

Montshire Museum of Science

Annual Progress Report For Science Education Partnership Award National Institutes of Health

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Introduction

The “Connecting Classrooms and Community with the Health Sciences” SEPA project is a five-year award to provide the development, piloting, and implementation of a series of health curriculum modules and teacher professional development activities aimed at students and teachers in grades 5-8. Specific topics explored in this work are those of high interest in young adolescents and related to current research at Dartmouth Medical School. The programs are targeted at reaching rural youth and their teachers in Vermont and New Hampshire. The project creates a unique collaboration between a science museum, with its rich science education teaching resources and curriculum development expertise with a medical school and its research staff and expertise in adolescent health issues.

A. Specific Aims

The Specific Aims of the project have not been modified from the original proposal and work during the current budget year has been based on meeting those aims.

B. Studies and Results

The third year of the project saw the expansion of the curriculum materials to include a third topic of study (influences on health behaviors) and the continuing support of the middle school curriculum in nine schools. We held the second annual Health Sciences Student Research Symposium at the Montshire Museum and are piloting using new technologies both in the classroom and in the Museum with visitors and students to participate in several health science investigations. Specific project activities and results are detailed below.

Health Curriculum Development and Piloting:

At the completion of Year 3 we now have curriculum support materials for three health topics. The first topic we developed curriculum material for was on nutrition and diet. *Investigations in Diet, Nutrition, and Activity* is now a completed teacher guide and will be available for free to teachers and the public as a PDF on our project’s website.

We also continued to pilot and refine the curriculum support materials for teachers implementing an investigative unit on solar radiation and skin health. This unit, implemented in six different

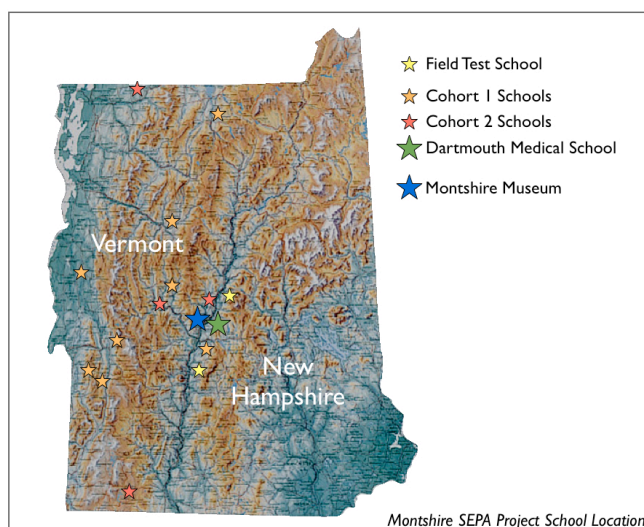


middle school classrooms this past spring includes investigations into UV radiation, as well as a series of lessons helping students understand the changes in UV exposure over the course of the year. Students then design and carry out their own research activities focused on how to encourage peers to use sun block, and where in their school yard and community are the sites that provide the greatest exposure to UV light.

A new area of curriculum development this year focused on social behavior research – specifically developing tools and curriculum resources for teachers to help middle school students begin to understand and research their decision making processes related to healthy, and unhealthy, adolescent behaviors. This work was informed by a collaboration with Drs. Rick Gibbons and Meg Gerrard and their research associates at Dartmouth College and Dartmouth Medical School. Through this collaboration teacher training and curriculum materials are being developed that will be useful for students researching any aspect of health behavior, ranging from adolescent health-risk behavior such as smoking and sun exposure, to eating and exercise behaviors. This unit will be piloted in schools beginning fall of 2012.

School Technical Support and Implementation:

Project staff supported ten schools during the implementation of the *Investigations in Diet, Nutrition, and Activity* unit and the *Sun and Skin* unit. Support included multiple site visits to each school to work with teachers and students; providing classroom teaching equipment and materials – including materials needed for students to measure UV levels in their school yard and custom-built lab equipment for students to recreate the Ritter Experiment to determine UV radiation beyond the visible spectrum; and email and phone support with teachers during the program’s implementation in their classrooms. Combined, project staff spent a total of 46 days in schools and classrooms.



Researchers Talking About Research Classroom Video:

We are currently creating a video with researchers with the working title *Researchers Talking about Research*. The video highlights different health researchers from Dartmouth Medical School and Norris Cotton Cancer Center who are partners in our SEPA project. These videos will be used in middle school classrooms to introduce researchers to the students, while discussing the research design process. Each researcher interviewed in the video will review a different aspect of health science research design and implementation, from developing a researchable question to communicating your results. We were hoping to be ready to pilot this video during the spring of 2012 but due to schedule conflicts between researchers and the production company the timeline has been pushed back. We anticipate the video being available for use in classrooms in winter of 2012/2013.

Student Research Symposium:

Middle school student engagement in authentic research is a major goal of this project. The curriculum material developed by the Museum staff provides the background knowledge, much of it through inquiry-based methodology, for students to learn the science behind the different

health topics presented. But in addition to these teacher-led inquiries, each module concludes with students working in their own 2-3 member research teams to develop their own health research project that they will carry out. This process begins students identifying and developing a researchable question followed by their developing of a research design and eventual data collection and analysis.

We highlight the importance of this aspect of the project to teachers by sponsoring a *Student Health Sciences Research Symposium*. The second annual symposium was held at the Museum on May 18, 2012 with student, faculty, and parent representatives from five of the ten schools currently participating in the project. A total of 24 student research teams presented their research during the course of the day.



Examples of research questions developed and investigated by the middle school students included “Do people who play team sports exercise more than people who do not?” and “What motivates students to participate in team sports?” Other student research questions ranged from investigating teacher snack preferences, drink choices by students, and what P.E. classes have students longest engaged in physical activity.

Our project evaluators noted in their October, 2011 interim report the value of the student symposium in helping students and teachers connect with researchers, as well as providing students the opportunities to share their research with other students and teachers from throughout the region in a meaningful way.

Community Engagement and Informal Learning:

Connecting Classrooms and Community with the Health Sciences continued to engage the community through informal science education programs in two very different activities at the Museum. Families visiting the Museum participated in 18 families workshops at the Museum’s *Science Discovery Lab* workshop space in learning sessions introducing concepts of energy balance, and portion size. In addition, a new family workshop is being developed during the summer of 2012 focusing on heart health in collaboration with Dr. Salvatore Costa, Director of the Echocardiography Lab at Dartmouth-Hitchcock Medical Center in Lebanon, NH. This new family health science activity will allow visitors to see images of both healthy hearts and those with signs of cardiovascular disease. Visitors will also participate in activities to learn about the role of exercise and diet in being heart healthy.

Additionally, we’ve offered a second after-hours program at the Museum based on the science café model. Dr. Rick Gibbons, one of our project partners, presented his research group’s current work on the influencers of adolescent risk behaviors on April 12, 2012.

Middle school students participating in the Museum’s one-week summer camp program “Tinkering with Electronics” spent three days building their own UV detection meters that measure both UVA and UVB, then used these meters to test different transparent materials, clothing materials, and sun blocks for their ability to filter UV light. This work, combined the electronic tinkering lessons in this summer camp with our health science curriculum module on solar radiation and skin health. 16 students participated in this summer camp.

Teacher Professional Development:

The project provided two professional development activities during Year 3. A December 5, 2012 seminar day was held for current teachers in the project. This workshop day provided an opportunity for teachers to share with each other their current health curriculum plans and learn how to incorporate the new *Sun and Skin* unit. A total of 14 teachers participated in this workshop, representing six school sites.

In addition, Mike Fenzel, the project's curriculum developer, presented a half-day workshop on the *Investigations in Diet, Nutrition, and Activity* unit to teachers of the Caledonia Central Supervisory Union schools in Danville, Vermont on July 18, 2012.

On July 19, 2012, our project was presented to 22 visiting teachers from Pakistan as an example of how a regional science center supports school science. The teachers participated in a workshop using two of the lessons developed for our curriculum project. This workshop took place at the Montshire Museum.

Project Website:

During the spring and summer of 2012 a new project website is being developed. This website will be available to both the public and teachers, though is specifically designed to support project teachers. The website is being populated with content background for teachers, as well as curriculum material developed by project staff. A September 2012 launch is expected.

Evaluation Activities:

Inverness Research Associates evaluators were on-site during the May 18, 2012 student science symposium. At this event they interviewed students and teachers about how the project has changed their approach to health science education. In addition, during Year 3, Inverness Research Associates have held a variety of interviews with teachers, prepared formative evaluation reports for project staff, and have met with project staff multiple times to help clarify project goals and provide formative assessment.

C. Significance

Based on preliminary data, major lessons which we believe may prove useful to the school health science education field include:

- The role of student research experiences in building awareness of adolescent health issue and providing students greater engagement in health science conceptual learning.
- Providing experienced project teachers with the opportunity to show-case their work to new teachers provides reflective-practice and self-assessment and teacher-leader development opportunities for those teachers presenting their work to their peers.
- Teachers continue to need external expert support in developing and implementing student research programs in their classroom.

D. Plans for Year 4

Major activities planned for Year 4 include:

- Web publication of the *Sun and Skin* (working title) unit.
- Completion, piloting, and formative assessment of the *What Influences our Behaviors?* (working title) unit.
- Completion of the video *Researchers Talking About Their Research* to be used as a classroom resource.

- Begin development of activities and curriculum materials to supplement a unit on brain science, brain injury, and prevention.
- Planning, recruitment, and implementation of final teacher summer institute in July 2013.
- Professional Development presentation of the *Investigations in Nutrition, Diet, and Activity* curriculum module at two regional science education conferences.
- Submission of an article detailing the role of student research in developing their awareness and understanding of the health sciences to NSTA's *Science Scope* or the *American Health Education Journal* or similar journals geared to K-12 teachers of the health sciences.
- Submission for a session at a 2013 regional NSTA conference and the 2014 national NSTA conference to disseminate lessons learned on engaging middle school students in research in the health sciences.
- Continued program formative evaluation work with Inverness Research Associates.