MSP-Start: Science and Math Applied Real-problem Teaching (SMART)

Adelphi University, Garden City, NY: Sean J. Bentley, Department of Physics (Project Director and PI), Elizabeth de Freitas, School of Education (Co-PI), Lee Stemkoski, Department of Mathematics (Co-PI), Gary Schechter, College of Arts and Sciences Math and Science Coordinator; *Westbury Free Union School District*, Westbury, NY: Brumsic Brandon, High School Science (Co-PI), Patricia Mueller, High School Science; *Cradle of Aviation Museum*, Garden City, NY: Andy Parton, Deputy Director; *New York Hall of Science*, Queens, NY: Preeti Gupta, Senior Vice President of Education and Public Programs; *Martin Van Buren High School*, Queens, NY: Marilyn Shevell, Principal; *Long Island Science Center*, Riverhead, NY: Delia Gibbbs, Executive Director; *Riverhead Central School District*, Riverhead, NY: Lois Etzel, Director of Science

Museum-based Learning   *Physics First*

SMART

Math-Science Integration   *Problem-based Learning*

Project Overview

The SMART project is a collaboration between Adelphi University and Long Island/New York City high schools and science museums. The goal of the project is to enhance the quality of high school science and mathematics education in high-needs schools in Long Island, New York by (1) jointly developing a museum-based curriculum grounded in inquiry models of instruction and (2) building school capacity for ongoing professional development and build learning communities among math and science teachers. The SMART project pairs high schools with a nearby science museum. This partnership enables teachers and students to gain an appreciation for how the material relates to the world around them by providing opportunities for students to make connections between theoretical science and real life experiences. This project is jointly designing a grade 9 integrated physics/math course grounded in local interactive museum contexts, and build a collaborative network amongst teachers, museum educators and university faculty. The program incorporates Physics First, an educational philosophy involving teaching physics at the beginning of the high school curriculum.

Activities at Long Island Science Center

Exhibits at Cradle of Aviation Museum

Hands-on Labs at Adelphi for participants

Exhibits at New York Hall of Science

Project Indicators of Success

The evaluation plan for this project centers around 4 guiding program evaluation questions:

1. What relationships exist between non-traditional preparation (9th grade) in physics, academic success in the subject, interests in science careers, and interest in future studies in science courses/studies?

2. What, if any, contributions do non-formal learning experiences play in improving academic performance in the physics and interest in future pursuits in science?

3. What, if any, contributions does the Science and Math Applied Real-problem Teaching (SMART) make toward the professional knowledge, skills and attitudes of secondary teachers of science?

4. What evidence exists to suggest that the SMART program can be successfully scaled-up (and replicated) by the end of Year 2?

These questions will be answered through a mixed-model (quantitative/qualitative) design that includes student test scores, survey instruments, field observation using observational frameworks and focus group interviews. The collection of data will target the objectives below:

1. Student-Based Outcomes
(a) Improved Performance on State-Mandated Exams
(b) Performance on Problem-Based Standardized Exams
(c) Increased Numbers Expressing Interest In Obtaining Degrees in STEM subjects

2. Teacher-Based Outcomes
(a) Increased Effectiveness based on Improved Student Performance
(b) Increased Numbers of Teachers Trained in the Methodology

3. Institutional-Based Outcomes
(a) Increased Enrollment in Upper-Level Science and Mathematics Courses
(b) Improved Scores on State Academic Assessments