



MINI-GRANT FINAL REPORTS

SCHOOL YEAR 2006-07



Energy Activities for the Classroom

Snohomish County PUD is committed to helping educators bring the world into individual classrooms or take the classroom out into the world.

We are excited to share with you the following success stories of our 2006-2007 mini-grant winners. Below are their stories – what they did and how their projects worked and what they'd do differently today. We provide these great teaching lessons in the hope that they will stimulate you to incorporate energy and/or water education into your curriculum.

Due to copyright laws, we are unable to produce all the materials provided to us; but you are welcome to contact the educators who developed and implemented the lessons.

The PUD thanks all the educators who brought their ideas forward for consideration as well as those individuals who gave their time to read the proposals.

Water Rockets

by Valerie J. Anderson

Grade Level: 4th, 5th & 6th grade (multi-age classes)
School District: Granite Falls School District
School Name: Monte Cristo Elementary School
School Address: 1201 100th ST. NE, Granite Falls, WA 98252
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Phone: 360-691-7718

Project Description

Classes will learn about potential energy, stored energy and energy transfer. Students will design, build, and launch a water rocket.

Learning Objectives

- Students will learn about the pressure in fluids, air and energy transfer.
- Students will learn about the scientific process by experimenting with different size rocket bodies, different amounts of air pressure and water levels within their rockets and recording the information in their science notebooks.
- Students will create charts and graphs to record different data for the different variables.
- Students will predict, observe, and collect data to answer the following question:
 - What variable will cause the greatest change in the height that the rocket reached?
- Students will be able to discuss energy transfer, air pressure, and pressure in fluids.
- Students will plan, design and build a water rocket.
- Students will be able to demonstrate their knowledge by successfully constructing a water rocket using recyclable materials that successfully flies and explain in writing where the potential energy is stored and how it is transferred to propel the rocket.
- Students will be able to identify at least one change they would make to their rocket to increase the potential energy or the transfer of energy.

Grade Level Expectations

- Science: 1.1.4 Understands that energy comes in many forms
Science: 1.2.1 Analyze how parts of a system interconnect and influence each other.
Science: 1.2.2 Understand how various factors affect energy transfer and that energy can be transferred from one form of energy to another.

Materials Needed

- Composition books for Science Notebooks
- Stop watches, Measuring Tape (100ft)
- Water Rocket Launchers (constructed from PVC pipe and fittings)
- Recyclable materials for rocket construction (1-2 liter plastic bottles, construction paper, cardboard, string, plastic bags)

Method / Design of Project

The science notebooks were used through out the year for students to record their classroom activities, write up science experiments and reflect on their learning. The district curriculum *Prentice Hall text book Science Explorer, Motion, Forces and Energy* (2002) was used for students to learn about speed, acceleration, energy transfer, potential energy and liquid pressure. Students learned how to use stop watches to time other experiments and different situations so they were comfortable using them for timing the “hang time” their rockets. Calculating the time of a flight was easier for intermediate students than calculating the height. The sequence of the unit had the students make a rocket first with only seeing a sample rocket. Then students talked about and wrote about their rocket and its performance. Following the first flight the concepts of energy transfer and flight concepts were examined in detail. They choose one thing on their original design to change and reconfigured their rockets and tested them again recording their results. Time allowed for a third trial so students choose another variable to change and reconfigured their rockets and tested them, again recording their results.

Evaluation

Anecdotal notes were kept during the building and designing phase of the unit to record what students built. Journals were evaluated following the project for scientific thought processes. Students wrote paragraphs evaluating the performance of their rockets identifying energy sources and design changes that improved their rocket system.

Challenges

Having no experience with water rockets or how to build a launcher was a challenge. Luckily for me one of my parents was an expert and volunteered to build the 3 launchers and assist with the first flights. Students were actively engaged in the building and designing of their rockets and having three launchers allowed students to launch their rockets multiple times at each session. Some students struggled with the physical construction of the rockets and some were frustrated when their system failed.

Successes / Strengths of the Project

While some of the students were frustrated with system failures having more than one chance to build and test fly a rocket hooked them back into the process, and was a great learning tool for teaching persistence. This was a high interest project and was the culminating science project of the year it helped students stay focused as their thought turned to summer vacation.

Budget

Item	# of units	Retail Source	Cost
Colored composition book 7 1/2 x 9 3/4 10 sheets # 639654	75	Staples.com	\$123.00
Economy Stop Watches #136 (EA)	25	Amazon.com	\$124.75
25 ft tape measure Stanley PowerLock	3	Amazon.com	\$68.97
10 foot length of 1/2 PVC pipe #23987	3	Lowe's	\$4.68
PVC 1/2 tee (2glue & 1 female connection) #23930	3	Lowe's	\$1.44
PVC 1/2 elbow (glue connections) #23867	3	Lowe's	\$.72
PVC 1/2 end caps (glue connections) #23937	6	Lowe's	\$1.32
PVC 1/2 male adapter #23855	6	Lowe's	\$1.38
Bathtub sealer CLDM41P24	1	Lowe's	\$2.98
PVC glue 4 oz. All Purpose #23540	1	Lowe's	\$4.49
Electrical Tape #39340	2	Lowe's	\$3.94
Value Stems Victor Monkey grip .453" Rim Hole #MG4130	2 pkgs/2per	Shucks	\$8.98
Floor Model Bicycle Pumps W/pressure gauge #57777	3	Shucks	\$23.97
		TOTAL	\$370.62

Partners in the Journey: Salmon and Seventh Graders

by Jean Hanson, Mark Depew, and Karl Mortensen

Grade Level:	Grade 7
School District:	Lakewood
School Name:	Lakewood Middle School
School Address:	17110 16th Drive NE; Marysville, WA 98271
E-mail Address:	jhanson@lwsd.wednet.edu
Phone:	360-652-4510

Project Description

Students will raise salmon from eggs to fry in the classroom and release the salmon back into the local watershed. This project is part of a hands-on, community-based, authentic, interdisciplinary learning project where the students will develop their understanding of system thinking and human-environment interactions by studying the salmon lifecycle and ecosystem. The raising of the salmon is essential to the project as it offers an experience that directly connects the students to their learning and participation in the community.

Learning Objectives

Students will:

- ♦ Identify the characteristics of salmon, their local ecosystem, and lifecycle.
- ♦ Monitor the salmon tank and understand the factors affecting the salmon.
- ♦ Understand through direct participation the process and interconnectedness of salmon recovery, including habitat enhancement and restoration.
- ♦ Understand how individual decisions and actions impact the environment.

Main Grade Level Expectations

- ♦ **Geography:** 3.1.2a *Analyze the different ways people use the environment, identify the consequences of use, and consider possible alternatives (Human/Environment Interaction, Region).* Students will learn how individuals' choices affect the salmon habitat in positive and negative ways.
- ♦ **Math:** 4.2.1: *Organize numerical, measurement, geometric, probability, statistical, and/or algebraic information for a given purpose.* Students will display background and monitoring information as tables and graphs.
- ♦ **Science:** 1.2.1 *Analyze how the parts of a system interconnect and influence each other.* Students will study the lifecycle and ecosystem of the salmon.
- ♦ **Writing:** 2.2.1. *Demonstrates understanding of different purposes for writing.* Students will write procedures, prepare a PowerPoint presentation and write thank-you letters.

Materials Needed

1 55 gallon aquarium w/lid & filter	1 Ammonia test kit
1 Filter charcoal: (12 pack)	2 pH test kit (25 tests)
1 Filter sponge	2 Long-handled fish nets
3 25-lb. bags aquarium gravel	1 Tubing for air pump (25 feet)
1 Aquarium thermometer	1 Undergravel filter
1 Aquarium gravel siphon	2 Pump Whisper 100
1 Chlorine remover	1 Chiller

Method / Design of Project

Students will:

1. Administer a brief survey to classmates to determine knowledge of local salmon and watersheds. (This step was completed. Sample results include: While 72% of the seventh-grade students can name a Seattle sports player, only 29% could name a type of salmon from this area.)
2. Analyze the data and produce summary tables and graphs.
3. Learn about the local salmon species and their ecosystem through readings, worksheets, and speakers.
4. Conduct research (including on-line research) to learn what is needed to raise salmon in the classroom and students will participate in the set-up of the tank.
5. Participate in a field trip to the Stillaguamish Tribe Natural Resource Department Hatchery from which they will later receive the Coho eggs that they will be raising.
6. Participate in the dissection of Coho Salmon (Stillaguamish Tribe Natural Resource Department).
7. Raise the salmon eggs to fry in the tank. This includes the day-to-day monitoring and maintenance of the environment. Students will graph information to assist in the monitoring.
8. Write a handbook of procedures to care for the salmon for the next year's class.
9. Participate in a restoration project (Stilly-Snohomish Fisheries Enhancement Task Force) by planting trees along a local waterway. This experience will be connected to the survival of the salmon that they will be raising.
10. Plan and participate in an evening presentation for parents and guardians to celebrate the release of the salmon (Salmon-Release Celebration). This will include a PowerPoint presentation that explains the salmon's lifecycle, ecosystem, cultural and historical significance, and the human-environment interactions, including how individuals' decisions can improve the environment.
11. Release the salmon into the local watershed. We will apply for a Snohomish County Public Works Surface Water-Related field trip grant to cover expenses.
12. Write thank-you letters to individuals and organizations that have helped their learning and the project.
13. Serve as mentors to instruct the following year's class in the steps to raise the salmon.

Evaluation

Students will:

- Be evaluated on their final Salmon-Release-Celebration PowerPoint presentations.
- Conduct and analyze a survey at the end of the project to determine if knowledge of the local watershed and salmon has increased.
- Receive traditional assessments that require them to identify the salmon ecosystem and salmon lifecycle.

Challenges

We needed to raise additional funds to purchase the chiller for the tank. We overlooked the high cost, but do see this as a multi-year project. Matching funds have been allocated from the building budget to help purchase the chiller. Next year teaching responsibilities have changed, which is a challenge, but is also an opportunity to involve an additional teacher in the project.

Successes / Strengths of the Project

Students this year completed the first seven steps of the project. They enjoyed and learned much from their participation in planting trees, monitoring the water quality, and learning about salmon from our region. The students are more aware how their individual choices can either degrade the environment or enhance the environment. They participated in writing the original grant and researched the needed materials. The students wrote thank-you letters, which left the main recipient “gushing” with appreciation of their thoughtfulness.

Budget

Qty	Item	Store	Price each	Total
1	55 gallon aquarium w/lid & filter	PETCO	199.99	199.99
1	Filter charcoal: (12 pack)	“	17.99	17.99
1	Filter sponge	“	5.99	5.99
3	25 lbs. Aquarium gravel	“	14.99	44.97
1	Aquarium Thermometer	“	1.99	1.99
1	Aquarium gravel siphon	“	14.99	14.99
1	Chlorine Remover	“	8.49	8.49
1	Ammonia test kit	“	15.99	15.99
2	pH test kit (25 tests)	“	14.99	29.98
2	Long handled fish nets	“	4.99	9.98
1	Tubing for Air Pump (25 feet)	“	4.99	4.99
1	Undergravel filter	“	22.99	22.99
2	Pump Whisper 100	“	39.99	79.98
			Subtotal	458.32
Shipping NA due to pick-up			Tax	36.67
			Total	494.99

Due to an educational discount from PETCO, we have remaining funds, which we will apply to off-set part of the purchase of a chiller for the tank.

Research and Examine the Feasibility and Impacts of Tidal and Wave Energy on the Kayak Point County Park Area by Kirby Schaufler

Grade Level: Grade 8
School District: Marysville School District
School: Cedarcrest Middle School
School Address: 6400 88th St NE / Marysville, WA 98270
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Phone: 360-653-0850

Project Description

Research and examine the feasibility and impacts of tidal and wave energy on the Kayak Point County Park area. As a culminating event take a field trip to Kayak Point County Park and study the ecology of the intertidal zone and the energy potential of the tide and waves. Based on studies determine the practicality of tidal or wave power generation in the Kayak Point County Park area.

Learning Objectives

To learn about the science of power generation using ocean tides or waves, and find out, using science and math, whether or not power generation is practical or possible in a given area (Kayak Point). To learn about the ecology of the area and how development of power generation may impact the area. To learn about governmental processes related to use of land and water resources. To learn how to write a letter to elected officials on behalf of a certain opinion about an issue of land and water use in the county.

Grade Level Expectations

- Science: 1.2.1 Analyze how parts of a system interconnect and influence each other. The systems we will study for interconnections are the ecosystem of an area and the oceans systems of waves, currents, and tides.
- Science: 1.2.2 Understand how various factors affect energy transfers and that energy can be transformed from one form of energy to another. The transfer of heat energy from the sun to wave energy, to possible electrical energy, is being explored in our project.

Materials Needed

Transportation, Measuring devices: tape measurer, meter sticks, stopwatches.

Method / Design of the Project

Steps to achieve objective:

- *Prior to the field trip:* Students will learn about causes of tides and energy transformation in science. Students will learn about measurement and calculation in math, governmental processes in social studies, and writing conventions in English.
- *During the field trip:* Students will be in 4 groups and will participate in 4 different activities in rotation:
 - *Activity 1 - Science:* Do an intertidal zone study related to organism distribution. Also put together a food web of the area from observations.
 - *Activity 2 - Math:* Measure and record tide changes, and wave amplitude and frequency, to determine power potential.
 - *Activity 3 - Social Studies:* Study historical use of the area and the governmental processes involved in maintaining the current use or changing the use.
 - *Activity 4 - English:* Do a free-write about a specific area of the beach incorporating observations, and a technical writing of the same area, and compare.
- *After the field trip:* Students will prepare a feasibility report that will utilize the students research prior to and during the field trip to persuade a mock panel of council members how to proceed on a proposed project to begin power generation using the Kayak Point area.

Evaluation

Assessment: Student's feasibility report will be assessed using a rubric that will stipulate the need for evidence gained through book and Internet research, and first hand information from the Kayak Point studies. The validity of the data and calculations regarding power production will also be assessed. Student's persuasive letters will also be graded using a list of criteria. The adherence to proper procedures during the council meeting will also be assessed. Students will also be assessed by the grading of the field trip packet, which is attached.

Challenges

As we did more research on tidal power it became clear that to determine feasibility of a region for tidal power we needed to determine velocity of flow in the middle of a channel, which we could not do on shore.

Successes / Strengths of the Project

Great exploration of the Kayak point area and a super experience of bringing classroom studies of tides, and intertidal ecosystems, to life. Students were very interested in the concept of tidal power generation and posed many great questions regarding the impact of underwater propeller like turbines on sea life and ecosystems.

Budget

Transportation 3 buses

Driver \$25/hour 3 buses x 2 hours = 6 hours x 25 = 150

Mileage \$1.95/mile 3 buses x 60 miles = 180 miles x 1.95 = 351.00

Total: \$501.00

Additional Advice: This was a great project. To do it well requires a lot of pre-trip planning and learning. I would recommend devoting 3-4 weeks investigating tidal power production from all scientific, environmental, and governmental perspectives.

Building Solar Cars by Joan Henderson

Grade Level: Grades 3-5
School District: Private School
School Name: Monroe Montessori
School Address: 733 Village Way / Monroe, WA 98272
Email Address: joan@monroemontessori.com
Phone: 360-794-4622

Project Description

The children will build solar cars from kits after learning about the benefits of solar energy, the causes and effects of air pollution, and effects of carbon dioxide on the environment.

Learning Objectives

- *Students will be able to list causes and effects of air pollution.
- *Students will investigate the effects of carbon dioxide on the environment.
- *Students will learn the benefits of solar energy as a renewable source of energy.

Grade Level Expectations

1. Students learn how the scientific design process is used to develop solutions to human problems.
2. Students will understand the damage air pollution is causing in our environment and how it may affect human's ability to survive in the future.

Materials Needed

- Solar car kits (one for every child to build) included are the parts and directions to build a solar car model
- Two other solar car kits to demonstrate the differences that can exist within models

Method / Design of Project

Students worked in pairs building their models. Previous to building the cars, we had lessons on the advantages of solar energy, air pollution, and the effects of excess carbon dioxide in the environment. I paired up younger students with older ones to help figure out the difficult directions. First, they checked off all the parts in the kit and then proceeded by following the numbered directions. We experimented with the energy the cars received from the sun on different days and concluded our study with a race.

Evaluation

Students kept a working journal of their progress in building the car. In their journal they recorded the steps to constructing the solar car and then wrote about any problems they had, either in the construction of the car or the running of the car. Students compared and contrasted solar powered cars with gas powered cars.

Challenges

Most of the students wrote that their biggest challenge was in putting the wheels on the axles. There was a little plastic tubing that had to slide on to keep the wheels in place and it required sanding the axle in order for it to fit. Some children experienced problems when they were running their cars. They would not drive straight.

Successes / Strengths of the Project

The children became very creative with their cars and tried a variety of options, such as, moving the solar panel flat instead of at an angle, putting two cars together to see if they would move faster, loading their cars with different objects to see if the weight would effect it's movement. They all enjoyed building and running the cars.

Budget from www.sunwind.ca

2 Sunny side up Classroom Kits with 10 models	269.90
Solar Drive Kit	24.95
Solar Drive II Kit	32.95

	327.80
Shipping Approximate	25.00

	352.80

K-8 Energy/Resources Library Materials

by Jill Hetzler

Grade Level: Kindergarten through 8th Grade
School District: Archdiocese of Seattle
School Name: St. Thomas More School
School Address: 6511 176th Street SW, Lynnwood, WA 98037
Email Address: jillh@stms.org
Phone: 425-743-4242

Project Description

St. Thomas More School has selected 24 books on energy-related subjects to add to the school library. Library materials will be used in the following ways: book report resources for middle school students; learning about sustainable living and resources required; updated and current materials in the non-fiction area of energy, resources and sustainable living.

Learning Objectives

The learning objectives of this project were to create a greater sense of knowledge in the areas of energy, resources and sustainable living. Also, to give middle school students more experience in using non-fiction materials and creating a book report or power point project that would report on the information gleaned from the library materials. Additionally books on sustainable living and energy were used by one class to determine “eco-footprints” and create a greater awareness of resources used on a daily basis.

Grade Level Expectations

Science 3. Application: The student knows and applies science ideas and inquiry to design and analyze solutions to human problems in societal contexts.

Scientific design process skills are used to develop and evaluate scientific solutions to problems in real world contexts. The application of an understanding of systems and inquiry is comprised of two components:

3.1 Designing Solutions: Apply knowledge and skills of science and technology to design solutions to human problems or meet challenges.

Reading 3. The student reads different materials for a variety of purposes.

3.1 Read to learn new information

Materials Needed

The materials needed for the project were the 24 energy titles/books selected by the librarian.

Method / Design of Project

Students in grades 6 & 8 were given the following assignment:

Science Non-fiction Book Report

- Search for a book in the library catalog: "Science Non-Fiction"
- Pick a book. on a topic you want to learn more about

Before you read your book compose an answer to these questions:

- Why am I interested in this subject?
- What do I already know about this subject?
- What is one thing I want to learn from reading this book?

Read your book, become an expert!

Stuff to write about:

- What are the author's qualifications to write on this subject? (write a short bio on this person(s).)
- Give an overview of the contents of the book.. (summary)
- What main points did the author make? From your reading what important conclusions did the author make?
- What new information did you learn? Discuss at least 3 in detail.
- Did this book give you information about what you wanted to learn from reading this book? (your pre-read question)
- How did this book contribute to your overall knowledge of the subject?
- Did you enjoy reading this book? Was it well written and informative? Would you recommend it to another student? Why or why not.
- List and define 5-10 vocabulary words found in the book that are specific to the topic.
- After reading this book what further questions do you have about this topic? (What else do you want to know?) Compose 3 questions

Evaluation

Scoring Rubric: Each section is worth 5 Points (45 points = 100%)

- What are the author's qualifications to write on this subject? (write a short bio on this person(s).
- Give an overview of the contents of the book. (summary)
- What main points did the author make? From your reading what important conclusions did the author make?
- What new information did you learn? Discuss at least 3 in detail.

- Did this book give you information about what you wanted to learn from reading this book? (your pre-read question)
- How did this book contribute to your overall knowledge of the subject?
- Did you enjoy reading this book? Was it well written and informative? Would you recommend it to another student? Why or why not.
- List and define 5-10 vocabulary words found in the book that are specific to the topic.
- After reading this book what further questions do you have about this topic? (What else do you want to know?) Compose 3 questions

TOTAL: _____

Students in grade 7 were assigned the following project:

What is your Eco-Footprint?

Directions: During class tomorrow, you will be answering many questions to help determine your “ecological footprint” (in other words, the amount of earth’s resources you need to support your lifestyle). The following are questions you will probably need help from your parents on. Please fill this out tonight.

- 1) How big is the city or town you live in?
- 2) Size of your home:
 - 2500 or larger
 - 1900-2500
 - 1500-1900
 - 1000-1500
 - 500-100
 - 500 or smaller
- 3) How far do you travel on public transportation in a week (estimate mileage)?
- 4) How far do you travel on motorbike each week (estimate mileage)?
- 5) How far do you travel by car each week (estimate mileage)?
- 6) How many miles per gallon of gasoline does the gar your ride in get (estimate)?

No evaluation or assessment was done for this project, as it was an informational assignment only.

Challenges

Challenges in implementing the project were few. The library materials were selected by the St. Thomas More School Librarian from a book vendor (Follett Library Services). Materials were chosen for relevance to projects, age appropriateness and currency of materials. All books chosen had a publication date of 2006 or later, when possible.

Successes / Strengths

All students in grades 6 and 8 completed a science/energy related non-fiction book report using the materials provided by the Snopud mini-grant. Additionally the students in grade 7 used the materials provided by the grant to investigate their own eco-footprints and to consider their own use of energy resources. Library materials provided by the Snopud mini-grant were also added to the general library collection and featured in a library display for the entire school community. Many of the titles purchased have been borrowed from the library by a variety of grade level students and teachers. These materials are current and very useful to teach students about energy consumption and use in their lives.

Budget

Budget for this project was the purchase of library materials as stated above. The number of books purchased was 24 with the total expenditure of \$481.67.

Additional advice

Thank you for the opportunity to participate in this mini-grant. The use of these books alone, as a part of our library collection, is a “renewable resource.” There is a continuing need to introduce and reinforce conservation of energy resources.

Solar Power by Judy Irving

Grade Level: 5th Grade
School District: Monroe School District
School Name: Fryelands Elementary School
School Address: 15286 Fryelands Blvd, Monroe, WA 98272
Email Address: irvingj@monroe.wednet.edu
Phone: 360-863-4700

Project Description

Students researched solar energy and its uses and then constructed a solar powered machine. Using materials supplied they spent time diagramming, discussing and then constructing a solar powered machine and gave a presentation to the class outside explaining how the machine worked. They wrote in journals throughout the project.

Students investigated solar energy and invented a solar powered machine. They drew diagrams showing how their machine would work and labeled the parts. They presented their inventions to the class and answered questions about their machines.

Learning Objectives

The main GLE that was addressed was how the parts of a system go together and how these parts depend on each other.

Materials Needed

I used a great kit from Solar Run that had most of the supplies that would make any machine work, the kids brought other items from home such as milk cartons, cardboard tubes, paint and anything they thought that might work with their project.

Methods / Design of Project

I really wanted this lesson to be hands-on, so I just started the kids on researching solar energy and started discussing with them why this works. I gave them the assignment that they were to invent a machine that would work using solar energy; they must sketch out their ideas first and then present the design plan to me. I then gave each team a solar cell, motor, and a motor mount and told them they could use any of the supplies in the kit. It was great to watch them answer their own questions by trying things out and re-designing to solve problems.

Evaluation

The students' journals and final project were used for evaluation

Challenges

One challenge I found was space in the classroom to keep things that were being worked on in a safe place when we were working on other things. The other challenge was getting kids to stay the course on what they designed because once they saw a boat or car that was designed they wanted to change their project.

Strengths / Successes

The kids were highly motivated to work on these projects and were spurred on when they would notice what another group was doing. Another neat thing that happened while we were doing this was that the city was installing solar lights outside of our school and we are on the second floor and it was the kids that first notice the "giant" solar cell out side of our window. (All of them wanted to hook their machines up to that one.) It also started a discussion about how the light was going to work in the winter when it is dark all the time.

Budget

1 Classroom Kit from Solar Run \$475.00

Have fun and let the kids use trial and error to make things work!

Nuclear Energy – A Viable Energy Source?

by Rosaleen Wilcox/David Delaney

Grade Levels: Grades 9-12
School District: Sultan School District
School Name: Sultan High School
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Phone: 360-793-9860

Project Description

In 2007, Sultan High School students, due to a mini-grant from PUD, had a unique expansion of our unit study on nuclear energy. We were able to take a field trip to and tour the USS Henry M. Jackson, an Ohio Class Fleet Ballistic Missile Submarine-Trident Program. Upon their return students designed their own version of a nuclear-powered habitat.

Learning Objectives

The primary focus of this project was to familiarize students with the implementation of nuclear power as an energy source. In so doing students were challenged to explore the societal, environmental, and economic ramifications of nuclear power. Research, data collection, and evaluation were useful components of the learning experience. The entire project fulfilled the multi-disciplinary educational goals outlines in our initial grant application. The tour of the submarine itself highlighted the effectiveness of nuclear energy as well as providing a glimpse into the lives of our military at sea.

Grade Level Expectations

The project exceeded the current grade level expectations for this energy unit. The tour was supplemental and the habitat designs an enhancement of unit learning goals.

EALR 1, GLE Component 1.2

EALR 3, GLE Component 3.2

Materials Needed

Classroom supplies, paper, pens, etc. were provided. Students wishing to include colored or printed material provided their own. The primary project costs were transportation to Bangor Submarine Base.

Method / Design of the Project

The project was divided into three phases:

- A) Preparation-Classroom Unit Study;
- B) Observation/Exploration-Field Study;
- C) Implementation-Habitat Design (classroom).

Evaluation

- A. Preparation – Classroom Unit Study (Nuclear Energy)
 - a. Fission/Fusion
 - b. Chain Reaction – Electricity
 - c. Risks/Fears
- B. Observation/Exploration – Field Trip
 - a. The trip abroad the Trident Submarine provided much more than the original goal. It was expected to observe an example of interconnected systems operating efficiently off nuclear power. The surprise was the enthusiasm of every level of Naval personnel we came into contact with and their willingness to answer every question presented. These men were so very proud of their boat.
- C. Implementation – Habitat Design (Classroom)
 - a. Students were charged with designing their own nuclear powered habitat. Their research was extensive. Some students contacted established groups with opposing views on utilizing nuclear energy.
 - b. The best example of the students' work was delivered to PUD headquarters in Everett, WA.

Strengths / Successes

The detail and creativity involved in the students' habitat design showed an impressive acquisition of knowledge on the subject of nuclear power. Rather than just a chapter of an Energy Unit, students closely examined the viability of nuclear power as a primary energy source.

Water Mini-Grant Streamkeeper Academ by Sara Wells

Grade Level: Grade 4
School District: Lake Stevens School District
School Name: Highland Elementary
School Address: 3220 113th Street NE, Lake Stevens, WA 98258
Email Address: sara_wells@lkstevens.wednet.edu
Phone: (425) 335-1585

Project Description

The project is to take a group of 48 students on a field trip to a local wetland habitat with the Adopt-A-Stream Education Program. Students will interactively learn about the salmon life cycle, their incredible journey to their native streams and what kind of habitat is critical for spawning and survival. They will also leave with a full understanding of what a watershed is and what riparian zones are.

Learning Objectives

- Students will have an authentic experience in a native growth/wetland habitat.
- Students will understand how their actions impact the environment.
- Students will be able to identify the life cycle & histories of salmon in the Puget Sound Region.
- Students will be able to describe the habits and habitat requirements of salmon.
- Students will understand what a watershed is and what riparian zones are.

Grade Level Expectations

GLE 2.2.5 (Science) Understand that scientific comprehension increases through inquiry.

✧ This field trip was a wonderful chance for students to inquire about the environment & gain deeper understanding of the science of water.

GLE 3.2.4 (Science) Understand how humans depend on the natural environment and can cause changes in the environment that affect humans' ability to survive.

✧ Students saw first hand a natural environment and the impact that humans have on it. They learned how they can help or hurt natural resources.

GLE 1.2.1 (Communication) Understand, analyze, synthesize, or evaluate information from a variety of sources.

✧ Students have been learning about water from a variety of sources, this field trip was one more opportunity for learning.

Materials Needed

Since this was a field trip, the only materials we needed were transportation and to arrange the speakers.

Method / Design of the Project

Students were taken to the wetland native growth area near McCollum Park, called Northwest Stream Center. Tom Murdoch, Streamkeeper Field Guide met us there and was our guide for the day. He had two assistants with him, one who was also a Streamkeeper Field Guide, and one who was an aquatic bug expert. The activities of the day included learning about watersheds, salmon, aquatic bugs, and how we help or hurt our environment. We also toured a native growth and wetland area. We were able to see aquatic bugs close up through microscopes.

Upon returning to the classroom students did a variety of writing activities about the trip and had many in-depth conversations.

Evaluation / Assessment

Student learning was assessed through students' participation in salmon writing activities. Students made a book that illustrates and describes the life cycle of a salmon. They also had the choice to make a brochure focused on one of the areas they learned about (water conservation, salmon habitats, native growth, etc.) Learning was also be assessed through in class discussion and their participation through out the day.

Challenges

This trip really didn't present any challenges. The Streamkeeper Academy was wonderful to work with and really all we did on our end was to coordinate.

Strengths of the Project

Both teachers who went on the field trip felt it was a huge success. The amount of knowledge the students gained was immense! The students were involved in a variety of activities that were hands on and engaging. They were active participants. They had many questions for the experts and were excited about all of the different activities they participated in. The field trip also encouraged inquiry into problem solving other issues within our local area. Students came back to the classroom and were definitely effected by what they had seen and learned and encouraged to make a difference.

Field Trip Budget

- Cost of field trip through Adopt-a-Stream \$350
- Transportation by bus estimated \$200.
- Total Cost = \$550



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