

DOE/TE/00051--T1

Outreach Energy Education to Rural Schools

Final Report

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November, 1997

Prepared for

U.S. Department of Energy

Award # DE-FG02-95TE00051

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Abstract

Consistent with the referenced award, Montshire Museum of Science designed and fabricated an energy education program, consisting of a set of interactive exhibits which are now being circulated to schools in New Hampshire and Vermont through the museum's extensive school outreach services. The hands-on exhibits, designed for grades 4-6, travel to schools accompanied by a museum science educator and help participants discover basic principles of electricity, learn how we use it to do work for us, and gain greater awareness of the meaning of energy conservation. Student materials and teacher training components are included.

Project Report

The specific goal of this project was to create a major, energy-oriented outreach program, built around a set of interactive exhibits, that could be efficiently delivered to rural schools by the Montshire Museum and would have a measurable impact on student comprehension of basic concepts of energy as they relate to the students' lives. The goal was fully met and the exhibits are now circulating actively to schools throughout New Hampshire and Vermont.

The project objectives and strategy were made in the context of the demographics of the intended audience. The target region of Vermont and New Hampshire is a rural constituency. Vermont's population barely exceeds the half million mark and New Hampshire's is slightly over one million. Both are among the least densely populated of the eastern states. As defined by the U.S. Census Bureau methodology, Vermont has the largest percentage of its population living in rural conditions in the nation. And rural poverty is a serious problem in both states, with large numbers of children living in poverty. New Hampshire leads the nation in participation (as a percentage of population) in the Federal Aid to Families with Dependent Children (AFDC) program; Vermont ranks seventh.

In combination with the decline of agriculture and manufacturing, the traditional sources of revenue in the region, this rural character has created an educational landscape characterized by numerous relatively small schools with insufficient tax bases. There are too few resources within the formal educational sector to provide adequate science education opportunities for youngsters in either state. Informal educational organizations like the Montshire Museum are especially important resources in this setting.

Operating within this context, the traveling energy exhibits were designed to improve opportunities for high quality science education programming to be delivered to under-served rural school children. Within the broader theme of the

need to expand science education opportunities, the completed program concentrates specifically on basic energy education, a demonstrated national priority and a central objective of the Department of Energy initiative.

Montshire's focus on outreach reflects the special problems associated with serving rural schools that are frequently small and under-funded. Because of distances involved and the expense of bussing, the interactive, hands-on exhibits located within regional science centers can only be a part of the solution. Systems for delivering high-impact exhibits, materials, and educators to the schools are clearly the most cost-effective approach and this energy program funded by D.O.E. has proven to be an excellent demonstration of this concept.

The core element of the project is a series of interactive exhibits which are transported to host schools in a museum truck. They were designed and fabricated by Montshire Museum exhibit staff, exhibit contractors working with Montshire staff, or by other museum collaborators, most notably Science Museum of Minnesota, taking advantage of their innovative approach to building small modular units that can be connected in a variety of ways to experiment with simple circuits with variable loads applied to those circuits.

To maximize the museum-to-school transportation investment, the energy exhibits funded by this award travel along with other companion interactive science exhibits to fully engage the students. Once at the school, the exhibits and education staff remain for as many days as may be required for all students in grades 4 - 6 to fully participate. In smaller schools this may be one full day, in others, it may be several days. While at the school, the museum educator is involved with the students, supporting their activities with the exhibits. Frequently, an in-service teacher workshop is conducted for interested teachers to receive tips on effective inquiry-based science education and to learn simple classroom activities on energy education that they can conduct as a follow-up to the Museum visit.

The exhibits are highly interactive, allowing students to investigate a sequence of topics related to energy and its role in their lives. Each exhibit or activity station is designed using well developed techniques for engaging the learner and holding her or him in an active process of experimentation and problem solving to gain a better comprehension for the subject matter.

The design criteria for these exhibits optimized for educational effectiveness and incorporates "best practices" as developed within the science center community. Other design criteria that was critical to the success of the final product included portability so that exhibits can be efficiently transported and sturdiness to stand up to heavy student use and frequent moving.

Where it was initially assumed that several exhibits would be duplicated to loan to classrooms for extended periods following the school visit, based on

advice of the project advisory group, this concept was scrapped in favor of increasing the quality of the core exhibits. Post-project experience with the teachers and schools using the exhibits suggests this was an appropriate modification.

During the exhibit venue at the school, the museum science educator meets with teachers for an in-service workshop. Energy education materials, both those prepared by Montshire staff and those available from other sources, are presented as options for teachers to use in customizing their own activities to fit their curricula..

As mentioned, a school visit may range from one to several days. For example, if a school has 200 students in eight classrooms, the Montshire Museum truck and a staff educator arrives early on the first morning with the exhibits which are installed in an auditorium or multi-purpose room. Four classrooms participate, one at a time, each day. Each class has approximately one hour with the exhibits. The museum science educator works with the students throughout the visit, and the teachers have the opportunity to participate fully and to observe the inquiry-based teaching style of the museum science educator. Depending on the distance from museum to school, the staff member either returns home in the evening or is housed with a local family most commonly arranged by the school parent-teacher organization. During the visit, the staff educator meets with the teachers for a post-visit workshop to encourage follow-up activity.

During summers and vacations, when the exhibits are not in use at the schools, they are installed at the Montshire Museum for added public benefit by Montshire's many thousands of family visitors.