at institutions and in the organization of complex strategies to support and sustain graduate students in completing the PhD. Between 2003-2010, one hundred and five (105) students have been admitted into the program. Twelve additional students were admitted into the program as part of the newly funded Cohort IX program which began September 2011. BTD programs have been hosted by the following Philadelphia AMP institutions: University of Delaware (Cohorts I and IX), New Jersey Institute of Technology (Cohort II), Drexel University (Cohorts III and VIII), Delaware State University (Cohorts IV, VI and VII), and Temple University (Cohort V). The grant provides a substantial fellowship for twelve candidates and covers their tuition and the cost of education, including health benefits. Intrinsic in this BTD fellowship is the identification of the candidates who may be, by traditional standards, marginally acceptable to most graduate programs. The utilization of the AMP model supplemented with the unique preparation for graduate education has proven to be very successful in our Alliance. With strong senior level administrative commitment and vision across the Alliance, Philadelphia AMP has leveraged the LSAMP, the Bridge to the Doctorate, IGERT, GK-12 and GAANN awards using a strategy that is directed at meeting workforce and leadership demands for the 21st century.

Figure 10: Philadelphia LSAMP Bridge to the Doctorate Productivity Rates and Commitment to Ph.D. Degree Attainment for Cohorts I-VIII as of June 2011.

# Admitted	# Retained (% from # Admitted)	# Committed to Complete Ph.D. Degree (% from # Admitted)	# Completed M.S. or Equivalent as of June 2011 (% from # Admitted)	# Enrolled / Accepted into Ph.D. program (% from # retained)	# Retained in Ph.D. program as of June 2011 (% from # retained)	Passed Ph.D. Qualifier Exam (% from # Admitted)	# Received Ph.D. Degree as of June 2011 (% from # Admitted)
105	86 (82%)	76 (88%)	61 (71%)	56 (65%)	47 (55%)	20 (23%)	6 (7%)

The establishment and successful development of Philadelphia LSAMP BTD Cohorts I-VIII programs provided a uniquely strong pre-existing foundation for the effective implementation of the newly funded BTD Cohort IX program which is being hosted by University of Delaware as of Fall 2011. As noted in ***Figure 10***, as of June 2011, eighty-six (86) of the one hundred and five (105) students (or 82%) from the BTD Cohorts I - VIII programs persisted, and seventy-six students (or 88%) have committed to complete the PhD degree. Of the students retained, fifty-six (56) students (or 65%) have been accepted into Ph.D. programs, twenty (20) students have already passed their Ph.D. qualifier examination, and six (6) students have been awarded their Ph.D. degree and have moved on to professoriate, federal agency, and military

appointments, respectively. Five additional students are on track to complete their Ph.D. degree by December 2011. Efforts are underway to transition additional students into Ph.D. programs. The Philadelphia LSAMP BTD Ph.D. student distribution by STEM category is as follows: 2% Agricultural Sciences, 44% Engineering, 27% Life/Biological Sciences, 11% Physical Sciences, and 16% Mathematics and Computational Sciences.

The BTD candidates exemplify the spirit of a new breed of technically competent and creative minority scientist and engineers who will lead the nation in cutting edge research. The Philadelphia Alliance takes great pride in being the launch site for talent which will have a national, as well as an international impact on the scientific enterprise.

Strategic Use of NSF Funds:

Philadelphia AMP has strategically used its LSAMP Bridge to the Doctorate program at Delaware State University (DSU) to help the institution successfully grow its graduate programs, as well as increase its research capacity. Historically, graduate enrollments at DSU, an HBCU institution, have been sharply limited by the lack of graduate assistantships. Until recent years, only the Ph.D. program had stipends to pay graduate students. Starting in 2005, the Plant Sciences and Natural Resources graduate programs were able to fund graduate students through an NSF EPSCoR grant, while in 2006 and 2008 DSU welcomed 24 BTD fellows of Cohort IV and Cohort VI, the Department of Biology was able to fund students seeking an MS in Molecular and Cellular Neuroscience and Mathematics; AMRC and CREOSA offered research assistantships and tuition support to students in several departments. The Bridge to the Doctorate (BTD) Cohort IV, VI and VII programs continued to allow the graduate programs at DSU to reach their potential to serve students by providing the needed financial resources. With the inclusion of Cohort VII, BTD students represent more than 50% of the graduate students in some departments such as Biology, Chemistry, and Applied Mathematics.

BTD Cohort VII student, Franz Delima, M.S. candidate, Optics, Delaware State University (DSU) has contributed to the development of intellectual property which will be transferred from DSU to Photon Machines, Inc. A Laser-Induced Breakdown Spectroscopy-Tag Method (LIB-Tag) developed from DSU's optics research work will be used in the creation of laser technology that can be used in hospitals and labs for diagnostic work.

The increased involvement of faculty and students in the research enterprise has also helped DSU attract additional research funding, enhance the quality of its minority STEM graduate students, as well as contribute to the advancement of scientific knowledge. Most recently, BTD students in optics have contributed in the development of intellectual property which will be transferred from DSU to Photon Machines, Inc. in which a Laser-Induced Breakdown Spectroscopy-Tag Method (LIB-Tag) developed from DSU's optics research work will be used in the creation of laser technology that can be used in hospitals and labs for diagnostic work.

Funding from other HRD programs has also helped the Alliance to revamp STEM education, to bolster the research infrastructure of our HBCU institutions, and to increase scholarship support and research opportunities for Philadelphia AMP students.

AMP ACCOMPLISHMENTS

Collaborations

The inclusion of both a community college and HBCUs in the Greater Philadelphia Region Alliance continues to contribute greatly to the ability of partners to increase their diversity, particularly as the readiness of minority high school students lags that of their non-minority counterparts. Students from these institutions are recruited for undergraduate and graduate study at partner institutions (especially the Alliance's Bridge to the Doctorate programs), and inter-institutional research collaborations have created faculty to faculty interactions which also benefit students. NSF and other government agencies continue to fund a number of inter-institutional collaborations. Other collaborations involving Philadelphia AMP partnership within NSF include:

- Centers for Research Excellence in Science and Technology (CREST)
- Collaborative for Excellence in Teacher Preparation (CETP)
- Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)
- Integrative Biology and Neuroscience / Behavioral Science Program
- Laboratory on Structure for Research Matter (LRSM)
- Louis Stokes Alliance for Minority Participation Bridge to the Doctorate (BTD)
- Major Research Instrumentation (MRI)
- Recognition Awards for the Integration of Research and Education (RAIRE)
- Research Experiences for Undergraduates (REU)
- Research Infrastructure for Science and Engineering (RISE)
- Research in Undergraduate Institutions (RUI)
- Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM)

With the NSF leverage we have garnered the support of additional federal agencies to provide research opportunities to both undergraduate and graduate students including:

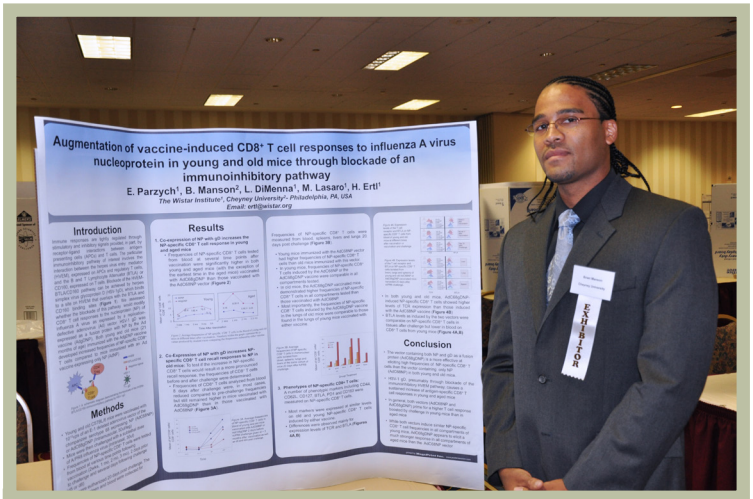
- Federal Highway Administration
- Federal Drug Administration (FDA)
- National Aeronautics and Space Administration (NASA)
- National Nuclear Security Administration (NNSA)
- National Institute of Health (NIH)
- Nuclear Regulatory Commission (NRC)
- Office of Naval Research
- U. S. Army Research Laboratories (ARL)
- U.S. Department of Agriculture (USDA)
- U.S. Department for Defense (DoD)
- U. S. Department of Education
- U.S. Department of Energy (DOE)

The Philadelphia AMP, in addition to the expansion of its cross Alliance activities in research and graduate transition programs has created new partnerships with corporations. The AMP/Sunoco Inc.-The Minority Pathfinder Awards was a concept developed by management from Sunoco Inc and the Philadelphia Alliance to identify and acknowledge minority engineers who have led the way in science engineering and technology in the Delaware Valley, achieved professional excellence and who are providing mentorship and career counseling in the engineering and scientific community. At the inaugural event on May 25, 2006 the attendance was in excess of 200 guests with

representation from Alliance institutions and a dozen major corporations in the Delaware Valley.

One of the most important factors in providing competent technical scientific and engineering talent is the support and participation of the regional corporate stakeholders. The Philadelphia AMP has coordinated a tri-state consortium of corporations who will be the recipients of the students that we have produced. The following is a brief list of the corporations involved:

- Air Products
- Dupont Corporation
- National Consortium for Graduate Degrees for Minorities in Engineering and Science (GEM)
- Lankenau Medical Research Center
- Lockheed Martin
- National Action Council for Minorities in Engineering, Inc. (NACME)
- The National Association of Multicultural Engineering Program Administrators (NAMEPA)
- Pennsylvania State University
- Rohm and Haas
- Sloan Foundation
- Sunoco, Inc.
- Unisys
- Ventures
- W. L. Gore Corporation
- Wistar Institute



Brian Manson, Cheyney University awaits judging of his research project conducted at the Wistar Institute on the "Augmentation of Vaccine-induced CD8+ T cell Responses to Influenza A Virus Nucleoprotein in Young and Old Mice through Blockade of an Immunoinhibitory Pathway."

Dr. Jamie Bracey (center) presents a Lifetime Service Award to Dr. Joseph Bordogna, former Deputy Director, National Science Foundation (left) and Dr. Eugene DeLoatch, Dean, College of Engineering, Morgan State University (right).

In addition, the Alliance has actively participated in regional efforts to increase the participation of underrepresented students. On December 9-10, 2009, hosted jointly by the Deans of Engineering of both Temple and Drexel Universities, in partnership with the Urban STEM Strategic Group of the Commonwealth of Pennsylvania, Philadelphia AMP co-sponsored the first Engineering Deans' Summit: "Partnering thru Diversity to Address Grand Challenges" which focused on the ways in which Philadelphia, New Jersey and Delaware (Delaware Valley) institutions could partner with Historically Black Colleges and Universities nationally to develop innovative solutions to the "Grand Challenges for Engineering" enumerated by the National Academy of Engineering. The goals of the regional summit included the following:

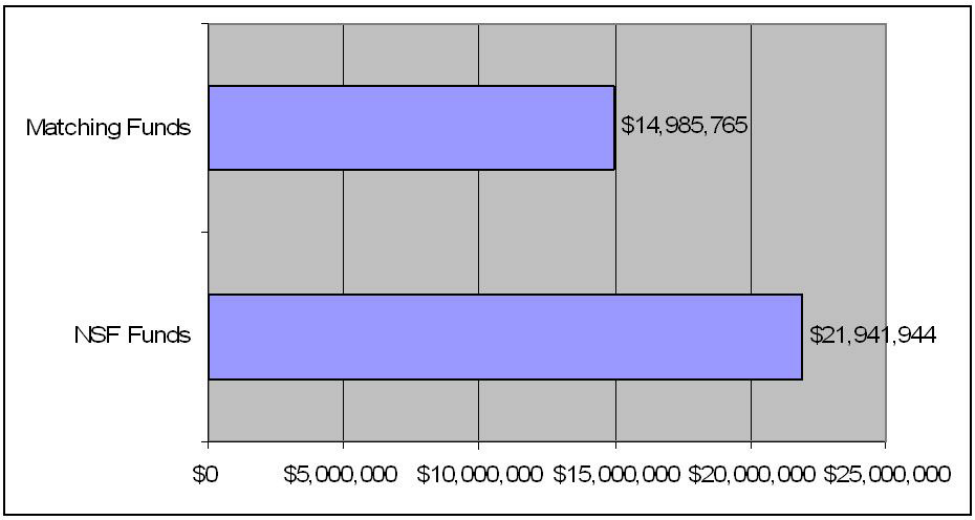
a) developing strategic research and funding collaborations between HBCU and Delaware Valley Colleges of Engineering to ensure matriculation of minority undergraduates into graduate and post-graduate degree opportunities.
b) developing policy recommendations to promote sustainable education reform benefitting STEM education.
c) fostering greater teacher/ educator/counselor/ parent/student awareness of STEM education and regional needs.

The relationships between school districts, higher education, corporate partners and regional STEM initiatives have shaped an alliance that has strengthened the economic status of the tri-state region.

ECONOMIC IMPACT

Between 1994 and 2010, the Greater Philadelphia Region Alliance partner institutions have contributed over $14,985,765 in matching funds to the LSAMP initiative through the use of college/university, foundation, state government, and corporate funds as noted in ***Figure 1*** below.

Figure 1: Comparison of NSF and Matching Funds for the Greater Philadelphia Region LSAMP Between 1994 and 2010

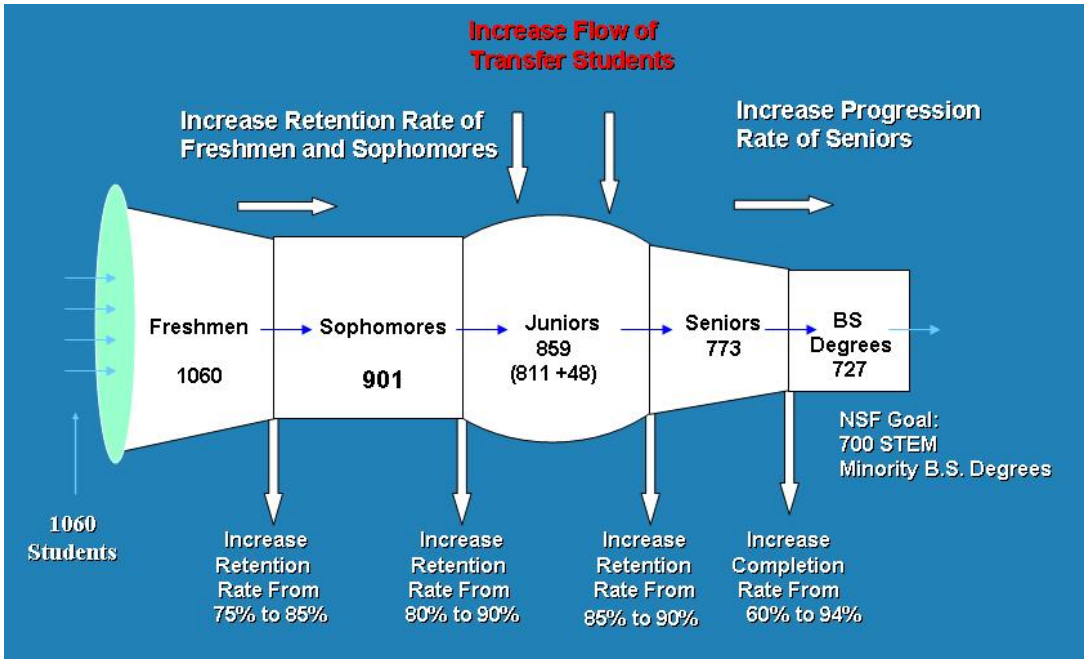


During the last 17 years, there has been a significant attempt to improve the scientific and mathematics literacy of the Greater Philadelphia Region. Many of the initiatives focused on programs to increase awareness of science, technology, engineering and mathematics (STEM) for students from K-12, with the intent to increase the probability of their considering an undergraduate education in one of the technical career areas. Through the support of the National Science Foundation (NSF) and a sequence of initiatives that engaged the stakeholders in academia, industry, professional technical organizations and government agencies, a pipeline strategy was developed that would produce, in significant numbers, a new generation of technical talent to carry the nation into the next millennium.

In order to create a population of scientific talent, it was necessary to identify the best practices and programs that would create a foundation for a pipeline mechanism that would not only develop prime talent, but sustain the growth and interest in STEM careers and add to the regional economic growth and development. In large urban centers in America there exists a significant portion of the population of students who are underrepresented in the technical disciplines, specifically African American, Hispanic and Native American students. Forty to sixty percent of the urban populations do not have either access to or opportunities to participate in technological experiences. As we started to shape a strategy, the major stakeholders were joined by teachers, parents and community organizations.

Initially, the Comprehensive Regional Center for Minorities (CRCM) model, established with NSF funding, focused on engagement from kindergarten through to graduate school and professional careers. This strategy included simultaneously the introduction of STEM to students in grades K through 12 with teacher staff development in science, technology, engineering, mathematics, and computer technology. The university community supported the staff development initiatives, and the corporate community provided role models and access which changed the scientific environment for both parents, teachers and families. This foundation pipeline integrated seamlessly into the LSAMP and the Bridge to the Doctorate Programs and has produced the impact that was anticipated in its initial stages of development. Once we had developed the pipeline strategy, the process of implementation began. With a sustained team of academicians, from senior university administrators to STEM faculty and support staff at each partner institution, we have produces B.S., M.S. and Ph.D. minority STEM scientists and engineers who are contributing to the economic wealth of the region. The Alliance's mid-level and senior-level strategic plan is included in ***Figure 2***.

Figure 2: Greater Philadelphia Region LSAMP Mid-Level and Senior-Level Strategic Plan (Recruitment, Retention, and Articulation)



By calculating the earning potential of the Alliance's minority B.S. STEM degree recipients, based on disciplines and time in-service, we were able to establish earning capacity and growth in their respective positions in both private and government work environments.

$21.9 million in NSF Funding + $14.9 million in Institutional Matching Funds + LSAMP's Mechanism + Corporate Mentoring > $2.2 billion in Income Capacity

As we calculated base salaries at the junior scientist/engineer, the senior scientist, supervisor and manager levels, we established an income contribution to the region to be minimally $2.2 billion dollars of income production in the tri-state Greater Philadelphia Region LSAMP region. This calculation takes into account a 12% attrition rate due to layoffs, 5% due to change of career objectives and a 3% movement out of the region. Also, a calculation for the present value of money and how that impacts income in 2011 was included in this regional income in the STEM community. These statistics are substantiated by a survey of Alliance's alums during the last 12 years. Even more revealing are the 1,900 minority STEM M.S. degree recipients and those 246 who have completed their Ph.D. have not been included in the calculation and would further enhance the income potential of the region. These recipients have become vested in the region and in many circumstances are in research academic fellowships or mainstream laboratories, private for-profit laboratories and employed in junior and senior faculty positions, regionally and nationally. Based on the NSF's Division of Science Resources Statistics, National Survey of Recent College data from 1994 – 2006 which provides the median salary of full-time employed M.S. degree recipients by discipline, the income capacity of the Alliance's minority M.S. degree recipients is calculated to be over $716 million.

While our internal survey of the Alliance alums was based on a good statistical sampling, the impact on the local economy has been much more dynamic and significantly enhanced by the NSF's investment. Housing acquisitions, automobile purchases, growing families, and new entrepreneurial ventures that have produced new businesses in pharmaceutical, telecommunications, biomedical engineering devices, arial pathogen detection systems, and military surveillance products have made this region of the country a growing source of economic promise for the nation. The total impact of the this Greater Philadelphia Region LSAMP effort has far greater impact on the region because of the return of these alums who are now influencing the minds and visions of a new generation of talented, technically advanced contributors to the national scientific enterprise.

CHEYNEY UNIVERSITY

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CHEYNEY UNIVERSITY OF PENNSYLVANIA

Impact Statement

Established in 1837, Cheyney University of Pennsylvania cherishes its legacy as one of America's oldest Historically Black Colleges and Universities (HBCUs). Its mission is to prepare confident, competent, reflective, visionary leaders and responsible citizens. The University upholds its tradition of academic excellence as it maintains its historical commitment to opportunity and access for students of diverse backgrounds. The institution offers baccalaureate degrees in more than 30 disciplines and the master's degree in education. Cheyney University continues to be a valuable resource, contributing to the intellectual, social, economic and cultural development of the Greater Philadelphia region, the Delaware Valley, and beyond.

During the last 17 years, Dr. Sakkar Eva has been the link to the scientific innovation occurring at Cheyney University. Her background in Physics and vision in understanding the fundamentals to strengthen the growth of underrepresented students in the sciences and engineering have led to many changes in the landscape of the university. Under her leadership, the LSAMP program has served as a critical change agent for Cheyney University on several fronts, with the support of the former and current presidents, Dr. George Covington and Dr. Michelle Howard Vital, respectively, and Dean, School of Arts and Sciences, Dr. Bernadette Carter. Firstly, the LSAMP funding provided direct support to attract students to STEM programs, retain and progress STEM students toward graduation, and advance them toward graduate study. The Cheyney LSAMP project funded book awards, peer tutors, technology integration into STEM course curriculum, tuition assistance, research training, and travel to professional conferences.

Secondly, the Cheyney LSAMP program helped preserve most of the university's STEM programs that are intrinsically expensive and therefore were seen as a burden in the small HBCU and state institution. One of the main impact's of LSAMP in Cheyney University, where STEM constituency is very small, is that its continual support has upheld the importance of STEM education in the university community. As a result, strengthening STEM programs remained one of the priorities in the strategic plan of the University for the last six years. Most recently, the University also received state funding to build a new science building which is scheduled to open in 2012.

Thirdly, the LSAMP program helped the University gain significant momentum over the last sixteen years in building relationships with other institutions, as well as seeking external funding to expand and enhance its STEM programs. The development of collaborations with LSAMP partner institutions in the areas of Biostatistics, Epidemiology, Radio Chemistry, Nanotechnology and science education, have increased the opportunities of students and faculty to expand the University's scientific profile. Through research fellowships at national laboratories (Brookhaven and Los Alamos, etc.) young scientist have also been able to identify how they can contribute and influence their communities and the world. In addition, among the fourteen universities in the Pennsylvania

State System of Higher Education, Cheyney University, which is the smallest institution in the system, is ranked second in external grant acquisition. The University was awarded $1.75 million by the National Science Foundation (NSF) to recruit, retain, train, and graduate underrepresented minority students, and strengthen faculty teaching and research activities under its Historically Black Colleges and Universities Undergraduate Program (HBCU-UP) Implementation competition for this year. The University also received a similar award in September 2005, worth a little over $2.5 million.

Dr. Eva is accompanied by her undergraduate and graduate students that she has supported from B.S., M.S. and through to Ph.D. achievement.

Simone Waters and Nicole Jackson (right) conduct research.

RICHARD ABLE JR. is a dedicated and persistent individual who has proven to be passionate about the advancement of science. A native of Philadelphia, PA, Mr. Able graduated with a BA in Biology from Cheyney University of Pennsylvania in 2004. Integrative in his approach toward problem solving, Mr. Able recognized early on the importance of acquiring the skill sets of various disciplines. During the summer of 2003, he was certified in Nanofabrication Manufacturing Technology through the Engineering Department of Pennsylvania (Penn) State University. The knowledge acquired at Penn State qualified him to accept a NASA funded research position, which led to the design and utilization of a nanotechnology laboratory at Cheyney. After graduating from Cheyney in 2004, Mr. Able was selected as a NASA-NAFEO Ames Academy Scholar under the supervision of Dr. R.H. Rubin. The focus of his research involved the investigation of spacecraft obtained astrophysical data and contributed to one of NASA's primary goals: "Determining the Origins of Life". Recently, Mr. Able successfully defended his graduate research work entitled Real-time measurement of glial progenitor chemotactic migration, under Dr. Maribel Vazquez, Department of Biomedical Engineering, City College of New York, and will receive his Ph.D. in Biochemistry on February 1, 2012. Mr. Able looks forward to pursuing a career in academia.

COMMUNITY COLLEGE OF PHILADELPHIA

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Impact Statement

Community College of Philadelphia (CCP) is an open-admission, associate-degree-granting institution that provides access to higher education for all who may benefit. Programs of study in the liberal arts and sciences, career technologies and basic academic skills provide a coherent foundation for college transfer, employment and lifelong learning. The College serves Philadelphia by preparing students from a wide range of ages and backgrounds to be informed and concerned citizens, to be active participants in the cultural life of the city, and to be able to meet the changing needs of business, industry and the professions. Founded in 1964, with an enrollment of over 38,000 students, CCP is the largest institution of higher education in the city of Philadelphia and the sixth largest in the state of Pennsylvania. CCP is also the single largest point of entry into higher education for minorities in Pennsylvania, and ranks eighth in the nation in the number of degrees awarded to African-Americans.

Dr. Linda Powell is the Co-PI and Project Director for the LSAMP initiative at Community College of Philadelphia. After an extraordinary career in medicine, Dr. Powell decided to bring her talents to the classroom, and for the last 17 years has been the driving force for the LSAMP initiative on CCP's campus with the support of the President, Dr. Stephen Curtis, Vice President for Student Affairs, Dr. Samuel Hirsh, and the Dean, Division of Mathematics Science, and Health Careers, Dr. Maryanne Celenza. Through the CCP LSAMP program students receive mentoring, academic counseling, career advising, and financial support, as well as engage in undergraduate research activities at national laboratories, research institutes, and Research-One institutions. Dr. Powell, who is a brilliant scientist, also encourages students to participate in minority professional organizations, as well as leadership activities. Through her mentorship, which continues beyond student matriculation at CCP, Dr. Powell has supported LSAMP students' movement from 2-year to 4-year institutions, as well as to B.S., M.S. and Ph.D. STEM degree completion. In addition, many of her former students are also working in local scientific laboratories, hospitals and pharmacies. CCP LSAMP students have also received 34 awards for academic excellence to date. In addition, under Dr. Powell's leadership, the CCP LSAMP program has accomplished the following:

- Served 1200+ students, awarded 236 scholarships, and 680 book stipends to date.
- Moved 6 CCP AMP students to graduate study; two students have received their Ph.D. degree and have moved to postdoctoral appointments, two students have completed M.S. degrees and are employed in industry or educational research positions, and two students have attained Ph.D. degree candidacy status.
- Established AMP supplemental instruction classes for gatekeeper courses from 1995-2001 in Biology, Chemistry and Physics.

Alumni Achieving Educational Goals with AMP

STEVEN JONES

- Attended, Community College of Philadelphia, 1994-1996
- B.A., Psychology / Neuroscience, Temple University, 2001
- Ph.D. Neuroscience, Drexel University, 2011
- Current Position: Postdoctoral Researcher, University of Pennsylvania, Dept. of Biology

YOLANDA WILLIAMS-BEY

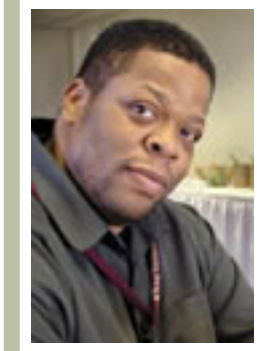
- Attended, Community College of Philadelphia
- B.A., Biology, Cheyney University of Pennsylvania, 2004
- Ph.D., Biological Sciences, Drexel University, 2010
- Current Status: Postdoctoral Associate, National Institute of Allergy and Infectious Diseases (NIAID), National Institute of Health

MARCELLA STOKES

- Seven years of distinguished military service during war and peacetime
- A.S., Engineering Science,Community College of Philadelphia, 2004
- B.S., Mechanical Engineering, Drexel University, 2008
- Current Status: Project Engineer, Design & Construction Division, General Services Administration

KIANNA RICHARDSON

- A.S., A.A., Culture Science and Technology, Community College of Philadelphia (CCP), 2009
- BS, Nutrition, Drexel University, 2011 (Magna Cum Laude)
- Distinguished Chapter President for Phi Theta Kappa, CCP
- Muriel Shapp Award Recipient for Academic Excellence in Biology, CCP
- Current Status: Participant in the Sodexo Health Care Services NY/ Philadelphia Metropolitan Dietetic Internship program



With support from the National Science Foundation through its cooperative agreement with the Department of Energy, **JOSEPH T. HEARD** scrutinized data received from the heavens at Brookhaven National Laboratory (BNL) for three summers between 2006-09. At BNL, Joseph worked in the Physics Lab collecting and analyzing data related to axions, hypothetical elements in space, which may account for an additional gravitational force not yet identified by scientists, but knowing how to analyze the data requires a thorough understanding of the field's most recent technology.

A 2007 CCP graduate, Joseph took his experience and skills to the University of Arizona in Fall 2007, where he majored in Mathematics and minored in Astrophysics. He later transferred to Syracuse University where he received his B.S. degree in Mathematics in May 2011. Joseph credits CCP and the Greater Philadelphia Region Louis Stokes Alliance for Minority Participation (Philadelphia AMP) initiative for helping him prepare for his BNL research internships and shaping his career path. Faculty and staff at the CCP advise students and encourage them to earn a bachelor's degree, but Joseph says that Philadelphia AMP and Dr. Linda Powell offer students much more.

"AMP provided a lot of support in different ways, such as financially," said Joseph. The program sponsored his internship stipend, as well as provided funding for a place to stay and transportation to and from Brookhaven, which is located in Upton, New York. "Dr. Powell and other individuals at CCP help you with registering for classes, study skills and academic counseling."

Through AMP, Joseph was invited to symposiums and seminars, where he had the opportunity to network with Ph.D.s and doctoral students. "The program helps you determine career goals." At present, Joseph is working as a Lab Assistant, Department of Physics at Florida A & M University, where he plans to continue his education and pursue a doctoral degree in Physics.

COMMUNITY COLLEGE CONNECTIVITY

The Alliance has continued its support of Community College students by accomplishing the following:

• Leveraged LSAMP funds to establish partnerships with other entities and programs to bolster Community College of Philadelphia (CCP)'s ability to provide research opportunities for students and to increase access to STEM education: Brookhaven National Laboratories, Monell Chemical Science Center, Wistar Institute, University of Pennsylvania, University of Delaware, Drexel University, Temple University, National Institute of Health Bridges to the Baccalaureate, William Penn Foundation EMC2 program, National Science Foundation Collaboratives for Excellence in Teacher Preparation, and Wistar Biomedical Technician Program.

• On October 15, 2010, the Alliance held its first Philadelphia AMP STEM Transfer Fair. During the event admissions personnel, as well as STEM faculty, administrators and graduate students from Alliance 4- and 5-year partner institutions talked to Community College of Philadelphia (CCP) students about the science, technology, engineering and mathematics program offerings at their institutions. The event was held on CCP's campus, and 179 STEM students attended. The second event was held on October 14, 2011 and was expanded to include additional regional 4-year institutions.

• Provided tutoring support for students enrolled in the following upper division classes of CCP's Engineering Science curriculum: Dynamics, Calculus III, Statics and Physics. Tutorial staff was provided by Drexel University.

• Supported STEM career awareness activities: University of Pennsylvania (Penn) provided CCP with speakers for its Science Speakers Series from its alumni. During the series, Penn alumni, Mr. Charles Wardlaw, Vice President, U.S. Fuels Chain Procurement, BP Oil and Dr. Jonathan Essoka, Environmental Scientist, Environmental Protection Agency came to CCP and talked to students about their career paths and the employment trends in their industries in February 2011. Dr. Essoka also participated in the Philadelphia Science Festival held at CCP on April 25, 2011 as a speaker on Energy and Sustainability as part of a city-wide activity.

• Expanded support services for transfer students at 4-year partner institutions: The New Jersey Institute of Technology focused on coordinating the STEM minority transfer students from Essex County College (ECC) to the NJIT, through its Educational Opportunity Program (EOP). In line with the focus of the Philadelphia AMP – community college coordination, developing the transferability of students, integrating community college students into four-year institutions, and assuring service delivery to the students, the institution focused on connecting with the STEM programs, staff and students at ECC, and other local community colleges, using two EOP/NJIT graduate students to coordinate all plans and activities. Similar coordination and support activities also occurred at other partner institutions.

Community College Articulation

Community College of Philadelphia (CCP) and Drexel University have formalized a dual-admissions program, the Blue-Gold Connection (BGC). This program allows students to receive both an Associate's degree from CCP and a Bachelor's degree from Drexel and offers students, while still at CCP, full access to Drexel's academic and support resources. Similar agreements are now in place with Temple University, University of Delaware, New Jersey Institute of Technology, Lincoln University and Cheyney University.

Dr. Linda Powell, CCP shares a moment with her students who are conducting research at the Philadelphia AMP Research Symposium.

CROSS-ALLIANCE ACTIVITIES

Community College Transfer Fair

Research Symposium

DELAWARE STATE UNIVERSITY

DR. MAZEN SHAHIN
Professor, Department of Mathematics
Director of HBCU-UP, AMP, and Bridge to the Doctorate (BTD) Projects
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mshahin@desu.edu

Delaware State University (DSU) has a long and proud history as one of America's Historically Black Colleges and Universities (HBCUs). Founded in 1891 as the State College for Colored Students, DSU takes pride in its heritage as one of the country's first land-grant educational institutions, rooted early on in agriculture and education. DSU's focus on cutting-edge research, technology and business practices have brought the University into modernity and made it a member of the scientific, solution-seeking community. Today, it remains well in the vanguard of other four-year institutions throughout the region and country. The University offers 52 undergraduate, 25 Master's, and 5 doctoral degree programs which includes an interdisciplinary Ph.D. program in applied mathematics and mathematical physics. DSU currently serves as a welcome center for learning for people from many cultural backgrounds who speak several different languages and dialects.

Dr. Mazen Shahin, Professor of Mathematics is the DSU LSAMP Project Director and also directs several other student-centered funded projects including the LSAMP Bridge to Doctorate (BTD) program, Sciences and Math Initiative for Learning Enrichment, and Technology Academy for Residence Scholars. At DSU, the LSAMP program is governed by the AMP council which is chaired by the Dean of College of Mathematics, Natural Sciences and Technology. The LSAMP program has had a huge positive impact on DSU, in general, and on its STEM undergraduate and graduate programs, in particular. From 1994 – 2003, the LSAMP program was one of two main STEM projects on its campus, the other being the MARC program funded by the National Institute of Health. The LSAMP program initiated an AMP Center and became the STEM umbrella for the institution; it also established an AMP Student Organization.

Since 2003, DSU has obtained substantial external funds for several STEM projects. The DSU LSAMP Director has also served as the Director of the NSF-funded HBCU-UP projects "Seeds of Success …" and "Science and Mathematics Initiative for Learning Enrichment (SMILE)" since 2005. Under Dr. Shahin's leadership, DSU integrated all LSAMP and HBCU-UP activities and provided funds and space to establish the new Science Resource Center which has become the main support center for all STEM students. The integrated activities for STEM undergraduates include the following programs: Summer Training Camp for incoming freshmen, peer mentoring, learning communities, mathematics workshops in the gatekeeper mathematics courses, undergraduate research, and workshop/seminar series, graduate preparation activities, and travel to regional/national conferences and professional meetings. It is worth noting that the mathematics workshops utilized the Peer Led Teal Learning (PLTL) approach and materials developed by the Math Forum at Drexel University. In addition, the Learning Communities offered integrated mathematics and English courses for STEM students.

In short, the LSAMP activities and strategies helped to increase the retention and graduation rates of underrepresented STEM students at the University, and move them to graduate school matriculation.

Among the 244 DSU STEM bachelor recipients in the 2007- 2010 period, 111 or 46% were enrolled in graduate programs. The LSAMP program also helped DSU establish productive partnerships with partner institutions. For example, DSU and Drexel University developed a dual-degree MS/PhD program with provides students with a Biomedical M.S. degree from DSU and Biomedical Ph.D. degree from Drexel University's College of Medicine. In addition, the increased involvement of faculty and students in the research enterprise has helped DSU attract additional research funding, enhance the quality of its minority STEM graduate students, as well as contribute to the advancement of scientific knowledge.

The LSAMP program greatly impacted the quality and quantity of STEM graduate education at DSU. Through its Bridge to the Doctorate (BTD) Cohort IV, VI and VII funding, it helped the institution successfully grow its graduate STEM programs, as well as increase its research capacity. With the inclusion of BTD Cohort VII, BTD fellows represented more than 50% of the graduate students in some departments such as Biology, Chemistry, and Applied Mathematics. The workshops/seminars and mentoring programs developed for BTD participants have also become the models for STEM graduate programs.

As an LSAMP Bridge to the Doctorate Cohort IV program participant, **SAMI ATIF** received his M.S. degree in Applied Mathematics from Delaware State University (DSU) in 2009. Sami has two publications: "1-Soliton Solution of Complex KdV Equation in Plasmas with Power Law Nonlinearity and Time Dependent Coefficients" in Applied Mathematics and Computation October 2010; and "Solitons in Relativistic Plasmas by He's Variational Principle" in Applied Physics Research November 2010. Presently, Sami is in the 5th year of his graduate study and anticipates receiving his doctoral degree in Applied Mathematics and Theoretical Physics from DSU in May 2012.

JAMES POLAND received his B.S. degree in Chemistry at Delaware State University and continued on to pursue a M.S. degree in Applied Chemistry, also at DSU through the Bridge to the Doctorate Cohort VII program. He is on track to complete his Master's by December 2011. James began his research in Physical / Electrochemical analysis, then moved to Biochemistry, and is now doing research in the field of Polymer Chemistry. These vastly different research projects have helped shape him into a versatile chemist instead of one that focuses on one area. James states that he was able to really pursue his goals because of the support of programs like the Historically Black College and University Undergraduate Participation (HBCU-UP) program, LSAMP, and the Bridge to Doctorate program. Currently, James is a Ph.D. student at Fisk and Vanderbilt Universities in the field of Chemistry through a joint program.

DENZIL ROBERTS began his educational career at Delaware State University with a B.S. degree in Physics and Pre-Engineering in 2003. He also earned his M.S. degree in Physics from Delaware State University in 2005. Denzil continued on to obtain his Ph.D. degree in Electrical and Computer Engineering from the University of Missouri-Columbia. Dr. Robert's Ph.D. dissertation was titled "Gallium Arsenide-Based Quantum Cascade Lasers for Mid-Infrared Operation at 3-5pm Grown by Molecular Beam Epitaxy". Denzil served as an AMP tutor while an undergraduate at DSU for Algebra, Calculus and Physics I & II. He also served as a mentor during the HBCU-UP Summer Programs. Dr. Roberts currently serves as a faculty member of Engineering at the University of Missouri-Columbia.

DREXEL UNIVERSITY

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Impact Statement

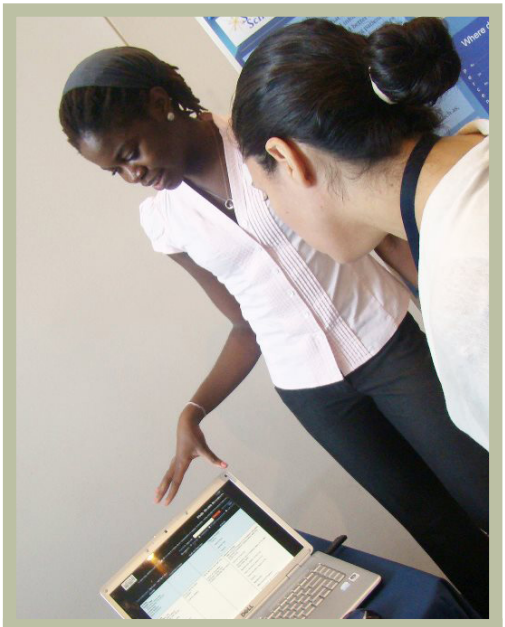
Founded in 1891 in Philadelphia, Drexel is a top-ranked, comprehensive university recognized for its focus on experiential learning through co-operative education, its commitment to cutting-edge academic technology and its growing enterprise of use-inspired research. With more than 23,500 students, Drexel is the nation's 14th largest private university and ranked second among national universities in the most recent U.S. News & World Report list of "Up-and-Comers."

Drexel is a leader in creating technological solutions to societal problems of the 21st century. The University's research enterprise has increased expenditures for sponsored projects from $15M in 1996 to approximately $110M today. With its focus on "use-inspired" research the University is poised to respond to novel opportunities for research, scholarship, and technological development. Examples include interdisciplinary efforts to meet emerging national imperatives to upgrade the transportation infrastructure, to move "alternative" energy sources into the mainstream, and to invent the means to improve medical care while reducing its costs.

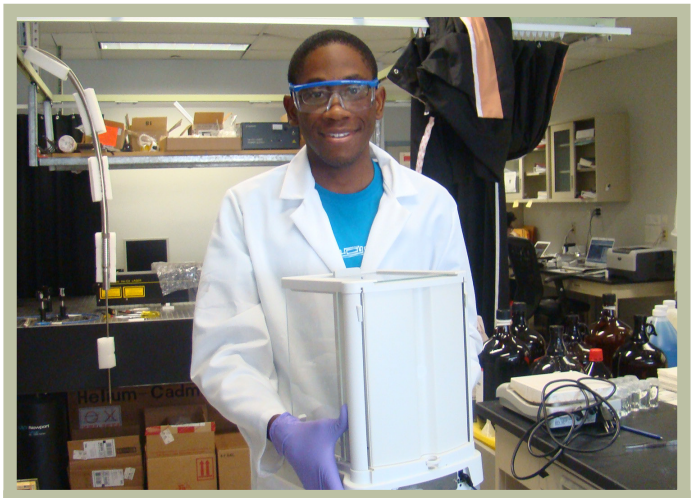
Dr. Constantine Papadakis, former President, Drexel University and Chairman, Greater Philadelphia Region LSAMP, led the Alliance through unprecedented STEM growth in its minority STEM degree productivity from 1996 – 2009, with the support of the Alliance partners and LSAMP central management personnel. The Drexel LSAMP program was initially administered by the former Director, SUCCESS program, Dr. Stephen Jones, and former Director of the Drexel Center for Learning and Academic Excellence (DCLAE), Ms. Sheila Graves. Since 2006, Ms. Marisol Rodriguez Mergenthal has continued and expanded upon the LSAMP legacy created by her predecessors through her industry experience and knowledge gained from advising, mentoring, and tutoring students in meeting the rigors of STEM curricula and courses as former Director, Drexel Learning Center. Under Ms. Mergenthal's leadership, the Drexel LSAMP program partners with student groups, community-based organizations as well as University departments to: (1) promote academic excellence for undergraduates, (2) link students to scholarship and other funding opportunities, (3) identify professional development opportunities/internships (both research and non-research) and (4) encourage students to pursue advanced degrees.

The Drexel LSAMP program provides students with access to activities that foster a sense of academic and social responsibility, personal accountability and professional growth which include: a pre-freshmen bridge program, academic coaching and counseling, supplemental instruction in mathematics and physics, faculty and peer student mentoring, undergraduate research, graduate school preparation, professional development seminars and workshops, social and cultural activities and financial counseling.

By immersing the students into spheres of activities and behaviors that encourage academic excellence for undergraduates, linking them to scholarship and other funding opportunities, preparation for internships and research experiences, and pursuit of advanced degrees, the LSAMP program has helped to change the scientific



EKENE ARINZE
Rising Sophomore
Major: Information Technology
College of Information Science & Technology
Faculty Mentor: Michelle Rogers, Ph.D



PAUL LACHAUD
Rising Sophomore
Major: Chemical Engineering
College of Engineering
Faculty Mentor: Jason Baxter, Ph.D

LEE SERPAS
Rising Sophomore
Major: Chemistry
College of Arts & Sciences
Faculty Mentor: Elizabeth Papish, Ph.D

culture for underrepresented minority students at Drexel and make it the type of environment where they can achieve success. With the support of President John Fry, the Provost and Senior Vice President for Academic Affairs, Dr. Mark Greenberg, and the Senior Vice Provost, Academic Affairs, Dr. N. John DiNardo, Drexel University continues to build on its record of success that has resulted from its institutional commitment to diversify through the LSAMP, as well as other NSF-funded programs.

The LSAMP Bridge to the Doctorate Program (BTD) has catalyzed Drexel University's commitment to increase diversity in STEM at the graduate level and has informed new practices in undergraduate research and minority inclusion in cutting-edge research engagement. As of June 2011, of the 14 fellows enrolled in the BTD Cohort III (2005) program, twelve (12) fellows or 86% have been retained. Of the twelve fellows remaining, eleven (11) are enrolled in Ph.D. programs, ten (10) students have passed their Ph.D. qualifying examination and five (5) students have completed their doctoral degree with generous funding from agencies such as the NSF, NIH, DoE among others. It is anticipated that the remaining BTD Cohort III fellows will complete their doctoral degree in the next two years. From its BTD Cohort VIII (2010) program, Drexel has also retained all twelve (12) fellows through to the second year of graduate study; eleven (11) fellows are currently enrolled in doctoral programs.

Moreover, Drexel experienced significant growth (2010-2011) in the number of underrepresented minority (URM) students in STEM at the graduate level as a result of additional grant-funding partnerships with entities such as the Educational Advancement Alliance which administers the National Minority STEM Fellowship funded by the US Department of Energy and the HBCU STEM Fellowship funded by the National Nuclear Security Agency. As a result, Drexel hosted its largest cohort of URM STEM students to date.

LINCOLN UNIVERSITY

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Impact Statement

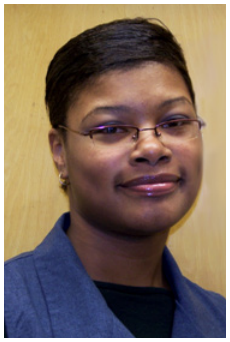
Founded in 1854, Lincoln University of the Commonwealth of Pennsylvania is a nationally acclaimed institution of higher learning that provides the best elements of a liberal arts and sciences-based undergraduate core curriculum and selected graduate programs to meet the needs of students living in a highly technological and global society. Lincoln University was one of the charter members of the Greater Philadelphia Region LSAMP. As one of the three HBCUs in the Alliance, Lincoln University has a vested interest in preparing and developing talented STEM majors capable of succeeding in graduate school. The LSAMP program has had a tremendous impact in this endeavor.

Dr. Robert Langley has guided the LSAMP program at Lincoln University for many years. Previous supporters have included Dr. Suligrama Subbarao, the former chair of chemistry, and later the Vice President of Academic Affairs, and Dr. Willie Williams, Physicist and Chair of the Department of Physics. Historically, the University was very instrumental in the development of Alliance-wide criteria for inspiring students to pursue and excel in science, engineering, mathematics and technology (STEM). As a result of Lincoln's successful tradition of providing inspiration for African American students through pre-college and pre-freshman bridge activities, continual interaction with minority professional scientist and engineers, and exposure to research experiences, these program components were instituted as normal Alliance practice.

In the early years, the LSAMP program assisted in providing the financial resources needed for STEM majors to succeed at Lincoln. In collaboration with the NASA-funded LASER (Lincoln's Advanced Science & Engineering Reinforcement) program, the LSAMP program provided students with stipends, book supplies, and scholarships. Through the LASER program, students participated in a 10-week summer pre-freshman bridge program which provided Calculus, Physics, English and Computer Science preparation for which they received college credit, and were given general academic counseling and advising. Through both programs students were able to access research opportunities on campus and at the national laboratories, NASA, the Environmental Protection Agency, the Department of Defense and other federal agencies. Over 94% of Lincoln's students receive some type of financial assistance. Therefore, the significance and impact that any financial aid contributes to the success of the students cannot be overstated.

The second phase of the Lincoln LSAMP program is equally important, student graduation from Lincoln and successful entry into graduate programs leading to a STEM Ph.D. and related degrees. In this aspect, LSAMP has been extremely successful. Over 50% of the Physics and Chemistry majors have attended graduate or professional school as a result of support from the LSAMP program. Many are proudly continuing the legacy induced by the spirit of the LSAMP program. Most of the graduates from the Department of Chemistry and Physics at Lincoln received some type of financial assistance from the LSAMP program. These two departments are among the top producers of minority Chemistry

and Physics majors in the State of Pennsylvania, thereby making LSAMP an integral part of the institution. As the Alliance has matured, the Greater Philadelphia Region LSAMP and Lincoln University have adjusted to provide even better opportunities for STEM students. Most recently, Dr. Langley, along with Dr. John O. Chikwem, Dean of Natural Sciences and Mathematics and Professor of Biology, and Dr. Derrick Swinton, Associate Professor, Chemistry have created new opportunities to support the LSAMP mission through the expansion of its various STEM research-based initiatives. This year, the University also completed its construction of a new $40 million science facility to advance the scientific agenda for the institution and the nation.



RENE OATS

B.S., Physics, Lincoln University
M.S., Civil Engineering, Temple University

Current Status: Ph.D. Candidate, Structural Engineering, Michigan Technological University

NANDIMA KOROMA

B.S., Mathematics / Math Education, Lincoln University
M.S., Applied Mathematics, Delaware State University
LSAMP Bridge to the Doctorate Cohort VI Recipient

Current Status: Ph.D. Candidate, Interdisciplinary Applied Mathematics and Mathematical Physics, Delaware State University

KRYSTAUFEUX WILLIAMS

B.S., Physics, Lincoln University
B.S., Mechanical Engineering, Drexel University
M.S., Materials Science, Pennsylvania State University

Current Status: Ph.D. candidate, Materials Science, Pennsylvania State University

DR. JAMES ARTHUR COOPER, JR.

Assistant Professor, Biomedical Engineering, Rensselaer Polytechnic Institute
B.S., Biology, Lincoln University
Ph.D., Biomedical Science, Drexel University

"The AMP program has shaped my career by providing funding to programs which have given me the time and attention to develop my maturity as a scientific researcher. I first came into contact with an AMP funded program at Lincoln University, PA which showed me the attention and devotion I would have to place on my studies in order to succeed. Since then, whenever I have had hard and stressful times in my studies or my research, I look back on the AMP programs which have influenced my career path and become motivated to succeed. I am thankful that I was a part of the AMP program and hope to continue to contribute to its legacy in helping minorities achieve their academic goals."

NEW JERSEY INSTITUTE OF TECHNOLOGY

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NJIT
New Jersey's Science & Technology University

Impact Statement

Founded in 1881, the New Jersey Institute of Technology (NJIT) is New Jersey's science and technology university. NJIT offers 92 undergraduate and graduate degree programs in six specialized schools instructed by expert faculty, 98 percent of whom hold the highest degree in their field. Since the mid 1970s, NJIT has become home to nearly 50 laboratories, centers, and business incubators, resulting in hundreds of breakthroughs such as new methods for producing carbon nanotubes, techniques for monitoring the earth's climate using measurements of earthshine, approaches to use membrane separation technology to desalinate water and algorithms for wireless telecommunications and signal processing. Research funding has surged to more than $75 million, and promises to keep rising.

Since 1997, under the leadership of Mr. Laurence "Tony" Howell, and support from Dr. Joel Bloom, former Vice President of Academic Affairs and current Interim President, and Dr. Robert A. Altenkirch, former President, the Greater Philadelphia Region LSAMP program has made substantial contributions to NJIT's STEM culture. Managed in concert with the Educational Opportunity Program (EOP) funded through the U.S. Department of Education, the LSAMP program helped NJIT to expand its academic support and monitoring of students eligible to participate in both programs, namely, first-generation and low-income minority STEM students, and most recently, community college transfer students.
In addition, the LSAMP program assisted NJIT in expanding the financial assistance to students, specifically to upper-level minority students who needed additional finances to: 1) pay down university bills that prevent continuation of education, 2) allow students to take critical classes to progress to graduation, and 3) establish a process in which upper-level students received more assistance than lower-level students in order to increase the retention-to-graduation rate of minority STEM students. The LSAMP program also helped NJIT expand the opportunity for faculty and students to conduct research at national facilities such as the Brookhaven National Laboratory through NSF's collaborative agreement with the Department of Energy (DoE). In collaboration with NJIT's Ronald E. McNair Scholars Program funded through the U.S. Department of Education, the LSAMP program has also facilitated students' increased participation in STEM conferences.

The LSAMP has also enhanced NJIT's partnerships with feeder county colleges. Although NJIT has long had standing collaborations / transfer agreements and joint academic programs with all 21 New Jersey county colleges, the LSAMP program enhanced those relationships by facilitating additional articulation programs for minority STEM students that streamlined the transfer process while connecting students with professional organizations like the National Society of Black Engineers (NSBE), the Society of Hispanic Professional Engineers (SHPE) and the Society of Women Engineers (SWE). The LSAMP program has also contributed to the increase and retention of NJIT's minority STEM graduate student population through its hosting of the LSAMP Bridge to the Doctorate Cohort II program.

Because of NJIT's relationship with LSAMP, the NSF funds were strategically integrated into and, actually expanded, the institution's desire to increase the number of minority STEM students and eventually, graduates from NJIT. NJIT has won national acclaim (21st in the nation) for graduating large numbers of STEM minority engineering students (Diverse Magazine, 2010). That standing would not have been possible without the financial and programmatic assistance from the Greater Philadelphia Region LSAMP program.

After graduating in 2005 with a B.S. degree in mechanical engineering, **CORINA KOCA**, (formerly Corina Guishard) started work as an aerospace engineer for NASA Goddard Space Flight Center, Greenbelt Maryland, in the electro-mechanical systems division. Currently, she is helping to design and develop the James Webb Space Telescope, which NASA expects to launch in this decade. Like the Hubble, the Webb Telescope will orbit space, take images of the cosmos for astronomical observations.

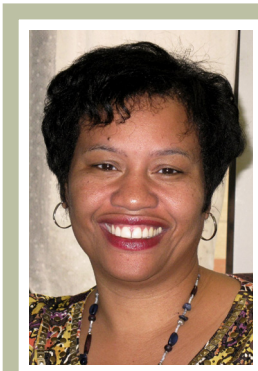
It's a great job and she got it when she was a senior at NJIT. As a student, she belonged to the NJIT Senate, Albert Dorman Honors College, and the National Society of Black Engineers (NSBE). During her senior year, the Newark College of Engineering named her a Madame Mau Distinguished Scholar. She also played soccer for the NJIT Women's Team, and is currently taking classes to learn Turkish.

"I'm optimistic about the future of the U.S. space program," Corina says. "The Webb Telescope I'm working on is expected to launch in 2014 and give us amazing images of the universe. NASA has many projects that will continue to further America's high technology. I think the future of NASA is bright."

JEFFERSON CUADRA completed his B.S. degree in Mechanical Engineering at the New Jersey Institute of Technology. As a participant of the Bridge to the Doctorate Cohort VIII program, Jefferson is presently enrolled as a Ph.D. candidate in Mechanical Engineering at Drexel University. His career goal is "to complete my graduate studies and continue my work as a researcher in industry or academe."

SHIVON BOODHOO received her B.S. degree in Industrial Engineering from NJIT. As a participant of the LSAMP Bridge to the Doctorate Cohort II program, she was able to attain a M.S. degree in Industrial Engineering / Engineering Management from NJIT. After working in industry for a number of years, Shivon has returned to NJIT as an Undergraduate Advisor in the Department of Electrical and Computer Engineering, and is now enrolled as a Ph.D. candidate in Industrial Engineering.

TEMPLE UNIVERSITY



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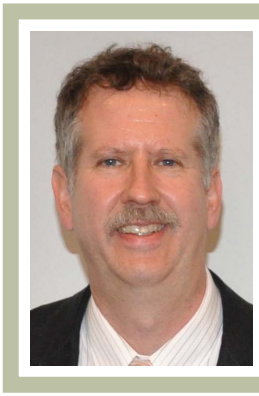

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Impact Statement

Founded in 1884 by Dr. Russell Conwell, Temple College became Temple University in 1907 and has evolved into a comprehensive urban research and academic institution. With more than 300 academic programs, the institution offers something for everyone – rigorous courses, innovative research opportunities, outlets for creative expression and much more. Temple University has the distinction of being the lead institution of the Greater Philadelphia Region Louis Stokes Alliance for Minority Participation at the inception of the initiative. With extraordinary leadership from Dr. James England, former Provost and programmatic support from Dr. Antonio Goncalves, Professor of Chemistry and former Associate Vice Provost for Science and Technology, and Dr. Allan Thomas, Assistant Professor of Chemistry, we launched the Greater Philadelphia Region LSAMP initiative which over 17 years later is still having a major impact on the region. The LSAMP program at Temple provided academic advising, a pre-freshmen bridge program, tutoring, faculty and peer student mentoring, learning communities, undergraduate research, pre-service teacher preparation, and supplemental instruction in gatekeeper courses. In Summer 1997, the LSAMP also supported the development of COW (Calculus on the Web), an internet utility for learning and practicing calculus which was designed at Temple by two members of the Temple University Mathematics Department, Gerardo Mendoza and Dan Reich. COW is still operational today, and its further development is being supported by the NSF's Division of Undergraduate Education.

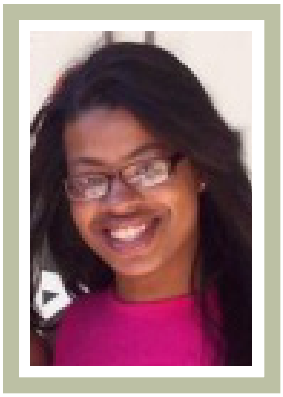
The Temple LSAMP program continued to thrive under the guidance of Dr. Bruce Conrad, Professor of Mathematics and former Senior Associate Dean, College of Science and Technology and Dr. Susan Jansen Varnum, Professor of Chemistry for many years. Currently, the leadership of the grant is being managed by Dr. Douglas Baird in concert with Dr. Jamie Bracey, and collectively

they have expanded the influence of Temple University and the LSAMP initiative to enhance the opportunities for underrepresented students to complete B.S. degree requirements and promote movement to graduate studies and terminal degrees. LSAMP services were expanded to include student engagement in minority professional organizations and conferences, and entrepreneurial training. During the term of the LSAMP initiative, Temple has increased its number of undergraduate minority B.S. STEM degrees annually, and hosted a Bridge to the Doctorate Cohort V program (13 fellows) which has a 92% program retention rate, an 84% M.S. degree completion rate, and as of June 2011, 58% of the population is enrolled in Ph.D. programs.

A significant addition to the Temple AMP initiative has been the introduction by Dr. Jamie Bracey, director of STEM Education, Outreach and Research of the statewide K-12 precollege initiative sponsored by the U.S. Navy entitled, "MESA" (Math, Engineering and Science Achievement) program, which creates a vital mechanism and feeder to the LSAMP initiative for all of the Philadelphia AMP institutions.

Temple University Provost and Senior Vice President for Academic Affairs, Richard Englert, U.S. Chief of Naval Operations Adm. Gary Roughead and Dr. Jamie Bracey cut the ribbon to officially launch the Pennsylvania Math Engineering Science Achievement (MESA) initiative during a ceremony at the Philadelphia Navy Yard.

Temple, in addition to grooming new minority scientific talent, through undergraduate research and its promotion of entrepreneurism, has expanded the scope of its programs and their regional impact by connecting the technical capabilities of excellent science and engineering graduates with industry and by creating opportunities for small business development with a diverse perspective.



JENNIFER BULLOCK is a senior in Mechanical Engineering at Temple University. Jennifer received a 2011 Temple LSAMP research fellowship to work with Dr. Judy Zhang to study "Hetero-aggregation of Oxide Particles and the Impact on the Oxide Reactivity". Former President of the Society of Women Engineers (SWE), Jennifer is very interested in attending graduate school for chemical engineering.

VIRGINIA KOCIEDA received her B.S. degree in Biology from Temple University in 2007. Through her participation in the LSAMP Bridge to the Doctorate Cohort V program, Virginia was able to enroll as a Ph.D. candidate in Microbiology and Immunology at Temple. In 2010, she served as Vice President of Temple's Graduate Student Association. Currently, she is continuing her doctoral study as a National Institute of Health (NIH) Training grant recipient. Virginia desires to pursue a career in higher education and research where she wants to help "train the next generation of scientists."

ANDRO-MARC PIERRE-LOUIS completed his B.S. degree in Chemistry at Temple University in 2007. Through participation in the LSAMP Bridge to the Doctorate Cohort V program, Andro-Marc was able to continue transition to graduate study. Currently, he is enrolled as a Ph.D. candidate in Chemistry at Temple University and is conducting research on "Cavity Ring-Down Spectroscopy (CRDS) with Theory and Applications of the Technique." His desire is to pursue a career in academic or industrial research in materials science chemistry.

UNIVERSITY OF DELAWARE

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Impact Statement

The University of Delaware (UD) has a great tradition of excellence, from its founding as a small private academy in 1743, to the research-intensive, technologically advanced institution of today. The University received its charter from the State of Delaware in 1833 and was designated one of the nation's historic Land Grant colleges in 1867. Its first class included three signers of the Declaration of Independence and one signer of the U.S. Constitution. Today, UD is a Land Grant, Sea Grant and Space Grant institution. The Carnegie Foundation for the Advancement of Teaching classifies UD as a research university with very high research activity—a designation accorded less than 3 percent of U.S. colleges and universities. UD ranks among the nation's top 100 universities in federal R&D support for science and engineering.

A state-assisted, privately governed institution, UD offers a broad range of degree programs: 4 associate programs, 137 bachelors programs, 117 master's programs, 50 doctoral programs and 12 dual graduate programs through seven colleges and in collaboration with more than 60 research centers. UD's student body encompasses nearly 17,000 undergraduates, 3,700 graduate students and 850 students in professional and continuing studies from across the country and around the globe.

Dean Michael Vaughan is one of the original collaborators in the development of the Greater Philadelphia Region LSAMP, and with the support of former president, Dr. David Roselle and current president, Dr. Patrick T. Harker, was and continues to be a key element in the success of the Alliance. With the direction and inspiration of Dean Vaughan the LSAMP has become a vital part of the pipeline strategy to provide diverse scientific professionals to compete and support the national technical enterprise.

The University of Delaware has benefitted greatly from its involvement in the Greater Philadelphia LSAMP effort for almost two decades. This effort has helped to create a unique platform, within the UD environment, to build on the institution's recognized strengths in STEM education and research in support of its recruitment and retention initiatives. It is very important for any institution to build and maintain a critical mass of underrepresented scholars within its ranks in order to promote long-term sustainability in its global diversity agenda. The LSAMP program has provided this baseline of support and continuity over time to inform and guide its efforts. The natural follow on to this activity has been a substantial and sustained increase in the overall STEM pipeline and degree production on UD's campus.

In the past decade, UD's global Campus STEM support programs, namely the RISE Program (Resources to Insure Successful Engineers), The NUCLEUS Program (Network of Undergraduate Collaborative Learning Experiences for Underrepresented Scholars) and the Academic Enrichment Center Program, have been redesigned and fueled by lessons learned from its involvement in LSAMP. Administrative support, staffing, and other

Dr. Robert Opila, Professor, Material Science and Engineering conducts research with LSAMP students, Saka Okyere-Asiedu, Civil Engineering, and Christopher Dixon, Computer Engineering as part of the Physics – Electronic Detection Group at the Brookhaven National Laboratory.

HBCU STEM students prepare to go whale watching as part of the EAA/University of Delaware (UD) Graduate Preparation Program in July, 2010 on UD's Marine Studies campus in Lewes, DE.

resources have expanded as the emphasis has shifted toward providing students with integrated support to meet their academic goals. UD's programs have leveraged LSAMP resources and expertise to develop and implement activities and policies that positively impact underrepresented STEM students, and an array of these supportive services that have now been institutionalized. The University also retains these students at a rate consistent with all students. In addition, LSAMP has supported UD faculty and student participation in research at the Brookhaven National Laboratory in collaboration with funding from the Department of Energy. It remains UD's expectation that by further refining and broadening the LSAMP coverage on its campus that UD will have increased success in graduating larger numbers of underrepresented students with STEM degrees.

UD has been involved in all Alliance-level Bridge to the Doctorate (BTD) cohorts in the past decade, and these efforts have served as a wonderful mechanism to broaden the pool of non-traditional graduate aspirants in STEM disciplines. In addition, these efforts along with the other LSAMP activities have inspired many of its undergraduates to pursue graduate school at UD and beyond. UD has been chosen to host the Alliance's latest BTD activity which began in September 2011. The BTD program complements numerous synergistic efforts at UD to broaden participation in STEM; increase student success, retention and graduation rates; strengthen research diversity, capacity and productivity; and foster interdisciplinary collaborations. We expect the BTD Cohort IX program to capitalize on UD's existing successful track record in broadening participation in STEM disciplines and the partnerships it has forged to increase research capacity in Delaware, an EPSCoR state. Building on its previous experience as host to Cohort I, UD will continue to offer the graduate fellows a high-quality experience, providing them with small class sizes, intimate research groups, and one-on-one mentoring by faculty.

With connections made via LSAMP, UD has continued the development of strategic partnerships with other institutions to organize articulation relationships and other activities. UD continues to work with other institutions to align curriculum in several disciplinary areas and to develop M.S./Ph.D. arrangements. Further, UD has built mutually beneficial partnerships with HBCU institutions and others internal and external to the Alliance. As an outgrowth of the Greater Philadelphia Region LSAMP's partnership with the Educational Advancement Alliance, in 2009, a pilot "Graduate Exploratory Learning Opportunity" EAA/University of Delaware (UD) Graduate Preparation Program was initiated and included 34 participants, all recent graduates or rising juniors or seniors at Historically Black Colleges and Universities (HBCUs). The program was hosted by UD from a grant from EAA and the National Nuclear Security Administration, with funding renewable for up to nine additional years. UD continues to host the program which has served 100 students since its inception. LSAMP has been a great partner in UD's ongoing success.

UNIVERSITY OF PENNSYLVANIA

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Impact Statement

The University of Pennsylvania (Penn) has a long and proud tradition of intellectual rigor and pursuit of innovative knowledge, begun by Benjamin Franklin in 1740. That tradition lives today through the creativity, entrepreneurship, and engagement of its faculty, students, and staff. Academic life at Penn is unparalleled, with an undergraduate student body of 10,000 from every U.S. state and around the world. The University's geographical unity, in which twelve schools connect on a single urban campus, is unique among Ivy League schools, fostering its integrated approach to education, scholarship, and research. Penn is one of the world's most powerful research and teaching institutions, with a research budget last year topping $800 million and more than 4,000 active faculty members. The institution is committed to creating a community of scholars, students and staff that reflects the diversity of the world in which we live. This range of perspectives and dialogue contributes to educational excellence and an inclusive, dynamic campus environment.

Ms. Cora M. Ingrum, Director, Office of Multicultural Programs, School of Engineering and Applied Science has served as a leader in developing programs and initiatives that create opportunities for underrepresented students in the sciences and engineering for many years, with the strong support of Dr. John Keenan, Director of Faculty Advising and Professor, Civil Engineering and the former and current Deans, School of Engineering and Applied Science, Dr. Joseph Bordogna and Dr. Eduardo Glandt, respectively, as well as other STEM research faculty and administrators.

As Co-PI and Project Director of the Penn LSAMP program for the past 17 years, with the aid of the previously noted individuals, as well as her Administrative Assistant, Ms. Donna Hampton, Ms. Ingrum provides academic advising and counseling, mentoring, national and international research experiences and BS/MS sub-matriculation opportunities to students from diverse backgrounds and cultures. In her words, "we enable students to optimize their talents, capitalize on their cultural perspectives, realize their intellectual potential, and fulfill their career aspirations. Students receive advising, counseling and mentoring. They build relationships that help them contribute to the culture of Penn Engineering and the University."

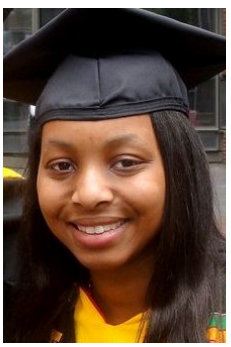
Ms. Ingrum has received many honors for her accomplishments including the 1997 Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring during President William Clinton's administration, and a Lifetime Devotion and Commitment to the Graduate Engineering Consortium (GEM) Award in 2011. Under her leadership, in 2004, Penn graduated 14 minority Ph.D.s in engineering (8 African Americans and 6 Hispanics), ranking them third in the country. Penn LSAMP program graduates have also contributed to the advancement of scientific and technical knowledge, both nationally and globally in the United States, Germany, France, England, South Africa, China and many other countries, received numerous tenure-track appointments at Research-One institutions and prestigious awards including the NSF Graduate Research fellowship, and have been recognized

annually at the National Society of Black Engineers conference. In addition, Penn LSAMP graduates continue to contribute to the economy as CEOs of their own companies, vice presidents of numerous corporations, doctors, lawyers, research scientists, etc.

MR. JAMOL PENDER is a Ph.D. candidate, Operations Research and Financial Engineering and president of the Wesley L. Harris Scientific Society at Princeton University. As a Penn LSAMP scholar, through the sub-matriculation program, he received a BSE in Electrical Engineering with a Minor in Mathematics in 2007, and a MSE in Systems Engineering in 2008. He is currently researching queueing theory inspired by problems in communication centers.

MS. RAINA WALLACE is currently a medical student at Mount Sinai School of Medicine of New York University. As a Penn LSAMP scholar, she received a BAS in Biomedical Applied Science in 2008, and served as president of the University of Pennsylvania Chapter of the National Society of Black Engineers (NSBE). As a participant of the LSAMP undergraduate research program, Raina conducted research in neurology at the Children's Hospital of Philadelphia and co-authored a paper entitled "The Role of Transcription Factors Cyclic-AMP Responsive Element Modulator (CREM) and Inducible Cyclic-AMP Early Repressor (ICER) in Epileptogenesis" which was published in Neuroscience 2008. Through the Minorities in International Research Training program, Raina also conducted research in pathology at the Dunn School of Pathology at Oxford University in 2006.

MS. CHARLOTTE RIVERA is a senior in Bioengineering. As a Penn LSAMP scholar, she serves as the president of the University of Pennsylvania Chapter of the Society of Hispanic Professional Engineers (SHPE) and is presently conducting research in vibrotactile and auditory feedback for robotic minimally invasive surgery.



MS. LAUREN FRAZIER is currently a Master's student in Computer Science at the University of Pennsylvania. As an undergraduate LSAMP scholar, she conducted research and co-authored the paper "Fault Detection in Partially Connected Networks". The paper received 1st Place at the 13th Annual Philadelphia AMP Research Symposium and Mentoring Conference, 1st Place at the Einsteins in the City International Conference, 1st Place at the National Society of Black Engineers (NSBE) Regional Conference, and 2nd Place at the NSBE National Convention. In her spare time, Lauren enjoys video games and performing Shakespeare on campus.

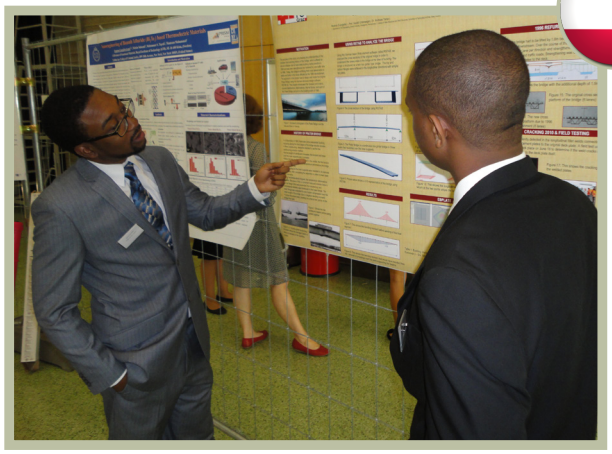
INTERNATIONAL ENGAGEMENT

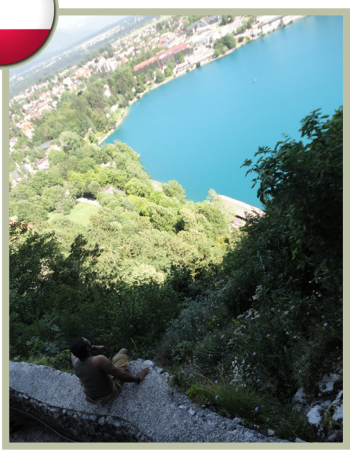
ARGENTINA

NON YOK, Ph.D., Electrical Engineering, Drexel University (left) reviews his presentation along with fellow students presenting their research at the 32nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC'10) in Buenos Aires, Argentina.

AUSTRIA

RODRICK EVANGELIST, Ph.D. Candidate, Civil Engineering, in collaboration with the New York City LSAMP, conducted research as an exchange student of Graz University of Technology in Austria at the Institute of Steel Structures and Shell Structures under the supervision of the Deputy Director of the Institute from June 1- August 2011.





SOUTH KOREA

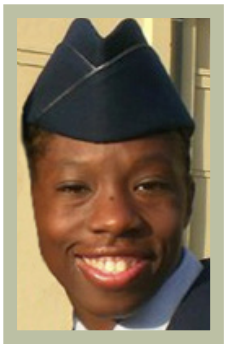
DANNIELLE SOLOMON FIGUEROA, Ph.D. Candidate, Biomedical Engineering, Drexel University (BTD Cohort III) (center) socializes with other participants of the NSF East Asia and Pacific Summer Institute (EAPSI) 2010 in South Korea.

CHINA

DR. MAZEN SHAHIN, DELAWARE STATE UNIVERSITY (lower right) with University personnel and students participating in research activities at the Grassland Research Institute (GRI) of the Northeast Normal University in Changchun, China from May 23, 2011- June 21, 2011.

LSAMP BRIDGE TO THE DOCTORATE

PhD Recipients



DR. MARLYSE WILLIAMS WHITE
Ph.D., Agricultural Engineering, Pennsylvania State University, 2010
B.S., M.S., Environmental Engineering, University of Delaware

Current Status: Officer, U.S. Air Force

DR. QUINCY BROWN
Ph.D., Computer Science, Drexel University, 2009
Current Status: Assistant Professor, Computer Science, Bowie State University

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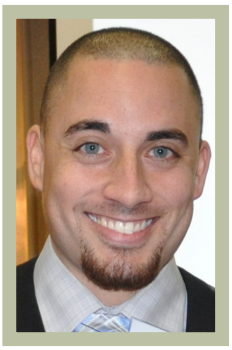

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Ph.D., Biological Sciences, Drexel University, 2011
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