

**Urban Massachusetts Louis Stokes Alliance for Minority Participation
First Five Years Impact Report
2006-2011**



Urban Massachusetts Louis Stokes Alliance for Minority Participation First Five Years Impact Report 2006-2011



Table of Contents

Foreword.....	4
Acknowledgements.....	5
Executive summary.....	6
Institutional Change.....	6
Economic Impact and Workforce Development.....	6
UMLSAMP up-to-date.....	9
Alliance model: UMLSAMP's vision and mission complementarity	9
The Alliance.....	9
Community Colleges	11
UMLSAMP Continuous Support of Student Research	12
4-Year Institutions.....	14
Searching for synergies and breaking silos	15
Catalyzing innovation.....	16
National and regional STEM workforce development.....	16
International Engagement	18
Phase One highlights.....	19

Overview of performance indicators	20
Toward Mid-Level Alliance Strategies and expected outcomes	21
You Belong with Us	21
Start on-track & Stay on-track	22
Consultative and participatory planning.....	23
High impact pedagogical practices to support student success	23
Increasing on- and off-campus Research Opportunities	23
Contributing to instructional development	24
UMLSAMP Leadership.....	25
Annex 1: List of Workshops	26

Urban Massachusetts Louis Stokes Alliance for Minority Participation First Five Years Impact Report 2006-2011



Foreword

The Urban Massachusetts Louis Stokes Alliance for Minority Participation (UMLSAMP) is honored to be a member of the national community of alliances created by the National Science Foundation under the very effective LSAMP model for the development of underrepresented in STEM degrees undergraduates. Although only in its 5th year as an originally formatted New LSAMP program, the UMLSAMP Program has been successful in bringing together public and private institutions of higher education; 4-year as well as 2-year universities and colleges; and governmental as well as non-governmental stakeholders for regional and global impact from the Commonwealth of Massachusetts.

In 2005-06, the University of Massachusetts Boston (UMB), as lead partner; UMass Dartmouth (UMD); UMass Lowell (UML); Wentworth Institute of Technology (WIT); and the community college partners, Bristol (BCC); Bunker Hill (BHCC); Middlesex (MCC); and Roxbury (RCC); formed the Urban Massachusetts Louis Stokes Alliance for Minority Participation (UMLSAMP) program to address the need to train U.S. and Massachusetts citizens to be STEM professionals and technicians. Over the past five years, our Alliance has implemented evidence-based strategies and activities aimed at integrating students, especially from low income, first generation, and underrepresented minority backgrounds (URM), into their institutions, socializing them into a STEM discipline, and developing their academic skills and scientific knowledge.

The chancellors and presidents of the Urban Massachusetts LSAMP program are proud of the impact this program has had on the furthering of their strategic plans for the education, training, and graduation of all students and especially traditionally underrepresented in STEM students. In this report you will read about some of the highlights from our first five years, which will give you a glimpse of our view of an exciting future as a possible Mid-Level LSAMP Program.

Winston Langley, Principal Investigator

Provost & Vice Chancellor for Academic Affairs, UMass Boston

Andrew Grosovsky, Principal Co-Investigator

Dean of the College of Science and Mathematics, UMass Boston

Marshall Milner, Executive Program Director

Urban Massachusetts LSAMP & Science Training Programs, UMass Boston

Acknowledgements

The commitment of time and resources for the Urban Massachusetts LSAMP program in its first five year NSF award came from an extraordinary group of education administrators, faculty, and staff. Vision and leadership for the solicitation of interest and support from the presidents and chancellors of the eight institutions for application for this LSAMP program came from UMass Boston's previous Provost Paul T. Fonteyn and Associate Vice Provost for Academic Support Services Joan Becker.

Over these first five years critical executive administration and senior academic managerial support came from Chancellors Michael F. Collins and J. Keith Motley of UMass Boston; Chancellor Jean F. MacCormack, Provost and Vice Chancellor Anthony J. Garro, and Associate Provost for Undergraduate Studies Magali Carrera of UMass Dartmouth; Chancellors William Hogan and Marty T. Meehan, Provosts John Wooding and Ahmed Abdelal, and Vice Provost of Undergraduate Education Charlotte Mandell of UMass Lowell; and President Zorica Pantic-Tanner and Senior Vice President for Academic Affairs and Provost Russell Pinizzotto; Associate Provost for Academic Operations Susan Paris; Dean of the College of Engineering and Technology Fred Driscoll, and Associate Vice President of Community Relations and External Affairs Sandra Pascal of Wentworth Institute of Technology.

Included in the above very important cadre of executive and senior administrative leaders are the following: President John J. Sbrega, Vice President of Academic Affairs Sarah Bartlett, and Dean Peter Schuyler of Bristol Community College; President Mary L. Fifield, Vice President of Academic Affairs and Student Services James F. Canniff, Dean S. Len Mhlaba, and Dean Laurie K. McCorry of Bunker Hill Community College; President Carole A. Cowan, Provost and Vice President for Academic Instruction and Assessment Philip J. Sisson, Vice President for Academic and Student Affairs Clea Andreadis, Senior Consultant Mary-Jane McCarthy, and Dean Mary Anne Dean of Middlesex Community College; and President Terrence Gomes, and Vice President of Academic Affairs Brenda Mercomes of Roxbury Community College.

The Urban Massachusetts LSAMP program could never have made the progress attained today over these past five years if we had not had the unreserved dedication and service of departments and their staff at all of our institutions. At each institution it would be difficult to name everyone who deserves acknowledgements for their extra efforts on behalf of this program. We attempt to name a small set who have made consistent sacrifices every day and even some nights for our students. We hope to be forgiven if we inadvertently omit any of these numerous dedicated educators.

Our special thanks to the following faculty, site coordinators, and liaisons: Michael Shiaris of UMass Boston; Tesfay Meressi and Joyce Yokel of UMass Dartmouth; Shelia Riley-Callahan and Wadia Khabezeh of UMass Lowell; Joseph Boston, Christiana Fischer, and Shankar Krishnan of Wentworth Institute of Technology; Shontae Praileau and Kristin Kadlec of Bristol Community College; Katherine Gustafson of Bunker Hill Community College; Darcy Orellanna, Maria Arambel, and Audrey Frater of Middlesex Community College; and Andrella King and Shelly Johnson-Payne of Roxbury Community College.

Executive summary

In the five years that we had UMLSAMP, this program has stimulated large investments from its colleges and universities into institutional STEM strategies influenced by our innovations and effective practices. The biggest impact that we have made has surely been the improvement of the success of STEM students on the Alliance campuses. We have established and met extremely ambitious goals in many cases. Some goals are yet to be achieved, but the progress towards them has been very significant:

- URM STEM enrollment for the Alliance has nearly reached its goal of a 50% (48%) increase
- URM STEM results in terms of retention and persistence are on par with the general population at some of our Alliance sites
- URM STEM transfers to universities from within the Alliance community colleges are notable for their continuing involvement in faculty mentored research placements

Even though we still have a lot of space for improvements, our achievements up-to-date are fundamentally important, because they represent a kind of equity and a promise for future generations of minority STEM students entering UMLSAMP. At some of our institutions we have experienced a 10% increase in the timely placement of STEM major freshmen into PreCalculus rather than College Algebra due to UMLSAMP summer mathematics workshops. The cascading effect of keeping our students on track with their STEM core course requirements reaches deep into their ability to graduate in a timely fashion with requisite skills. We want our students to become more competitive for off-campus STEM internships and we want to rapidly grow those placements. Thus the eight institutions within UMLSAMP will accelerate their efforts to use this relationship as a focal point for transformative change and institutionalization of service and training innovations.

Institutional Change

On a number of our UMLSAMP campuses we achieved a goal of 150 per cent of minority STEM students graduating with a baccalaureate degree, and while not all Alliance institutions performed uniformly due to different economic, organizational and other circumstances, these results demonstrate a positive trend in achieving the goal of 150 percent on a broader scale. We are a diverse set of institutions and not everybody is implementing programmatic activities and progressing in exactly the same way, however we believe that this diversity will become a major driving force towards achieving even more ambitious goals of the Mid-Level Alliance Phase.

All Alliance institutions remain committed to the same goals and all of these institutions are implementing programs, which could be defined by a common theme of “Strengthening the Pipe Line”. Facilitated Study Groups, Research Workshops and other activities are implemented in a way that best represents the culture of individual institutions, while helping participating institutions overcome common and site-specific challenges. Learning from each other’s successes and mistakes helps generate and maintain the momentum, which is necessary for entering the Mid-Level Alliance phase where our best practices could be successfully scaled up and institutionalized.

Economic Impact and Workforce Development

The Alliance generates economic impact through the development of well-educated and technically advanced STEM workforce. The role of the participating institutions in developing and diversifying

STEM workforce is fundamental and we believe that UMLSAMP serves as an engine behind these improvements. The Alliance provides selected students with very strong research and internship opportunities, which equip them with skills and experience necessary to become highly competitive for job placements at a baccalaureate level as well as for further academic careers. Though the program can only arrange a limited number of research and internship opportunities, we seek innovative approaches to achieve stronger results by concentrating on the number and diversity of students that benefit from UMLSAMP activities and the quality of service the Alliance provides its beneficiaries.

We work on maintaining a strong and uninterrupted flow of students, which will inevitably be much stronger as the Alliance enters its Mid-Level Phase. UMLSAMP is assisting its members in advancing their relevant institutional efforts by strategically investing in ways, which are synergistic with institutional investments, such as funding FSGs, Math and Research Workshops, and other similar programmatic activities. The impact of UMLSAMP on the research opportunities cannot be solely estimated by the number of students who are in our UMLSAMP Scholars Program, because the efforts that we are making as the students enter the university indirectly help improve learning experiences for a broader group of students. We focus on scalable programs that touch a lot of students and are complementary to similar efforts on our campuses.

UMLSAMP has effectively contributed to the development of the local economy in the following ways: 1) helped to provide role models to community urban youth thereby improving their probability of attending college; 2) helped to train undergraduates who will be able to work in STEM related fields and professions in the state; 3) and helped to increase STEM employer's positive view of local talent for their research and technology based jobs.

At Wentworth Institute of Technology, LSAMP students served as role models in their RAMP pre-freshman Bridge Program, for Boston Public High graduates matriculating at Wentworth in the coming fall and majoring in STEM. It provided, through academic advising, tutoring, and mentoring, a six week summer academic enrichment experience. Twelve students from participating high schools developed the skills and motivation they needed to successfully complete a postsecondary education. Participants received direct instruction in composition, mathematics, and science during six weeks in the summer. The program was funded also by Wentworth and the Boston Private Industry Council. Two recently Wentworth LSAMP students graduating with BS degrees (Paul Britton and Ron Jean) are attending Polytechnic Institute of New York pursuing masters programs in engineering this Fall and they mentored RAMP students. Paul had the following to say about his experience with the RAMP program and students:

“The overall experience I have developed working as a coordinator with the RAMP program has been my favorite involvement within LSAMP; next to completing undergraduate research in 2009 and most recently in 2011. As a coordinator for the RAMP program I maintained a variety of roles with the RAMP students throughout the 6 week long program. These roles entailed as program coordinator, student mentor, and most importantly a friend for the incoming freshman in RAMP. Within these three vital roles, I then began to gain full participation from all the students. The students were committed to three academic courses - Intro to Research Technique, Science, and Mathematics which were held Monday – Wednesday. On Thursday's both Ron and I would host workshops, outdoor programs and tour with the students to get them familiar with our own undergraduate experience at Wentworth as well as the campus resources. Our Thursday activities were very important because it gave the RAMP students the opportunity to ask both Ron and I any questions concerning our experience as minority students, and how to succeed at Wentworth. The workshops on Thursday included topics about time management, student leadership, and undergraduate research. The tours we took part in were an Architectural tour, Campus tour, and academic department and resources tour.

We had the opportunity of implementing a series of guest speakers, who came in every Friday from industry and spoke to the students about their duties and their struggles in college. We named these set of events “Industry Fridays”. From the expressions of the students, I noticed that this was the most inspiring part of their week. As a minority, it is very rare to see someone from a similar background, make it far in the field of academia – this is the main reason why we stray away from academics and aim to make a career out of rap and sports. So having these people of African descent from industry come in and speak to the students is not only moving, but it is symbolizing one of the five aspects of learning (History).”

At the end of its 5th year, UMLSAMP improved its research skills development model and increased the schedule for Research Workshops (see Appendix 1 for partial list of workshops.) These provide intensive preparation in 1-2 week programs, running from 9 am to 3 pm on a daily basis. The workshops were offered in January, May, and/or June. UMLSAMP has also increased the number and quality of the mentored research internships at off-campus corporations and research institutions as well as in on-campus faculty supported research laboratories. We have had an impact on many hiring managers on their view of our students and their skills and have over time given direct referrals from our program. Some examples of placements are as follows: Schlumberger (4 students placed so far), Sanofi-aventis (3 students placed while at Genzyme), Novartis (1 student placed so far), and the Broad Institute (1 student with 3 placements).

The Commonwealth of Massachusetts has a unique cluster of leading companies, universities, medical centers, capital, talent, and government agencies which trains some of the most innovative and productive STEM knowledge workers here and abroad. Massachusetts sets the pace in a wide range of endeavors, from biotechnology and next generation pharmaceuticals to devices, diagnostics, tools and equipment. Our impact on the local Boston, Lowell, and New Bedford communities and industries will follow this trend of relevance to the local economy if our program continues in the future. The Massachusetts economy grew 4.2 percent in 2010, trailing only North Dakota, which grew 7.1 percent; New York, 5.1 percent; and Indiana, 4.6 percent. The economy of West Virginia, which ranked fifth, grew 4 percent, according to the U.S. Commerce Department. The growth of life sciences and high technology industries in Massachusetts continues at a high rate thereby providing more opportunities for jobs and the social integration of corporate, university, and other community constituencies for global competitiveness. UMLSAMP (through UMass Boston) is a member of the Massachusetts Biotechnology Council (MassBio). MassBio studies the economic impact of the Life Sciences sector here via active engagement with STEM related agencies. The MassBio organization reported that the Massachusetts Bio/Pharma industry growth rate was 19.7% in the 2005 – 2009 time period.

The UMLSAMP director led a panel discussion before 40 human resources industry representatives on ways to improve internship programs within the state and ways to develop broader participation planning in their hiring practices. The UMLSAMP program played a small but important role in forwarding these professionals understanding of the need to train and hire a workforce representative of our nation and state. In November 2010, UMLSAMP acquired corporate sponsorship for a “Careers in Science and Research Forum” that was attended by 60 students, 30 scientists and researchers, 10 faculty, and 40 industry representatives from across Massachusetts including Pfizer, Sanofi-aventis, Novartis, and others.



The picture on the left is from the “Careers in Science and Research Forum.” Pictured on the right from left to right are Dr. James McNeish, Pfizer scientist and researcher; Dr. Gary Puckrein, President and CEO of the National Minority Quality Forum; Dr. Joseph Hammang, Senior Director of Worldwide Science Policy, Pfizer; Andrew Grosovsky, UMass Boston Dean of the College of Science and Mathematics; and Winston Langley, UMass Boston Provost and Vice Chancellor for Academic Affairs.

UMLSAMP up-to-date

Alliance model: UMLSAMP’s vision and mission complementarity

The Alliance

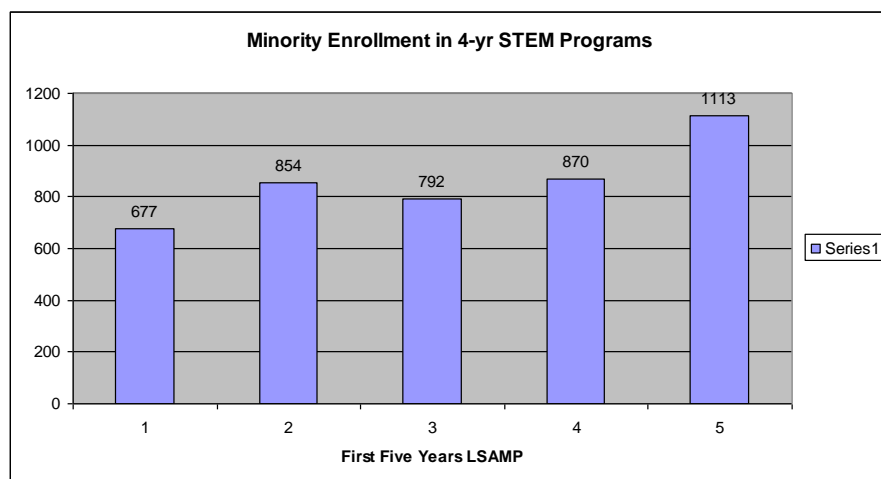
The UMLSAMP mission is to strategically invest in efforts that will result in student success. This Alliance has been important because we have been able to fund transformative activities, which had not existed previously. For example, UMLSAMP was the first project that funded facilitated study groups (FSGs) at community colleges and now they are indispensable for their “Gateway” STEM courses. At two of our universities alone, more than 20 UMLSAMP undergraduates are doing mentored research in laboratories during the regular academic year. Since UMLSAMP has started this program has placed some of its students into off-campus research laboratories of some of the most prestigious corporations and institutions in the world located here in Massachusetts who previously did not accept students from public universities and colleges. Although we have had a vision for where we want to go, we have taken into account the needs of our team to present their unique strengths for the program mission but to allow each other space for individual site cultures and capacities. We seek complementarity for high impact as we advance our common goals.

In the beginning to attain UMLSAMP goals, we spent a lot of time getting to understand the student support services structures and processes on each Alliance campus. Getting to know the service providers for each type of service available to STEM students on a campus allowed for all of us to begin to create a common LSAMP program services “blueprint” or architecture for how we would motivate and educate students for persistence toward graduating with BS degrees while providing them with competitive research skills experiences for the global workplaces. The most immediate impact of those initial steps to define a common architecture for LSAMP “Best Practices” or services at each campus was to accelerate our interest and willingness to begin a redesign of a framework that could help us institutionalize “What LSAMP does” with a new infrastructure of actual processes and services that can transform regular campus services. This will require even stronger leadership and support from all site campuses as we collaboratively implement a stronger management plan to expand on the successes described below and create new innovative services attractive to our students.

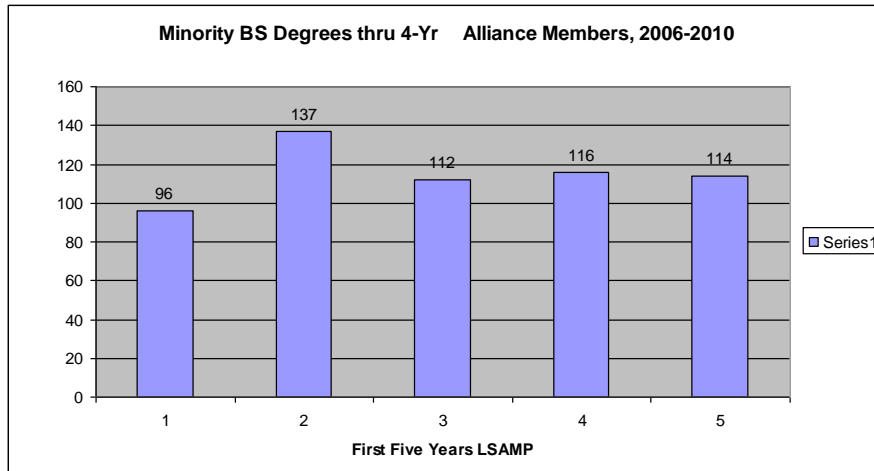
Over the past five years the UMLSAMP actively assisted its Alliance in advancing their strategic goals to become world-class STEM educators. The nature of our eight Alliance members as primarily urban public institutions of higher education, which are all located in the Commonwealth of Massachusetts, enabled the Alliance to establish collaborative relations with various state STEM policy organizations, biotechnology, biomedical, and high technology institutions, as well as with federal funding agencies. Alliance institutions use their UMLSAMP programs as centers of gravity for other STEM related programs to catalyze transformative changes and attain broader impacts. The Alliance has also enhanced their student STEM services through relationships with the Massachusetts Life Sciences Center, the Massachusetts Biotechnology Council, the Biotechnology Organization, the Massachusetts Labor and Economic Workforce Development Office, several national engineering associations, and a number of regional and national institutes and corporations.

In Fall 2010, 12,153 students were enrolled in STEM fields at our institutions of higher education (the Alliance). A total of 1,851 (15.2%) of these students were from underrepresented minority groups with historically poor graduation rates. In academic year 2009-2010, UMLSAMP 4-year institutions awarded 1,013 baccalaureate degrees in STEM disciplines, with 114 (11.3%) conferred on students from underrepresented minority groups. *We are thus most proud to note that students from underrepresented minority groups graduated with BS degrees from our Alliance in a manner commensurate with their matriculation rates, and at the same rate as their peers from other demographic groups. During the 5-year period from 2005-10 our Alliance experienced a 38% increase in URM enrollment in STEM majors, but a much greater 61% increase in URM STEM baccalaureate recipients during that same time frame.*

In 2010 the Urban Massachusetts LSAMP Program enrolled a total of 1,113 minority students in STEM majors. Below are the series numbers from year 1 (2006) to year 5 (2010) for the four 4-year universities and institute in this Alliance. In 2007, five UMLSAMP students were involved in on-campus mentored research placement and in 2010 UMLSAMP had attained 171 on-campus and 29 off-campus cumulative placements from that baseline. Most of the off-campus research internships were at globally recognized leading research institutions.



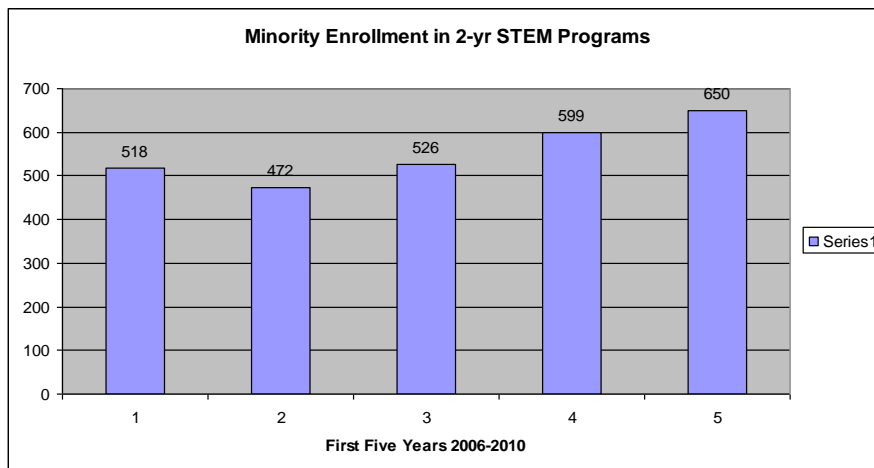
Over the 2006 to 2010 period, the four 4-year universities and institute in the Urban Mass LSAMP program graduated 575 minority students with STEM BS degrees. Below is a breakdown for each year from 2006 to 2010 for these four 4-year institutions.



Community Colleges

Enrollment

Bristol Community College, Bunker Hill Community, Middlesex Community College, and Roxbury Community College are the four community colleges in our Alliance of eight institutions of higher learning. The UMLSAMP community colleges have been especially effective in embracing the development and implementation of STEM Learning Communities through in-kind funding. They have also embraced FSGs and 1-2 week long research skills workshops for students created and funded through the UMLSAMP program. In 2010 the Urban Massachusetts LSAMP Program community colleges enrolled a total of 650 minority students in STEM majors. Below are the series numbers from year 1 (2006) to year 5 (2010) for the four 2-year community colleges in this Alliance.



Research and Community Development

Through the UMLSAMP transformative experiences, community college students in STEM are able to enter rigorous bachelor's degree programs with strong research skills. Senior faculty engaged UMLSAMP participants in research projects and other relevant scholarly activities that developed their comfort and confidence around working in research and in labs.

Faculty mentors from the community colleges as well as the universities worked closely with our students during all phases of the research experience. We had community college students working in university research labs while still attending regular classes at their community college. This resulted in a number of community college students having two faculty research advisors – one from their community college and a second from the university research faculty who sponsored the lab placement. This dual research faculty support occurred before students transferred to the Alliance university. This development model has resulted in the transfer of better STEM prepared student from the community colleges to some of our four 4-year universities and college.

Bristol Community College ran a UMLSAMP summer Biotechnology Essential Skills Workshop this past August with acclaim around its importance for students' knowledge and motivation for STEM graduation. Roxbury Community College implemented three UMLSAMP Biotechnology Skills Development workshops over the last two years. Bunker Hill Community College implemented five Biotechnology Research Skills Development workshops. Middlesex Community College implemented three UMLSAMP sponsored workshops in conjunction with UMass Lowell thus involving for the first time the collaboration STEM faculty from those two institutions. The 3 research skills workshops had had 16 MCC students 16 UML students involved. The three workshops were: 1) Fundamentals in Biotechnology Workshop, 2) Environmental Measurements Stream & Groundwater Assessment Field Workshop, and 3) Fundamental Physical Laboratory Sciences Workshop.

One qualitative impact from these workshops has been the increase in participating students comfort with research assignments and experiments that faculty offered as part of their regular courses. Several students gave credit to UMLSAMP research experiences for confidence in follow-on STEM courses. Several faculty from two different campuses also credited our program with encouraging their faculty to accelerate their overall development of biotechnology modules to include industry participation and visits – an activity present in all of their UMLSAMP biotechnology workshops.

UMLSAMP Continuous Support of Student Research

The MassBioEd Foundation created the new Massachusetts Life Sciences Education Consortium (MLSEC), a group of industry and educational professionals working to promote a coordinated approach to the development of the Massachusetts life sciences workforce. In 2010, the MLSEC rolled out a new community college endorsement program meant to promote colleges that are training students with the skills and experiences they need to enter the biotechnology industry as it grows and hires.

In the first round of endorsements, eleven biotechnology degree or certificate programs at eight Massachusetts community colleges received gold or silver level certificates. Out of the eight community colleges, three are UMLSAMP colleges who have had several years of extensive biotechnology research skills workshops funded by UMLSAMP (Bunker Hill, Middlesex, and Roxbury Community Colleges.) The impact from these awards where UMLSAMP played a small part has been to trigger requests from faculty at sites for additional research training workshops for the future. These small successes do not have a major economic impact on the state or this area of the state especially in just a five year program such as UMLSAMP but these workshops give students more confidence to explore new research opportunities in the future. Faculty, students, and employers are impacted by these workshops.

Based on perceptions from on their numerous conversations with students over the past five year Middlesex Community College UMLSAMP representatives said the following about the impact of UMLSAMP: “The UMLSAMP program at Middlesex Community College (MCC) contributes to the institutional objective of increasing the number, success and transfer of URM students in STEM majors by providing support and academic programs through a comprehensive approach to build a STEM community at MCC.”

One impact from similar comments from other campuses has resulted in adding an additional data request parameter for our annual reports – where do community college transfer students go if they leave before they attain their Associate Degree? How do we strengthen their research experience while still at the community college so that they get their required skills and degree before they go to the university? More enriched UMLSAMP experiences while at the community college was a conclusion that impacted decisions resulting in more innovative experiences.

Five students and a faculty member participated in “Mouse-Trap Race Car Competition” at MCC as part of the STEM Club Events schedule there. MCC leaders stated:

“Research shows that students are more successful when they are part of a community. Through close collaboration with UMass Lowell (UML) and other transfer institutions, we have worked to build the STEM community for our students and to prepare them for the STEM academic communities they will be transferring to. A combination of academic support services including tutoring services, facilitated study groups, and teaching assistantships; STEM co-curricular activities, research experiences and in-depth student mentoring comprise the STEM community outcomes that are the result of the UMLSAMP program at MCC.” MCC leaders continued to say:

“UMLSAMP funds have supported STEM community building co-curricular activities such as the summer bridge, field trips, guest speakers, STEM poster sessions and the Women in STEM luncheons. Students have the opportunity to improve their presentation skills at the research poster sessions. These activities and programs have shaped how STEM is presented to our students and how they learn about and experience STEM education at MCC. The result is MCC’s URM STEM students have increasing equitable access to STEM opportunities because they have programs and faculty/staff committed to the STEM community at the college. Examples include our partnership with UML which exposed our students to research through skills workshops and REUs, and facilitated faculty mentoring of students as well as informal student mentoring between the two colleges.

Students who participate in the UMLSAMP funded activities form a strong connection with each other and with participating faculty and staff, which contributes to their persistence in the STEM fields [survey finding from SageFox August 2011 evaluation.] With research showing that **mentoring, building community/connections** and **exposure to research** are key factors in the success of students in STEM majors, the UMLSAMP program contributed significantly by funding projects, programs and activities aimed at achieving these factors and targeting our underrepresented student population.”

Bunker Hill Community College in its UMLSAMP statement had these additional comments on the impact of UMLSAMP at their college:

“One example of how the UMLSAMP program has contributed significantly to BHCC’s institutional and faculty knowledge of how to improve the retention, persistence and graduation of underrepresented minority students in STEM majors is through the implementation of facilitated study groups (FSGs). Study groups have been instrumental in improving students’ abilities to succeed in gateway STEM courses, allowing them to progress in their programs in a timely fashion and with increased confidence. Faculty increasingly encourage FSG participation both through their syllabi and by individual referrals. Evaluations have shown the FSGs to have been successful in helping students better understand course material, their primary goal. In addition, the FSGs have helped students become more comfortable asking questions, perform better on course work, and gain a greater appreciation for course material and STEM career paths. One student’s comment sums up the FSGs’ strength: “All of my questions were answered in a way that allowed me to problem solve better on my own.” Building of confidence and capability both led to improved retention and persistence of URM STEM students.”

The Impact of Facilitated Study Groups

Of particular importance for URM STEM students in a community college setting has been that the **FSGs provide students with a physical “home” for learning and studying.** Students and facilitators report that FSGs provide a place where students can be less inhibited about asking questions, and where they can meet with fellow URM STEM students. BHCC has now established a STEM study area for FSGs to meet in. Not only do students help recruit other students to attend and participate in FSGs, but STEM students who have already graduated know this as the place to come to share their transfer experience with students and facilitators. FSGs serve as the basis for building a cohesive “community of science” at BHCC, a connecting piece that helps in retention, persistence and graduation of URM STEM students.

LSAMP internships have also contributed to retention through providing hands-on experiences in the summer for URM STEM students under faculty mentorship. The mentoring relationships have helped the students further define their area of STEM interests as well as develop their research skills, presentation abilities, and self-discipline within a work environment. Opportunities for career discussions helped motivate interns academically and guide them through graduation and making transfer decisions. Of the 4 summer interns who have graduated, one has transferred to UML in Engineering, one to UMB in Biology, one to Emmanuel in Biology, and one to BHCC Nursing Program, from which he plans to continue on to bachelor’s and graduate programs. One student described what he gained from his internship this way: “a greater appreciation for the world of science, a bigger desire to learn, and a deepening interest in the biological processes underlying different anatomical and physiological aspects of the human body.”

4-Year Institutions

Our universities (UMass Boston, UMass Dartmouth, and UMass Lowell) and our 4-year college (Wentworth Institute of Technology) have embraced UMLSAMP leadership and strategic thought in supporting with in-kind or fund dollars this program’s “Best Practices” and tools such as FSGs and intense 1-2 workshops in mathematics preparation. Some have adopted new campus approaches and processes for education and training based on UMLSAMP influences. UMass Boston found a 10% in the number of newly enrolled students able to sign up for PreCalculus after UMLSAMP supported intense math workshops in that area. This impact is to allow for more students to be able to forego other math entry level courses which don’t meet STEM major math requirements for “staying on course” in their major. Staying on course with STEM major courses semester by semester helps students graduate within a reasonable number of years (4-6).

The following is just one example from our partner Wentworth Institute of Technology. Leaders there had the following to say about UMLSAMP:

“In the first 5 years of the UMLSAMP grant Wentworth went from ruminating on STEM persistence issues to piloting programs designed to deal with retention. Through NSF’s focus on best practices for retention and by funding such efforts through UMLSAMP, Wentworth was encouraged to begin addressing the need to support students in mathematics. The Summer Bridge in Math and the first FSG Math activity supported an innovative young faculty member with a passion for teaching math to launch WIT’s first Math Summer Bridge Program and FSG. Not only did she run these math STEM programs, she promoted discussion with other STEM faculty who stepped forward to lead additional FSG’s. (Four years later she has been promoted to chair of the Math Department and continues to press for innovative methods of instruction). We now have an active cohort of faculty and department heads grappling with retention on multiple levels, which includes the pursuit of NSF Funding for the expansion of STEM programing. The President and the Dean of the College for Engineering and Technology visited NSF to explore additional funding for STEM initiatives. This summer we are submitting a STEP Grant and

applying for an SSTEM grant. These proposals build on the STEM activities started through UMLSAMP.”

The award by NSF to UMLSAMP has had a major impact on Wentworth’s ability to focus the efforts being done to recruit and retain under represented students attending WIT in STEM. Starting in the summer of 2006 with a single program, the Math Summer Bridge Program and one Facilitated Study Group in Math slated for the Fall Semester, Wentworth has as of end of spring 2011:

- 515 level 1 and level 2 students currently involved in LSAMP.
- In the 2010-2011 academic year 390 (roughly 10 percent of the WIT population) students participated in AMP sponsored programming including AMP scholars (10), research projects (2), summer bridge programming (19), and facilitated study groups (359).
- Since 2007, AMP has sponsored the following facilitated study groups:
 - 8 semesters of math
 - 6 semesters of circuit theory
 - 6 semesters of computer science
 - 1 semester engineering statics
 - 3 semester of physical science
- Summer Bridge Programming has served 89 students in the past 4 years and has morphed into a full day program for incoming freshmen, awarding \$1200 stipends from a non UMLSAMP funding source.”

Searching for synergies and breaking silos

Before we were an Alliance, 8 institutions of higher learning in Massachusetts developed and executed strategic plans around their separate missions to provide quality education and services to their enrolled students which included of course underrepresented in STEM students. Each of us had a number of campus departments and projects which may or may not have collaborated strategically on their own campus to develop and implement “Best Practices” through continuous improvement but they certainly did not collaborate cross-functionally with 7 other universities and colleges around the goals and objectives similar to those of a LSAMP program.

Five years later, the impact on these 8 institutions from their involvement with the UMLSAMP program is startling. They no longer operate in ‘silos’ on issues critical to the advancement of underrepresented students within their institutions. UMLSAMP representatives share ideas with their compatriots on the other campuses and act as transformational agents within their own institutions to press for changes that can improve the recruitment, retention, persistence, and graduation of underrepresented in STEM students on those campuses. There is a second point of professional growth and awareness which befalls UMLSAMP staff at the 8 institutions as they work over the first 5 years of the UMLSAMP program. They discovered that many ‘so called’ problems that underrepresented in STEM students were “pegged with” had in reality contributions from inadequate or ineffective institutional practices that affected all the students. This realization elevated their thinking around transformational change – look more systemically at every issue or problem affecting UMLSAMP program objectives and advocate institutional improvements for everyone.

Then there developed toward the end of our first 5 years another “leap” in knowledge. Our collaborative and integrative approach to problems and solutions across 8 institutions and without “concrete silos” caused a number of UMLSAMP campus representative to be “change agents” at their institutions on statewide issues and not just campus issues affecting their LSAMP students. The ultimate impact of the UMLSAMP program is that it “develops” change agents and is important beyond its size and beyond normal expectations. Testimonials to this conclusion can be found in any inquiry made to UMLSAMP

site coordinator or involved faculty member who has worked with the program for more than two years. All of our Alliance senior administrators as well as our UMLSAMP site coordinators realize that our “whole is greater than the sum of our parts.”

Catalyzing innovation

National and regional STEM workforce development

The UMLSAMP has developed a number of collaborations and partnerships over the first 5 years that have provided valuable service opportunities for students. Our Alliance has assisted students with advancing their post-baccalaureate careers by introducing them to off-campus practicing researchers and scientists. Comprehensive STEM workforce development comes about only if we recognize it is a “value chain” pipeline where each link must be strong or everything falls apart. For our students we emphasize that they need to be aware of their STEM major course requirements and the need to be early for course registration so they don’t get locked out. We emphasize they must get great grades in core STEM courses if they want to be viewed as competent and competitive in their subject knowledge. They must attain STEM workforce skills related to their major. These STEM workforce skills can be acquired either through on-campus research work or off-campus internships but students must be able to explain without hesitation the STEM procedures and techniques that are applicable to any research experiences they have listed in their resumes. Students should understand the opportunities and affordability of obtaining a STEM post-baccalaureate degree. This is UMLSAMP’s “value chain” pipeline to a career of science or research.

We are always looking for leverage for our students through our external contacts. For example, On August 25, 2011, the CEO and President of the National Action Council for Minorities in Engineering (NACME) came to UMass Boston in response to a special invitation from UMLSAMP to talk with the UMLSAMP leadership team about his organization’s portfolio of Pre-Engineering and Engineering programs and scholarships. Follow-on inquiries will come from a number of our sites to see how LSAMP students might benefit from this connection.

The UMLSAMP program director attended the U.S. Congressional Black Caucus Forum on Health Disparities among Diverse Populations a year ago through an invitation from a Pfizer Corporation executive. At that forum the UMLSAMP program director was introduced to Gary Puckrein who is creating a new approach to impact health disparities in America. His firm is starting first with a view on the HIV/AIDS disease effect in the U.S. and then the Diabetes effect. The UMLSAMP program director is working with Gary and a CBC contact to get a UMLSAMP research intern in Washington D.C. for Summer 2012. The U.S. HIV/AIDS Index database developed by Dr. Puckrein obtained tremendous support from the 2011 US Congressional Black Caucus Health Disparities Forum held in Washington. As CEO, Gary Puckrein will attain through his firm a preeminent position for health policy and research studies priorities as he selects additional disease/health topics for megadata analysis. His company and their tools look at the clinical trial data nationally according to congressional districts by race, ethnicity, social economic status, etc, and produce visual maps for researchers, policy makers, and congressional legislators so everyone can see where research is being done compared to disease instances and how much research dollars are being allocated in those areas compared to their health or disease parameters. This tool can be used descriptively or prescriptively with tremendous implications around how even science and research itself might have to be transformed when it deals with health disparities in the U.S.

Case studies from the U.S. HIV/AIDS Index database will be disseminated to the UMLSAMP site coordinators for use in our STEM Club or LSAMP Topics meetings. Also, Dr. Puckrein has agreed to come to Boston to give a presentation or lecture some time in the near future to our UMLSAMP students and faculty.

Students participated in innovative off-campus research internships as they attained higher levels of confidence and competencies from campus-based research experiences. Our goal is not to just get them internships but to maximize the throughput of students from freshmen to graduates as they discover their passion for science and technology and want to get to their destinations as quickly as possible.

The following organizations have accepted our AMP Scholars in the past and have expressed support for future placements: Genzyme (parent: Sanofi-aventis), Novartis, Pfizer, Schlumberger, the Broad Institute, Dana Farber/Harvard Cancer Center, and Massachusetts General Hospital research centers. For example, Laura Kibbuka an UMLSAMP student from UMass Boston had one of our first internships during Summer 2008 at Genzyme Corporation. She had the following to say:

“Having the internship at Genzyme was a very rewarding experience. I always wanted to work at Genzyme but was discouraged when I heard it was impossible to get an internship. Working at Genzyme gave me hands on experience in a large biotech company. I acquired many new skills that I use in my classes and will help me in my career. The information I learned on immunology was priceless and put me ahead in my class. Additionally, it was an eye opening experience. I wanted to work for Genzyme because I thought I would be more competitive if I went into pharmacy or applied to medical school. Now, I find that a career in biotechnology may almost be just as rewarding as medical school; you can still make a big difference in people's lives. Genzyme does and so do other biotech companies. Personally, I loved working at Genzyme. Everyday was an adventure. I liked that Genzyme is very dedicated to the safety of its employees and that interns are treated like they serve a purpose. My managers and supervisor were nothing short of extraordinary, professional, helpful and understanding, and everyone in the building was actually very nice. They were genuinely willing to help. The work environment at Genzyme gets 100% rating. The intern activities were very helpful. Genzyme has made me a better student. I know I have an advantage when it comes to job hunting after I graduate. I really appreciate the opportunity Genzyme gave me to further my studies with the grant and the summer internship.”

- Laura Kibuuka, Biology, UMass Boston



The UMLSAMP students will be able to apply for an internship with small startup firms who are in Massachusetts and are part of the NSF Small Business Innovation Research Program (SBIR). SBIR Program stimulates technological innovation in the private sector by strengthening the role of small business concerns in meeting Federal research and development needs, increasing the commercial application of federally supported research results, and fostering and encouraging participation by socially and economically disadvantaged and women-owned small businesses.

International Engagement

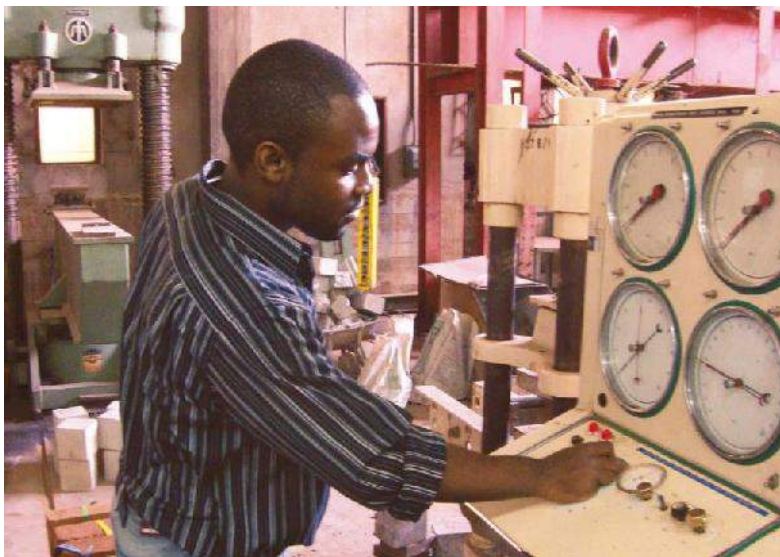
International experiences for our students are important to prepare them for sensitivity toward various work environments around the world and to enlighten them first hand on their need to be globally competition. This service will generate support as a tool for rallying institutionalization support from Alliance members since more of our students have express interest in working abroad in internships. Such experiences help to make them aware of how they compare with other students from around the world. The impact of this type of exposure can affect persistence to and past baccalaureate degree study as they see work abroad as a viable possibility. Some of our UMLSAMP students have obtained international perspectives and experiences through contact with international researchers and scientists here in the U.S.



Nairobi, Kenya – Willems Leveille and two young international mentees

UMLSAMP senior Willems Leveille studied a fiber reinforcement for composite materials at UMass Dartmouth. His research was supported by an LSAMP research grant to study and work abroad under the NSF International Center for Undergraduate Research Experiences program which only accepted 20 applicants from across the country for that year. From May to August of 2010, Leveille lived at the YMCA in Nairobi, Kenya, working on developing sustainable materials for reinforcing sand dams. “We had to make everything cost-effective for the locals,” said Leveille. He adds that “I believe, at the very least, we made significant steps for further research.”

After his return from Kenya, Leveille worked on a Civil & Environmental Engineering project titled “Novel Use of Ion Exchange Nanofibers for Trouble-Free Methane Generation from Biomass and Organic Waste.” Leveille learned how to apply research in a resource deprived area. Leveille credits LSAMP for his passion for Civil Engineering. “Before LSAMP, I knew I wanted to use my profession and education to help others.” He helped other student researchers see how he applied his thinking about how to solve problems which was enlightening to them since he utilized reference points and knowledge he acquired as an American. “Without LSAMP, I feel I would have never done this kind of research or studied Civil Engineering. Going to Kenya and being in LSAMP opened my eyes.”



Leveille in a laboratory at the University of Massachusetts Dartmouth in North Dartmouth, Massachusetts

Dr. Tesfay Meressi, Associate Dean for Engineering and LSAMP site coordinator has been very pleased with the program's impact on students like Leveille. "This program has been a great success. Many 10 to 12 LSAMP scholars work in research labs on cutting edge projects under faculty supervision. We are very proud of their accomplishments and we hope to involve many more undergraduate students in the LSAMP program." These students acquire individual research skills in a lab environment and learn to work with faculty member often under unpredictable research conditions. This type of experience lets students understand the true nature of experimentation. The impact is that UMass Dartmouth would like to double the number of resource sponsorships if they could.

UMass Boston and the International Academy of Life Sciences (IALS) are partnering to host an international workshop in Boston titled "Advancing the Life Sciences and Uniting Universities, Corporate and Government Partners." A UMLSAMP corporate contact provided some support for this October 2011 event. UMLSAMP students from our various sites will participate in this workshop and will attain perspectives on how their STEM knowledge can contribute to solutions for current challenges and future careers across the globe.

Phase One highlights

During the UMLSAMP's first five-year period, we made progress in increasing underrepresented minority students' (URM) interest in, and preparation for careers in STEM through our educational components. We have made progress in bringing URM students up to par with non-URM students in terms of retention and persistence rates at many of our Alliance institutions.

Our Alliance offered the following services which impacted students' knowledge, confidence, and persistence through their STEM matriculation:

- 79 FSG's were offered in 09-10 compared to 9 the first year of the Alliance; 2,050 students total.
- 234 students participated in 21 Intensive Skill Development Workshops in 09-10 compared to 42 in 06-07; 571 students total.
- 408 students received tutoring through UMLSAMP in 09-10 versus 34 in 06-07; 974 in total.
- 65 students participated in Mentored Research Experiences in 09-10 compared to 5 in 06-07; 200 students total in lab related research. We will increase this offering by 100%

Overview of performance indicators

In Phase One we increased the enrollment of underrepresented students in STEM majors across all 8 Alliance institutions and concentrations by 92% exceeding our goal of 50%. Enrollments increased at each Alliance institution, although by varying amounts. STEM enrollments at the community colleges for instance increased by 25% and at our 4-year institutions by 64%. BS degrees increased by 61%. Our objective for 150% in the number of BS STEM URM degrees was not attained due to a number of factors including the elongation of matriculation to graduation time created by external employment with reductions in academic credits. Tables 1 and 2 provide further detail regarding individual UMLSAMP site institutional data on underrepresented minority students in STEM majors. *Please note that the majority of our Alliance institutions have achieved our key goals of a 50% increase in URM STEM enrollment and some came close to our 150% goal increase in URM STEM baccalaureate degrees.*

Searching for synergies and breaking silos has allowed us to have direct impact on students' lives and on institutional effectiveness. Alliance site coordinators closely advise freshmen during their first year so they might take the appropriate courses required for sequential enrollment in the sophomore year. This has allowed students and advisors to “tackle” and command the “Gateway” courses issues that might arise and provide students supplemental instruction as required. Site coordinators have been able to encourage students to take more challenging STEM courses while directing them to extra resources that they did not know existed. This has improved their chance to move sequentially through their STEM major requirements more deliberately.

We have established facilitated study groups at all of our Alliance sites and this has helped students to ask thoughtful questions without feeling judged. We have implemented research skills development workshops, which have given students reaffirmation in their “joy” of science and confidence in their ability to master research methodologies. We have worked early in the advising process to have students understand and think about the courses and skills they need to acquire if they wish to have a STEM career and not just a STEM degree. We have helped many of them get research projects and research lab placements on-campus as well as off-campus due to their skills and confidence development. All of this has impact on students understanding of what they must do to have a STEM career. We have helped them learn to look for synergies, be courteous and studious, and professionally breakdown the “silos” that get in their way to graduate and have a life of science and research.

UMLSAMP was invited by the Lieutenant Governor of Massachusetts Timothy Murray to present at the Massachusetts STEM Summit VI Conference (400 professional attendees) in October '09 in Sturbridge, MA. UMLSAMP presented on the topic: “Recruitment & Retention of Underrepresented Students in STEM.” An overview was presented on some approaches, current trends and issues, recent research developments, funding opportunities and best practices especially from our UMLSAMP model. Attendees were extremely interested in FSGs, research skills workshops, and internship development models involving undergraduates from community colleges as well as universities. The impact from this and similar community and professional activities is that UMLSAMP has enhanced its reputation as a systemic catalyst for more cogent policies relative to graduation and STEM employment of underrepresented in STEM students. UMLSAMP continues to make an impact with national and regional STEM research corporations and institutions.



The photo above was taken at our November 2010 “Careers in Science and Research Forum” led by UMLSAMP with sponsorship acquired from a major corporation. Pictured from left to right are Andrew Grosovsky, UMass Boston Dean of the College of Science and Mathematics; Dr. Helen Marie Nugent, Co-Founder/VP of Research & Development, Pervasis Therapeutics; Winston Langley, UMass Boston Provost and Vice Chancellor for Academic Affairs; Sridaran Natesan, Scientific Site Head of Research & Development, Sanofi-aventis; Paul Wengender, CEO of Blue Sky Biotech; Dr. Dustin Armstrong, VP of Research, 4s3 Bioscience; and Dr. James McNeish, scientist and researcher at Pfizer.

Toward Mid-Level Alliance Strategies and expected outcomes

Our vision is not only to accomplish our LSAMP program mission for the STEM graduation and advancement goals for our students but to be the preeminent LSAMP center in the New England area. We envision being a model for training and graduation of thousands of students from our communities who primarily have attended public schools or community colleges and still want to participate in the ever expanding life science and high technology sectors both here and abroad. We envision a partnership with corporations and research institutions who now recognize the need to strengthen the local talent “in the fields” around them to make this country globally competitive and nationally secure. We envision our institutions of higher learning using LSAMP as an innovation center for the development of “ground level” training and motivational practices that should and will be institutionalized as they come forward for the success of all of their students.

You Belong with Us

We intend on having an impact on our students. We want them to feel that they belong with us in the communities of science and research; and in the community of doers who will have the skills to try and solve the global and local problems which they will face in their lives as world citizens. All of our strategies are aimed toward these somewhat elusive but very important expected outcomes. Our needs are great – but our potential talent is greater.

Start on-track & Stay on-track

The success of the UMLSAMP program will depend on a “Start-on-Track & Stay-on-Track” philosophy for STEM major advising and services programming. The key elements of this philosophy are the following: 1) assisting students in persisting through STEM “Gateway” courses necessary for success in intermediate level courses through facilitated study groups and supplemental instruction groups; 2) providing advanced research skills development workshops to accelerate students’ mastery of research skills; 3) supporting student placements into on-campus and off-campus mentored research positions; and 4) graduating our students not only with a STEM BS degree but with a confidence in their ability to contribute in a graduate degree program or in a STEM related career. Our strategy involves finding external organizations including corporations who are interested in our success in advancing our students’ knowledge in STEM and STEM research by providing mentors and fund resources. We also continue to increase the institutionalization of a number of UMLSAMP practices into Alliance members’ existing services infrastructure as we recognize “Best Practices” that can bring improvements for our entire student bodies. A number of our Alliance members started this process over the previous 5 years and will increase their degree of adoption for sustainability for their general STEM program efforts. Sustainability, program expansion with funding, and innovation exploration will be a key responsibility of the management and site coordinating committees of the program. We will provide one example from UMass Boston on how the UMLSAMP program on our Alliance campuses can begin to establish transformative program synergies and mainstream funding support for some of LSAMP’s activities.

In 2007, the new Dean of the College of Science and Mathematics (CSM) at UMass Boston launched a student success center (SSC) that became a driving force behind dramatic improvements in the number of students that place in pre-calculus or higher math levels and stay on track for their degree. Based on this experience and the analysis performed during the strategic planning process with the graduation rate committee that was co-chaired by the CSM Dean, UMass Boston (UMB) committed to very ambitious yet practical goals.

Retention statistics demonstrate a positive trend. However, although the UMass Boston overall retention rate is in the high 70%, our university graduation rate remains in the high 30%, leaving us with a forty-point gap between retention and graduations rates. While retention means that students, entering the university as first time fulltime students are enrolled for a second year, it does not necessarily mean that they achieve a sophomore status. It also does not mean that they take an adequate and coherent set of courses. We established that this issue was the root cause behind such a dramatic gap between our retention and graduation rates.

Our aim for students is to progress in a timely manner towards 4-year graduation. We know that students that are reasonably on track usually graduate within four or five years, but those who fall behind in accumulating a sufficient number of credits, perform poorly in terms of eventual graduation. That is why we have to focus on the first year students and make it possible for them to stay on track.

To address this challenge we asked: what if students have made good progress in their freshman year and strongly enter their sophomore year? What if we set a relatively modest benchmark for them to complete 25 credits and maintain a 2.5 GPA? Then their graduation rate approaches 70%. What if they do 30 credits and their GPA is 3.0? Then their graduation rate approaches 80%. UMB had 170 students in the SSC driven program and around 70% of them completed at least 25 credits, along the lines of 60% of 25 credits within the 2.5 GPA range. Recently collected data demonstrate that we are on the path that would help produce the desired outcomes. Though we do not know exactly what kind of graduation outcomes we could expect in 5 years from now, there is no question that we are in the process of a dramatic turnaround on graduation rates that could have an impact for other LSAMP programs.

Consultative and participatory planning

UMLSAMP senior administrators, faculty, and site coordinators at all of the 8 institutions have been engaged frequently at their campuses and in meetings around the objectives of the program and around services to be supported for students. The major impact from these frequent meetings is to have the foundations for a consultative and participatory planning process. This type of planning process takes time but when fully operational, this approach leads to stronger commitments around high impact pedagogical practices and services. Frequent one-on-one and small team meetings on the campuses resulted in deeper understanding of how to align UMLSAMP best practices and activities with campus mainstream academic and student support programs.

These consultative meetings of site coordinators created knowledge on the efficacy of specific LSAMP activities for particular campuses and how to customize them for success. Site coordinators communicated frequently with their campus senior administrators thereby making all Alliance members well aware of program operations, strategy, and accomplishments. At least once a year the UMLSAMP program director communicated one-to-one with these senior administrators as well. Every 18 months, a UMLSAMP Governance meeting or conference call was held for strategic overviews. The UMLSAMP program began to be used as a strategic focal point for systemic improvement in student academic development around STEM degree graduation.

High impact pedagogical practices to support student success

Facilitated Study Groups proved to be a powerful tool for sharpening all of our understanding of how to supplement regular courses to improve student success in the programs on the separate campuses. This tool was so successful after the initial 2 years of implementation that faculty began to more closely examine courses in every STEM major sub-discipline to see how persistence in such areas might benefit from a FSG implementation. For some Alliance campuses, the impact of a FSG was dramatic. At Wentworth Institute of Technology, Statics and Dynamics FSGs were found to have strategic value for persistence in several majors which had these “Gateway” courses in common. We also found that FSG’s had an impact for building faculty-student rapport even when the faculty member was not the FSG facilitator but communicated frequently with the undergraduate or graduate student facilitator. FSGs helped elevated the probability of student success in staying on track for their graduation. The SageFox Associates evaluators (August 2011 Annual Report) found that 85% of the students participating in FSGs self-reported in a survey that they understood material better; 62% said they performed better on exams; and 64% reported they kept up with the course more effectively (Fall’10 sample size of 105 students, Spring ’11 sample size of 209 students.)

Increasing on- and off-campus Research Opportunities

An independent research project, carefully guided by a faculty mentor, has a powerful impact on a student’s determination and ability to be a mathematician, scientist, or engineer. UMLSAMP has developed a robust research apprenticeship program that emphasizes student-centered learning as key to the students’ integration into professional practice. In their second or third semester, students are encouraged to engage with UMLSAMP research faculty mentors in their non-lab related research projects or serve as apprentices to STEM faculty to learn one-on-one the multiple levels of research and demonstration methodologies for the classrooms. Students who meet core STEM courses requirements will be placed into research labs on university campuses and supervised by faculty or graduate student.

During Phase One of the UMLSAMP, interested and qualified community college students were placed in research labs on 4-year university campuses when such opportunities were not available on their campuses. One critical performance indicator is the degree to which we have progressed in getting LSAMP students into mentored research opportunities on our campuses.

Contributing to instructional development

UMLSAMP constructs such as FSGs, intense workshops, and summer bridge programs offer opportunities for college and university faculty to interact intellectually with students in smaller and less formal settings than the typical lecture classroom. Faculty hear student observations from their FSG leaders that would not otherwise be articulated. Whether it involves feedback on the way they have been lecturing on a complex concept or observations in an UMLSAMP workshop that helps the faculty improve teaching techniques – these LSAMP services have an impact on faculty as well.

Actions

To accomplish our UMLSAMP mission and maximize impact on student success we will strengthen our management plan to improve standard operating procedures and to increase opportunities for services innovations. Our challenge will be attain support from the necessary stakeholders to put in the meeting time necessary for the development of participatory management committees able to acquire and process information to execute their responsibilities. Innovative services and programs requiring an Alliance sponsorship rather than the sponsorship of a college as an individual institution will be a necessary condition to help the entire Alliance come together as a single unit. There are some funding opportunities for high impact Alliance services which are in a development stage.

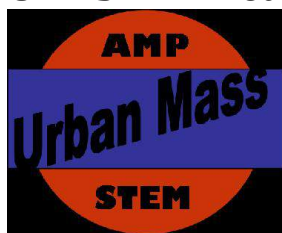
Adjusting the Model

We will have maximum impact on our expected outcomes in terms of our vision and mission if we “fund what we run” and consistently use results based management to increase our probability of success. We will continue to reallocate precious resources when practices do not accomplish program goals for our students or institutions. We have begun to take a closer look at our strategies and required actions with a sensitivity toward resources required for implementation before we commit to those actions. Our process of deliberation will be to access and quantify as best we can the value of the impact from our expected outcomes. If the value of the impact warrants the resources needed and there is a huge gap in the resources then we have a necessary condition for approving fundraising actions. We will have to “fund what we run”. This approach will allow us to sustain our current services for students while attaining strategic growth in innovative arenas.

Contributing to institutional development

Our infrastructure for institutional development consists of the following resources and support staff: 1) UMLSAMP site coordinators at each site responsible for LSAMP Level 1 student support on their campuses and for leadership on any data or administrative requirements for the program; middle level college liaisons who will be knowledgeable of the LSAMP program and represent the provosts or vice presidents of academic affairs who serve on the LSAMP governing board; and access to laboratories, classrooms, and meeting areas for use of LSAMP activities.

UMLSAMP Leadership



Lead Institution: **University of Massachusetts Boston**

Winston Langley, Provost and Vice Chancellor for Academic Affairs – UMLSAMP Principal Investigator
 Andrew Grosovsky, Dean of the College of Science and Mathematics – UMLSAMP Co-Principal Investigator
 Marshall Milner, Executive Director of Science Training Programs - UMLSAMP Program Director

Winston Langley, PI Provost & Vice Chancellor UMass Boston	Antony Garro Provost & Vice Chancellor UMass Dartmouth Site Coordinator Tefey Meressi Associate Dean	Ahmed Abdelal Provost & Vice Chancellor UMass Lowell Site Coordinator Wadia Khabazeh	Russell Pinizzotto Provost Wentworth Institute of Technology Site Coordinator Joseph Boston
Peter Schuyler Dean of Science & Math Bristol Community College Site Coordinator Shontae Praileau	S. Len Mhlaba Dean of Mathematics Laurie McCorry Dean of Engineering Bunker Hill Community College Site Coordinator Katherine Gustafson Faculty	Philip Sisson Provost & Vice President Middlesex Community College Site Coordinator Audrey Frater	Brenda Mercomes VP of Academic Affairs Roxbury Community College Site Coordinator Andrella King Faculty

Annex 1: List of Workshops

UMLSAMP Science Research Skills Workshops – Science & Engineering Core

Workshop Title:

Biotechnology Essential Skills Workshop

Location, Dates, Daily Schedule:

UMass Boston; Jan 11 - 15, 2010; Mon-Fri, 10:00 am – 3:00 pm

Participation of Sites, Students, and Faculty/Staff:

Primarily UMB, Open to UMLSAMP, 16 students, 5 faculty/staff, 2 researchers

Summary of Skills Taught in Workshop:

Lab safety approaches, Running acrylamide gels, Using Coomassie Blue Stain, Serial and direct dilutions of whole cell lysate from A431 cells, Using hypertriploid human cell lines, Using acrylamide gel under non denaturing conditions, Using Polyvinylidene fluoride (PVDF) membrane, Immunodetection, Immunoblotting using a SNAP i.d. Protein Detection System, and industrial demonstrations from Millipore Corporation researchers.

Workshop Title:

Biotechnology Essential Skills Workshop

Location, Dates, Daily Schedule:

Bristol Community College; Aug 8 – Aug 17, 2011; Mon-Fri, 8:30 am – 2:00 pm

Participation of Sites, Students, and Faculty/Staff:

Primarily BCC, Open to UMLSAMP, 16 students, 3 faculty/staff

Summary of Skills Taught in Workshop:

Molecular Cloning, PCR, DNA Visualization and Analysis, Aseptic Techniques, Bacterial Transformation, Plasmid DNA Extraction, Affinity Chromatography

Workshop Title:

Biomedical Instrumentation and Research Skills Workshop

Location, Dates, Daily Schedule:

Wentworth Institute of Technology; Jun 6 – June 10, 2011; Mon-Fri, 9:00 am – 4:00 pm

Participation of Sites, Students, and Faculty/Staff:

Primarily WIT, Open to UMLSAMP, 16 students, 4 faculty/staff

Summary of Skills Taught in Workshop:

Intro to Biomedical Engineering, Medical Instrumentation, Biosignals, Biomedical Testing & Calibration, Research Project Lab, Biomedical Data Analysis, Electro Physiology, Research Methods, Conducting Research and Documenting, Report Writing Lab.

Workshop Title:

Biomedical Training Workshop

Location, Dates, Daily Schedule:

Roxbury Community College; May 17 – May 28, 2010; Mon-Fri, 10:00 am – 3:30 pm

Participation of Sites, Students, and Faculty/Staff:

Primarily RCC, Open to UMLSAMP, 16 students, 5 faculty/staff

Summary of Skills Taught in Workshop:

Pipetting, Solutions & Dilutions, Intro to Molecular Catalysts, Spectrophotometer Use, Isolation & Purification with Affinity Chromatography, Chromatography Analysis, DNA Gel electrophoresis, FBPase Assay, Enzymatic Assay, Western Blotting.

Workshop Title:

Biotechnology Saturday Fall 2010 Workshop

Location, Dates, Daily Schedule:

Roxbury Community College; Oct 16, 23; Nov 6, 13, 20; Dec 4, 2010; 9:00 am – 3:00 pm

Participation of Sites, Students, and Faculty/Staff:

Primarily RCC, Open to UMLSAMP, 12 students, 6 faculty/staff

Summary of Skills Taught in Workshop:

Solutions Prep, Cell Culture/Aseptic Techniques, Spectrophotometry.

Workshop Title:

Essential Techniques in Biotechnology Workshop

Location, Dates, Daily Schedule:

Roxbury Community College; Jan 4 – Jan 14, 2011; Mon-Fri, 9:00 am – 3:00 pm

Participation of Sites, Students, and Faculty/Staff:

Primarily RCC, Open to UMLSAMP, 16 students, 5 faculty/staff

Summary of Skills Taught in Workshop:

Pipetting and Solutions Prep, Aseptic Techniques for Prokaryotic Cell Culture, Bacterial Transformations, Isolation of Plasmid DNA, PCR, Restriction Enzyme Analysis, DNA Gel electrophoresis, DNA Visualization and Quantitation

Workshop Title:

Fundamentals in Biotechnology Workshop

Location, Dates, Daily Schedule:

Univ. Mass Lowell; Jan 10 – Jan 21, 2011; Mon-Fri, 10:00 am – 3:30 pm

Participation of Sites, Students, and Faculty/Staff:

UML & Middlesex Community College students, 12 students, 3 faculty/staff

Summary of Skills Taught in Workshop:

DNA Sequence Analysis, Plasmid Manipulation, DNA Purification, Cell Culture Techniques, Genetic Manipulation of Mammalian Cells, Agarose Gel, Automated DNA Sequencing, Transfection of Cultured Cells, Gene Expression in Cultured Cells

Workshop Title:

Environmental Measurements, Stream & Groundwater Assessment Field Workshop

Location, Dates, Daily Schedule:

Univ. Mass Lowell; Jan 10 – Jan 14, 2011; Mon-Fri, 10:00 am – 4:00 pm

Participation of Sites, Students, and Faculty/Staff:

UML & Middlesex Community College students, 10 students, 2 faculty/staff

Summary of Skills Taught in Workshop:

Field techniques, Chemical Analysis using the LaMotte Smart Kit Colorimeter, Stream Gaging, Groundwater Measurement Modeling, Pollutant Tracking, Permeability Testing.

Workshop Title:

Fundamental Physical Laboratory Sciences Workshop

Location, Dates, Daily Schedule:

Univ. Mass Lowell; Jan 10 – Jan 21, 2011; Mon-Fri, 9:00 am – 3:00 pm

Participation of Sites, Students, and Faculty/Staff:

UML & Middlesex Community College students, 10 students, 2 faculty/staff

Summary of Skills Taught in Workshop:

Fundamental circuits design and fabrication, Signals measurement and analysis, Signal amplification and frequency filtering, Oscilloscopes use, Signal generators and power supplies, Building prototype DC and AC circuits.

Workshop Title:

Engineering Skills Workshop

Location, Dates, Daily Schedule:

Bunker Hill Community College; Aug, 2010; 9:00 am – 2:30 pm

Participation of Sites, Students, and Faculty/Staff:

Bunker Hill Community College students and other UMLSAMP, 9 students, 2 faculty/staff

Summary of Skills Taught in Workshop:

Word problems, Systems of Equations, Graphs as Models of Physical Systems, Creating and Interpreting Graphs using Excel, Study Habits of Successful Engineering Students, Hands-On Engineering Challenge Project, Intro to Vernier with Lab Activity, Intro to Principle of Conservation of Mass with Lab Activity.

Workshop Title:

Cell Culture Essential Skills Workshop

Location, Dates, Daily Schedule:

Bunker Hill Community College; Jan 7, 10, 12, 14, 19 – 2011; 9:00 am – 2:00 pm

Participation of Sites, Students, and Faculty/Staff:

Bunker Hill Community College students and other UMLSAMP, 12 students, 2 faculty/staff and 2 instructors from Beth Israel Deaconess Hospital & Boston University

Summary of Skills Taught in Workshop:

Basic skills for performing cell culture, Good manufacturing practices, Documentation Disciplines, Intro to Bioinformatics.

Workshop Title:

Engineering/STEM Institute Workshop

Location, Dates, Daily Schedule:

Bunker Hill Community College; Jan 18 – 20, 2011; 9:00 am – 2:30 pm

Participation of Sites, Students, and Faculty/Staff:

Bunker Hill Community College students and other UMLSAMP, 9 students, 2 faculty/staff

Summary of Skills Taught in Workshop:

Word problems, Systems of Equations, Graphs as Models of Physical Systems, Creating and Interpreting Graphs using Excel, Study Habits of Successful Engineering Students, Hands-On Engineering Challenge Project, Intro to Vernier with Lab Activity, Intro to Principle of Conservation of Mass with Lab Activity.

Workshop Title:

Cell Culture Essential Skills Workshop

Location, Dates, Daily Schedule:

Bunker Hill Community College; May 20, 23, 25, 27, & Jun 1 – 2011; 9:00 am – 2:00 pm

Participation of Sites, Students, and Faculty/Staff:

Bunker Hill Community College students and other UMLSAMP, 12 students, 2 faculty/staff and 1 instructor from Boston University

Summary of Skills Taught in Workshop:

Intro to cell culture, aseptic technique, working in a tissue culture hood, use of a carbon di-oxide incubator, intro to lab math, media transfer and inoculation, using an inverted microscope, using the hemocytometer, practicing toxin assays and cryopreservation.

Workshop Title:

Bio/Chem Basic Lab Skills Workshop

Location, Dates, Daily Schedule:

Bunker Hill Community College; Aug 29-31, 2011; 9:00 am – 2:00 pm

Participation of Sites, Students, and Faculty/Staff:

Bunker Hill Community College students and other UMLSAMP, 15 students, 4 faculty/staff.

Summary of Skills Taught in Workshop:

Metric measurements, Microscopy and Aseptic Lab, Molarity, Molar Solutions, Aqueous Solutions Lab, Bio/Chem Writing Skills, Chemistry Lab Skills, Physics Lab Skills.