1991

Developing an inservice on energy and energy conservation for teachers, grades kindergarten-eight

Cynthia Gail Blair

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California State University
San Bernardino

DEVELOPING AN INSERVICE ON
ENERGY AND ENERGY CONSERVATION
FOR TEACHERS, GRADES KINDERGARTEN-EIGHT

A Project Submitted to
The Faculty of the School of Education
In Partial Fulfillment of the Requirements of the
Degree of

Master of Arts
in
Education: Environmental Education Option

by

Cynthia Gail Blair
San Bernardino, California

1991
DEVELOPING AN INSERVICE ON ENERGY AND ENERGY CONSERVATION FOR TEACHERS, GRADES K-8

Cynthia Gail Blair
California State University, San Bernardino, 1991

Abstract

The attention given to energy conservation in recent times has triggered the need to provide teachers with classroom materials to educate students about this topic. Inservices have been widely used to share information with teachers. This project developed an energy and energy conservation inservice for teachers, grades Kindergarten-eight. The hands-on activities and materials provided to the participants were compiled from several sources, including Southern California Edison and the California Energy Extension Service. The activities were chosen based on their alignment to the 1990 Science Framework for California Public Schools Kindergarten through Grade Twelve. Consideration was also given to appropriate grade level concepts, process skills, and cross-curricular applications. The inservices were attended by 110 teachers during the 1990-91 school year. The presentations and materials received favorable rating by the participants.
Special Thanks to:

Dr. Darleen K. Stoner
and
Kaycee Crouse
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Introduction

Conservation has become the buzz word of the 1990's. The inhabitants of Planet Earth are expected to incorporate conservation techniques into their everyday lives, yet many of them do not have adequate information on how to accomplish this change in lifestyle. Conservation means to use less of a resource or reuse it several times. Many resources, such as water, energy and minerals, are currently being conserved to some degree, either by personal choice or by government regulation.

The energy shortages and crises of the 1970's and 80's, together with rising fuel bills, have encouraged many to adopt energy saving practices. Unfortunately the general public still lacks the knowledge and values necessary to employ widespread energy conservation techniques. The supply of energy available directly influences humans' ability to deal with environmental problems and the supply of all other resources. The fossil fuels will continue to supply energy for some time to come; however they are considered a nonrenewable source and cannot last forever. Conservation can increase the period of time these resources are accessible, giving more time for alternative sources of energy to be developed and readily attainable. Indeed, "conservation is the perfect renewable energy source" (Arms, 1990).

The availability of energy affects almost every aspect of environmental education. As teachers assume the responsibility for educating the public about issues that go beyond the basic skills (reading, writing and arithmetic), the classroom becomes a forum for environmental education including critical environmental issues (Shrigley & Koballa, 1983). Many teachers currently incorporate energy
conservation into their curriculums; however some feel a lack of expertise and knowledge about the latest energy and energy conservation trends (Bueth & Smallwood, 1985; Glass, 1982). As they learn about energy conservation habits, students are encouraged to take action both at school and at home.

The "Energy and Energy Conservation Inservice" was developed to provide teachers, grades Kindergarten through eighth, with hands-on activities to be used with students as they explore the concepts of energy and energy conservation.
Review of Related Literature

The inservice method has become popular as a device to provide information to teachers. The goals of these inservices should be to increase the teacher awareness and knowledge about energy and to pass on information and attitudes to the students (Buethe and Smallwood, 1985; Geil and Sheldon, 1983; Lawrenz, 1986). However, simply having teachers attend an inservice may not insure their use of the materials in the classroom. A study by Lawrenz (1985) found that "for implementation to actually take place, teachers must be convinced of the value of the material and understand how to use it with students." Van Kovering and Sell (1983) found that elementary school teachers tended not to use everything they learned in an inservice. Therefore, the inservices should emphasis increasing the teachers' basic knowledge of energy and energy conservation; rather than the political and technical aspects. The inservices should also focus on topics that can be easily understood and lend themselves to demonstrations and hands-on student activities that could be replicated in the classroom (Kimmel and Tompkins, 1985).

Many of the topics in energy education can be effectively and simply demonstrated and utilize activities that encourage student participation. Elementary school teachers can use energy education to help create an early awareness of and an attitude toward the energy problems facing our earth. Their students are developmentally ready to understand many basic environmental concepts and to form attitudes and values toward the environment (Kimmel and Tompkins, 1983).
Students' conceptual understanding is reinforced when they can make connections between the concepts of science and their everyday lives (Science Framework for California Public Schools Kindergarten through Grade Twelve, 1990).

Research has shown individual conservation to be an area meriting emphasis in future inservice programs (Lawrenz, 1985). This seems to be especially relevant for teachers of younger students who need to deal with concrete issues, such as their own family's conservation efforts (Lawrenz and Dantchik, 1985). Global approaches are necessary, but can take extended periods of time. The conservation efforts of individuals are usually easier and the results are more immediate. The phrase "think globally, act locally" reminds us to begin our actions in our own neighborhoods, while being mindful of the larger environmental picture.
Statement of Goals and Objectives

The goal of this project was to develop and implement a fifty (50) minute inservice for teachers, grades Kindergarten through eighth, that would supplement the basic district science curriculum. The inservices were structured by grade level groups: Kindergarten through second, third and fourth, and fifth through eighth.
Design

The fifty (50) minute inservice format was designed to include both information and hands-on activities related to energy and energy conservation. The activities were chosen from a variety of sources, including Southern California Edison educational materials and materials from the California Energy Extension Service. The activities were selected based on their alignment to the 1990 Science Framework for California Public Schools Kindergarten through Grade Twelve (hereafter referred to as Science Framework). Consideration was also given to appropriate grade level concepts, process skills, and cross-curricular applications. Thus, three individual inservices were developed, taking into consideration the needs of students at different grade level groupings. The three groupings were: Kindergarten through second, third and fourth, and fifth through eighth.

The inservice for the teachers of Kindergarten through second grade focused on the topics of conservation of resources, insulating properties of various materials and alternative energy sources. These topics align with the following content areas in the Science Framework: Geology and Natural Resources and Energy: Sources and Transformations. The topics also support the themes of: (a) Energy; (b) Patterns of Change; and (c) Systems and Interactions. The process skills emphasized at these grade levels are: observing, comparing, communicating and ordering. The focus of the content is to help students develop an awareness of the environment and energy sources as well as an understanding of basic energy concepts, such as
conservation and alternative energy sources. The activities incorporate the subject areas of mathematics, science, social sciences and art. The grade level agenda summarizes this information for the participants (see Appendix A for the complete agenda with activities).

The inservice for the teachers of grades three and four was set up similar to the Kindergarten - second inservice. The topics emphasized were conservation of resources, energy problem solving, energy use in product manufacture and distribution, and alternative energy sources. These topics align with the content areas in the Science Framework: (a) Geology and Natural Resources; (b) Energy: Sources and Transformation; and (c) Energy: Heat. The topics support the themes of: (a) Energy; (b) Patterns of Change; and (c) Systems and Interactions. The process skills developed by the activities are: observing, comparing, communicating, ordering, categorizing and relating. The students should develop an understanding of basic energy concepts, such as conservation, energy flow and usage. The students should also develop an awareness of the environment, energy sources and energy habits. Subject areas incorporated are math, science and social sciences. Participants received an agenda with this information (see Appendix B for the complete agenda with activities).

Participants in the inservice for teachers of grades five through eight received activities related to the topics of conservation of resources, energy problem solving, energy transformations, alternative energy sources, and wasteful energy habits. The
areas of the Science Framework aligned to were: (a) Geology and Natural Resources; (b) Energy: Heat; (c) Energy: Electricity and Magnetism; and (d) Energy: Sources and Transformation. The topics support the themes of: (a) Energy; (b) Patterns of Change; and (c) Systems and Interactions. The process skills highlighted are: observing, comparing, communicating, ordering, categorizing, relating, and inferring. The students at these grade levels should practice action skills as well as acquire an understanding of basic energy topics, such as conservation, energy flow and usage, and energy sources and energy habits. The information is outlined in the inservice agenda (see Appendix C for the complete agenda with activities).

All inservices provided hands-on instruction and handouts detailing the activities. The materials needed by the participants for the activities were prepared and placed in individual sets prior to the inservice. These preparations facilitated the flow of the inservice. The handouts allow the teachers to be able to immediately implement the energy and energy conservation activities with their students (see Appendix D for individual activity handouts). A bibliography of currently available free or low cost energy activity resources and programs was compiled and given to each participant (see Appendix E). A participant survey form was developed to evaluate each workshop (see Appendix F for the complete participant survey form).
Results

The inservices were presented at four locations during the 1990-91 school year. The Kindergarten-second workshop was given three times: at Kimbark Elementary, at the Fall Environmental Discoveries for Innovative Teachers Conference (EDIT), and at the Environmental Expo Teacher Workshops. The three-four workshop was given twice: at the Fall EDIT Conference and at the Environmental Expo. The five-eight was given four times: at Kimbark Elementary, Mary Tone Elementary, at the Fall EDIT Conference, and at the Environmental Expo. A total of 110 teachers attended these workshops. The participants were predominantly elementary school teachers, grades K - 6, representing 15 districts in the Inland Empire.

Following each inservice session, each participant was asked to evaluate the inservice in several areas including appropriateness of the length of the inservice, usefulness of activities, usefulness of bibliography and quality of presentation. The last three areas were rated on a scale of one to five, with five representing the highest rating. The evaluations results were tallied and summarized on the Workshop Evaluation Summary Form (see Appendix G). 90% of the responses were fives, in all areas. One-third of the evaluations had positive comments for the activity handouts and bibliography. The evaluations from the first six presentations were used to modify the inservices presented at the Environmental Expo. The pacing of the inservices was modified and the time spent for each hands-on activity
was reduced to accommodate a more complete closure for the inservice.
Conclusion

The inservices were successful based on the ratings and comments made by participants. It is assumed that since the teachers judged the activities as highly useful, that these activities were shared or will be shared in the near future with classroom students. If only one-half of the 110 participants actually conducted the activities with students, over 1600 students would have received energy conservation education.

An area for follow up study would be an assessment of the actual implementation of activities. This might be accomplished by a mailed survey to previous inservice participants.
References


Appendix A

Inservice Agenda, Grades K-2
ENERGY AND ENERGY CONSERVATION

Presented by Cindi Blair

Grades K-2

These activities were chosen to help the students understand the following topics:

- Conservation of resources
- Insulating properties of various materials
- How a wind turbine operates
- Alternative energy sources

Science Framework for California Public Schools Kindergarten through Grade Twelve Correlation

- Major content areas of the Framework:
  - Energy: Sources and Transformations
  - Geology and Natural Resources

- Themes:
  - Patterns of Change
  - Energy
  - Systems and Interactions

Process Skills developed:

- Observing
- Comparing
- Communicating
- Ordering

Subject Areas:

- Math
- Science
- Social Sciences
- Art

Workshop Activities:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Source</th>
<th>Materials</th>
<th>Time*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Puzzlers</td>
<td>Energy Math-CEES</td>
<td>Copy of problems</td>
<td>5-10 min</td>
</tr>
<tr>
<td>Activity</td>
<td>Source</td>
<td>Materials</td>
<td>Time*</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------</td>
<td>-----------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>Ice Race</td>
<td>Let's Get Energized-CEES</td>
<td>Insulating materials-see handout, ice cubes</td>
<td>15-20 min.</td>
</tr>
<tr>
<td>Wind Energy</td>
<td>&quot;Full of Energy&quot;, from Learning,90</td>
<td>Tagboard, new pencils, file cards, string, paper clips, tape</td>
<td>20-25 min.</td>
</tr>
</tbody>
</table>

* This is the approximate time for implementation with students.
Appendix B

Inservice Agenda, Grades 3 and 4
ENERGY AND ENERGY CONSERVATION

Presented by Cindi Blair

Grades 3-4

These activities were chosen to help the students understand the following topics:

- Conservation of resources
- Energy problem solving
- Energy required to produce and distribute a product
- Wasteful energy habits
- How a wind turbine operates

Science Framework for California Public Schools Kindergarten through Grade Twelve Correlation

Major content areas of the Framework:
- Energy: Sources and Transformations
- Energy: Heat
- Geology and Natural Resources

Themes:
- Patterns of Change
- Energy
- Systems and Interactions

Process Skills developed:
- Observing
- Comparing
- Categorizing
- Communicating
- Ordering
- Relating

Subject Areas:
- Math
- Science
- Social Sciences

Workshop Activities:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Source</th>
<th>Materials</th>
<th>Time*</th>
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</thead>
<tbody>
<tr>
<td>Energy Puzzlers</td>
<td>Energy Math-CEES</td>
<td>Copy of problems</td>
<td>5-10 min.</td>
</tr>
<tr>
<td>Activity</td>
<td>Source</td>
<td>Materials</td>
<td>Time*</td>
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</tr>
<tr>
<td>Energy Problem</td>
<td>Energy Math-CEES</td>
<td>Transparency of problems, scratch paper</td>
<td>5-10 min.</td>
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<tr>
<td>of the Day</td>
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</tr>
<tr>
<td>Energy Pathways</td>
<td>Conserve &amp; Renew-CEES</td>
<td>Objects-see handout, large paper, markers</td>
<td>30 min.</td>
</tr>
<tr>
<td>The Pay Me Game</td>
<td>Let's Get Energized-CEES</td>
<td>Envelopes, copy of questions, play money-$100 per person</td>
<td>20-30 min.</td>
</tr>
<tr>
<td>Wind Energy</td>
<td>&quot;Full of Energy&quot;, from Learning,90</td>
<td>Tagboard, new pencils, file cards, string, paper clips, tape</td>
<td>20-25 min.</td>
</tr>
</tbody>
</table>

* This is the approximate time for implementation with students.
Appendix C

Inservice Agenda, Grades 5-8
ENERGY AND ENERGY CONSERVATION

Presented by Cindi Blair

Grades 5-8

These activities were chosen to help the students understand the following topics:

- Conservation of resources
- Energy problem solving
- Energy transformation to provide light
- How a wind turbine operates
- Wasteful energy habits

Science Framework for California Public Schools Kindergarten through Grade Twelve Correlation

Major content areas of the Framework:
- Energy: Sources and Transformations
- Energy: Heat
- Energy: Electricity and Magnetism
- Geology and Natural Resources

Themes:
- Patterns of Change
- Energy
- Systems and Interactions

Process Skills developed:

- Observing
- Comparing
- Categorizing
- Inferring
- Communicating
- Ordering
- Relating

Subject Areas:

- Math
- Science
- Social Sciences
### Workshop Activities:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Source</th>
<th>Materials</th>
<th>Time*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make a Light Bulb</td>
<td>Energy Transformations, from Edison</td>
<td>plastic cups, clay, lunch bags, wire, batteries</td>
<td>30 min.</td>
</tr>
<tr>
<td>Wind Energy</td>
<td>&quot;Full of Energy&quot;, from Learning, 90</td>
<td>Tagboard, new pencils, file cards, string, paper clips, tape</td>
<td>20-25 min.</td>
</tr>
<tr>
<td>The Pay Me Game</td>
<td>Let's Get Energized-CEES</td>
<td>Envelopes, copy of questions, play money-$100 per person</td>
<td>20-30 min.</td>
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* This is the approximate time for implementation with students.
Appendix D

Individual Activity Handouts
### Energy Puzzlers

#### Why recycle?

Solve the problems to find where each letter belongs in the coded answer.

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<td>6 E</td>
<td>4 C</td>
<td>3 R</td>
<td>2 S</td>
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<td>+ 2</td>
<td>+ 3</td>
<td>+ 1</td>
<td>+ 3</td>
<td>+ 0</td>
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<td>1 G</td>
<td>5 A</td>
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<td>+ 5</td>
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</table>

FACT: California recycling centers must pay you at least 1¢ for each can or bottle labeled “CA Redemption Value.”

Funding: California Energy Extension Service
Energy Puzzlers

Name:

How can kids save energy and trees?
Solve the problems to find where each letter belongs in the coded answer.

<table>
<thead>
<tr>
<th>6 E 4</th>
<th>5 R 5</th>
<th>7 L 3</th>
<th>9 A 1</th>
<th>5 S 3</th>
</tr>
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<tbody>
<tr>
<td>+ 2</td>
<td>+ 6</td>
<td>+ 1</td>
<td>+ 7</td>
<td>+ 5</td>
</tr>
<tr>
<td>8 P 4</td>
<td>4 U</td>
<td>1 R</td>
<td>5 D</td>
<td>3 I</td>
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<tr>
<td>5 0</td>
<td>4 4</td>
<td>9 5</td>
<td>8 5</td>
<td>9 9</td>
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<tr>
<td>+ 2</td>
<td>+ 6</td>
<td>+ 9</td>
<td>+ 8</td>
<td>+ 7</td>
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</tbody>
</table>

_____ both _____
10 13 12 13 19 18 12 13

of _____ _____
17 11 11 15 17 15 12 16 13

before throwing them away!

FACT: Turning old paper into new paper uses only 1/2 the energy that was needed to make the paper in the first place.

Funding: California Energy Extension Service
Energy Puzzlers

What is energy conservation?

Solve the problems to find where each letter belongs in the coded answer.

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<td>A</td>
<td>11</td>
<td>N</td>
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<td>1</td>
<td></td>
<td>0</td>
<td></td>
<td>10</td>
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</tbody>
</table>

In other words,

```
1  7  5
3  0  6  5
8  6  5  2  10
```

```
5 11 5 4 14 12
```

```
13 5 6 6
3  9  6 1  5
```
Energy Puzzlers

You can save energy!

Fill in each box with the number which comes just before the number to the right of the box. Use the code letters to decipher the hidden message below.

I = □ 4  R = □ 3  F = □ 1
T = □ 9  D = □ 13  V = □ 5
E = □ 15  O = □ 6  A = □ 8
L = □ 2  S = □ 11  N = □ 14
G = □ 10  H = □ 7

Kids can save energy by:

Turning off the

Turning off the

Closing the

Funding: California Energy Extension Service
Energy Puzzlers

Carpools and ordinal numbers.

Follow the directions:

Carpool to save

Carpool for less

Carpool to

with
Objective: Students will determine which materials have the best insulating properties for conserving energy.

Preparation:
1) Obtain needed insulation materials
2) Make 1 ice cube per student and put them in paper cups. (measure water going into ice cubes so that they are all the same size.)

Materials:
- ice cubes (1/student)
- paper cups (1/student)
- timer or stop watch

Recommended materials - use what is readily available
- sawdust
- straw
- cotton
- wool
- paper
- plastic bags
- newspaper
- styrofoam
- aluminum foil
- paper bags

Time Frame: 15 to 20 minutes
Suggested Audience: grades 1 to 6

Procedure:
1) Spread out insulating materials in an area where students have easy access to them.
2) Explain to students you are going to give them an ice cube in a cup and it is their job to use the materials on the table to keep their ice cube from melting. Explain that what they are doing is to "insulate" the ice cube. Insulation is used to keep the temperature of something at a constant level instead of the level of the air around it. Insulation in a building or a stove or refrigerator saves energy by not letting hot or cold air escape.
3) Tell students that you are going to have them check their ice cubes at 2 minute intervals for the first 10 minutes, then 1 minute intervals, then 30 second intervals. (NOTE: depending on the weather you may want to modify intervals)
4) Give each student an ice cube in a cup and start the timer. Have students check each others ice cubes at the appropriate time intervals. The last student with a piece of ice is the winner.
5) Talk about which materials kept the ice the longest. Ask students why this would be important to know and how energy could be conserved by knowing this.

Adapted from: Primary Energy Activities

Funding: California Energy Extension Service
Wind Energy—
discover how wind does work

Materials: 3" x 6" tagboard to make a tube, new wooden pencil, 4 file cards, tape, string, paper clips

Procedure:
• Make a 6" tube to fit loosely around a pencil.
• Cut the file cards.
• Tape the file cards to the tube.
• Assemble the tube, pencil, string, and paper clip.
• Hold the pencil and blow on the blades.
How many breaths does it take to raise one clip? Two clips?

Background for your presentation:
1. Draw and display devices that use wind to pump water from a well, to mill flour, to generate electricity, or to help power a modern tanker.
2. Explain how they work.

Geothermal Energy—
make some earth steam

Materials: Pyrex dish, nail, funnel, hot plate, pinwheel

Procedure (this activity should be done under adult supervision):
• Partially fill the Pyrex dish with water. Insert the nail under the funnel as shown. Boil the water and observe your "geyser."
• Hold a pinwheel above the geyser and observe.

Background for your presentation:
1. Draw a cutaway diagram of a geyser showing the source of geothermal energy inside the earth.
2. Explain how geothermal energy can produce electricity.
3. Describe or illustrate how geothermal energy can heat homes directly, or keep crops from freezing.
Let's Get Energized
Electricity: Who Needs It?

TO THE TEACHER:
Objective: Students will creatively explore alternatives to using electricity in their daily lives.

Preparation:
1) Obtain the materials listed below.
2) Hang butcher paper and questions, as a set, around the room for each group of 6 to 8 students.

Materials:
Butcher paper
crayons or felt tip pens
masking tape
Copy of "Electricity: Who Needs It?" questions for each group.

Time Frame: 15-25 minutes
Suggested Audience: grades 1 to 5

Procedure:
1) Review the scenario from "Electricity: Who Needs It?" with the students. Tell them each group is to make a mural showing how they would solve each of the problems presented on the question sheet. The solutions may be funny, but they must be realistic.
2) Divide the students into groups and pass out the crayons or pens for students to draw murals in the time allotted.
3) When the time limit is over, have students come together to describe the solutions they drew. As a group, decide on the most practical solution for each of the problems presented.

Taking It A Step Further:
Encourage the children to try to do without electricity for a day. If any students do this then ask them to report back to the class on what they had to do differently because they didn't have electricity.
Imagine a day that starts something like this. You roll over in your bed, open your eyes, and discover that the morning seems much brighter than it usually does at the start of your day. You check your alarm clock, but that turns out to be no help at all. It is stopped at 12:05. You know that's not right! You jump out of bed and bound into the kitchen. The battery-operated clock on the wall tells you that you have only 15 minutes to get to school—just enough time for a quick slice of toast and a cup of hot instant chocolate.

Before you go back to your room to get dressed, you pop a slice of bread into toaster and turn on the electric stove burner to boil some water. When you get back to the kitchen, you find that everything is exactly the way you left it—the bread is untoasted and the water is cold.

And that is only the beginning!

Suppose the electricity in your community has been shut off until further notice. And suppose everyone in your family is in good health and there is plenty of food on the house. You shouldn't have any problems. Right!

Well, without electricity how would you and your family:

Cook your food?
Wash the dishes?
Open a can?
Make toast?
Bake a cake?
Store food in summer?
Store food in winter?
Wash the clothes?
Keep warm in winter?
Have light in your house?
Entertain yourselves?
Get to the 6th floor of a building?
Communicate with a friend across town?

*This activity is from Your Energy World, U.S. Dept. of Energy, 1978

Funding: California Energy Extension Service
**Energy Problem of the Day**

Almost 100 years ago, a person used 58 pounds of paper a year. Today a person uses 639 pounds of paper a year. How many more pounds of paper does a person use now?

THINK: List all of the ways that your family uses paper:

THINK: Does it take more energy to make all the paper we use now?

---

**Energy Problem of the Day**

The electric light was invented in 1879. It is now 1988. For how many years have we had electric light?

THINK: What would life be like without electric lights? We really haven't had them for very long.

---

Funding: California Energy Extension Service
Energy Problem of the Day

Gasoline costs $1.00 a gallon. My car gets 25 miles per gallon. How much will I pay for gasoline to take a 200 mile trip? Complete the chart to find the answer.

<table>
<thead>
<tr>
<th>COST</th>
<th>$1.00</th>
<th>$2.00</th>
<th>$3.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>MILES</td>
<td>25</td>
<td>50</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>125</td>
<td></td>
</tr>
</tbody>
</table>

My friend’s car gets 40 miles per gallon. If gas costs $1.00 a gallon, how much will she pay for gasoline to take a 200 mile trip? Complete the chart to find the answer.

<table>
<thead>
<tr>
<th>COST</th>
<th>$1.00</th>
<th>$2.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>MILES</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>120</td>
<td></td>
</tr>
</tbody>
</table>

THINK: Why do some people buy cars that get more miles per gallon of gasoline?
Energy Problem of the Day 3

It costs 1 cent to run a microwave oven for 5 minutes. How much does it cost to run a microwave for 50 minutes a week? Complete the chart to help figure it out.

<table>
<thead>
<tr>
<th>COST</th>
<th>1¢</th>
<th>2¢</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MINUTES</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>

Energy Problem of the Day 4

In the U.S. about 35,000 homes heat their water with sunlight. In Japan about 2,000,000 (2 million) homes heat their water with sunlight. How many more Japanese homes use solar hot water heating than U.S. homes?

THINK: What could be the reasons for more Japanese homes using solar hot water heating? Why don't more U.S. homes use solar hot water heating?
Energy Problem of the Day

THINK:

Funding: California Energy Extension Service
Energy Problem of the Day ~ Blue Tierney

Answer Key

1. 639
   -58
   581 pounds
   THINK: newspaper
   magazine
   toilet paper
   packaging
   letters, etc.
   THINK: U.S. per capita energy consumption has more than tripled in the same time period.

2. 1988
   -1879
   105 years
   THINK: This is a great time to talk about electrical “blackouts” that students have experienced.

<table>
<thead>
<tr>
<th></th>
<th>COST</th>
<th>1¢</th>
<th>2¢</th>
<th>3¢</th>
<th>4¢</th>
<th>5¢</th>
<th>6¢</th>
<th>7¢</th>
<th>8¢</th>
<th>9¢</th>
<th>10¢</th>
</tr>
</thead>
<tbody>
<tr>
<td>MINUTES</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>40</td>
<td>45</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

3. 2,000,000
   -350,000
   1,965,000 more homes
   THINK: In Japan there are fewer resources. Energy is more expensive because it has to be imported.
   In the U.S., resources are available, and still affordable, but our home heating bills are increasing. Initially, a solar water heating system costs more than a gas or electric system.
   But there are no heating bills to pay later!

<table>
<thead>
<tr>
<th></th>
<th>COST</th>
<th>$1.00</th>
<th>$2.00</th>
<th>$3.00</th>
<th>$4.00</th>
<th>$5.00</th>
<th>$6.00</th>
<th>$7.00</th>
<th>$8.00</th>
<th>$9.00</th>
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<tbody>
<tr>
<td>MILES</td>
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<td>50</td>
<td>75</td>
<td>100</td>
<td>125</td>
<td>150</td>
<td>175</td>
<td>200</td>
<td>225</td>
<td></td>
</tr>
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</table>

<table>
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<tr>
<th></th>
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<th>$4.00</th>
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<tr>
<td>MILES</td>
<td>40</td>
<td>80</td>
<td>120</td>
<td>160</td>
<td>200</td>
<td></td>
</tr>
</tbody>
</table>

THINK: The “friend” paid $3.00 less for the 200 mile trip.
Her car costs less to use because it uses less gasoline, a non-renewable fossil fuel.

Funding: California Energy Extension Service
OBJECTIVES: Students will be able to analyze the energy flow and resources used in everyday products.

SUMMARY: Students will draw a "map" of the energy sources used in the materials, transporting, manufacturing, marketing, delivery, and disposal of an object.

GROUPING: 1-6 students.

TIME: 30 min.

PREPARATION & BACKGROUND: Discuss how we use many things in our everyday life, but we do not think about what goes into making them, delivering them to us, and disposing of them when we are finished using them. Choose an object with a short "history" as an example. With the whole group, discuss the raw materials used, the collection process, the machinery used in manufacturing, the transportation, marketing, delivery, and disposal of the item. Trace the energy flow and resources used on the board or verbally.

SUBJECTS: Social science, art.

VOCABULARY: Origin, ingredient, disposal.

MATERIALS:
- Objects for analysis: pencil, aluminum can, coat, food, and a disposable diaper
- Large pieces of paper: one piece for every group of 1-6 students
- Drawing instruments: crayons, or colored pencils for every group of 1-6 students
PROCEDURE:
1. Break the class into groups, up to six students in each.
2. Give each group a large piece of paper and an assortment of drawing instruments.
3. Pass out an object to every group and have them draw a map using arrows, lines, and anything else to connect the energy pathways. Don’t be afraid to speculate!!!
4. Have students share their pathways with each other when they are finished.

FOR DISCUSSION:
1. Could you figure out all the energy that went into your object?
2. Can you think of something in the classroom that has lots and lots of energy inputs, the longest energy path? How about something with very few energy inputs, the shortest energy path?
3. Which item from question #2 costs more? Why?

EXTENSIONS:
1. Have the students make a “map” from an object at home.
2. Act out the map.
3. Try to figure out an object’s pathway that you can observe firsthand: visit a farm, a processing plant, and a grocery store.
The incandescent light bulb has been in use since Thomas Edison introduced the first practical version in 1879.

Try to make a light bulb yourself. You will need:
- Nichrome wire for the filament
- Insulated copper wire for the connections
- A source of electricity, such as a 12 volt lantern battery
- A clear jar or cup
- Modeling clay
- 2 nails for holding the filament in place

Do you have all the things you need?

Building the Light Bulb

**Step 1: The Filament**

Start with a piece of nichrome wire about 10 cm long (the length of the following line).

Wrap the wire around one of the nails to form a coiled filament. Each turn of wire should be close to the next, but not touching. Leave 2 cm of straight wire at each end. It should look like this:

Now slide the filament off the nail. It should look like this:

**Step 2: The Base**

Flatten a piece of modeling clay big enough to cover the mouth of your jar.

Stick two nails into the clay near the center. The tops of the nails should be as far apart as the filament is long. The bottoms of the nails should be about 2 cm farther apart than the tops. This will prevent the filament from sliding down the nails when it is attached. The two nails should look like this:

**Step 3: Attaching the Connecting Wires & Filament**

Cut the insulated copper wire into two pieces, each about 30 cm long. Remove 2 cm of insulation from each end of the two pieces.
Wrap the exposed end of one copper wire around the bottom of a nail. Wrap the exposed end of the other copper wire around the base of the other nail.

Attach the filament to the top of the two nails. Use the 2 cm of straight wire at each end of the filament to wrap around the nails.

**Observations**

1. Which part of the light bulb gives out light?

2. Is there evidence of any other form of energy besides light coming from the light bulb?

3. Trace the energy flow from a dry cell to a flashlight bulb. Four forms of energy should be listed.

4. About how many years has the incandescent light bulb been in use?
Let's Get Energized

The Pay Me Game

Objective: Students will use play money to understand the dollar cost of their energy habits.

Materials:
2 envelopes, 1 marked "me" and 1 marked "utility"
Play energy money (See master sheet) $100 per student
One copy of Pay Me Game Questions

Time Frame: 20-30 minutes
Suggested Audience: grades 3 to 6
It works well to pair an older student with a younger one to help in the process of making change.

Procedure:
1. Cut out the money sheets. Each student should have $100 made up of 20 - $1, 10 - $5, and 3 - $10's. A student can put the money into piles prior to starting the activity.
2. Give each student one: "me" envelope and one "utility" envelope.
3. Tell students that they have just gotten paid $100, and whatever they and their family don't spend on energy at home, they can use to buy the things they want. Read each question to the group. Depending on their answer, the students will put the required amount of money in either their "me" envelope or in their "utility" envelope. If a student runs out of money before the end of the game he may borrow from his "me" envelope to pay the "utility bill".
4. At the end of the game, count the money in each envelope to show the students how much their energy habits are costing them. Discuss how students could get more in their "me" envelopes.

Taking It A Step Further:
How much the student learns from this depends on you. If you quickly discuss the "whys" of the questions with the students they will have a better understanding of how to change their energy practices. Stress to the students that this is that a game for them to see how much extra energy they really use, so it is best if they answer the questions totally honestly.

Utility companies produce good pamphlets with energy saving tips. You could get copies for your students to take home as a follow-up to this activity.

Funding: California Energy Extension Service
Let's Get Energized

The Pay Me Game Questions

QUESTION: DO YOU HAVE AN ELECTRIC BLANKET?
YES: pay UTILITY envelope $2
NO: pay your ME envelope $2
(Electric blankets cost about 8 cents a night or $2.40 a month per person. Using warm pajamas and blankets save the most energy. But if your room is still too cold at night it costs less to use an electric blanket than to heat up the whole room.)

QUESTION: HAVE YOUR PARENTS EVER HEATED THE KITCHEN WITH THE STOVE OR OVEN?
YES: pay UTILITY envelope $10
NO: pay ME envelope $10
(If you ever see someone doing this you should tell them that is dangerous, expensive and doesn't work very well.)

QUESTION: DO YOU HAVE AIR CONDITIONING FOR YOUR ENTIRE HOUSE?
YES: pay UTILITY $45
NO: pay ME $20
(A mid-size air conditioner costs about 16 cents an hour to operate. You can save money on air conditioning if you keep windows and doors closed during the heat of the day. At night you can turn off the air conditioner, open the doors and windows and turn on fans to get cool outdoor air into the house. Be sure to close the house back-up before it gets warm the following day.)

QUESTION: DO YOU HAVE A WINDOW AIR CONDITIONER FOR ONE ROOM?
YES: pay UTILITY $20
NO: pay ME $20
(Cooling only one room or area of your house costs much less than cooling the entire house. Keep the doors closed to un-used rooms.)

QUESTION: DO YOU TAKE BATHS IN THE BATH TUB?
YES: pay UTILITY $6
(a bath takes at least 15 gallons of hot water, that's at least 10 cents a bath. In a month that's $3 per person)

QUESTION: DO YOU TAKE SHOWERS THAT ARE LESS THAT 5 MINUTES LONG?
YES: pay ME $5
(A shower that is less than 5 minutes will use less than 6 cents of hot water)
Let's Get Energized

QUESTION: HOW MANY MEMBERS OF YOUR FAMILY TAKE SHOWERS THAT ARE MORE THAN 5 MINUTES LONG?
pay UTILITY $5 for each person in your family who does this

QUESTION: DO YOU ALWAYS, ALWAYS TURN OFF THE LIGHTS EVERY TIME YOU LEAVE A ROOM?
YES: pay ME $5
NO: pay UTILITY $5
(An average electric bill for lights alone is $9 a month)

QUESTION: ARE YOUR CLOTHES DRIED IN A CLOTHES DRYER?
YES: pay UTILITY $13
NO: pay ME $13
(It costs about 80 cents an hour to operate - This can get very expensive after a few loads of clothes. Cleaning the filters after each load is dried and drying one load after another so the drum doesn't have to be re-heated for each load will save money.)

QUESTION: DO YOU SLEEP IN A WATERBED?
YES: pay UTILITY $20
(Keep the water bed below 85° and keep the mattress covered at all times to save money. There are special electric blankets that you can put on top of your water bed which keeps you warm without having to heat up all the water. These electric blankets can save a lot of money.)

QUESTION: IN THE SUMMER ARE THE DRAPES IN YOUR HOME CLOSED TO KEEP OUT THE HEAT?
YES: pay ME $10
NO: pay UTILITY $5
(Closing drapes and putting up shades keeps the sun and warm air from getting into your house, which keeps your house much cooler. Students will probably be familiar with how light coming through a window can heat up a car on a hot day. A house with direct sunlight coming in heats up the same way.)

QUESTION: DO YOU USE A DISHWASHER TO WASH YOUR DISHES, WITHOUT OPENING THE DOOR TO DRY THE DISHES?
YES: pay UTILITY $5
NO: pay ME $3
(If you turn the drying cycle off and open the door to let the dishes dry you can pay yourself $2.)

Funding: California Energy Extension Service
Let's Get Energized

QUESTION: DO YOU HAVE MORE THAN ONE REFRIGERATOR OR FREEZER AT YOUR HOUSE?
YES: pay UTILITY $12 for a second refrigerator or freezer
(Each extra refrigerator costs about $12 a month, that's $144 a year!)

QUESTION: IS YOUR REFRIGERATOR OPENED MORE THAN 6 TIMES A DAY?
YES: pay UTILITY $2 for each person who opens the door
NO: pay ME $5
(It costs about 3 cents every time the door is opened.)

QUESTION: DO YOU USE A HAIRDRYER?
YES: pay UTILITY $3
NO: pay ME $3
(It costs about 8 cents every time you use a hair dryer)

QUESTION: DO YOU LISTEN TO THE RADIO OR WATCH A VCR?
YES: pay UTILITY $2
NO: pay ME $1
(It costs the average household about $2.30 a month to use these)

QUESTION: DO YOU PLAY VIDEO GAMES?
YES: pay UTILITY $4
NO: pay ME $2
(Even though most video games are electronic and use a small amount of electricity usually they are played for many hours and the electricity adds up.)

QUESTION: DO YOU HAVE AN ELECTRIC TOOTHBRUSH?
YES: pay UTILITY $1

QUESTION: DO YOU HAVE A SWIMMING POOL?
YES: pay UTILITY $20
(Pools are expensive to operate, especially if you heat them. The pool filter alone costs about 10 cents an hour to operate.)

QUESTION: DO YOU HAVE AN ELECTRIC CLOCK?
YES: pay UTILITY $1
NO: pay ME $1
(A wind-up clock doesn't use electricity.)

QUESTION: DO YOU USE AN ELECTRIC CAN OPENER?
YES: pay UTILITY $1
NO: pay ME $1
(A good hand-operated opener works well for most people.)
Let's Get Energized

QUESTION: DO YOU USE A PORTABLE ELECTRIC HEATER IN WINTER?
YES: pay UTILITY $30
NO: pay ME $10
(In general, portable heaters are one of the least efficient heating sources. If you're the only one who's cold consider putting on an extra sweater or socks instead of using the heater to warm up your room.)

QUESTION: DOES YOUR FREEZER HAVE AN ICE MAKER?
YES: pay UTILITY $3
(It is cheaper to make ice cubes with ice cube trays in your freezer.)

CONCLUSION:
Add up the money in each envelope, don't count any money that is in your hand. Ask: Who has the most money in their "ME" envelope. Who has the most money in their "UTILITY" envelope? Discuss how students could get more in their "ME" envelope. (use the information provided with the questions)

If this was real money, and students could get any money that they could save, what would they do?

Funding: California Energy Extension Service
Appendix E

Bibliography of Resources
The Adventures of Aunt Energina - similar to the almanac, Grades 5-8.

Aunt Energina Poster Pack - pad of 40 activity posters, Grades 3 and up.

Conservation Posters - set of 12 posters, each month focuses on a different energy conservation idea, Grades K-12.

The Electric Gnus - energy issue with stories and activities, Grades 7-9.

Energy Conservation Coloring Book - large picture coloring book with simple energy saving ideas, Grades K-1.

Energy Conservation Experiments You Can Do - Grades 7-12.

Energy Transformations - make a light bulb and build a motor, packet contains student set of booklets and nichrome wire, Grades 5 and up.

Environmental Experiments - Grades 7-12.

How to Save Energy: A Coloring and Activities Book - Grades 1-3.

Let's Explore Electricity: An Information and Activities Book - Grades 3-6.


Let's Save Energy: An Information and Activities Book - Grades 3-5.

Selected Experiments and Projects from Edison contains 10 experiments and projects related to Edison's work, Grades 5 and up.

Other Materials:

California State Environmental Education Guide. Grades K-6 (Available for $17.95 from Alameda County Office of Education, Media Sales, 313 West Winton Ave., Hayward, CA 94544-1198, (415)887-0152.)


The Environmental Education Resource Center at Cal-State, San Bernardino has most of the above materials plus many more. Call 880-5640 to check on the hours of the Center (they change every quarter).

ENERGY RESOURCES


CALIFORNIA ENERGY EXTENSION SERVICE (CEES)
1400 Tenth Street, Rm 209, Sacramento, CA 95814,
(916) 323-4388.

From the Animated Bibliography - details several of the booklets listed below and other energy programs. Available from CEES. Two grade levels - K-6, 7-12.

Classroom Energy Poster Puzzle - Grades 2-5.

Conserve and Renew: Energy Activities - Grades 4-6.
(Available for $10.00 from Energy Center, Sonoma State University, 1801 East Cotati Ave., Rohnert Park, CA 94928, (707) 554-2577.)

Energy Activities for the Primary Classroom - Grades K-3.


Energy Tech'Knowledge - individual grade level packets for Grades K-6.

4-H Home Conservation Guide - Grades 5-12.


SOUTHERN CALIFORNIA EDISON
Contact: Karen Barreira, Division Educational Services Rep.
P.O. Box 788, 2885 Foothill Blvd., Rialto, CA 92376.
(714) 820-5516, FAX (714) 820-5301

From the Educational Resources Catalog: Available from Edison.

The ABC's of Electricity - general information booklet about electricity in the United States, Grades 3 and up.

About Alternative Energy Sources - information booklet about other energy sources, Grades 6 and up.

About Solar Energy - information booklet about solar energy, Grades 4 and up.

About Wind Power - information booklet about wind energy, Grades 4 and up.

Aunt Energina's Almanac - part of an energy conservation program, the almanac is a comic-book type activity booklet, Grades 2-4.

Appendix F

Participant Survey Form
<table>
<thead>
<tr>
<th>Participant Survey Form</th>
<th>Energy Lessons Energy Education Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date:</td>
<td>Presenter:</td>
</tr>
</tbody>
</table>

1. Your District

2. Your School (If assigned to one)

3. (Circle the letter of the most appropriate response to the following)
   (a) Elementary Teacher
   (b) Middle School Teacher
   (c) High School Teacher
   (d) Principal
   (e) Curriculum Specialist
   (f) Preservice Teacher
   (g) Other:

4. Grade Level or Subject taught:

5. Usefulness of the activities: 5 4 3 2 1

   Usefulness of bibliography 5 4 3 2 1

6. "Compared to all other training sessions or workshops I have attended, this was...
   (a) one of the best I've attended."
   (b) better than average."
   (c) average."
   (d) below average."
   (e) one of the worst I've attended."

7. Was the workshop long enough for you to understand the relationship between education and energy efficiency?
   (a) It was about the right length
   (b) It was too short to cover what we expected to learn
   (c) It was unnecessarily long

8. Any other comments, suggestions, requests, concerns, and/or accolades?
Appendix G

Workshop Evaluation Summary Form
WORKSHOP EVALUATION SUMMARY

I  Descriptive Data

Center: CSUSB Energy Extension Center
Workshop Title: Energy Lessons
Workshop Location: Kimbark Elementary
Date: March 12, 1991
Presenter: Cindi Blair
Target Audience: Teachers, Grades K-6
Number Pre-enrolled: 20
Total Number Participants: 17
Number Districts Represented: 1
Number Schools Represented: 1
Number Surveys Completed: 17

II  Evaluation Results

Enter the number of responses in each category for the job indicated:

16 Elementary Teacher  ___ Curriculum
___ Middle School Teacher  1 Preservice Teacher
___ High School Teacher  ___ Other _________
___ Principal

Enter the number of responses in each category:

1 K  3 1  4 2  3 3  2 4
3 5  3 6  7-8  9-12 Subjects ______
Enter the number of responses given in each category:

Usefulness of activities:

\[ \begin{array}{cccccc}
1 & 2 & 3 & 5 & 4 & 11 \ 5 \\
\end{array} \]

Usefulness of bibliography:

\[ \begin{array}{cccccc}
1 & 2 & 3 & 4 & 12 \ 5 \end{array} \] (2 blanks)

Enter the number of responses in each category for the question "Compared to other workshops...?"

\[ \begin{array}{ll}
4 & \text{one of best} \\
2 & \text{average} \\
1 & \text{one of the worst} \\
11 & \text{better than average} \\
\end{array} \]

Enter the number of responses in each category for the question "Was the workshop long enough...?"

\[ \begin{array}{ll}
12 & \text{about the right length} \\
5 & \text{too short} \\
\end{array} \]

Comments and suggestions:

They enjoyed getting written materials and having a hands-on session. The K-2 group asked to keep the Ice Race insulating materials so they could do the activity with classes that afternoon.

III Workshop Summary

Description: The workshops are for teachers, grades K-8, on the topics of energy and energy conservation. The workshop participants are grouped by grade levels (K-2, 3-4, 5-8) and the activities are
aligned with the California State Science Framework with a hands-on emphasis. The workshops are 50 minutes in length and include an evaluation of the session. Each participant receives activity handouts and a bibliography of available resource materials and programs. Several of the bibliography items are taken from the Animated Bibliography from the California Energy Extension Service.

Marketing: The workshops were marketed through personal and phone contact with districts participating with the CSUSB Energy Extension Center. The workshops were also announced at various energy meetings and seminars given by the CSUSB Center.

Barriers: By meeting before school, the teachers were somewhat preoccupied with the day's events, and some came late or had to leave early. Also, the Vice Principal had some business to take care of that was distracting.

List of Participants' Schools and/or Districts:

San Bernardino City Unified School District
WORKSHOP EVALUATION SUMMARY

I  Descriptive Data

Center: CSUSB Energy Extension Center
Workshop Title: Energy Lessons
Workshop Location: Mary Tone Elementary School
Date: February 26, 1991
Presenter: Cindi Blair
Target Audience: Teachers, Grades 4 & 5
Number Pre-enrolled: 8
Total Number Participants: 6
Number Districts Represented: 1
Number Schools Represented: 1
Number Surveys Completed: 6

II  Evaluation Results

Enter the number of responses in each category for the job indicated:

5 Elementary Teacher
___ Middle School Teacher
___ High School Teacher
___ Principal

___ Curriculum
1 Preservice Teacher
___ Other

Enter the number of responses in each category:

___ K  ___ 1  ___ 2  ___ 3  ___ 4
___ 5  ___ 6  ___ 7-8  ___ 9-12  Subjects
Enter the number of responses given in each category:

Usefulness of activities:

1 2 3 4 5

Usefulness of bibliography:

1 2 3 4 5

Enter the number of responses in each category for the question "Compared to other workshops...?"

2 one of best
4 better than average
___ average
___ below average
___ one of the worst

Enter the number of responses in each category for the question "Was the workshop long enough...?"

5 about the right length
___ too short

___ unnecessarily long

Comments and suggestions:

The time limit might have been too short to do all the activities.
(The workshop did not start on time due to some confusion on room location.)

III Workshop Summary

Description: The workshops are for teachers, grades K-8, on the topics of energy and energy conservation. The workshop participants are grouped by grade levels (K-2, 3-4, 5-8) and the activities are aligned with the California State Science Framework with a
hands-on emphasis. The workshops are 50 minutes in length and include an evaluation of the session. Each participant receives activity handouts and a bibliography of available resource materials and programs. Several of the bibliography items are taken from the Animated Bibliography from the California Energy Extension Service.

**Marketing:**

The workshops were marketed through personal and phone contacts with districts participating with the CSUSB Energy Extension Center. The workshops were also announced at various energy meetings and seminars given by the CSUSB Center.

**Barriers:**

Afternoon time; after-school; all teachers were not aware of the workshop arrangements. This was a small school, only grades 4 & 5, so the number was limited.

**List of Participants' Schools and/or Districts:**

Rim of the World School District
WORKSHOP EVALUATION SUMMARY

I  Descriptive Data

Center:  CSUSB Energy Extension Center
Workshop Title:  Energy Lessons
Workshop Location:  Environmental Expo, CSUSB
Date:  April 20, 1991
Presenter:  Cindi Blair
Target Audience:  Teachers, Grades K - 8
Number Pre-enrolled:  52
Total Number Participants:  34
Number Districts Represented:  15
Number Schools Represented:  25
Number Surveys Completed:  32

II  Evaluation Results

Enter the number of responses in each category for the job indicated:

Elementary Teacher  Curriculum
Middle School Teacher  Preservice Teacher
High School Teacher  Other:
Principal  Education Student:
Gate Teacher

Enter the number of responses in each category:

K  1  2  3  4  5  6  7  8  9  10
 Subjects:  Science; Math, Preschool
Enter the number of responses given in each category:

Usefulness of activities:

1 2 3 3 3 4 26 5

Usefulness of bibliography:

1 2 3 3 4 27 5

Enter the number of responses in each category for the question "Compared to other workshops...?"

8 one of best
7 average
___ below average
___ one of the worst

Enter the number of responses in each category for the question "Was the workshop long enough...?"

27 about the right length
5 too short
___ unnecessarily long

Comments and suggestions:

The participants seemed to enjoy the activities and I received several favorable comments regarding the hands-on content and the bibliography of resources.

II Workshop Summary

Description: Three workshops for teachers, grades K-8, were conducted on the topics of energy and energy conservation. The workshop participants were grouped by grade levels (K-2, 3-4, 5-8) and the activities were aligned with the California State Science
Framework with a hands-on emphasis. The workshops were 50 minutes in length and included an evaluation of the session. Each participant received activity handouts and a bibliography of available resource materials and programs. Several of the bibliography items were taken from the Animated Bibliography from the California Energy Extension Service.

**Marketing:**
The workshops were marketed as a part of the Environmental Expo. A pre-registration form was sent to teachers in the Inland Empire.

**Barriers:**
There was some confusion about space availability for the workshops and many teachers who pre-registered did not show up the morning of the Expo.

**List of Participants' Schools and/or Districts:**
- Alvord School District
- Apple Valley School District
- Chino Unified School District
- Colton Joint School District
- Corona Norco Unified School District
- Fontana Unified School District
- Hemet Unified School District
- Morongo Unified School District
- Ontario/ Montclair School District
- Pasadena Unified School District
- Rim of the World School District
- San Bernardino City Unified School District
Snowline School District
Ventura School District
Victor Elementary School District