



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



Hands-on Labs at Adelphi for participants

Activities at New York Hall of Science



Exhibits at Cradle of Aviation Museum



Activities at Long Island Science Center

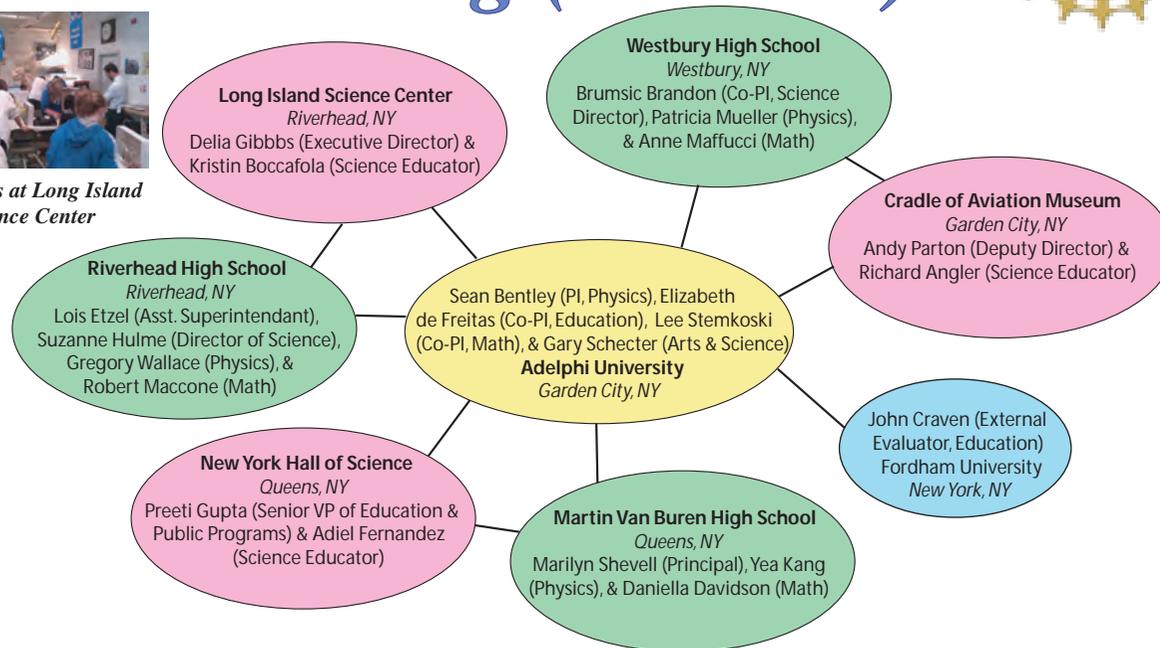
Museum-based Learning

Physics First

SMART

Math-Science Integration

Problem-based Learning



Project Indicators of Student Success

Improved Performance on State-Mandated Exams

In Year 1 of the pilot, 87% passed the Regent's exam (in a school with average pass rate of ~50% for juniors and seniors). In Year2 of the pilot, 88% passed. Additionally, 100% of those from Year 1 who took the Chemistry Regent's exam in Year 2 passed. The first full set of students will be taking the exams this year.

Performance on Problem-Based Exams

These will be administered for the first time this spring, with problems mixed into a regular exam.

Increased Enrollments in High School Science and Math Courses

We are looking for increased student interest through increased enrollment in all math and science subjects.

Increased Numbers Expressing Interest In Obtaining Degrees in STEM subjects

We will initially hope for higher numbers through a survey, but will ultimately track the students.

Project Challenges to Student Success

Within the structure of the SMART curriculum, we must still follow the NY State Regent's guidelines.

We work with the teachers and museum educators to develop innovative elements that fit.

We must face resistance to the concept of Physics First, needing to show success in using the SMART system to teach Regent's physics to high school freshmen.

By outreach to parents and discussions with teachers and administrators, the mindset is changing. We will explore how schools and museums in different areas (urban, suburban, and rural) can have meaningful interactions to promote excitement and student engagement in physics and mathematics (including issues of time, money, and other resources).

Each of our three sites needed a much different approach to the interaction, but it works well at all.

We needed to develop the instruments for quantifying the measurements of success, exploring each element.

With several elements being introduced, it is important to be able to see the effects of each.

Research Design for Student Success

The teachers, museum educators, and math-science education students are trained in the SMART program and work together to develop lesson plans during an annual summer institute.

Lesson effectiveness is followed by evaluation using a program-created rubric.

Students are given pre/post surveys about their attitudes towards science and science education.

Teachers keep an on-line log of activities to monitor success of SMART elements.

Students are given exam questions specifically designed to explore their level of problem-solving skills.

Video data is collected and analyzed to search ways to improve programatic elements as related to students.

Care is taken to ensure that while the classes focus on innovative methods to improve student learning and increase student interest, the students still cover the needed material for success on the state exam.

Roles of Project Partners for Student Success

The Adelphi faculty organize and run the SMART Summer Institute in which all program participants are trained, and during which lesson plans are developed.

The museum educators work with the high school teachers to develop innovative, hands-on, real-world activities to enhance student learning beyond that of a traditional classroom.

The high school teachers have ultimate responsibility for the lesson plans, working to ensure that they both display the features of the SMART program while at the same time follow the Regent's curriculum.

The school administrators are responsible for ensuring that the day-to-day issues of the classes run smoothly (student transportation, class scheduling, liason with museum administration, etc.).

The external evaluator works closely with the PI to develop tools to quantify the success, and analyze the data.

The PI meets regularly with all involved, including frequent classroom observations, to make sure the program is meeting the needs of all involved in the best interests of the students.