SUNY/NYAS STEM Mentoring Program Statewide Scale Up Project

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.

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.

Summary

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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. Relocation to lower wage, low-skill jobs, effecting lifetime 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/above grade level in NY.

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

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.

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 scientist-in-training (graduate students and post-doctoral 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 Nanoscience Science and Engineering, Downstate, and Institute for Technology)

5. Additional three: Environmental Science and Forestry, Oswego Stony Brook State, and University;

6. Continue program evaluation: online course, middle-school curriculum, 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 50 responded with the following results in two key areas.

1. Mentors reported their interest in K-12 teaching changed

2. 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.

Program Highlights, Year One and 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:
   -- significantly 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 #1121333 to the New York Academy of Sciences, and #1523531 to the State University of New York, and award #SE-1223284 to Empire State College.

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Career Pathways Project Evaluation