

## SAMPLE OF AN ENERGY GRANT FUNDED IN 2007-08

### A. THE IDEA

Hi! Energy Exploration Kits will be designed to engage ABC County students in grades 3 – 5 and their teachers in math and science energy activities that focus on problem solving. Hi! Energy materials will integrate music, drama, multi-media technology, and hands-on science explorations that support the Virginia Standards of Learning for Science and the ABC County Science Curriculum. Hi! Energy kits will include interdisciplinary lessons that focus on energy resources and conservation concepts at Grade 3; Grade 4 concepts related to force, motion, and energy; and matter, light, and sound concepts at Grade 5. Kits will be modeled after “Exploring Electricity” an inquiry-based unit funded in 2006 by Micron, Inc. Kit activities will encourage problem solving, independent research, and science fair projects on energy related topics.

Energy is an important concept in science, as well as the vital force powering our global economy. As such, an understanding of energy and the implications of its use is necessary for every citizen. Its use in everyday contexts makes energy a difficult concept to “re-teach” in an academic environment. For many students, the concept of science can be highly abstract; therefore, in order to effectively communicate the concept of energy to young learners, information and activities must be presented through clear, concise, and accurate means. Hi! Energy kits will provide a sound basis for developing a robust understanding of energy that students can carry with them to future math and science courses.

To assist teachers in developing energy concepts with their students, each of our 53 elementary schools will receive three Hi! Energy kits (one for grades 3, 4, & 5), that will include teacher background materials. Teachers at the three targeted grade levels will receive ongoing instruction on energy concepts. Student lessons will be presented through many modalities to help students from diverse backgrounds visualize the major concepts. Hands-on exploration activities and multi-media lessons will be designed to actively engage students in the scientific inquiry process necessary to reinforce and retain energy concepts. In addition, parent “Hi! Energy Newsletters” will be developed for each unit to encourage students to discuss new ideas with their families.

Teachers are eager to teach about energy in as clear and accurate a manner as possible and look forward to well researched lessons and materials that bring energy concepts to life in a way that reaches the diverse populations of the students that they serve.

### B. OUTCOMES

- Teachers in grades 3-5 will have a clear scientific understanding of energy concepts through training and written materials that specifically address the challenges of teaching energy concepts to young learners.
- Teachers will teach energy concepts in a clear, accurate manner making connections between the 3rd, 4th, and 5th grade curriculums.
- Teacher enthusiasm for teaching science units on matter and energy will increase as a result of the Hi! Energy Exploration Kits and the teacher training provided.
- Each elementary school will be provided with hands-on Hi! Energy Exploration Kits, with multi-media presentations, to engage students in math/science inquiry activities that develop major energy concepts.
- Student awareness and interest in energy as a vital force powering our world will increase problem solving ability, individual research, and the number of science fair projects in energy related areas.
- Students from diverse backgrounds will be engaged in hands-on math and science lessons on energy and problem solving that incorporates music and drama for concept retention.
- Parent Energy Newsletters will be developed to make a home to school connection.
- State and county assessments in the areas of scientific reasoning, matter and energy, and problem solving will increase at all levels as teachers and students deepen their knowledge of the scientific energy concept.

### C. EVALUATION

- Evaluations will be given after teacher training to assess learning and enthusiasm for the Hi! Energy Units and Exploration Kits.
- Professional Learning Communities of teachers in each school will meet to discuss the Hi! Energy Units during and after instruction to improve future instruction.
- Students in grades 3-5 will keep interactive science notebooks of energy concepts. Notebooks will be evaluated after each unit. Sample entries will be shared among teachers to evaluate instruction and student learning.
- Student surveys will be given to assess student attitudes about the Hi! Energy Units.
- Pretests will be given at grades 4 and 5 to assess previous learning and retention of science concepts and problem solving.
- County and state SOL assessments from 2006/2007 will be compared with scores from 2007/2008 assessments in energy related areas and problem solving to assess increased student learning.

### D. PROJECT LEADERSHIP

Jane Doe, Supervisor of Science for ABC County Public Schools and Science Instructional Support Team member John Smith will provide project leadership. They will develop the exploration kit materials and activities and develop and deliver teacher training on a continuing basis throughout the 2007-2008 school year. Supervisors and professional development specialists in the Offices of Mathematics, Instructional Technology, English Language Learners, and Special Education will serve as consultants to evaluate kit materials in order to meet the needs of diverse learners from all backgrounds.

#### E. CONTEXT

ABC County Public Schools is the third largest school division in the Commonwealth of Virginia. The student population of the county's 55 elementary schools is extremely diverse and consists of approximately 41 percent White, 26 percent Latino, 20 percent Black/African American, 12 percent Special Education, 23 percent English Language Learners, and 32 percent Economically Disadvantaged. Student performance data on the Virginia Science Standards of Learning assessments indicate steady overall progress in science content for all subgroups, with less progress in the area of scientific reasoning and logic. The Grade 4 Stanford achievement assessments show a mean score of 63 percent in problem solving. Hi! Energy kits will be designed to reinforce critical thinking skills and target areas of weakness.

#### F. OTHER HELP

Two Energy Organizations, The N.E.E.D Project and The Department of Energy, will be consulted for research and curriculum materials. Scientists from Micron, Inc. and the ABC Department of Public Works will help with student research and science project evaluation.

#### BUDGET

Instructional Supplies and Materials (books, videos, software, kits)	
3rd grade Natural Energy Resources Kit materials (60 kits)	2,060
4th grade Force and Motion Kit materials (60 kits)	2,300
5th grade Matter, Light, & Sound Kit materials (60 kits)	4,000
Reference Books	200
Notebooks for written units	540
CDs for Multi-Media Presentations	150
Consumable Supplies	
Paper, Ink, etc.	250
Staff Development	
Teacher training materials	500

TOTAL REQUESTED FROM DOMINION

\$10,000

## SAMPLE OF AN ENVIRONMENTAL GRANT FUNDED IN 2007-08

### A. THE IDEA

Project COOL is designed to provide the XYZ Elementary Schools (student population includes: K-5 & children with multiple handicaps) and local communities with a Center for Outdoor Observation and Learning. This proposed outdoor classroom with an accompanying outdoor energy source gives children the opportunity to observe and study the natural environment firsthand as well as learn about various environmental friendly energy sources. Students can learn about the outdoors and how nature is important in our every day lives. By utilizing currently underutilized land, we can add value to the school, as well as provide a space for the staff to teach science in an applied, hands-on format – including activities from wetlands to weather. We will collaborate with other community organizations including the boy scouts, girl scouts, Big Brothers and Big Sisters and many others providing them with the opportunity to utilize this outdoor center for learning, week-end activities, and community service projects. This project also provides the opportunity to recapture an area that is currently overgrown as well as provide its deserved protection as a wetland area.

The overall plan is to utilize the expertise of a group already formed in the area, the Wetland Education Team (WET) to create an environmentally friendly green space to protect these wetlands. WET has also committed to providing guidance and training for this project. WET has committed to provide their expertise gained in creating an Outdoor Classroom area at the XYZ Middle School and other local schools. They will provide birdhouses and feeders, also. Students, members of the Parent-Teacher Organization, local businesses, garden clubs, and community groups will also aid in the development of this project.

The space will include trails, a pavilion/education station, ten to fifteen marked observation areas, a wetland lab area, and an amphitheater with log benches. The observation stations will include areas such as a weather station, plant identification signs, a butterfly garden, native plants/planting beds, bird & bat houses, and water & soil testing. At the start of the 2008-2009 school year, XYZ AP high school students with the guidance of the AP Physics teacher will help to develop an energy source for the classroom such as wind power or solar power.

The current plan is to clean-up and eradicate invasive species in the designated area by the end of July. We will break-ground at the beginning of August, and will complete the pavilion by August 25, 2007 in time for the start of the 2007-2008 school year. Once school starts, the Program Challenge (pull-out gifted program) students will work to complete the trails, classify and label the observation stations, and prepare the outdoor lab for all students and the community to enjoy. The students will also design a map along with GPS coordinates describing the features

of the outdoor classroom which will be available to anyone that visits or uses the site. The WET group will provide training in classification and upkeep of the designated wetland habitat. A wetland certified naturalist will conduct a brief workshop to Program Challenge fifth graders and staff of both local grade schools. We also plan to invite members from the Western Reserve Conservancy and Soil and Water Conservation District to participate in the workshop. XYZ staff will revise their science curriculum to incorporate learning and activities utilizing the outdoor classroom/lab starting fall 2007. Program Challenge students will work under the guidance of staff to create grade appropriate labs designed to enrich the current curriculum – example labs include soil profile activity, log analysis (history), weather activity, tree & plant discovery activities, and wetland habitat recognition activities. Once the selected energy source is completed, students will be able to conduct labs on how the energy source operates as well as analyze energy effectiveness. These labs will also be posted on the web enabling any community or school to take advantage of the program.

Our goal is to provide students with an inquiry-based, active learning environment that not only enhances student comprehension, but also teaches students to appreciate nature and our environment. Additionally, the outdoor classroom/lab will aid in addressing core state science curriculum competencies and student outcomes.

## B. OUTCOMES

- All students in the XYZ elementary schools will be provided with an outdoor learning environment that will encourage and enhance critical thinking & problem-solving skills.
- This nontraditional, natural learning setting will encourage inquiry skills and will show students that science is part of their every day life and learning.
- Students will learn about and practice key process skill indicators such as observing, classifying, measuring, predicting, inferring, experimenting, and interpreting data.
- Students will analyze various environmentally friendly energy sources.
- Students will increase awareness and understanding of traditional and alternate energy sources.
- Students will understand how using alternative energy sources in combination with traditional sources helps the environment.
- The outdoor learning labs created by students for students (with the help of staff) will be shared with other schools through the web.
- Project COOL incorporates Ohio's Academic Content Standards in science as well as addresses the National Science Education Standards, Teaching Standard D. We also expect to see an increase in state proficiency test scores on the Ohio Grade 5 & 8 Science Achievement Tests.

- During the 2007-2008 academic school year, the Program Challenge students will study various environmentally friendly energy sources that could serve to provide energy (lighting on the cloudy days we often experience in northeastern Ohio) for the pavilion. Program Challenge students will conduct hands-in activities such as solar kits to learn more about 'how energy sources' operate. XYZ AP high school students with the guidance of the AP Physics teacher will help to develop the selected energy source such as wind power or solar power.
- Each year, at the end of the school year, fifth grade Program Challenge students will be empowered to teach/train the incoming fifth grade Program Challenge students in classification and upkeep of the designated wetland habitat. This will be an ongoing requirement of Program Challenge. Ninety percent of Ohio's wetlands have been destroyed in the past 200 years, so it is critical for students to develop an understanding of their role in the environment to enable them to aid in wetland preservation.
- Local organizations such as the boy scouts and girl scouts will be able to use this center to work on badge achievements.

### C. EVALUATION

- Each month teachers will meet as a grade level to assess the curriculum as it relates to the outdoor lab and student outcomes. Teachers will adjust lessons as needed based upon student outcomes.
- Each month the Program Challenge Coordinator will assess and update the materials and professional development resources being used by staff for the outdoor classroom; and ensure that the plan for on-going maintenance, stewardship and teacher training is working successfully.
- In May and October, the Program Challenge Coordinator will collect input (qualitative and quantitative) from each grade level lead teacher and will summarize in a written report that will be shared with the XYZ Curriculum Coordinator, and upon request to the Dominion Educational Partnership.
- WET, Wetlands will continue to be available to consult with student leaders as needed, and will provide periodic seminars to students.

### D. PROJECT LEADERSHIP

Jane Doe, Program Challenge Coordinator, has successfully implemented grants, programs, and activities involving the integration of math and science into the XYZ School District curriculum. Mrs. Doe has championed student academic achievement through the use of technology in the classroom through SmartBoards, PDA's, and student response systems. She has also trained teachers in the use of hardware and software in her capacity as Building Technology Specialist. Additionally, Mrs. Doe developed a multi-media science program using Life Science simulation software. Mrs. Doe has worked as a math and science associate in

collaboration with Michigan State University for the last three years on a project entitled PROM/SE, Promoting Rigorous Outcomes in Math and Science Education. This work prompted her to travel to China in December of 2005 to observe math and science instruction in different schools throughout China. This observation allowed her to compare and contrast instruction of math and science in China to math and science instruction in the United States. This research was part of an ongoing study on improving math and science instruction for all students in the U.S. in order to compete in a global society.

Mrs. Doe will work with the lead Math and Science teachers, to provide materials and professional development resources to be used by staff for the outdoor classroom.

In addition, Mrs. Smith (K) and Mr. Jones (1st grade) will coordinate a butterfly garden obtained through a recent grant.

## E. CONTEXT

An “outdoor classroom” site is essentially an outdoor area on a school’s campus that can be used as a hands-on laboratory where students can learn seemingly abstract concepts in a more concrete manner and utilize multiple-disciplinary skills including reading, writing, math, science, and social studies in a fun and exciting environment.

Outdoor classrooms offer many curriculum connection opportunities in English, science, mathematics, history, geography, social studies and art. The process of planning, creating and using a habitat with an environment friendly energy source provides children with unique hands-on experiences and improves critical thinking skills. Research shows that using the environment as a focal point of teaching improves student performance (Dr. Gerald Lieberman's Closing the Achievement Gap).

Specifically, the outdoor classroom provides for:

- Community-based investigations as learning experiences that offer both minds-on and hands-on experiences through service-learning opportunities;
- Collaborative instruction so teachers, parents, students and community members can connect together instruction and learning;
- Learner-centered, constructivist approaches adapted to the needs and unique abilities of individual students;
- Combinations of independent and cooperative learning;
- Local natural and community surroundings to be used as context for standards-based instruction and proven pedagogy as a comprehensive school improvement strategy to improve teaching and learning;

- Students' understanding of natural systems in their community;
- Students' understanding of social systems and their community's cultural characteristics;
- Opportunities to apply skills and knowledge in local surroundings;
- Opportunities to investigate real-world community problems and issues;
- Higher-level thinking and creative problem-solving skills to achieve comprehensive understanding of the complexity of real-world problems and issues involving the interaction of their natural surroundings with diverse cultural, economic, and political perspectives and interests;
- Opportunities to pursue authentic issues of personal interest;
- Connections between subject area disciplines and, among natural and social systems;
- A continuum of learning that crosses grade levels and allows students to conduct multi-year research and service-learning projects that contribute to their community;
- Opportunities for teachers to model positive team relationships;
- Students' individual learning styles, multiple intelligences and cultural background to insure effective instructional design and practices in the context of the local community;
- Assisting students as they initiate self-directed courses of study;
- Allowing students to construct their own understandings;
- Supporting students as they define specific learning goals and objectives;
- Facilitation of students as they form teams to work on projects and investigations;
- Different learning styles and ability levels; and,
- Development of group membership skills.

The outdoor classroom takes a much more proactive design strategy that is based on a whole-systems awareness of the cognitive learning process, makes appropriate adjustments for age and learning activity, and even the classroom teaching style. A whole-systems approach to the learning process and design can truly address the primary goals of our school—equal educational opportunity to learn regardless of a student's visual, auditory or kinesthetic modality, visual or auditory handicap, or ethnic origin.

## F. OTHER HELP

We will involve the Wetlands Education Team (WET), the Western Reserve Land Conservancy, the Geauga Soil and Water Conservation District, the Geauga Park District, Dominion East representatives, other schools within the XYZ School District (including students from the middle and high schools), as well as other local community organizations and businesses.

Current status of Funding secured:

- \$3000.00 grant in place from WET for wetland research, supplies & materials, and training.
- \$7000.00 grant from XYZ Education Foundation for alternative electricity source to the outdoor classroom and representative from REpower Solutions to demonstrate how the alternative source works.
- Pursuing \$3000.00 grant from Martha Holden Jennings Foundation to obtain lab tables for the outdoor classroom.

Requested from Dominion:

Instructional supplies and materials	\$3,000
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Leaf Identification Kits: 40.00; Seed Identification Kits: 40.00; Water testing Kits: 35.00 ; Soil testing Kits: 40.00; Compasses (10): 80.00; Observation Containers: 90.00 ; Trail Markers: 100.00; Conservation books, videos, CDs and posters appropriate for use with the outdoor classroom: 300.00; Binoculars (20): 600.00; Sundial: 15.00; Insect Nets: 125.00; Beating Nets: 125.00; Thermal & Sewage Pollution Kit: 75.00; Solar Energy Kit: 15.00; Dissectible Fuel Cell: 145.00; Wind-Powered Generator: 230.00; Air Testing Kits: 40.00; Power House Kit: 140.00; Energy Science Kit: 35.00; Physics Workshop Kit: 50.00

Equipment	\$1,500
Construction of amphitheater	

Teacher training	\$1,000
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