

City University of New York Louis Stokes Alliance For Minority Participation: Perceptions, Performance and Evaluations

Dr. Claude Brathwaite, City University of New York, City College

Dr. Claude Brathwaite currently serves as the Director of Student Resources and Services at the City College Grove School of Engineering, utilizing a model of High Impact Practices and Engagement (HIPE). Dr. Brathwaite previously served as the Project Administrator and later Executive Director of the NYC Louis Stokes Alliance. He has also served as the Deputy Director of the City College Black Studies Program, the Director of the City College Black Male Leadership and Mentoring Program and has taught courses in Black Studies and Chemistry at the City College. At the NYC Alliance, he oversaw the day-to-day operation of the NYC Alliance programming across the 18 participating campuses at the City University of New York for 20 years. Dr. Brathwaite began his college education at Hostos Community College, received his BS in Chemistry from the City College of New York and his Ph.D. in Organic Chemistry from the Graduate Center of CUNY. He served as a Chancellors Fellow, and conducted additional postdoctoral training at Weill Cornell in the Division of Molecular Medicine.

CITY UNIVERSITY OF NEW YORK LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION: PERCEPTIONS, PERFORMANCE AND EVALUATIONS

The NSF supported Louis Stokes Alliance for Minority Participation at the City University of New York (NYC LSAMP) has, since its inception in November 1992, been at the forefront of a concentrated effort to substantially increase the number of underrepresented minority students (African-Americans, Hispanics, Native Americans and Native Pacific Islanders), who pursue and graduate with Baccalaureate Degrees in Science, Technology, Engineering and Mathematics (STEM). During their stay in the program NYC LSAMP Scholars are required to present at the NYC LSAMP Weekly Research Meeting Presentations at least once during the semester during their stay in the LSAMP resulting in each Scholar having a minimum of two research presentations with a Peer Evaluation. All incoming NYC LSAMP Scholars are required to attend a one-day Peer Mentoring training that was specifically designed for STEM majors, and students who are in their second semester of LSAMP participation are encouraged to act as mentors to new NYC LSAMP participants and STEM students at their home campus. At the end of every semester, NYC LSAMP Scholars are required to complete an Evaluation Survey describing their background information, coursework data, workload, summer activity and future goals. The paper will present the results of the Peer Evaluations and Peer Mentoring surveys, performance, and perceptions of the NYC LSAMP Scholars.

Introduction

The NSF supported NYC Louis Stokes Alliance (NYC LSAMP) at the City University of New York (CUNY) has, since its inception in November 1992, been at the forefront of a concentrated effort to substantially increase the number of underrepresented minority students (African-Americans, Hispanics, Native Americans and Native Pacific Islanders), who pursue and graduate with Baccalaureate Degrees in Science, Technology, Engineering and Mathematics (STEM). Since inception in November 1992 (through 2018), over 18,000 baccalaureate degrees have been awarded to underrepresented minority students in CUNY. The campus-based NYC LSAMP Activity Coordinators (ACs) served a critical role in the NYC LSAMP from inception [1].

Alliance Management

The NYC Alliance has four main committees that operated in a collaborative way to fulfill the NYC Alliance goals. The organization and management structure of the NYC LSAMP includes:

- A Governing Board, chaired by the Chancellor
- A University-wide Steering Committee, chaired by the Principal Investigator/Project Director
- College-wide Campus Steering Committees, chaired by the respective Steering Committee Members and
- A University-wide Activity Coordinators Committee, chaired by the Project Administrator

The Governing Board of the NYC Alliance consisted (as of 2018) ten CUNY college presidents, a faculty representative, a student representative, and an alumna of the NYC LSAMP. The NYC

LSAMP Steering Committee consists of one dean/provost from each of the seventeen CUNY partner colleges. This committee met at least four times each semester with the Project Directors and established policy for the NYC LSAMP. NYC LSAMP Steering Committee Members were presidential appointees of Alliance member campuses. Steering Committee members supervised/directed the Alliance program activities at their respective campuses. The *Campus Steering Committees* was chaired by the respective NYC LSAMP Steering Committee Members and meets on the respective campuses to provide executive direction to implement the Campus model. The Campus Activity Coordinators meet monthly with the Project Administrator, to review the NYC LSAMP Research Scholar's performances, campus operations, to plan and review operations to be carried out throughout CUNY.

Project Approach and Activities 1992-2018

The NYC Louis Stokes Alliance at the City University of New York was one of the programs that ensured the university-wide maintenance of a significant pool of underrepresented minorities (URM) in the STEM disciplines graduating with BS/BA degrees. The Collaborative Infrastructure at CUNY allowed for the adaptation and adoption of best practices in educational pedagogy and cutting-edge STEM research. The City University of New York graduated output rose from 274 in 1994 to 1,529 URM with BA/BS degrees in 2018 at the end of Phase 5 (Phase 1-5, 1992 to 2018). The 2018 graduation numbers show an increase over the previous year of 1,392. From 2011 to 2018, the BA/BS degree increased from 735 to 1,529 in 2018. This is an increase of 108% from the level reached in 2012 [2-4].

NYC LSAMP Alliance Activities

NYC LSAMP Research Assistantship - The NYC LSAMP Undergraduate Research Program served as the heart of the NYC Alliance. The program included research experiences on or off CUNY campuses, international research, research enrichment and career development. LSAMP Scholars engaged in High Impact activities during their stay in the program. At the end of Phase V seventy to eighty students participated each semester in the academic year research program. Twenty-five to thirty NYC LSAMP Research Scholars conduct research during the summer at CUNY. On average, twenty NYC LSAMP Research Scholars secure summer internships with REU programs, at National Labs/NASA labs and Industry sites.

International Research - The Alliance committed in 2008 to making the International Research (IR) Experience an important component of the High Impact undergraduate activities NYC Alliance participants engage in, and GlobalCUNY was inaugurated in 2009. From 2008 - 2019 over 250 students participated in research experiences in over 30 different countries.

Weekly Student Presentation Series - Each week six to ten Research Scholars are invited to present their research findings. Each cohort of presenters is a mixture of disciplines, campuses, and academic levels. LSAMP Research Scholars evaluate each other's presentations and are offered feedback and tips on improvement.

Peer Mentoring Training - The LSAMP Peer Mentoring Training Workshop was specifically to train LSAMP Scholars to serve as Peer Mentors for incoming freshman students interested in studying in the STEM disciplines. The program was envisioned to serve 200 to 300 STEM majors CUNY-wide.

NYC LSAMP Professional Development Institute - The Professional Development Institute (PDI) of the NYC Alliance consisted of a series of workshops and seminars designed to enhance the communication, professionalism, and career planning of the NYC Alliance Research Scholars.

NYC LSAMP CUNY Summer Research Program - Each summer, 25 to 30 students are selected to participate in the CUNY based Summer Research Experience program of the NYC Alliance. The students selected come from across the university and several different disciplines.

NYC LSAMP Activity Coordinators (ACs) - are graduate students at CUNY. A majority of the ACs participated in the NYC LSAMP as undergraduate scholars, and in their current position, serve as mentors/role models to current students, conduct the Peer Mentoring Workshops, the Professional Development Institute and GSAs for the summer research scholars.

CUNY Collaborations - As envisioned in the NYC LSAMP model, the Alliance collaborated with programs at CUNY with a STEM focus or offers experiential learning opportunities. These include the CUNY CRSP, C-STEP, McNair, Mellon, MARC, MBRS, Bridge, NOAA, and NASA programs.

NYC LSAMP Partnerships and Collaborations - Longstanding relationships with NASA labs and Department of Energy Labs were encouraged by the Alliance. NASA GISS and Brookhaven National Lab are the major partners for faculty and student research opportunities.

Bridge To the Doctorate - Nine cohorts of Bridge to the Doctorate were supported at CUNY. The Bridge to the Doctorate program of the NYC Alliance has been successful in transitioning a number of graduates into doctoral programs, and a number have completed MS degrees, and are now contributing to the STEM enterprise in Agency, Academic, and Industry settings.

NYC LSAMP 2014-2015 Evaluation and Evaluation Survey Data Analysis

All NYC LSAMP Scholars are required to present at NYC LSAMP Weekly Meeting Presentations at least once during the semesters they participate in NYC LSAMP. If students participate for a full year, they will present twice, once during each semester. During these meetings, students are evaluated by their peers and by the facilitator (generally, the Executive Director, or a current doctoral student in the sciences). The feedback provided during these meetings is factored into the overall evaluation of a student.

All NYC LSAMP Scholars are also required to attend a peer mentor training workshop, and students who are in their second semester of NYC LSAMP participation are expected to act as mentors to new NYC LSAMP participants. In addition to this training, there is at least one day-long professional development seminar offered per semester that is open to both NYC LSAMP students and other students in the CUNY community.

At the end of every semester, students are required to complete an evaluation survey describing their background information, coursework, workload, and future goals. This survey serves to document/evaluate the student's performance in NYC LSAMP, which impacts the decision to continue funding the student, and evaluates how NYC LSAMP is contributing to student career goals. This survey also allows NYC LSAMP to gauge its impact on student achievement. The following captures some trends seen in evaluation surveys completed by NYC LSAMP participants.

NYC LSAMP Scholar Evaluation Survey Aggregate Fall 2014 – Spring 2015

The NYC LSAMP provided stipends to 112 students from Fall 2014 to Spring 2015. LSAMP supported 71 students in Fall 2014 and 74 students in Spring 2015. Of those, 33 students participated in both Fall 2014 and Spring 2015 semesters. Students came from sixteen (16) different CUNY campuses, including: Baruch College (3.6%), Borough of Manhattan

Community College (9.0%), Bronx Community College (9.0%), Brooklyn College (2.7%), The City College of New York (21.6%), College of Staten Island (8.1%), Hostos Community College (2.7%), Hunter College (5.4%), John Jay College of Criminal Justice (0.9%), LaGuardia Community College (3.6%), Lehman College (8.1%), Medgar Evers College (4.5%), New York City College of Technology (13.5%), Queens College (1.8%), Queensborough Community College (2.7%), and York College (3.6%).

NYC LSAMP Scholars came from 23 different countries throughout North and South America and Africa. Of the NYC LSAMP students who participated throughout the 2014-15 school year, 36% of them were born in the United States. The other 64% of students were born in a variety of countries. While many of our students were born abroad, most students completed high school in the United States. Of the 63% of students who attended high school in the USA, 85.7% attended high school in one of the five New York City boroughs, 8.6% in the surrounding tri-state area, and 5.7% in other US cities. In terms of high school graduation, 48.6% of students graduated between 2010 and 2014, 36.7% graduated between 2005 and 2009, 10.1% between 2000 and 2004, and 4.6% between 1990 and 1999. The majority of NYC LSAMP Scholars are at least bilingual (76%), with some students speaking as many as four different languages. Participating students during the period spoke nineteen languages other than English.

Many NYC LSAMP students are engaged in several other activities in addition to their coursework and research commitment. Over 70% of our students participate in part-time work, extracurricular clubs or organizations, tutoring, and volunteer work. The majority of these students participate in two or more additional activities. The average overall GPA of an LSAMP student is 3.44, and the average semester GPA is almost identical at 3.43.

Evaluation Survey: Fall 2014

NYC LSAMP provided stipends to 71 students in Fall 2014, 33 female students and 38 male students. Students represented 14 different CUNY campuses. Of those, 20 students (28%) represented community colleges. Students were born in 18 different countries, with about 38.5% born in the U.S. Only 30% of students attending community college were born in the U.S., compared with about 42% of students attending senior colleges. Approximately 63% of students attended high school in the United States, and of those, nearly 87% attended high school in New York City.

Students were born in 18 different countries, with about 38.5% born in the U.S. The average overall GPA for LSAMP students was 3.38, identical to the average Fall 2014 semester GPA for NYC LSAMP students. Students attending community colleges had an average overall GPA of 3.53, compared with the average GPA of 3.33 for students attending senior colleges. Students, on average, met with their faculty mentors slightly more often than twice per week. Students who met with their mentors less than two times per week had an average GPA of 3.30, while students who met their mentors two or more times per week had an average GPA of 3.45.

Evaluation Survey: Spring 2015

NYC LSAMP provided stipends to 74 students in Spring 2015, 34 female students and 40 male students. Students represented 17 different CUNY campuses. Of those, 20 students (27%) represented community colleges. Slightly over 60% of students were born outside the United

States. Only 26% of students attending community college were born in the U.S., compared with about 46% of students attending CUNY senior colleges. Approximately 66.2% of students attended high school in the United States, and of those, about 71% attended high school in New York City.

NYC LSAMP students had an average GPA of 3.48 (on a 4.0 scale), nearly identical to the average semester GPA of 3.47. Students who attended high school in the US had an overall average GPA of 3.44 while international students had an average GPA of 3.54. Students who attended community colleges had an average overall GPA of 3.64, compared with the average GPA of 3.44 exhibited by students attending CUNY universities. Students, on average, met with their faculty mentors about two times per week. Students who met with their faculty mentors less than two times per week had an average GPA of 3.34, while students who met with their faculty mentors two or more times per week had a GPA of 3.56. Out of 71 students, 45 students have presented their research at a conference during the semester in which they participated at NYC LSAMP.

Fall 2014 – Spring 2015 Trends

Community Colleges - Over both semesters, the number of LSAMP scholars attending community college has remained consistent at about 27.5% of admitted students. On average, NYC LSAMP students attending community colleges are more likely born outside the United States, and this difference becomes more pronounced in the Spring 2015 semester. Students attending community colleges had higher GPAs than students attending senior colleges; this difference is statistically significant at the 90% level in the fall semester and at the 85% level in the spring semester.

GPA -Roughly 50% of students had a positive difference between their GPA for the semester they participated in NYC LSAMP and overall GPA (meaning their GPA during the semester they participated was higher than their overall GPA) while the other 50% of students had a negative difference. Those with a positive difference, on average, worked part time 10% more hours than those with a negative difference. Additionally, students who met with their mentors two or more times per week had a higher GPA across both semesters; the difference in GPAs in the spring semester is statistically significant at the 95% level. This is consistent with other studies that show the amount of mentor-student contact is positively correlated with GPA [5]. An evaluation of the Meyerhoff Scholars Program at the University of Baltimore County, a program similarly designed to increase minority student participation and achievement in the sciences, determined research internships with a faculty mentor component in which students and faculty met regularly to be particularly influential in retention and academic performance of African-American students in the sciences [5].

Accomplishments-Students stated widely varying answers when asked what the major accomplishment of their research project was; some viewed their major accomplishment as the results of their study, while some valued the experience and skills gained in the process. When asked what research techniques they learned during their experience, each student reported a different answer. They included different kinds of spectroscopy, computer coding, mathematics – it is clear that NYC LSAMP students are exposed to a very wide variety of research and techniques. Naturally, the students reported a number of different instruments utilized in their

research, which is attributed to the wide variety of techniques employed. The majority of students participated in a research presentation other than the required presentation over the course of the semester, providing students additional professional development skills as well as the opportunity to articulate their research to a multidisciplinary audience.

Faculty Mentor Survey

In addition to the evaluation survey, all students are required to complete a survey describing their experience with their faculty mentor. This survey asks about the frequency of meetings with the faculty mentor, helpfulness and supportiveness of the mentor, and overall commentary on this piece of the NYC LSAMP experience. Additionally, the mentor survey asks students to depict a typical weekday during the semester so that NYC LSAMP can glimpse the different activities NYC LSAMP scholars participate in and how much time they spend on each activity. Finally, the survey asks students to comment on their perception of the impact LSAMP has on themselves, the CUNY campuses, and their overarching community.

Mentor Survey: Fall 2015

For the Fall 2015 semester, we received 55 responses from NYC LSAMP scholars. A portion of the survey requires students to describe on a scale of 1 to 5 how fully they agree with positive statements about their experience working under their mentor. On average, all students chose “completely agree” for all statements. This included statements like, “*The meetings with my mentor are productive*”, “*I am satisfied with my relationship with my mentor*”, and “*I would like my relationship with my mentor to continue after I graduate*”, to name a few. The lowest scoring of these statements is, “*I meet with my mentor regularly*”; numerical data on this point is cited above. The remainder of the survey asks open-ended questions about the NYC LSAMP scholar’s experience, including a portion asking students to fill in a “weekly schedule” for a typical week.

Evaluation Survey: Spring 2016 - Spring 2017

Origin of LSAMP Scholars - NYC LSAMP Scholars at CUNY represent a global mixture of 53% born in the United States of the America, nearly 18% come from Africa and 29% come from Latin /South America. A total of 58% of the scholars are bilingual, with a majority having the ability to speak Spanish (62%) fluently as their second language to English. Other languages spoken include French (19%), and African local languages such as Arabic (12%) and Yoruba (8%).

Educational Background - Ninety-eight percent of the scholars possess a high school diploma and 2% have GED equivalent certificate. Nearly 63% graduated within 2010-2014, while 21% graduated within 2005-2009, 7% each graduated with 2000-2004 and 2015-2017, and 2% graduated before 1999.

Member College Participation/Present Academic Pursuit - A total of 167 scholars (Spring 2016-Spring 2017) completed the Evaluation Survey at the end of the semester (Spring 2016, Fall 2016 and Spring 2017). Of the 167 scholars, 17% were enrolled at a Community College of CUNY at the time, and 83% were enrolled at a Senior College of CUNY. The Borough of Manhattan Community College and the City College enrolled the largest number of NYC LSAMP Scholars (at the Community College and Senior College respectively). Of the Community Colleges, 7% of the scholars were students from Borough of Manhattan Community

College, and among the Senior Colleges, nearly, 30% were students from the City College of New York.

Future Academic Pursuit for Senior College Scholars - Over 23% of the scholars have begun looking into their next academic endeavor. Aiming for acceptance at the City University of New York, Cornell University, and Stony Brook University (not an exhaustive list), these students desire to further pursue degrees in their current fields. With the reminding 73%, have yet to plan their next step and, nearly, 4% claimed that they would make the decision soon.

Figure 1: NYC LSAMP Scholars at the Community Colleges

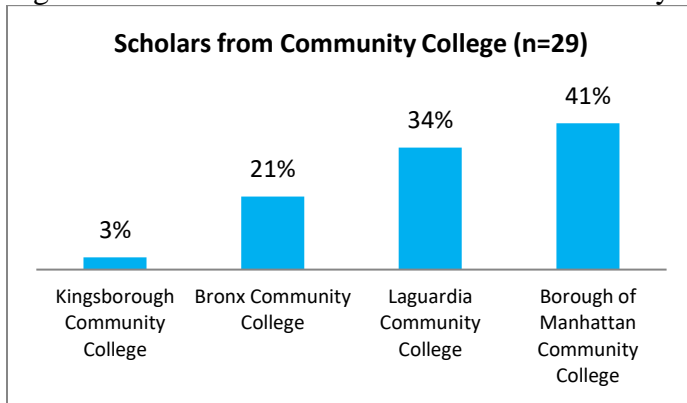
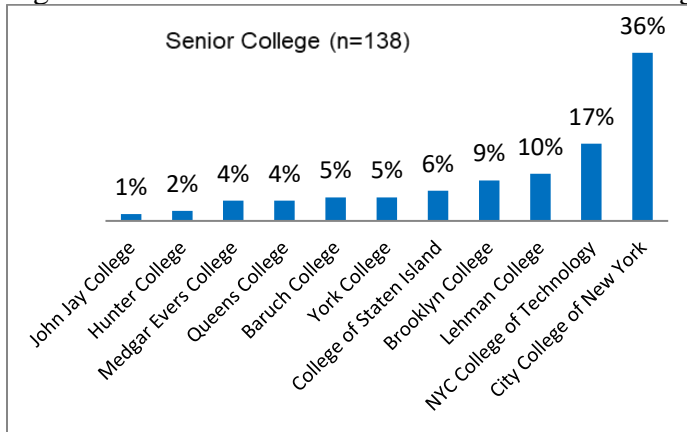


Figure 2: NYC LSAMP Scholars at the Senior College



NYC LSAMP Mentors

NYC LSAMP Scholars work closely on research projects with their faculty mentors who are specialists in their field of research. Nearly 54% of the scholars selected their mentors because of the impression left of the work done by the faculty mentors. Whereas, 17% selected their mentor because of the work ethics demonstrated by the mentor during research, 16% had taken some course in which the professor taught and decided to work with him/her, 8% were the high performing students that the mentors personally ask them to be a part of his/her team, and lastly, 5% found difficulty finding that perfect match, and were referred to a mentor who would match their interest well.

Meetings with Mentor - On average, scholars were required to meet with their mentors at most twice a week (79% of the 167), and nearly 69% “always” felt that they had adequate contact with their mentors. Moreover, if they did not have their regular meeting, 66% of the scholars stated that their mentors would “always” follow up with them. From these meetings, scholars rate their experiences from a scale of “Always”, “Most Times”, “Sometimes”, “Rarely”, and “Never”. A majority of NYC LSAMP Scholars, 72%, stated that the meetings with their mentor were “always” productive, and 74% were “always” satisfied with their relationship with their mentor. In addition, 75% claimed that their mentors “always” actively listen to their questions and responds appropriately, 73% further stated that their mentor would “always” provide constructive feedback on their performance, and while 63% stated that they would “always” set clear expectations and goals for their relationship and regularly reevaluate them.

Figure 3: Mentor Interactions and Meetings

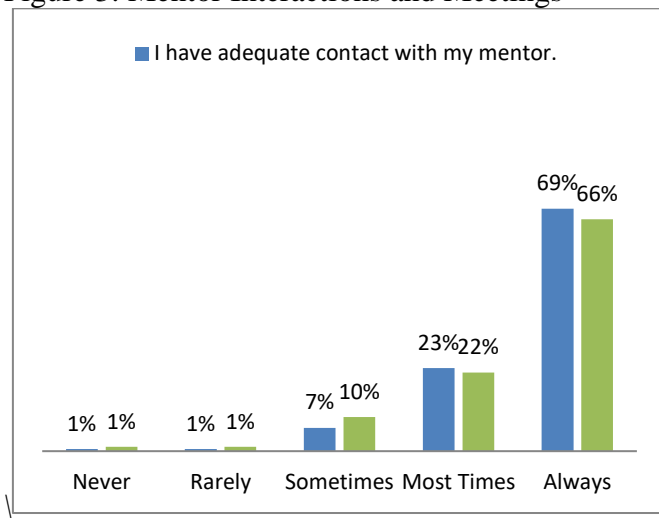


Figure 4: Quality of Meetings with Mentors

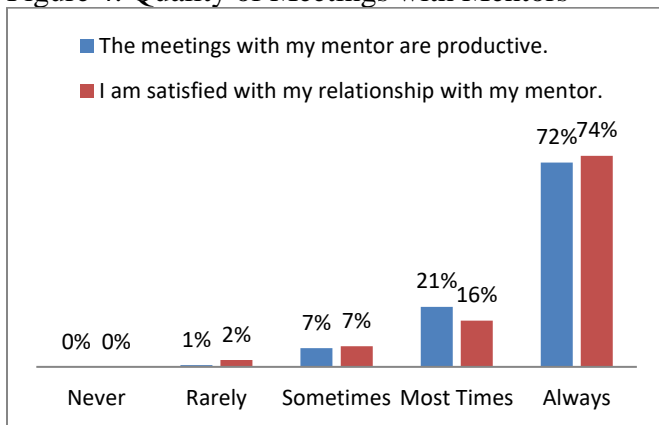
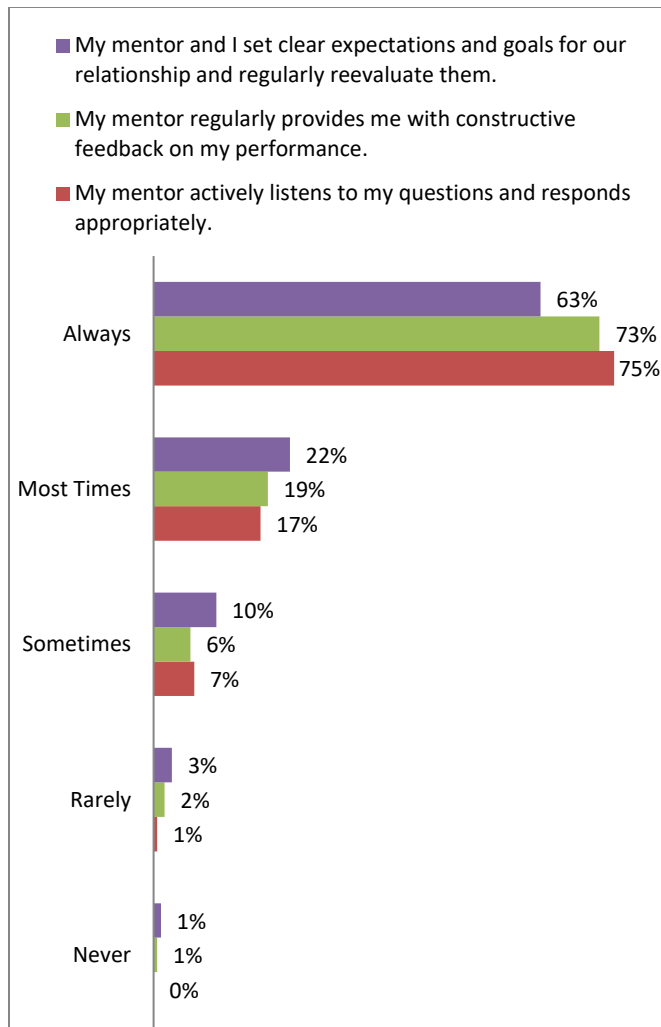


Figure 5: Mentor Expectations

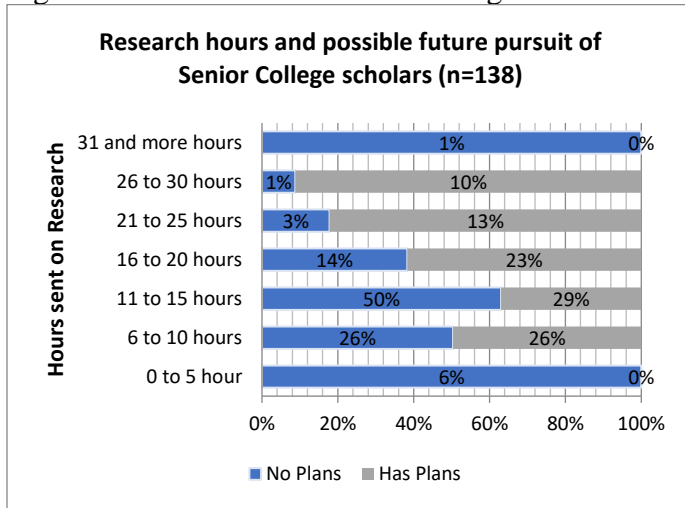


Scholars were also asked to identify any changes they wished in the relationship with their mentors. Only 21% stated some sort of change while the remaining 79% stated they would not change anything in their relationship with their mentor. What was found among the 21% of those who desire a change was that they felt the changes needed to be made within themselves. That is, 41% felt they needed to make changes in specific areas of their habits within their mentor-mentee relationship. Moreover, 79% of the self-change can be considered a positive change because from the relationship, they identified areas within themselves they needed to improve on. For example, many scholars stated they wished they had more time to invest in research and wished they had worked harder to achieve more of the set goals they have established.

Conversely, 32% felt that changes needed to be made by the mentor, and these were considered all negative changes. Many of the changes scholars desired included more communication/meeting with the mentors for feedback and assistance. A smaller total of 5% felt that both parties needed to make personal changes within the mentor-mentee relationship, and the identified reasons are like the abovementioned. Whether positive or negative, 22% who rated a negative/positive change in their mentor would consider changing their mentor given the right opportunities, while 77% would continue to work with their mentors.

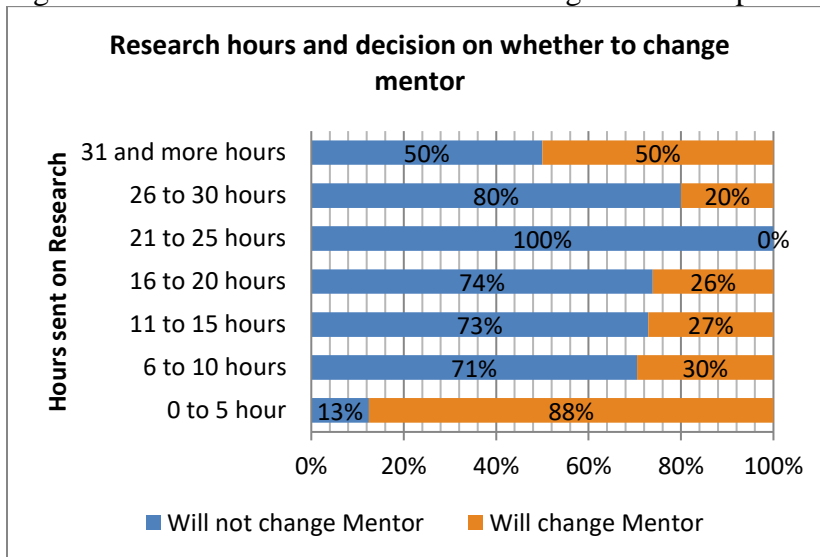
How influential was the mentor-mentee relationship on the scholars, their academic career and research work? There was a correlation between the research work hours and the senior college students pursuing higher education, ($r_{rb} = 0.203$, $n = 137$, $p = 0.017$). As a result, the more hours sent on perform research activities, the more likely scholars are aiming to pursue their education further.

Figure 6: Mentor influence on career goals



There was a correlation between the research work hours and whether scholars wanted a change of mentor, ($r_{rb} = -0.176$, $n = 159$, $p = 0.027$). As a result, the more hours spent on performing research activities, the least likely the scholars are thinking about changing their mentors.

Figure 7: Research Workload and Mentoring Relationship

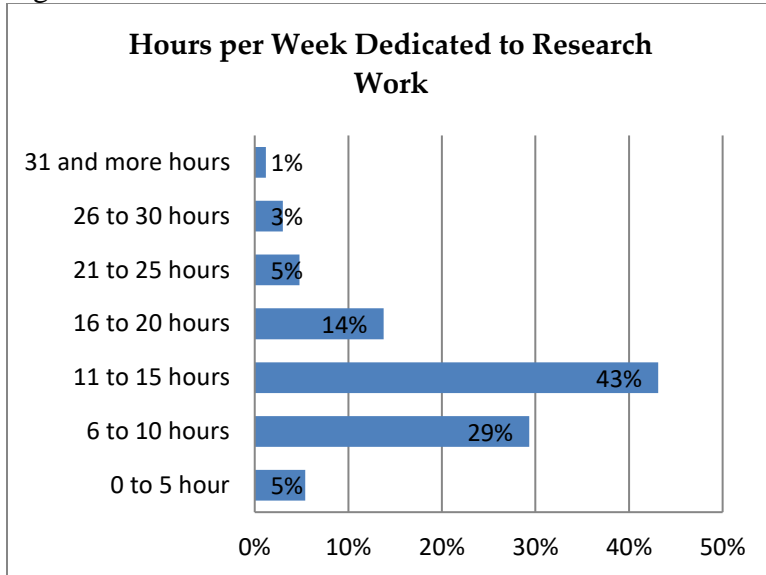


Research Fields - A majority of the scholars (39% of the scholars), were affiliated with a Physical Science department for their research work. The top 3 major academic departments in which scholars were affiliated with include Chemistry (14%), Mathematics (9%), and Earth

Science (5%). The distribution of the other affiliations is as follows: 27% were with Life Science, 24% were with Engineering, and 10% were with Computer Technology.

Dedication to Research - In a given week, some scholars have to juggle school, research and work. Nearly, 43% of the scholars spent 11 to 15 hours a week on conducting research, and 60% spent more than 5 hours a week at working at a part-time job. There is no difference between research hours and whether scholars were from a community college or a senior colleges or within the disciplines of the research.

Figure 8: NYC LSAMP Scholar Research Workload



NYC LSAMP Scholars: GPA Analyses - LSAMP accepts students with a 2.7 GPA from a Junior College and 3.0 GPA from a Senior College. Both community and senior college scholars from the Spring 2016 – Spring 2017 participation periods had a higher overall GPA score (greater than the minimum for selection to participate). The average overall GPA for community college was 3.44, and the average overall GPA for senior college participants was 3.48. There is no difference in GPA between the type of colleges the LSAMP Scholars represent.

Table 1: NYC LSAMP Scholar GPA Evaluation Survey: Spring 2016 - Spring 2017

Senior Colleges	Mean GPA
Baruch College	3.70
Brooklyn College	3.40
City College of New York	3.45
College of Staten Island	3.42
Hunter College	2.96
John Jay College	3.62
Lehman College	3.72
Medgar Evers College	3.50
NYC College of Technology	3.46

Queens College	3.36
Staten Island	3.91
York College	3.51
Community Colleges	
Borough of Manhattan Community College	3.57
Bronx Community College	3.82
Kingsborough Community College	3.77
LaGuardia Community College	3.12

Discussion

NYC LSAMP scholars are spread on all participating campuses and roughly correlates to the research activity at each campus and the opportunities/programs available. On some campuses (primarily the community colleges) the program is the ‘next step’ for students with an interest in STEM after completing programs that are more exploratory in nature. Level 1 students/Research Scholars are full-time students in a mentored research relationship with faculty and must show progress towards completion of the baccalaureate degree to continue participation in the program.

New York City is an entry point for many immigrants to the US and this is reflected in the program participants that hail from over 18-23 different countries throughout North and South America and Africa. However, more than a third were born in the US and nearly two thirds completed high school in the US. The program participants are very diverse in language, culture, majors and gender. Over 70% of our students participate in part-time work, extracurricular clubs or organizations, tutoring, and volunteer work. Scholars are very active on and off campus with some having additional part-time employment and are able to maintain excellent academic performance with average GPAs above 3.3 on a 4.0 scale. For the two periods examined there is no major differences seen for the areas examined above.

The Faculty Mentor Survey assessing the frequency of meetings with the faculty mentor, helpfulness/supportiveness of the mentor, and overall commentary on this component of the LSAMP experience were quite revealing. Scholars were satisfied with the relationship with their mentor, would continue working with them and wanted more time to invest in research and wished they had worked harder to achieve more of the set goals they have established. The mentoring relationship is extremely important as the more hours spent on performing research activities, the more likely scholars are aiming to pursue their education further. As a result, the more hours spent on performing research activities, the less likely the scholars are thinking about changing their mentors and students who met with their mentors two or more times per week had a higher GPA across both semesters.

NYC LSAMP Scholar Peer Mentor Training

One intervention that can promote STEM degree attainment in CUNY are peer mentoring programs. Peer mentoring has been shown to increase mentees investment and involvement in their majors; therefore, could be a possible solution to the low persistence rates in STEM. Peer mentors are upperclassmen who are paired with lowerclassmen; first year and second year

students, to guide and provide advice to their mentees [6]. The primary role of a peer mentor is to interact with their mentees to establish mentees' strengths and initiating their path towards working autonomously [6]. To promote such growth, mentors share their most recent experiences and endeavors with their mentees [7]. Student peers can strongly influence student's commitment to academic work [8]. Mentees can also develop productive approaches to learning from their peer mentors [9]. Peer mentoring relationships allow mentees to feel more comfortable with their chosen major. This allows mentees to become more confident in their abilities to perform well academically. Peer mentors connect their mentees to social support groups on campus, which bolsters their sense of belonging to their institutions.

Peer mentoring can be employed in combating low persistence in STEM. Peer mentoring has been found to increase the chances of students capitalizing on available STEM related opportunities, to build networks of peers for guidance to help each other in STEM courses, and to discover professional identity development (Holland, Major, & Orvis, 2011). Considering that peer mentors are students who are in their junior and senior year of college, they will be able to shed insight on their career goals to their mentees and what they did to establish those goals.

The NYC LSAMP is incorporating Peer Mentoring in STEM trainings as a new piece to prepare NYC LSAMP scholars with the information and tools needed to become peer mentors on their individual campuses. Specifically, NYC LSAMP scholars are ideal students to be STEM peer mentors because they have the STEM academic background and research experience to share with incoming undergraduates. NYC LSAMP's primary mission is to increase the number of underrepresented students who enroll and graduate with a baccalaureate degree in STEM. This peer mentoring component aims to educate students about the necessity for peer mentoring programs, specifically those with an emphasis in promoting STEM disciplines. During the peer mentoring trainings, NYC LSAMP scholars were provided with a toolkit of best practices and strategies to serve incoming first year and second year students. As part of the training, students learned about the goals of a peer mentoring program and how they can be applied to improve various STEM disciplines.

As a result of being trained, NYC LSAMP scholars can provide insight on strategies used in their STEM coursework, and also share information about other resources that guided the mentors along the way. These mentors can increase the chances of mentees having positive outcomes (i.e. persisting in chosen STEM discipline). They may utilize their research expertise to assist in producing higher persistence in the STEM disciplines and shed light on their experiences at CUNY. NYC LSAMP scholars could promote increased student engagement in high impact activities at the campuses across CUNY.

Peer Mentoring Method

All new NYC LSAMP Scholars are required to attend a one-day Peer Mentoring training that was specifically designed for STEM majors, and students who are in their second semester of LSAMP participation are expected to act as mentors to new NYC LSAMP participants. Also required for new NYC LSAMP Scholars is a one-day Professional Development seminar offered twice per semester that is open to both NYC LSAMP students and other students at CUNY. Prior to the training sessions, students are divided into groups for the group activities. Each group has five-six students depending on how many students confirmed their attendance for the training.

Students are placed in diverse groups such as that their different gender, majors, and CUNY campuses are represented in the group.

LSAMP Peer Mentoring Training Curriculum Activities

- Peer Mentoring Training Agenda
- Group Assignments
- Two Truths and Lie Activity Instructions
- Peer Mentoring in STEM Discussion
- Barriers to Academic Success as STEM students Discussion/Instructions
- Guidelines and Boundaries Instructions
- Peer Mentoring Guidelines Handout
- Establishing Boundaries Activity Instructions
- Effective Communication and Listening Skills Instructions
- Listening Problems and Skills Activity Instructions
- Faculty- Student Interactions Instructions
- CCNY/ CUNY Campus Resources
- LSAMP Peer Mentoring Training Evaluation

Responses

Results from the Pre-Peer Mentoring Evaluation and the post Evaluation were collected and evaluated to determine how the NYC LSAMP Research Assistants perceive the Peer Mentoring training (n-56).

Table 2: Common responses to the Pre-Peer Mentoring Evaluation

Describe Mentoring in Your Own Words	Rank the Importance of Mentoring	Three Qualities that Make a Good Peer Mentor	Three Qualities that Make a Bad Mentor
Giving others advice based off of previous experience	Important	Patience	Impatient
Supporting others toward their goals	Very Important	Good Listener	Unreliable
Helping other students and leading them to positive outcomes		Caring	Rude
Guiding individuals through different situations		Understanding	Judgmental

Response: My Overall Rating of the Information that I Received from this Workshop. Question 1 from the Peer Mentoring Training Evaluation. The results from all three sets of evaluations

were added and the overall percentages for each answer was calculated. 87% of students who attended the peer mentoring training highly rated the information received in this workshop.

Response: The Workshop Met My Expectations. Question 2 results from the Peer Mentoring Training Evaluation. The training met the expectations of 80.8% of the trained students.

Response: The Workshop Content was Organized and Easy to Follow. Question 3 results from the Peer Mentoring Training Evaluation. 92.30% of the students found the content of the workshop to be organized and easy to follow.

Response: The Materials that were Distributed were Helpful. Question 4 results from the Peer Mentoring Training Evaluation. 84% of students found the materials to be helpful in their training towards becoming a peer mentor.

Response: I Learned Techniques and Strategies that I will Use as a Peer Mentor. Question 5 results from the Peer Mentoring Training Evaluation. 78.9% of the students learned techniques they will use as a peer mentor.

Response: The Facilitators were Knowledgeable and Prepared. Question 6 results from the Peer Mentoring Training Evaluation. 90.4% of students found the facilitators to be knowledgeable and prepared for the training.

Response: I will Recommend this Training to Other Students. Question 7 results from the Peer Mentoring Training Evaluation. 75% of students would recommend this training to other students.

There were 153 scholars who completed the Peer Mentoring Training Evaluation for LSAMP during Fall 2015-Fall 2017 academic periods.

For the training evaluation, participants were required to rate the following questions on a Likert scale of 1 ('Strongly Disagree') to 5 ('Strongly Agree') for the 6 items listed below, follow by an overall rating of the Peer Mentoring Training program for the semester.

- The workshop met my expectations.
- The workshop content was organized and easy to follow.
- The materials that were distributed were helpful.
- The facilitators were knowledgeable and prepared.
- I learned techniques and strategies that I will use as a Peer Mentor.
- I will recommend this training to other students.

The Kruskal-Wallis test was conducted to determine if there is any difference among the ratings over the different semester. With all resulting in the lack of a rejection of the null, it suggests that there is no evidence that there were any differences in the rating over the semesters.

The participants were asked to provide their overall rating of the peer mentoring training. The following graph depicts the average rating over the semesters. A one-way ANOVA test revealed that there is no statistical significant difference, $F(6,152) = 0.0365$, $p > 0.05$.

Discussion

The NYC LSAMP peer mentoring training allows NYC LSAMP scholars to see similar challenges students face daily while pursuing a degree in the STEM fields. While openly discussing these barriers, they became aware that they were not alone in their struggles. Other students could be presently facing similar situations. As individuals who have overcome such barriers, they have acquired a set of skills and knowledge to master their STEM courses. This is information that NYC LSAMP scholars can now pass along to their peer mentees. Using peer mentoring, they can facilitate others on their struggles through guidance, comprehension, understanding, and willingness to share their experiences. This allows lower classmen to see that persistence and perseverance are key components to being successful in the STEM disciplines. By bringing awareness to our current STEM student population, we are opening a world of possibilities towards overcoming low persistence rates. Even if these trained students do not join formal mentoring programs, they will feel encouraged to guide their counterparts. This partnership will allow lower classmen to feel motivated in continuing their pursuit to a degree in the STEM fields.

The results from the evaluations suggest that NYC LSAMP scholars have a positive outlook overall regarding peer mentoring training. Seventy-five percent or more of the students agreed with all the questions asked in the post-training evaluation. Speculations could be made why some students chose “strongly disagree” or “disagree” for some of the questions. For example, for Question 7, “I will recommend this training other students”, some students probably chose to disagree or strongly disagree because they did not want to sit through an all-day training on a Saturday. As a recommendation for future evaluations, students should be asked to give a reason as to why they chose to disagree or strongly disagree with a given question.

These NYC LSAMP -STEM peer mentors have been trained to provide insight on strategies used in their STEM coursework and serve as a reference to their mentees. These mentors can utilize their research expertise to assist in producing higher persistence in the STEM disciplines and promote increased student engagement in high impact activities at the campuses across CUNY. Moving forward, we hope to scale up this STEM peer mentoring initiative CUNY wide.

At the end of five phases of NYC LSAMP at CUNY over 25 years, the impact of the program is magnified by the Collaborative Infrastructure at CUNY and a mindset of making true systemic reform that is scalable across the university, with programs that broaden participation in STEM and academic success across the university and across both STEM and non-STEM disciplines.

ACKNOWLEDGEMENTS

We acknowledge the support of the faculty and staff of the City University of New York in supporting the NYC LSAMP activities. We acknowledge the dedication and work of the faculty mentors at CUNY and at the non-CUNY partner sites, as well as the Project Directors, Steering Committee and Activity Coordinators. We acknowledge the funding support of the NSF to the City University of New York and the NYC LSAMP.

REFERENCES

- [1] Clewell, B.C., Cohen, C.C., Tsui, L., & Deterding., N. (2006). Revitalizing the Nation's Talent Pool in STEM. Washington, DC: The Urban Institute.
- [2] New York City Louis Stokes Alliance Annual Reports 1998-2011.
- [3] New York City Louis Stokes Alliance Impact Report 1992-2012 (2012).
- [4] New York City Louis Stokes Alliance Impact Report 1992-2015 (2012 and 2015).
- [5] Campbell, T. & Campbell, D. (1997). Faculty/student mentor program: Effects on academic performance and retention. *Research in Higher Education*, 38(6): 727-742.
- [6] Ward, E. G., Thomas, E. E., & Disch, W. B., *Journal of College Student Development*, 55(6), 563-579 (2014).
- [7] Hall, R., & Jaugietis, Z., Developing peer mentoring through evaluation. *Innovative Higher Education*, 36(1). 41-52 (2011).
- [8] Astin, A. W., Student involvement: A developmental theory for higher education. *Journal of College Student Development*, 40(5), 518-529 (1999).
- [9] Chester, A., Burton, L. J., Xenos, S., & Elgar, K. Peer mentoring: Supporting successful transition for first year undergraduate psychology students. *Australian Journal Of Psychology*, 65(1), 30-37 (2013).