



SUNY/NYAS STEM Mentoring Program Statewide Scale Up Project

SUNY Central: Johanna Duncan-Poitier*, Jill Lansing*, Phillip Ortiz* **Academy:** Meghan Groome*, Kristian Breton, Stephanie Wortel

Downstate Medical Center: Mark Stewart, Kristine Paulsson; **Center for Nanoscale Science and Engineering:** Robert Geer, Nakesha Smith; **Institute for Technology:** Deborah Tyksinski, Elizabeth Rossi; **Environmental Science and Forestry:** Charles Spuches, Brandon Murphy; **Oswego State:** Lorrie Clemo, Karen Valentino; **Stony Brook University:** Angela Kelly, Joe Cirnigliaro
Empire State College: Gwendolyn F. Elphick
 Gaylen Moore Program Evaluation

*Principal Investigators



Summary

The United States is facing a crisis: not enough students are being trained in the areas of science, technology, engineering and mathematics (STEM) to support and foster economic growth. In response, the State University of New York (SUNY) and the New York Academy of Sciences (The Academy) are collaborating to train SUNY graduate students and post-doctoral fellows to deliver mentoring and STEM content to underserved middle-school children in afterschool programs.

Since 2010, as part of the Afterschool STEM Mentoring Program, The Academy has successfully trained graduate students within the New York City area; to date they have reached >10,000 middle school students with curricula in areas such as genetics, mathematics, and space science.

At the suggestion of SUNY Chancellor Nancy Zimpher, who serves as the Chair of the Academy's Board of Governors, we have developed a collaboration whereby SUNY graduate students and post-doctoral fellows learn pedagogy and content via an online course, and then are placed in underserved afterschool programs in New York State. The online course was developed by faculty and SUNY ESC. After a thorough evaluation of the course, curriculum, and methods, the program goal is replication throughout the United States.

Project Rationale: Problem

U.S. needs STEM competent professionals

In order for the United States to keep pace in our fast-evolving global economy, we must be innovative in preparing a future cadre of highly-qualified STEM professionals.

Low STEM competency equates to:

1. Being shut out of many employment opportunities, resulting in,
2. Relegation to lower wage, low-skill jobs, effecting life time earnings and quality of life, and negative impact on the broader economy.

What is Lacking Now Impacts the Future

-- Basic Math and Science Skills in pre-secondary education are not sufficient to provide the workforce necessary.

-- Traditionally underserved families (incl. lower income) particularly struggle with the lowest STEM proficiency.

-- Fourth and Eighth grade Hispanic and black students are 25-38 points behind the average percentage vs. their white peers who are at/near grade level in NY.

(U.S. Department of Ed's National Assessment of Educational Progress, 2009)

Primary Project Goals

1. Increase middle school student access to and participation in high-quality, engaging and hands-on STEM programs in informal learning environments;
2. Improve the teaching and outreach skills of participating scientists-in-training (graduate students and postdoctoral fellows) through online learning and virtual training seminars;
3. Test hypotheses around scalable program elements;
4. Successful program implementation at all six sites: -- first three SUNY Center for Nanoscale Science and Engineering, Downstate, and Institute for Technology) and, -- additional three: Environmental Science and Forestry, Oswego Stony Brook State, and University;
5. Continue program evaluation: online course, middle-school curricula, and implementation process

Making an Impact

Over 400 former mentors were surveyed to test if clinical experiences with the ASMP could impact their career paths. Over 90 responded with the following results in two key areas.

Mentors reported their interest in K-12 teaching changed



The vast majority reported that their opinion of the prestige of a K-12 Teaching Career was higher than their perception of their colleagues' view.

Mentors' opinions regarding the prestige of K-12 teaching careers were different than their peers



Source: Wortel, S. Stony Brook University. Pending publication.

The Partners and the Synergy of 'Systemness'

SUNY, the largest and most comprehensive public higher education institution in the nation, is deeply committed to improving the education pipeline for New York's students.

-- 600+ NSF-funded projects currently underway across its statewide network of campuses.

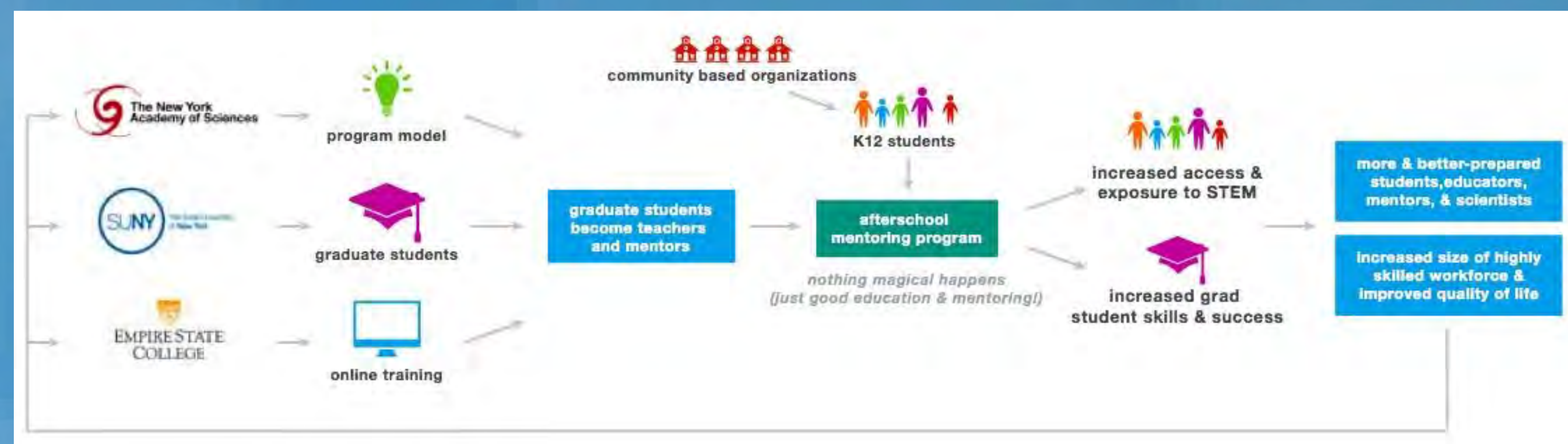
--Partnering with The Academy, as demonstrated by SUNY Chancellor Zimpher's role as Chair of the Academy's Board of Governors.

The Academy provides training for mentors and inquiry-based curriculum in STEM areas ranging from life sciences to computer programming.

Empire State College provides online support through a three-credit, graduate-level, modeled upon successful courses that are part of the existing curriculum in STEM and MAT. After completion, Mentors connect virtually for support and asynchronous discussion.

Challenges

1. During the RFP process seven high-quality proposals were submitted, but only three could be chosen.
2. Adapting curriculum to the unique populations of graduate students and post-doctoral fellows requires flexibility.
3. Coordinating SUNY campus schedules with local middle calendars limits ability to align program elements.



Program Highlights, Year One and Year Two

Major Focus Areas

1. Increase Number of Mentors and Students

Key parameter: *Successfully increase participation*
 2012-2013
 -- 27 mentors, ~240 students
 -- 11 program sites

2. Impact on Students

Key Parameters: *Student content knowledge, attitudes, self-efficacy and interest*
 2012-2013 after participation Students had:
 -- significant knowledge increase in taught subjects
 -- significantly greater enthusiasm for STEM
 -- increased interest in a STEM career

3. Impact on Mentors

Key parameters: *Teaching skills and confidence*

2012-2014 Mentors had:
 -- positive education experience and knowledge gain in teaching skills from online course participation
 -- felt more confident about their teaching skills
 -- improved their classroom effectiveness per independent classroom evaluations

4. Quality of Implementation

Key parameters: *Mentor practice and support*
 2012-2013
 --3 streaming training sessions
 2013-2014
 -- 6 sessions in 2013-2014

2012-2014 Online course through Empire State College

2013-2014
 -- 81 mentors, ~800 students
 -- 14 program sites

2014-2015 Goals

1. Reach a greater number of students and mentors
2. Continue curricula development, training, and expansion
3. Use knowledge gained in this program to develop additional innovative programs for mentors and students
4. Launched Scientist in Residence program with mentors working with teachers during the school day on research questions

Acknowledgments

This project supported by the National Science Foundation, award #ISE-1223303 to the New York Academy of Sciences, award #ISE-1223531 to the State University of New York, and award #ISE-1223284 to Empire State College.

