

Title IIB: Massachusetts Mathematics and Science Partnerships Continuation Grants

Summaries of Funded Projects – Grants awarded September 2006; ending August 2009

The Science Improvement Partnership (SIP): Improving Physical and Earth Science Education in Southeastern Massachusetts and Cape Cod

Partners: The public school districts of Brockton, Barnstable, New Bedford, Fall River, Plymouth; Cape Cod and North River Collaboratives; and Bridgewater State College, Bristol Community College, and Cape Cod Community College

The goal of the project is to improve the content knowledge of science teachers, grades 4 - 8, through a series of graduate-level science courses. The targeted teachers are those who are not yet highly qualified in science or not yet licensed in science in elementary or middle school. The courses include "Energy and the Environment", "Special Topics in Chemistry", and "Special Topics in Geology." The courses have been designed to address the weaknesses in the areas of science as determined by an analysis of the science MCAS results from the last three years in each of the partner districts as well as aligning with current Massachusetts curriculum frameworks. Each course is being offered at all three higher education sites on a rotating schedule for teachers from the partner districts. In the fall, the first course, "Energy and the Environment," will be held at Bristol Community College and the second course, "Special Topics in Chemistry," will be offered at Bridgewater State College. As teachers complete each course, they become part of a follow-up focus group that meets monthly with a science lead teacher from their home district to discuss ways in which they are using the lessons learned from the courses in the classroom. An online discussion forum, using the Blackboard platform, has been launched for further sharing of material and ideas. Each year, in the spring, a poster and sharing of projects session will be held to further disseminate work by the participants. As teachers complete the courses, they are becoming highly qualified to teach science, and are applying the graduate credits towards initial or professional licensure in elementary or middle school science.

An advisory committee made up of representatives from the partner districts and higher education partners meets monthly to discuss the implementation of the grant and plan for grant activities. An outside evaluator, Pamela Kelley of Kelley Research Associates, also attends these meetings to coordinate data collection for the grant. A Blackboard page/site is available for MMSP board advisory members to communicate and disseminate information about grant courses and activities.

For more project information, contact the program coordinator, [Linda A. Santry](#), Coordinator of Math and Science, K - 8, Brockton Public Schools.

[Intensive Immersion Institutes in Mathematics for Grades 4-8 Teachers](#)

Partners: EduTron Corporation, Lowell Public Schools, Massachusetts Institute of Technology, and Fitchburg State College

Based on the analyses of the students' and teachers' knowledge gaps in the Lowell Public Schools, two Intense Immersion Institute mathematics courses and two science courses have been developed. Conceptual understanding, computational fluency, and problem solving are emphasized with a balanced approach. These highly customized courses are aimed at deepening the mathematical and scientific understanding of grade 4-8 teachers. The partnership reaches about 120 teachers and impacts (indirectly) more than 2000 students yearly.

Assessment tools developed as an integral part of the course allow the partnership to simultaneously monitor student and teacher progress annually. In addition to the measurable content gain, the chemistry, dynamics, and positive peer pressure fostered in the intensive immersion experience trigger qualitative changes in individual teachers to such an extent that some of them may become catalysts to transform their local mathematics and science community. These transformations are expected to play a pivotal role in sustaining peer-based learning beyond the project span. The courses in the third year will aim to make the importance of the content-pedagogy connections very explicit. The goal is to speed up the transfer of knowledge into participants' classrooms, as documented in the MMSP logic model. The mathematics and science faculty from Fitchburg State College work closely with the instructional team in teaching some of the partnership courses and will integrate the intensive immersion approach into the corresponding pre-service offerings.

For more information, contact the program coordinator, [Andrew Chen](#), President, EduTron Corporation.

[School-Based Intensive Immersion Intervention](#)

Partners: Fitchburg Public Schools, Gardner Public Schools, Leominster Public Schools, EduTron Corporation, Massachusetts Institute of Technology, and Fitchburg State College

Based on the outcomes of the first two years of content-focused Intense Immersion Institute courses, a series of targeted intervention courses will be

developed and delivered. The elementary and middle school mathematics courses are designed with strong input from the districts' coaching team. In addition to focusing on the conception and addressing the misconceptions in deep content learning, the class interaction will also aim to dovetail content learning with school-based coaching activities by explicitly demonstrating and reflecting on desirable classroom practice. Two of these courses are structured as shorter modules to accommodate the targeted teachers' schedule.

In the third year, the main goal is to build sustainability through district-run workshops. District coaches will co-design and co-run short workshops with the EduTron team. These workshops will (1) begin to establish some local expertise in conducting high-quality workshops; (2) build up a local culture among teachers to take these offerings seriously; and (3) provide a sustainable venue for coaches to facilitate transfer of content and pedagogical knowledge to the classroom. In the long run, the common Intensive Immersion experience provides a natural foundation to build a learning community for teachers—similar to the common NISL (National Institute for School Leadership) experience and language for administrators.

The math faculty from Fitchburg State College has worked with the EduTron instructional team to integrate the courses of study into the Fitchburg State offerings for pre-service teachers. A three-course sequence, conforming to the *Massachusetts Guidelines for the Mathematical Preparation of Elementary Teachers*, will be offered in the near future.

For more information, contact the program coordinator, [Andrew Chen](#), President, EduTron Corporation.

[The Coalition for Higher Standards Math Partnership Program](#)

Partners: Lesley University; Mass Insight Education; University of Massachusetts at Boston; Haverhill Public Schools, Holbrook Public Schools, Holyoke Public Schools, Fall River Public Schools, Fairhaven Public Schools, Randolph Public School and Somerville Public Schools.

This project focuses on improving teacher quality in Haverhill, Holyoke, Fall River, Fairhaven, Randolph, Holbrook and Somerville; four urban and three suburban school districts. All of the districts are high need in mathematics and three are priority districts since they have two or more schools identified for aggregate improvement in mathematics. Additionally, on a space available basis, this initiative also serves selected teachers from other districts that have developed long-term partnerships with Lesley University in part through the earlier MSP grant.

Approximately 150 teachers from across these districts will complete the 3-year program. The primary focus is on teachers in grades 4-8, with a small number of teachers from both lower and higher grades also enrolled in the program. The specific goal is to provide strong, intensive, and sustained professional development leading to improved instructional practice and satisfying requirements for professional licensure in Middle School Mathematics.

Over the three years of this project, each teacher-participant will complete a program of study consisting of nine courses, all of which emphasize strong mathematics content, consist of 45 hours of in-class instruction, award three Arts and Sciences graduate credits, and serve as models for effective classroom pedagogy. Thus, at the end of the three years, a teacher will receive 27 graduate credits, which can be used towards Lesley's Certificate of Advanced Graduate Study (CAGS) or a Master of Education degree in Curriculum and Instruction, with a Specialization in Elementary or Middle School Mathematics. In addition to the 45 class hours, each course will support mathematical learning and classroom teaching by: additional contact hours in which content is expanded through practice and problem solving; and a classroom implementation in which content knowledge is applied to classroom practice, the aim of which is to raise student achievement.

For more information, contact Anne M. Collins, acollin8@lesley.edu, Director of Math Programs or [Katherine Richard](#), Associate Director of Math Programs at Lesley University.

[The North Shore Science Partnership \(NSSP\)](#)

Partners: Revere Public Schools, Somerville Public Schools, Northeastern University and Saugus Public Schools.

The North Shore Science Partnership (NSSP) consists of three Core Partners (Revere and Somerville Public Schools, and Northeastern University) and two Supporting Partners (Saugus Public Schools and UMass Boston). The NSSP uses a distributed management model where each Partner shares some management responsibilities. Revere Public Schools serves as the Lead Partner, handling the fiscal responsibility. Northeastern oversees the course delivery, content and follow-up activities as well as monitoring the evaluation and research component of the program. The Director of the program is Dr. Christos Zahopoulos, Research Professor at Northeastern University's College of Engineering. He has overall responsibility for overseeing the entire project with Eric Johnson responsible for all day-to-day operations.

The primary goal is to provide science professional development, leading to a Master's Degree of Science, to a cohort of between 20 and 30 science teachers. The secondary goal is to provide current teachers the opportunity to pass a

science licensure test. Although this 3-year program focuses on middle level teachers, there are courses for high school teachers as well.

An additional course, Mathematics for Science Educators, will be added this year to meet the academic needs of enrolled teachers. The objective for this course will be to provide teachers mathematical practice of algebraic, geometric, statistical and trigonometric principles and formulae imbedded in scientific problem solving.

For more information, contact the Program Coordinator, [David Lyons](#), Revere Public Schools; [Christos Zahopoulos](#), Program Director, Research Professor at Northeastern; or [Eric Johnson](#), Project Coordinator, Northeastern.

[Project SALEM \(ELL and SPED Teachers\)](#)

Partners: Salem State College, Lynn, Salem, Everett, Malden, Gloucester, Haverhill, Wilmington, Danvers and Hamilton-Wenham

This project is a response to the increasing demands in North Shore communities for well-trained and licensed Mathematics teachers at the middle school level. The heart of this project is a new graduate program, the Master of Arts in Teaching Middle School Mathematics, appropriate for prospective or current teachers of mathematics in grades 5 to 8. The courses developed for this MAT program are specifically designed to increase teachers' content knowledge in areas of mathematics essential to implementing the Massachusetts Curriculum Frameworks. Tools for teaching and learning, including hand-held graphing calculators as well as CBL and CBR data collection devices and dynamic geometry software such as Geometer's Sketchpad are utilized in these courses. These courses provide teachers with opportunities to learn mathematics using a variety of instructional methods, including many that might be used in their own instruction.

In the past teachers from partnership districts took courses at a reduced tuition and participated in 20 hours of follow-up activities. During the final year we will be transitioning into sustainability of the program. The courses have been integrated into Salem State's offerings, therefore, they will not be part of the MSP grant this year; the focus will be on the 20 hours of follow-up activities. The partnership will sponsor a "follow-up" component that will make it possible for grant participants to "meet" online to explore and discuss specific classroom instruction issues. This online approach to follow-up activities will foster communication and a sense of community among districts and teachers in ways that would not be possible given the restraints of time and geographical location. It will be a particularly valuable resource for ELL and SPED teachers whose need to network is great. In this environment teachers can respond to specific pedagogy problems, such as "What are some the most effective ways to teach

division of fraction?" Teachers will be encouraged to post and share grade and content specific course material, activities and web resources.

For more project information, contact the program coordinator, [Martha Hunt](#), Professor of Mathematics, Salem State College.

PV STEMNET Pipeline Middle School Science Technology/Engineering and Mathematics Partnership

Partners: University of Massachusetts Amherst, and the public school districts of: Holyoke, Westfield, Springfield, Mohawk Trail Regional, Pioneer Valley Regional, Amherst-Pelham Regional; and Springfield College, Western New England College, Springfield Technical Community College, Westfield State College, Holyoke Community College, and WGBY-Educational Television.

The PV STEMNET Pipeline Mathematics Partnership Grant (MMSP 2) was designed to deliver a course of study that prepares in-service and pre-service teachers to be highly qualified mathematics and science teachers in grades 4-8. Thirteen (13) courses and corresponding follow-up activities have been or will be made available during the three-year time frame that will provide subject matter knowledge in those areas of mathematics and science as specified in 603 CMR 7.00 (Effective June 2003) for middle school (grades 5-8) mathematics and science teachers. The course work will also provide professional development in technology/engineering. In-service and pre-service teachers are able to use these courses to achieve highly qualified status in several ways:

- The courses can be used to prepare teachers for the middle school mathematics/science (5-8), middle school science (5 - 8), and elementary science and mathematics MTEL exams. Most, but not all of the subject matter requirements for the middle school general science and mathematics MTEL exam will be provided in the courses.
- The set of courses can also help with recertification and the attainment of the Professional License in middle school mathematics (5-8), elementary mathematics (1-6), middle school mathematics/science (5-8) and general science (5-8).
- They provide a set of content courses for the 18-credit, post-graduate degree option for professional licensure.

These multiple options are available because the PV STEMNET includes multiple institutions of high education that have approved initial licensure programs and are in the process of seeking approval of programs for the professional license.

For more information, contact Allan Feldman, Principal Investigator at afeldman@educ.umass.edu, or Kathleen Baker, Project Manager, at kbaker918@aol.com.

Building a Better Science and Technology/Engineering Background

Partners: Worcester Polytechnic Institute (WPI), Worcester Public Schools, and Winchendon Public Schools

The Building a Better Background is a three-year project, which combines core physics concepts with technology/engineering. The first year focused on Motion & Forces and related engineering designs. Year Two focused on Work and Energy Transfer, including kinetic and potential energy along with heat transfer concepts and related engineering. The final year's course will be offered in the summer of 2009 on Electricity & Magnetism with related engineering.

The content is provided during a seven-day summer workshop that runs on the WPI campus. Dates for the first workshop were July 5 - 13th, with the instruction being provided by physics and engineering faculty members. Dates for third year have not yet been set. The total contact hours for each course are the same and include 45 hours of class time and 20 hours of follow-up time. The goals of the program are to: increase content area knowledge for grade 5-9 science and technology teachers, to increase student performance in the sciences, and to develop of a set of courses at WPI that can be used by in-service or pre-service teachers towards licensure.

For more information, contact the program coordinator, [Martha Cyr](#), Director K-12 Outreach, Worcester Polytechnic Institute.