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ABSTRACT

This module is intended to assist students to evaluate how students in American high schools view their use of energy. Values clarification activities consider energy conservation and energy use habits. The activities are intended to cover one to two class periods and involve discussion, small group activities, and language arts. (Author/RE)

CRITICAL CHOICES

By Nancy Landes and Martin Hetherington

Unit Title: Net Energy

Module Title: Critical Choices

Description of Module: How do students in American high school classrooms view their uses of energy? What values do they hold regarding energy conservation and daily energy use? This module helps students evaluate answers to these questions and poses others to be considered Through the Values Clarification activities presented, you and your students will become more aware of the attitudes and values you possess, especially in regard to energy.

Unit Objective Met: 3d, 3e, 3f, 3g.

Materials Needed: Paper and Pencil.

Module Type: Alternative.

Context: Science, Social Science, and Home Economics.

Time Required: one - two class periods.

Mode: Discussion, small group activities, reading and writing.

Sample evaluation items.

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TEACHER'S GUIDE

Youth of today are confronted by many more choices than youth of previous generations and will soon be required to make many more decisions affecting not only themselves but their community, nation and world.

The complexity of our times and of environmental decisions has made the act of choosing exceedingly difficult. Ideally, choices are made on the basis of one's underlying values; however, many persons (especially young people) are not clear about their own values.

The Values Clarification Process is concerned with trying to help students: a) become more aware of their own beliefs, attitudes and values; b) consider and weigh the pros and cons and consequences of various alternatives; c) consider whether their actions match their stated beliefs and if not, how to bring the two into closer harmony; and finally, d) recognize options, in and out of class, for it is only when students begin to make their own choices and evaluate the actual consequences of these choices that they develop their own set of values.

The valuing process begins with bits of information which are called beliefs. These beliefs tend to cluster together to form attitudes. Many attitudes together develop a value system that guides and directs behavior. A student begins to develop his/her own set of values when he/she starts to consider alternatives,

the consequences of alternatives, and personal feelings toward each alternative before he/she acts.

The values clarification process advocated by Raths, Harmin and Simon includes the three action aspects of choosing, prizing, and acting. The steps advocated in the values clarification process are:

1. students are presented with an issue.
2. students suggest alternative solutions.
3. students consider the consequences of each alternative.
4. students make a free choice.

Advanced Preparation:

The following are guidelines to be considered by the teacher in handling values in the classroom:

1. When using activities and strategies for values clarification, encourage a classroom atmosphere of openness and honesty where diversity of opinion is encouraged and the opinions of others are respected.

2. The teacher should strive to help the class learn to listen to one another. One of the best ways to do this is for the teacher to be a model of a good listener.

3. When dealing with values the focus should be on the "process of valuing," not on the transmission of the "right set of values."

4. Valuing approaches should be used which will help students become aware of values they hold and prize.

5. Assist each student to build his own set of values.

6. Assist each student in considering alternatives, the consequences of each alternative, and his personal feelings toward each alternative before he acts.

7. Assist each student in considering whether his actions match his stated beliefs, attitudes and values and if not, how to bring the two into closer harmony.

8. Whenever a student does not want to respond to a valuing activity, he should be given the right to pass.

9. The teacher should participate in the valuing exercises and discussions whenever possible. The best time for the teacher to give his view is usually toward the end, after the students have had a chance to think things through for themselves and to express their own point of view. The teacher should express himself as a person with values of his own. Thus the teacher shares his or her values, but does not impose them.

The following are activities you may want to use with your students to help them explore and clarify some of their values, particularly those that pertain to energy use.

Activity 1: Name Card

Activity 2: Twenty Questions

Activity 3: Baker's Dozen

Activity 4: Either-or Forced Choice

(Above information and activities adapted from Reference #4. Volume I: pp. 29-30; Volume VI: pp. 147, 154-155, 160-161, 169-170.)

NAME CARD

1. Time involved: five - ten minutes.

2. Materials needed:

   a. 3 x 5 notecards, one per person.

   b. Pen or pencil.

3. Recommended procedure:

   a. Have participants write their name in the center of the card.

   b. Have participants write in the four corners the following information:

      1. Upper left - list 3 ways that you use energy that yo really value.

      2. Lower left - list 3 figures (alive or dead) that you really admire.

      3. Upper right - list 3 things that you would like to be remembered for after you die.

      4. Lower right - what do you feel are the most serious energy problems?

   c. Have participants break into groups of 3 and discuss one corner of their cards.

   d. After 2 or 3 minutes, rotate people to other groups, have them then discuss another corner of their cards.

4. Debriefing:

   a. Name Card is a mixer-type activity, used to get participants acquainted.

   b. Helps participants publicly affirm their values.

5. References:

Simon, Sidney, Leland Howe and Howard Kirschenbaum. Values Clarification: A Handbook of Practical Strategies for Teachers and Students. New York: Hart Publishing Co., 1972.

TWENTY QUESTIONS

Time Involved: 15 minutes.

Materials Needed: Paper, pencil, and blackboard.

Recommended Procedures:

Ask the students to write on a piece of paper the numbers 1-20. Now have them list twenty things they enjoy doing. (You may want them to think seasonally about these activities.) Have students evaluate their list according to the code listed in the "Debriefing" section following.

Debriefing:

$ - anything that costs more than $10 to do.
S - things that relate to something you learned in school.
FF - things that need fossil fuel energy.
N - things that you do in the natural environment.
A - things you do alone.
F - things you do with friends.
P - things you do or did with parents.
E - things that need electricity.
Ph - things that need mainly physical (muscular) energy.
5Y - things you didn't do five years ago.
10Y - things you hope to do 10 years from now.

Several code items may be used for each of the twenty things.

The code provides a way to evaluate the types of things you like to do.

The code also gives you an idea of the trends you are following in doing enjoyable things.

It is a good idea to do this activity at different times in the year to show the students how they might have changed during the year.

Declaring the things you enjoy doing provides you with a way of identifying and clarifying what you enjoy.

Declaring the things you enjoy doing and rating them according to this type of scale may make you aware of things about yourself you hadn't realized before, such as "Most things I do cost a lot of money." "Most things I enjoy doing are with my friends." "I enjoy many activities that use fossil fuels," etc..

BAKER'S DOZEN

1. Time Involved: 10-15 minutes

2. Materials Needed:

   a. pencil and paper

3. Recommended Procedures:

   a. Have each student list 13 electrical appliances they use at home (lights, TV, radio, etc.).

   b. After everyone has completed their list, have each student cross out 3 things he or she can do without.

   c. Next have the students check 3 things they feel they couldn't do without.

   d. Now, have each student circle the items which they have obtained within the last 5 years (3 things which would not have been on their list 5 years ago).

   e. Allow the students to share their lists and reasons with the class (you can pick several students or just ask for volunteers).

4. Sample Valuing Questions:

   a. The class could list 13 records they own, identifying the 3 most important and the 3 least important records.

   b. The class could list 13 items they have purchased or been given (bicycle, watch, new clothes, book, etc.) identifying the 3 items they would be most willing to give up, and the 3 items they would least like to give up.

5. Debriefing:

   a. Identifying one's priorities is necessary when considering among various alternatives.

   b. Many electrical appliances are luxury items, which are seldom used, and are not very important to one's life style. Perhaps these items might not be purchased if a person thought about whether the item was very important, or just another thing to buy.

   c. The U.S. has doubled its energy consumption in the last 20-25 years. With only 6% of the world's population, the U.S. consumes 37% of all the energy used in the world. A large portion of this increased energy consumption is due directly to the purchasing (it takes energy to produce an electrical appliance, as well as energy to use it) and use of non-essential or luxury appliances.

d. Identifying those items obtained within the past 5 years indicates personal trends in purchasing and consumer behaviors.

e. Looking at the items crossed out as non-essential, the students can begin to think how easy it is to stop using those items once they have identified them.

EITHER-OR FORCED CHOICE

Time involved: 45-50 minutes.

Materials needed: large pieces of paper (10-20).

Recommended procedures:

1. Have students arrange their desks/chairs so that there is a wide path from one side of the room to the other.
2. Place an either-or forced choice question on either side of the room. (These are to be printed on the large pieces of paper and taped to opposite walls.)
3. Ask students: "Which do you identify with more--Ice Cream or French Fries? Explain to the students that they are to select one of the alternatives and move to that side of the room where it is posted.
4. Have students form triads to explain briefly why they decided on this choice. Allow 2 minutes per student.
5. Have students return to their orignial places in the center of the room and ask another question (forced choice).
6. Select students from each opposing view and have them relate to the entire group why they made their particular choice.

Begin with Energy-related Forced Choices: (Be sure to explain to students that they are to choose one or the other--there is no "middle-of-the-road" in this activity.) Introduce each activity with "With which of these do you identify more?"

car or bicycle

economy car or luxury car

downhill skiing or cross-country skiing

McDonald's or a restaurant (sit-down meals)

solar energy or nuclear energy

sailing or water skiing

cross-country skiing or snowmobiling

backpacking or Recreational Vehicle camping

train or airplane

expressways or bike routes

home gardening or large scale farming

individual homes or apartment buildings

swimming out-of-doors or swimming in an indoor heated pool

football games after school or football games on Friday night

voluntary reduction in automobile use or gas rationing

STUDENT PAGE I

Everyday we make many choices: what to wear to school, what to eat for breakfast, how to get to school, who to walk to class with, which homework assignment to do first, what to do after school, and many more. Most of these choices are made very automatically, almost out of habit. Other decisions are not made so automatically. We usually need to evaluate alternatives before we sign up for new term courses, before we decide upon a career or whether to attend college, before we spend large sums of money on a car, a stereo, a vacation, or a new coat or suit. How do we learn to make these choices? On what do we base our decisions?

Generally, we make choices based on our values--our feelings or attitudes about particular issues or events. But what are our values and how do these develop? Usually, our values are established long before we are able to recognize them through our families and the society in which we live. We come to prize such things as honesty, friendship, responsibility, freedom, etc. as a way of life. We are also influenced by our friends, by TV and movies, by people we admire, by books and the news. All of these help to shape the values we use to live our lives.

Oftentimes we encounter conflicting issues or situations where we are unsure of what choices to make because we are unsure of exactly what we believe. In these cases our values need some clarification, some explanation or understanding so that we may make rational, well-planned decisions. Through the process of values clarification, we become more aware of our own beliefs, attitudes, and values; we learn to consider the pros and cons and consequences of various alternatives; we consider whether our actions match our stated beliefs and, if not, how to bring them closer together; and we discover our options for making choices and evaluating the consequences of those choices.

Because we act and make many decisions that are value-oriented, we can make more meaningful decisions if we clearly understand what we believe and why. This unit has been planned to help you clarify your values and make some decisions about your own values and actions, especially those concerning your use and conservation of energy. Do your actions reflect what you state your values to be? Let's find out!!!

*Each activity is self-explanatory and open to many adaptations depending upon your students and how you feel most comfortable facilitating each activity. Not all activities listed need to be done, but enough so that the students begin to feel comfortable expressing themselves.

To help students begin to recognize their values toward energy use and how well their actions fit with their expressed values, try the following:

Values/Actions Rating Scale

First, fold the paper in half (right side over left side) along dotted line labelled (1). Next fold the page back along dotted line (2) so that you have one section of the paper folded back over itself. (This will shorten the paper and cover 2 of the middle rows of lines.) The 2 lines with arrows: ACTIONS ↓ VALUES ↓ should line up directly on top of one another if the folding is done correctly. Now you are ready to begin.

Have the students open the pages all the way out. Ask them to find the section numbered (3) where it states: "Place Values answers here." The object of this part of the activity is to rate the lettered items at the right according to the values the students have concerning these items. Each lettered item should be rated along the sliding scale given--+4 for a high rating to -4 for a very low rating. For example, if watching TV is something you value highly (consider it very worthwhile), then you would place the letter f on the +4 line under the VALUES column (3). However, if watching TV is just O.K. or something you like once in a while, you would probably place the letter f on the +1 or 0 line. Have the students complete this for all letters a-u.

If the students do not actually do some of the items listed, such as fertilize the lawn or wash the clothes, have them rate these items according to what they think should be done or what they would do given that responsibility.

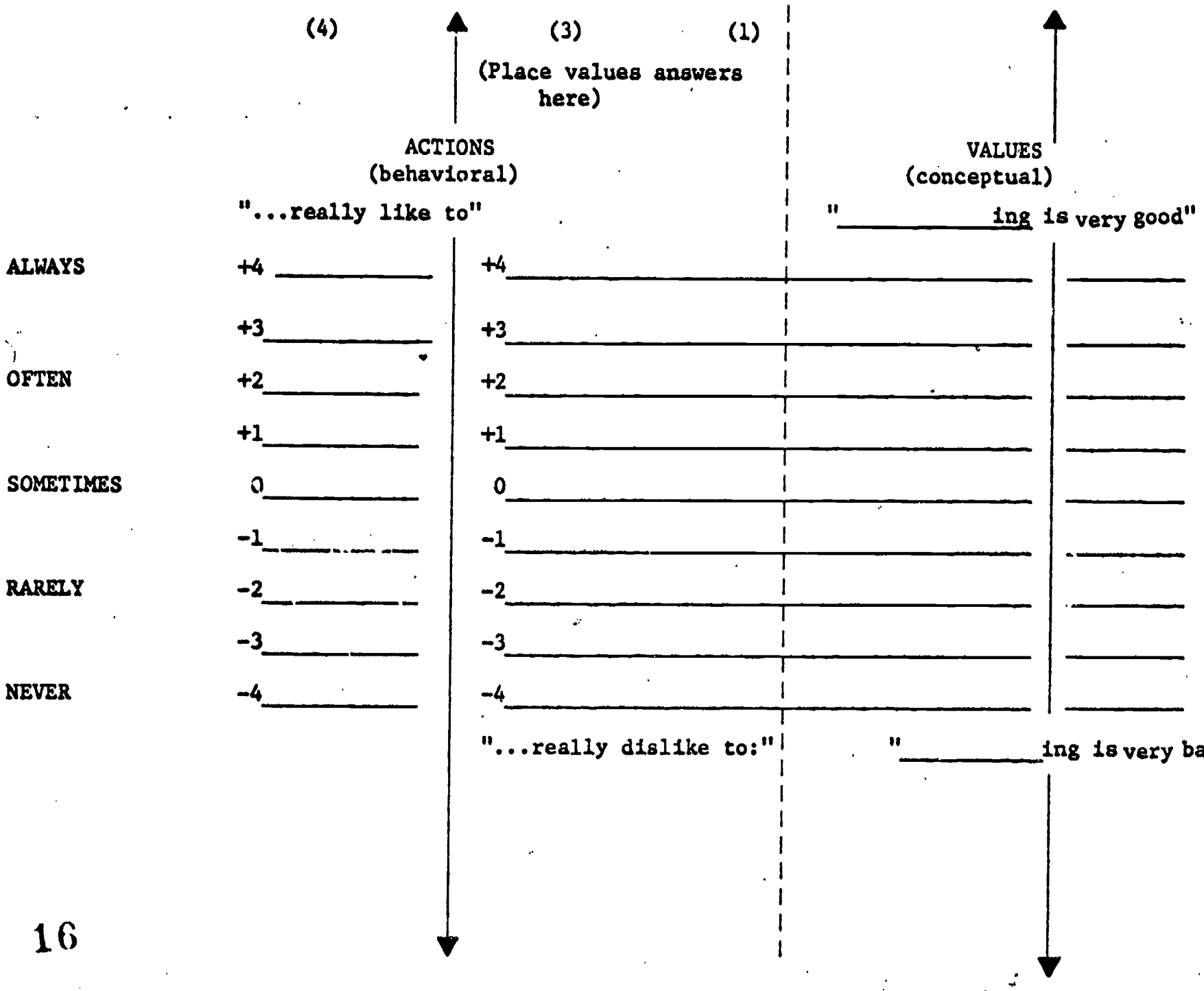
Next, have the students fold the right section of the paper toward the center along the two folds previously made. This should leave the ACTIONS section (4) visible and cover the VALUES section (3) just completed. Now have the students rate their actions relating to the lettered items (a-u) in a similar manner to the VALUES section. For example, if you ride your bike quite a bit, you would rate this item high (+4 or +3) on the action scale. On the other hand, if you don't even own a bicycle, you would need to rate this action low (-3 or -4) since you don't participate in bicycle riding. The VALUES section already completed should be covered during this part of the exercise so that the values already marked don't influence the honesty of the marking of the students' actions relating to each item.

When the ACTIONS section is completed, have the students open the paper completely so that both the VALUES section (3) and the ACTIONS section (4) are visible and lying side by side. Let the students compare their actions with their expressed values rated in each section. Do most of their actions agree with their values? If not, how might they change this situation? Should they change their values or their actions?

Many possibilities remain for further values exploration. Student Pages III and IV relate to activities that students can do with their families or in the community and you may want to distribute these as supplemental activities only.

Student activities V, VI, and VII can be used by the total class or provide a framework for small group participation depending upon the time you care to spend on the activities.

VALUES/ACTIONS RATING SCALE



a. Recycle
b. Air condition
c. Go over 55 MPH
d. Ride my bike
e. Eat out
f. Watch TV
g. Read about energy
h. Heat with wood
i. Use the bus
j. Set the thermostat at 65° in winter
k. Set the thermostat at 75° in summer
l. Install insulation
m. Garden
n. Eat "fast" foods
o. Walking
p. Live in an apartment
q. Eat only fruits & vegetables in season
r. Fertilize lawn
s. Use cold water to wash clothes
t. Vacation out of state
u. Live on a farm

(Fold back along this line) (2)

Student page II should be read and discussed before proceeding further. Are the students becoming aware of some of their values concerning energy use and conservation? The Energy Conservation Ethic questions listed on p. 2 are especially good discussion points. Remember, though, that all student values must be accepted and respected if these activities are to be helpful to the students. The idea is to become aware of values, not defensive of them. Hopefully, more students will begin to see the necessity for energy conservation as the unit progresses, but this cannot be forced upon them.

So, how do we begin to interest students in conserving energy? First, you may want to point out that energy conserving activities may be divided into three basic categories:

1. Activities that save energy and have no apparent disadvantages.
2. Activities that save energy as well as money.
3. Activities that save energy but have some minor associated disadvantages.

YOU MAY WANT TO DUPLICATE THIS SECTION ALSO TO HAND OUT TO THE STUDENTS.

Ask the students to list activities they feel would fit into each of the above categories. Some examples to start with might be:

Category 1: non-consumptive recreation
use of energy efficient appliances
avoiding products with excessive packaging

Category 2: home insulation, weatherstripping, etc.
buying fresh produce in season rather than canned, frozen, or dehydrated.

Category 3: carpooling
driving 55 mph
taking short showers instead of baths
turning down thermostat (could come under both categories)
riding bike short distances to run errands, etc.

STUDENT PAGE II

As seen in some of the activities, using our value orientations involves making choices every day of our lives. We must often weigh the benefits of one choice (and its consequences) in relation to our lifestyle or in relation to another alternative and its consequences. As also demonstrated in the above activities, many of these choices are related to our uses of energy. Do we choose to participate in energy consuming or energy conserving activities? Will these choices affect our lifestyles and those of others in years to come?

Why worry about conservation of energy? Doesn't that mean living below our present standards and sacrificing many of the things that make our lives pleasant? Not according to Dr. Herman Koenig, Director of the Center for Environmental Quality at Michigan State University. He states, "We must find new values and a way of life that will allow us to live comfortably, yet within our means in the world energy picture. Though our current life-style depletes our limited quantities of resources, we can counter rising costs and impending shortages by using resources more efficiently and effectively than we now do. It is conceivable that we could live on much less energy and be just as well fed and sheltered and probably socially and culturally happier."

Besides providing for our health and happiness, conservation measures can save us money and reduce waste in both a material and an energy sense. If we recycle aluminum and steel products, for example, we reduce the amount of energy needed to make new products. (Recycling saves up to 90% of the energy expended in mining new ore plus saves that natural resource for future use.) We also reduce the amount of solid waste in land fills for other disposal areas and save ourselves money.

What then can the average citizen do to conserve energy and still maintain a high standard of living? The major contribution to energy savings comes from more efficient use of energy; in other words, we must waste less. In buying an electrical appliance, we can look for its efficiency rating and buy only the most efficient, durable product. We could begin to enjoy other people's company and form car pools for driving to and from work. If we add a few inches of insulation in an attic, we can save both energy and money in home heating. We can begin to develop an Energy Conservation Ethic: a belief system that incorporates wise use of energy into everything we do.

A person who lives by such an ethic would ask the following questions before buying any product, whether it be a new car, new clothes, or a refrigerator, or an air conditioner:

1. Do I really need it to be happy?
2. What could be used as a substitute or alternative?
3. Will buying it promote a more materialistic lifestyle?
4. Is it inexpensive, yet efficient, in terms of total cost?
5. How long will it last?
6. Can it be recycled?
7. Are the energy resources scarce or non-renewable?
8. What resources are in it?
9. From what countries do the resources come?
10. Are there other resources which could be used to make it?
11. Did its production result in significant environmental or ecological damage?
12. Will its use result in significant environmental or ecological damage?

An Energy Conservation Ethic is defined in "Energy Conservation in the Home," published by the U.S. Department of Energy as "a conscious effort on the part of the individual to think in terms of wise and efficient use of resources when developing, buying, or consuming them. It reminds one of the 'stewardship' responsibility to maintain an ecological balance for survival, that the natural environment is not limitless in its capacity to assimilate waste and abuses."

All of us can contribute in many ways to the wise use of energy in our country. Some of these conservation measures may mean some sacrifices on our part, but generally, conservation can be very painless and very profitable to us as individuals and to our nation as a whole.

"Conservation is not just a matter of saving; it is a method for maintaining a way of life."

STUDENT PAGE III

A Project to Do: Energy Monitor (Taken from Reference #3 p. 10)

Here's a project which conserves fuel and saves your family money.

1. Find your gas or electric meter (or both). Make sure you know how to read them.

2. Take a reading on Sunday evening, and compare it with the reading the following Sunday evening. How much energy did you use?

3. Make a list of everything in the house which uses that energy.

4. Now work out a plan with your family on who you can cut down on the use of that energy for 1 week. Write down your plan and try to get everyone to agree to follow it.

5. Again measure the amount of gas or electricity used over a week when your family was following your conservation plan. How much did you save? Could other factors such as cold or hot weather make a difference?

6. Compare your home's energy use with your friends. Why are there differences?

STUDENT PAGE IV

How Is Energy Used Town and City? (Taken from Reference #3 pp. 13-14)

Energy is used in city living in many ways. Electricity, which is used to light streets and buildings, and sometimes cool or heat stores, is generate by burning oil or coal or natural gas, or in some places by using the energy stored in the atoms of uranium (nuclear) or the forces of running water (hydroelectric).

Most office buildings are heated with oil or natural gas. Gasoline and diesel oil move cars, trucks, buses, and many trains. Our factories get the power they need to manufacture their goods from coal, natural gas, or oil. Food, aluminum cans, and many products sold in shops require a great deal of energy to produce and transport. Others, especially plastics, are made from petroleum itself. The consumption of energy does not end when something is sold - we must also count the resources which are used up in disposing of our trash and refuse.

We Americans use a tremendous amount of energy - more per person than any country in the world. We have only 6 percent of the world's population, but we account for 35 percent of the world's energy consumption. Even countries with a standard of living about as high as ours (Germany, Denmark, and Sweden, for example) use about half as much energy per person as we do.

A Project to Do: Energy Survey

Much energy is wasted by our towns and cities. Shops may leave doors open when they are using energy to cool their buildings; office lights may be left on overnight; monuments may be flood-lighted; resturants may be kept too

cold with air-conditioning.

You can help your town or city by keeping a notebook of energy being wasted and the address of the place wasting it.

With your classmates list all the places you have found wasting energy. After three or more class members have confirmed each energy waster on the list, have a class debate to decide if that use of energy is really wasteful.

After the debate and the class vote, write letters to the three addresses considered to be wasting the most energy. Explain in your letter the national need to conserve energy, the class project you have undertaken, and the way you think energy is being wasted. Try to be helpful and suggest ways that the same job can be done with less energy.

Other Things To Do:

1. Set up a display in the town hall or city library showing ways to save energy.

2. Ask the local stores to give special price discounts on items that save energy. For example, sell 25-watt light bulbs for less than 100-watt light bulbs.

3. Write an article for the local paper on the energy conservation project your class is doing.

4. Interview everyone in your neighborhood to find the ways they are saving energy.

STUDENT PAGE V

Energy Use Situation and Decision-Making (Taken from Reference #2, pp. 135-142).

Objective: To provide students an opportunity to better appreciate the decision-making process about energy use.

Multidisciplinary

Have students select one or more of the 29 *Energy Use Situations* prepared for this activity. Situations should be considered as though they are occurring in the students' own community. Students should be able to defend their decisions or answers. This might require some library research or contacts with agency officials. If maps are needed, they may be obtained from the Chamber of Commerce, Soil Conservation Service, or Local Planning Commission Office.

NOTE: It is advisable to omit any references to local personalities by name or inference in this activity.

ENERGY USE SITUATIONS

1. Assume <u>you</u> are in a position to considerably influence energy consumption patterns in your community:

   a. Would you limit energy use? In what ways? Why? What factors would you consider?

   b. What provisions would you make for the elderly on fixed incomes? The unemployed? The sick?

   c. What special considerations, if any, would be given to hospitals? To schools? To public office buildings? To jail?

2. Assume <u>you</u> hold a political office and have the power to influence decisions on energy use:

   a. How would you reach decisions? How might they be put into effect?

   b. Would one group of citizens receive more attention than others? Why?

   c. What factors would influence your decision? Wealth? Power? Knowledge?

   d. Would you make unpopular decisions? Why? State an example.

3. Assume <u>you</u> are in a position to assist in recreational planning for your community:

   a. Would you give consideration to having athletic events only during daylight hours? What problems would you encounter?

   b. What areas near major concentrations of people could be utilized for parks?

   c. Would bicycle trails throughout the city be popular? Could you suggest a location for a bicycle trail?

4. Assume <u>you</u> are in a position to determine the location of street lights in your community:

   a. Are there locations in which you would add lights for safety or security reasons? Where are they?

   b. Are there locations in which you would eliminate lighting? Where are they? Why?

   c. Are there types of lighting that require less electricity than others? What kinds of lights last the longest period of time? Justify the reasons for using different types of lights at different places.

5. Assume you are in a position to promote mass transit in your community:

   a. Where would you encourage special bus, van or carpool lanes? What criteria would you use in deciding their location?

   b. Are there adequate areas to park cars so individuals could then take part in mass transit? Where are these areas?

   c. Where would you obtain the funds to start your programs?

6. Assume you are owner/manager of a grocery store in your community:

   a. Are there items you, as an energy conservationist, would not sell, knowing your personal income might be reduced? Explain.

   b. Are there items you would not sell because of the energy used in packaging? What are the alternatives to packaging?

   c. What other ways could you promote the conservation of energy at your grocery store?

7. Assume you are going to purchase a family automobile:

   a. What type of automobile would you buy? Why?

   b. Would you buy a new or used automobile? Why?

   c. On what basis would you choose options (radio, air conditioning, power steering, power windows, etc.)?

   d. What effect do you think the new anti-pollution systems have on gas mileage or engine efficiency? What is the effect of running an air conditioner on mileage?

8. Assume you are in a position to give a homeowner in your community an award of $100 for energy conservation:

   a. What energy conservation features would you look for on the exterior of the home?

   b. What energy conservation features would you look for on the interior of the home?

   c. How does the homeowner's lifestyle contribute to energy conservation?

9. Assume you have been asked to develop an advertising campaign on energy conservation for your community:

   a. Would there be different approaches for different segments of the community? What would they be?

   b. What types of programs would you develop for television, radio and newspapers?

   c. Where would you go for assistance (information, manpower, money, etc.)?

10. Assume you are in charge of transporting coal from the mine to a power plant:

    a. What type of transportation would you use (roads, a river, and railroads are all available)? Why?

    b. What social factors would be considered in your decision?

    c. What economic factors would be considered in your decision?

    d. What environmental factors would be considered in your decision?

11. Assume you are in charge of operating a strip mine operation:

    a. What would you do to reclaim stripped land? Why?

    b. How would you deal with citizen objections to your operation?

    c. What type of reclamation laws are now in effect? To what extent are they enforced? Who (what agency) is responsible for enforcement?

12. Assume you are an automobile salesperson?

    a. How would you describe the air pollution controls on the new models? (See driver's manual of a new car.)

    b. What energy conservation tips would you offer?

    c. Would you feel any obligation to lead your customers to an energy conserving model?

13. Assume you are interested in promoting solar energy technologies (or hydroelectric facilities, conventional nuclear power plants, coal-fired steam plants, or liquid metal fast-breeder reactor):

    a. Where would you go for assistance?

    b. What type of opposition might you encounter? Why?

    c. Are there any solar demonstrations in the state?

    d. How would you inform citizens about your energy choice?

14. Assume you are mayor of your city and, in attempting to involve more citizens in decision-making situations, are going to establish a citizens' advisory committee on energy conservation:

    a. What type of individuals (educational background, occupations, political philosophy, age, experience, and wealth) would you choose? How many individuals would you choose? Why?

    b. What problem areas would you assign this committee?

c. What responsibilities would the committee have? How much decision-making power?

15. Assume you want to live a simple, uncomplicated, and less consumptive lifestyle:

a. Where would you establish your home? Why? Where would you not live and why?

b. How would you support yourself?

c. In what ways would you use less energy?

d. What kind of home would you buy or build?

16. Assume you are on the Board of Directors of the Tennessee Valley Authority and must approve the site of a nuclear or coal-fired power plant:

a. What economic factors would you consider?

b. What social factors would you consider?

c. What environmental factors would you consider?

d. What other kinds of data or information would you want in order to make your decision?

17. Assume you, a consumer, are about to buy some clothing:

a. Would you want synthetic (e.g., polyester) material? Why? Why not? How much energy is required to produce it? To maintain it?

b. Would you want natural (e.g., cotton) material? Why? Why not? How much energy is required to produce it? To maintain it?

18. Assume you, a consumer, are purchasing a television set:

a. What size set would you buy? Why?

b. Would you buy a black-and-white or color set? Would you buy a tube set or a solid-state set? Which ones utilize the most energy? Why?

c. If you had unlimited funds, how many television sets would you have in your house? Why?

19. Assume you are the fleet manager for a large governmental agency or private firm:

a. What type of vehicles would you purchase? Why?

b. What options would you consider for vehicles in the fleet?

c. In what ways would you encourage drivers to conserve energy? How could you enforce energy conservation?

20. Assume you are the manager of an apartment complex:

    a. How would you encourage tenants to conserve energy?

    b. In what ways could energy be conserved in maintenance of the apartments?

    c. What energy conserving actions would you take in the public areas of the complex?

21. Assume you are designing an apartment complex in your community:

    a. Is there a site that could result in saving transportation costs for the prospective residents? Where?

    b. What type of recreational facilities could be developed on this site to encourage residents to stay home during leisure hours?

    c. How could the apartments be designed and situated (oriented on the site) to conserve energy?

22. Assume you are looking for a way to store additional amounts of frozen food:

    a. Would you buy an upright or chest-type freezer? Which conserves the most energy? What would be advantages and disadvantages of having your own freezer at home?

    b. Is freezer locker space available in your community? Where? Would you conserve energy by storing food this way? What would be the advantages and disadvantages of using this system?

23. Assume you are buying a water heater for your home:

    a. Where would you place the heater? Is the location important? Why?

    b. What is the quick recovery system on a water heater? Is it possible to disconnect this system? Why would this be done?

    c. How often should you drain the water heater? Why?

24. Assume you are a state legislator preparing a bill introducing a state energy policy:

    a. What energy conserving measures would you include and why?

    b. What would be the major steps you would have to follow in order to get the bill passed by the legislature?

25. Assume <u>you</u> are buying tires for your automobile:

    a. What are the advantages/disadvantages of bias ply tires? Radials?

    b. Does the speed at which you drive affect the lifetime of tires?

26. Assume <u>you</u> are going to insulate your home:

    a. What are the most important areas of the house to insulate?

    b. What insulation materials would you use and why?

    c. How is the effectiveness of insulation specified on the material?

    d. Within what time period could the insulation pay for itself in lowered utility bills?

27. Assume <u>you</u> are remodeling your present home:

    a. Where would you place new lights and why?

    b. Where would you use fluorescent light fixtures? Why?

    c. Where could you reduce wattage and size of lights?

28. Assume <u>you</u> are planning a vegetable garden:

    a. What would you plant and why?

    b. How could you conserve energy in gardening? In canning or freezing your own foods? In cooking?

29. Assume <u>you</u> are a planner for the State Department of Transportation:

    a. Would you encourage mass transit? Why? How?

    b. How should highways be designed to conserve energy? For safety?

    c. Would you recommend a right turn on red after stop? Why?

    d. What would you want the speed limit to be on interstate highways?

ENERGY-ENVIRONMENT OPINIONAIRE

(Taken from Reference #2, pp. 153-159).

Objective: To help assess the opinions of students in areas of energy and environment.

MULTIDISCIPLINARY

Have students react to the statements in the ENERGY-ENVIRONMENT OPINIONAIRE prepared for this acitivty. The opinionaire can be used with school administrators, teachers, and parents. An answer sheet and form for collecting information on the respondent is included.

CONTACT ORGANIZATIONS

none

Energy-Environment Opinionaire follows.

ENERGY-ENVIRONMENT OPINIONAIRE

STUDENT PAGE VI

Directions: Circle the letter on the answer sheet which corresponds to your opinion on the scale. Please do not write on the opinionaire.

1. Nuclear breeder reactors should be developed because they would be cost-effective and safe.
2. Nuclear power plants should be placed underground.
3. The government should develop floating nuclear power plants at sea.
4. Automobiles should be banned from certain streets in the largest cities during certain times of day.
5. Global environmental standards must be established and followed if man is to survive.
6. Basic changes in lifestyles will be necessary in order to offset the energy crisis and environmental problems.
7. Electricity will probably never be cheaper than it is today.
8. Regional urban waste management systems should become a major responsibility of the federal government.
9. It will eventually be necessary to have gasoline rationing to conserve fuel.
10. There should be an additional charge on bottles, newspapers, and automobiles which would be refunded if and when the items were recycled.
11. Vehicles and household appliances should be designed to allow for nearly total reclamation.
12. The United States needs a cohesive land-use policy.
13. The United States needs a cohesive energy policy.
14. Additional taxes should be imposed on industries which do not clean up their air and water pollution.
15. Effective energy conservation programs will result in increased unit costs and slow down economic growth.
16. Zero population growth would result in an improved quality of life.
17. Population size must be limited.
18. The population must be redistributed.

19. A real problem in establishing environmental standards lies in determining "how much" of any pollutant is "too much".

20. Citizens will eventually have to place more value on government controls if they are to live in a healthy environment.

21. Citizens have the responsibility of analyzing and lessening the magnitude and number of environmental problems.

22. A major concern of pollution control technologies in the United States is the degree to which the air, water, and land can assimilate poisons and wastes.

23. Most environmentalists are radicals and oppose economic growth and development.

24. Most environmentalists are staunch preservationists.

25. Ecological principles and systems apply to man in the same ways they apply to other animals.

26. Stability and diversity are important elements in an ecosystem.

27. Pollution control devices are essential for maintaining balanced ecosystems.

28. Any change man can bring to a natural system will be beneficial.

29. The average citizen doesn't realize the extent to which he/she is dependent upon the proper functioning of natural ecological systems for survival.

30. The National Environmental Policy Act (NEPA) is very valuable legislation.

31. Greater consumption of energy is currently rewarded by lower prices per unit.

32. Society really doesn't want to pay the cost of maintaining a quality environment.

33. It is currently more profitable to pollute in the United States than to apply pollution abatement technologies.

34. TVA is a leader in strip-mine reclamation.

35. The cost of controlling pollution must, in most instances, be passed on to the consumer.

36. Technology assessment refers to determining the full impact of a new technology, including secondary effects, before the technology is applied.

37. The world population doubles about every 35 years.

38. Short-range and self-centered thinking linked with a lack of commitment and responsibility are primary factors of human behavior contributing to environmental degradation.

39. The only time there is an energy crisis is when demand exceeds supply.

40. There was no energy crisis; the whole problem was contrived by the oil companies.

41. Building codes should be modified to encourage energy conservation in homes and other buildings.

42. The public has the right to get all the electric power it wants whenever they want it.

43. It is neither reasonable nor economically desirable to limit the growth and use of energy in the United States.

44. Utilities must develop better methodologies for communicating effectively with the people they serve.

45. There should be no governmental limitations placed upon energy production.

46. It is extremely unlikely that there would be a disaster in the United States from a nuclear accident.

47. The quality of the environment is primarily a social issue, not an economic one.

48. Most people would buy a less expensive polluting detergent over a more expensive nonpolluting one, even if they knew the difference.

49. Environmentalism is just a fad and most people couldn't care less about it.

50. American society is destroying the quality of life by producing more and more goods.

51. Although used widely, the gross national product (GNP) is a misleading index for measuring the quality of life because it deals only with economic activity.

52. If the less developed nations of the world accepted our capitalistic economic system, there would be added negative impacts on the world's environment.

53. As cities increase in industrialization, pollution increases to the point where it is not assimilated effectively by the environment, thus endangering the health of the residents.

54. Stockholders of industry, the consumer, and the taxpayer have all benefited economically from the lack of environmental control by not being charged the full costs of products and their impact on the environment.

55. It is not known to what extent environmental degradation has affected the health and life span of people.

56. To date, government and industry have done very little to measure the value which society places on a quality environment.

57. It is extremely difficult to place a dollar value on recreation areas or the aesthetics of viewing a clean river.

58. Some government agencies and industries have tended to ignore the real environmental issues and blamed the "radical environmentalists".

59. Engineers and chemists make the best resource or environmental managers.

60. The government has made an excellent attempt to conserve energy.

61. Effective strip mine reclamation laws would increase the cost of coal and electricity.

62. An adequate energy supply is as important to society as food, clothing, and shelter.

63. Most citizens get involved in the energy-environment decision-making process very effectively through voting, participating in hearings, and writing letters to members of Congress, the Senate, and newspapers.

64. Effective energy conservation programs will help alleviate shortages, extend supplies of resources, and result in improvements to the environment.

65. It is possible to attain zero energy growth by the year 2000 and still have an adequate supply of energy.

66. TVA should not play a role in the development of energy-efficient appliances or machinery.

67. The government should not encourage the implementation of any new energy technologies until it is sure there would be no unacceptable consequences to society.

68. Locating power plants in rural or undeveloped areas would facilitate economic growth.

69. Some significant environmental problems will have to go unsolved in the short run to provide an adequate supply of energy to meet current demand.

70. The public wants to have a voice in the energy development decision-making process, but this should be left to the experts.

71. TVA is unresponsive to changing social needs and must be forced by public pressure to implement programs which improve the overall quality of life and environment.

72. Solar heating is not technologically feasible at this time and offers little potential for the future.

73. There is a great need for providing citizens with sound economic and environmental information so they can make personal decisions which save them money and preserve natural resources.

74. All electrical appliances should contain a label revealing the resources used in making them, their energy requirements, and expected operating costs.

75. If industries use more electricity, they should pay more and not be rewarded by cheaper rates for higher consumption.

ENERGY-ENVIRONMENT OPINIONAIRE

ANSWER SHEET

Name (optional)_____ Date_____

A = Strongly agree
B = Mildly agree
C = Not sure or don't know
D = Mildly disagree
E = Strongly disagree

Directions: Please circle the letter which best describes your opinion on each corresponding statement.

1. A B C D E	26. A B C D E	51. A B C D E
2. A B C D E	27. A B C D E	52. A B C D E
3. A B C D E	28. A B C D E	53. A B C D E
4. A B C D E	29. A B C D E	54. A B C D E
5. A B C D E	30. A B C D E	55. A B C D E
6. A B C D E	31. A B C D E	56. A B C D E
7. A B C D E	32. A B C D E	57. A B C D E
8. A B C D E	33. A B C D E	58. A B C D E
9. A B C D E	34. A B C D E	59. A B C D E
10. A B C D E	35. A B C D E	60. A B C D E
11. A B C D E	36. A B C D E	61. A B C D E
12. A B C D E	37. A B C D E	62. A B C D E
13. A B C D E	38. A B C D E	63. A B C D E
14. A B C D E	39. A B C D E	64. A B C D E
15. A B C D E	40. A B C D E	65. A B C D E
16. A B C D E	41. A B C D E	66. A B C D E
17. A B C D E	42. A B C D E	67. A B C D E
18. A B C D E	43. A B C D E	68. A B C D E
19. A B C D E	44. A B C D E	69. A B C D E
20. A B C D E	45. A B C D E	70. A B C D E
21. A B C D E	46. A B C D E	71. A B C D E
22. A B C D E	47. A B C D E	72. A B C D E
23. A B C D E	48. A B C D E	73. A B C D E
24. A B C D E	49. A B C D E	74. A B C D E
25. A B C D E	50. A B C D E	75. A B C D E

STUDENT ACTIVITY VII

From your previous activities you may begin to realize that the value of conserving energy has some bearing upon your lifestyle. Some of you may be starting to think about the consequences of your actions in relation to the energy these actions use. You may find that you can make many choices about how you spend your leisure time in relation to energy use. In one previous activity, you may have made some choices between cross-country skiing and down-hill skiing, water skiing vs. sailing, and various others. Most of the choices presented were designed to allow you to make choices between what are generally referred to as non-consumptive activities vs. more highly energy consumptive activities.

But what is considered in the way these activities are categorized as energy consuming or non-energy consuming? Generally, if an activity needs a fossil fuel or electricity as its primary fuel source, we tend to think of it as energy consuming (at least in relation to those activities that rely on human energy, solar or wind energy). But are the activities such as cross-country skiing, sailing, and backpacking actually non-consumptive in relation to energy?

To answer this question, we must do some thinking about <u>all</u> the energy requirements of a particular acitivity. Let's take backpacking for an example. We usually think of backpacking as using mainly physical energy and little more. But, where do we go backpacking and how do we get there? What special equipment do we buy and how is it produced? What foods do we take with us for ease in packing and carrying?

An "energy analysis" of backpacking would then look something like this:

Product or Activity	Energy Used
Backpacking (the actual activity).....	physical energy
Transportation to and from the area.....	gasoline (fossil fuels) (You could go so far as to include the car itself.)
Equipment including its production, distribution and sale.....	raw materials, fossil fuels and electricity (again fossil fuels usually)
Foods.....	fossil fuels and electricity used in processing canned and dehydrated foods (dehydrated foods use about 3 times the energy of canned foods and about 4 times the energy of fresh food in their production)

In considering activities in this way, you are analyzing factors of the "net energy" involved--all the energy put into a system must be added in before a value for that system's total consumption can be derived.

Try this type of analysis with other of your favorite leisure time activities and see which ones are really low in energy consumption. Some possibilities include:

watching TV

reading a book

cross-country skiing

sailing

going to a movie

swimming

jogging

hiking

bike riding

Student Self Evaluation

You may never have thought about the development of your present values, but there are some checks you can make to analyze the way you form values in the future.

The first thing you should do is analyze how the issue or question is approached. (Use the items in the "Energy Environment Opinionaire" as examples). Check yourself and see if you use the following steps to develop a position or a value about an issue.

1. Do I understand the question?
2. Have I gathered the facts to answer the question?
3. Have I assessed the facutal assertions?
4. Are the facts relevant?
5. Can I arrive at a tentative decision?
6. Is the solution acceptable?

When you go through the above steps you may get involved in sub-issues. These may be:

1. moral issues.
2. dealing with definitions.
3. issues involving facts.

If you think about all these steps, you will understand more about how values are formed.

Module Evaluation

A method of teaching values has been presented in this module. The module is designed to see the types of values students hold about energy and energy use. We are trying to get students to see the value of understanding and thinking about energy use in their every day lives. As their teacher you should be able to observe value shifts in students. There should be no "Right" or "Wrong" answers but students should be able to explain their values about energy use.

You can assess value shifts by a pre-post questionaire on energy use statements. You may also be able to observe how they are arriving at a particular position. (See the student self evaluation.) Are your students following the steps outlined for them for developing a position on an issue? Do they show any behavior which would indicate a value shift, e.g. conserving energy, talking more about the topic of energy, planning for the future with energy in mind?

REFERENCES

1. Simon, Sidney, Leland Howe and Howard Kirschenbaum. Values Clarification: A Handbook of Practical Strategies for Teachers and Students. New York: Hart Publishing Co., 1972.

2. Ideas and Activities for Teaching Energy Conservation Grades 7-12, University of Tennessee Environment Center, Knoxville, Tennessee, 1977.

3. Energy Conservation: Understanding and Activities for Young People, Office of Conservation Education, Federal Energy Administration, Washington, D.C., 1975.

4. Stapp, William B., Dorothy A. Cox, Environmental Education Activities Manual, Volumes I and VI, Farmington Hills, Mi., 1974.

NAME CARD

1. Time involved: five - ten minutes.

2. Materials needed:

   a. 3 x 5 notecards, one per person.

   b. Pen or pencil.

3. Recommended procedure:

   a. Have participants write their name in the center of the card.

   b. Have participants write in the four corners the following information:

      1. Upper left - list 3 ways that you use energy that you really value.

      2. Lower left - list 3 figures (alive or dead) that you really admire.

      3. Upper right - list 3 things that you would like to be remembered for after you die.

      4. Lower right - what do you feel are the most serious energy problems?

   c. Have participants break into groups of 3 and discuss one corner of their cards.

   d. After 2 or 3 minutes, rotate people to other groups, have them then discuss another corner of their cards.

4. Debriefing:

   a. Name Card is a mixer-type activity, used to get participants acquainted.

   b. Helps participants publicly affirm their values.

5. References:

Simon, Sidney, Leland Howe and Howard Kirschenbaum. Values Clarification: A Handbook of Practical Strategies for Teachers and Students. New York: Hart Publishing Co., 1972.

TWENTY QUESTIONS

Time Involved: 15 minutes.

Materials Needed: Paper, pencil, and blackboard.

Recommended Procedures:

Ask the students to write on a piece of paper the numbers 1-20. Now have them list twenty things they enjoy doing. (You may want them to think seasonally about these activities.) Have students evaluate their list according to the code listed in the "Debriefing" section following.

Debriefing:

$ - anything that costs more than $10 to do.
S - things that relate to something you learned in school.
FF - things that need fossil fuel energy.
N - things that you do in the natural environment.
A - things you do alone.
F - things you do with friends.
P - things you do or did with parents.
E - things that need electricity.
Ph - things that need mainly physical (muscular) energy.
5Y - things you didn't do five years ago.
10Y - things you hope to do 10 years from now.

Several code items may be used for each of the twenty things.

The code provides a way to evaluate the types of things you like to do.

The code also gives you an idea of the trends you are following in doing enjoyable things.

It is a good idea to do this activity at different times in the year to show the students how they might have changed during the year.

Declaring the things you enjoy doing provides you with a way of identifying and clarifying what you enjoy.

Declaring the things you enjoy doing and ting them according to this type of scale may make you aware of things about yourself you hadn't realized before, such as "Most things I do cost a lot of money." "Most things I enjoy doing are with my friends." "I enjoy many activities that use fossil fuels," etc..

BAKER'S DOZEN

1. Time Involved: 10-15 minutes

2. Materials Needed:

   a. pencil and paper

3. Recommended Procedures:

   a. Have each student list 13 electrical appliances they use at home (lights, TV, radio, etc.).

   b. After everyone has completed their list, have each student cross out 3 things he or she can do without.

   c. Next have the students check 3 things they feel they couldn't do without.

   d. Now, have each student circle the items which they have obtained within the last 5 years (3 things which would not have been on their list 5 years ago).

   e. Allow the students to share their lists and reasons with the class (you can pick several students or just ask for volunteers).

4. Sample Valuing Questions:

   a. The class could list 13 records they own, identifying the 3 most important and the 3 least important records.

   b. The class could list 13 items they have purchased or been given (bicycle, watch, new clothes, book, etc.) identifying the 3 items they would be most willing to give up, and the 3 items they would least like to give up.

5. Debriefing:

   a. Identifying one's priorities is necessary when considering among various alternatives.

   b. Many electrical appliances are luxury items, which are seldom used, and are not very important to one's life style. Perhaps these items might not be purchased if a person thought about whether the item was very important, or just another thing to buy.

   c. The U.S. has doubled its energy consumption in the last 20-25 years. With only 6% of the world's population, the U.S. consumes 37% of all the energy used in the world. A large portion of this increased energy consumption is due directly to the purchasing (it takes energy to produce an electrical appliance, as well as energy to use it) and use of non-essential or luxury appliances.

d. Identifying those items obtained within the past 5 years indicates personal trends in purchasing and consumer behaviors.

e. Looking at the items crossed out as non-essential, the students can begin to think how easy it is to stop using those items once they have identified them.

EITHER-OR FORCED CHOICE

Time involved: 45-50 minutes.

Materials needed: large pieces of paper (10-20).

Recommended procedures:

1. Have students arrange their desks/chairs so that there is a wide path from one side of the room to the other.

2. Place an either-or forced choice question on either side of the room. (These are to be printed on the large pieces of paper and taped to opposite walls.)

3. Ask students: "Which do you identify with more--Ice Cream or French Fries? Explain to the students that they are to select one of the alternatives and move to that side of the room where it is posted.

4. Have students form triads to explain briefly why they decided on this choice. Allow 2 minutes per student.

5. Have students return to their orignial places in the center of the room and ask another question (forced choice).

6. Select students from each opposing view and have them relate to the entire group why they made their particular choice.

Begin with Energy-related Forced Choices: (Be sure to explain to students that they are to choose one or the other--there is no "middle-of-the-road" in this activity.) Introduce each activity with "With which of these do you identify more?"

car or bicycle

economy car or luxury car

downhill skiing or cross-country skiing

McDonald's or a restaurant (sit-down meals)

solar energy or nuclear energy

sailing or water skiing

cross-country skiing or snowmobiling

backpacking or Recreational Vehicle camping

train or airplane

expressways or bike routes

home gardening or large scale farming

individual homes or apartment buildings

swimming out-of-doors or swimming in an indoor heated pool

football games after school or football games on Friday night

voluntary reduction in automobile use or gas rationing

STUDENT PAGE I

Everyday we make many choices: what to wear to school, what to eat for breakfast, how to get to school, who to walk to class with, which homework assignment to do first, what to do after school, and many more. Most of these choices are made very automatically, almost out of habit. Other decisions are not made so automatically. We usually need to evaluate alternatives before we sign up for new term courses, before we decide upon a career or whether to attend college, before we spend large sums of money on a car, a stereo, a vacation, or a new coat or suit. How do we learn to make these choices? On what do we base our decisions?

Generally, we make choices based on our values--our feelings or attitudes about particular issues or events. But what are our values and how do these develop? Usually, our values are established long before we are able to recognize them through our families and the society in which we live. We come to prize such things as honesty, friendship, responsibility, freedom, etc. as a way of life. We are also influenced by our friends, by TV and movies, by people we admire, by books and the news. All of these help to shape the values we use to live our lives.

Oftentimes we encounter conflicting issues or situations where we are unsure of what choices to make because we are unsure of exactly what we believe. In these cases our values need some clarification, some explanation or understanding so that we may make rational, well-planned decisions. Through the process of values clarification, we become more aware of our own beliefs, attitudes, and values; we learn to consider the pros and cons and consequences of various alternatives; we consider whether our actions match our stated beliefs and, if not, how to bring them closer together; and we discover our options for making choices and evaluating the consequences of those choices.

Because we act and make many decisions that are value-oriented, we can make more meaningful decisions if we clearly understand what we believe and why. This unit has been planned to help you clarify your values and make some decisions about your own values and actions, especially those concerning your use and conservation of energy. Do your actions reflect what you state your values to be? Let's find out!!!

To help students begin to recognize their values toward energy use and how well their actions fit with their expressed values, try the following:

Values/Actions Rating Scale

First, fold the paper in half (right side over left side) along dotted line labelled (1). Next fold the page back along dotted line (2) so that you have one section of the paper folded back over itself. (This will shorten the paper and cover 2 of the middle rows of lines.) The 2 lines with arrows: ACTIONS ↓ VALUES ↓ should line up directly on top of one another if the folding is done correctly. Now you are ready to begin.

Have the students open the pages all the way out. Ask them to find the section numbered (3) where it states: "Place Values answers here." The object of this part of the activity is to rate the lettered items at the right according to the values the students have concerning these items. Each lettered item should be rated along the sliding scale given--+4 for a high rating to -4 for a very low rating. For example, if watching TV is something you value highly (consider it very worthwhile), then you would place the letter f on the +4 line under the VALUES column (3). However, if watching TV is just O.K. or something you like once in a while, you would probably place the letter f on the +1 or 0 line. Have the students complete this for all letters a-u.

If the students do not actually do some of the items listed, such as fertilize the lawn or wash the clothes, have them rate these items according to what they think should be done or what they would do given that responsibility.

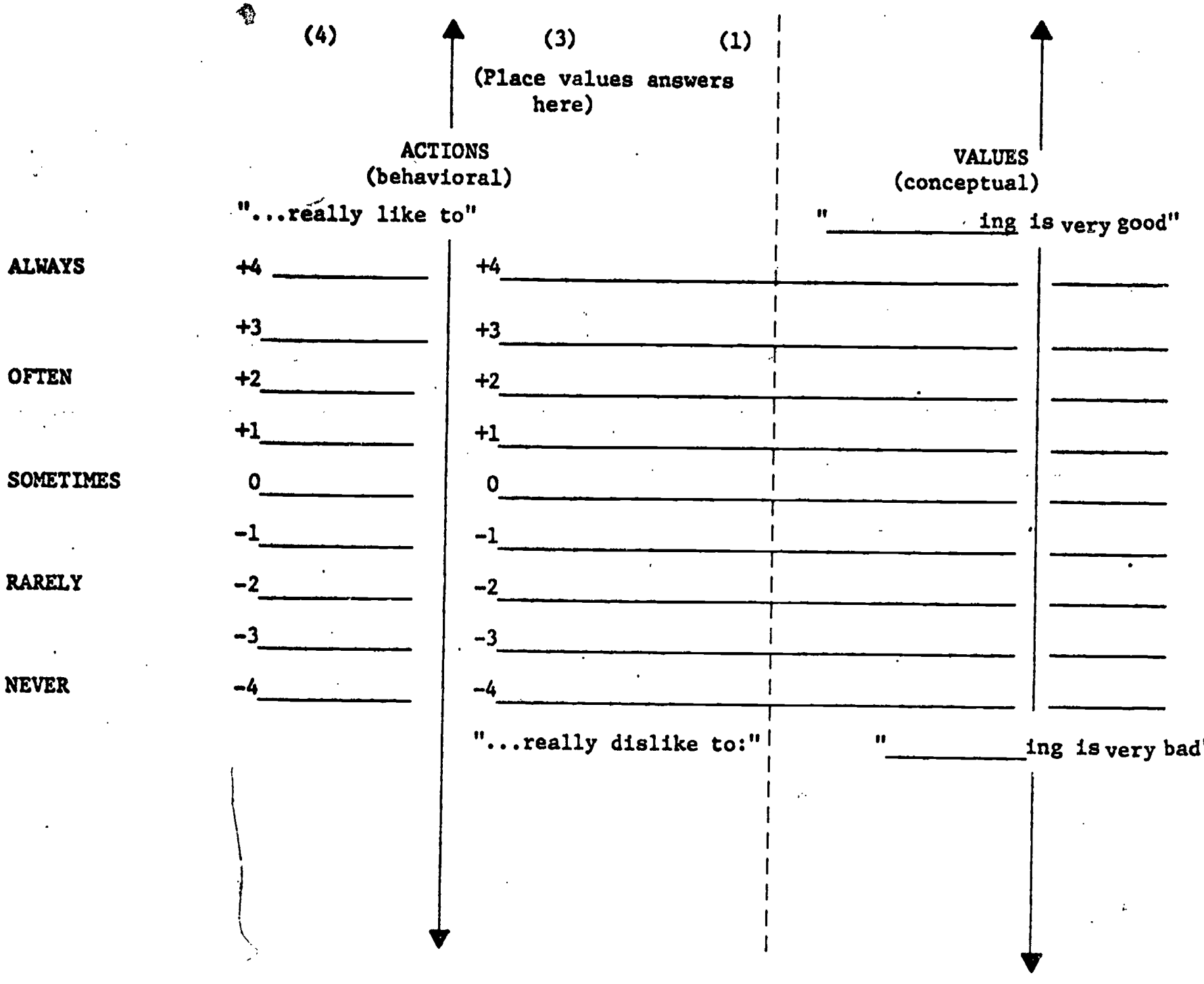
Next, have the students fold the right section of the paper toward the center along the two folds previously made. This should leave the ACTIONS section (4) visible and cover the VALUES section (3) just completed. Now have the students rate their actions relating to the lettered items (a-u) in a similar manner to the VALUES section. For example, if you ride your bike quite a bit, you would rate this item high (+4 or +3) on the action scale. On the other hand, if you don't even own a bicycle, you would need to rate this action low (-3 or -4) since you don't participate in bicycle riding. The VALUES section already completed should be covered during this part of the exercise so that the values already marked don't influence the honesty of the marking of the students' actions relating to each item.

When the ACTIONS section is completed, have the students open the paper completely so that both the VALUES section (3) and the ACTIONS section (4) are visible and lying side by side. Let the students compare their actions with their expressed values rated in each section. Do most of their actions agree with their values? If not, how might they change this situation? Should they change their values or their actions?

Many possibilities remain for further values exploration. Student Pages III and IV relate to activities that students can do with their families or in the community and you may want to distribute these as supplemental activities only.

Student activities V, VI, and VII can be used by the total class or provide a framework for small group participation depending upon the time you care to spend on the activities.

VALUES/ACTIONS RATING SCALE



a. Recycle
b. Air condition
c. Go over 55 MPH
d. Ride my bike
e. Eat out
f. Watch TV
g. Read about energy
h. Heat with wood
i. Use the bus
j. Set the thermostat at 65° in winter
k. Set the thermostat at 75° in summer
l. Install insulation
m. Garden
n. Eat "fast" foods
o. Walking
p. Live in an apartment
q. Eat only fruits & vegetables in season
r. Fertilize lawn
s. Use cold water to wash clothes
t Vacation out of state
u. Live on a farm

(Fold back along this line) (2)

STUDENT PAGE II

As seen in some of the activities, using our value orientations involves making choices every day of our lives. We must often weigh the benefits of one choice (and its consequences) in relation to our lifestyle or in relation to another alternative and its consequences. As also demonstrated in the above activities, many of these choices are related to our uses of energy. Do we choose to participate in energy consuming or energy conserving activities? Will these choices affect our lifestyles and those of others in years to come?

Why worry about conservation of energy? Doesn't that mean living below our present standards and sacrificing many of the things that make our lives pleasant? Not according to Dr. Herman Koenig, Director of the Center for Environmental Quality at Michigan State University. He states, "We must find new values and a way of life that will allow us to live comfortably, yet within our means in the world energy picture. Though our current life-style depletes our limited quantities of resources, we can counter rising costs and impending shortages by using resources more efficiently and effectively than we now do. It is conceivable that we could live on much less energy and be just as well fed and sheltered and probably socially and culturally happier."

Besides providing for our health and happiness, conservation measures can save us money and reduce waste in both a material and an energy sense. If we recycle aluminum and steel products, for example, we reduce the amount of energy needed to make new products. (Recycling saves up to 90% of the energy expended in mining new ore plus saves that natural resource for future use.) We also reduce the amount of solid waste in land fills for other disposal areas and save ourselves money.

What then can the average citizen do to conserve energy and still maintain a high standard of living? The major contribution to energy savings comes from more efficient use of energy; in other words, we must waste less. In buying an electrical appliance, we can look for its efficiency rating and buy only the most efficient, durable product. We could begin to enjoy other people's company and form car pools for driving to and from work. If we add a few inches of insulation in an attic, we can save both energy and money in home heating. We can begin to develop an Energy Conservation Ethic: a belief system that incorporates wise use of energy into everything we do.

A person who lives by such an ethic would ask the following questions before buying any product, whether it be a new car, new clothes, or a refrigerator, or an air conditioner:

1. Do I really need it to be happy?
2. What could be used as a substitute or alternative?
3. Will buying it promote a more materialistic lifestyle?
4. Is it inexpensive, yet efficient, in terms of total cost?
5. How long will it last?
6. Can it be recycled?
7. Are the energy resources scarce or non-renewable?
8. What resources are in it?
9. From what countries do the resources come?
10. Are there other resources which could be used to make it?
11. Did its production result in significant environmental or ecological damage?
12. Will its use result in significant environmental or ecological damage?

An Energy Conservation Ethic is defined in "Energy Conservation in the Home," published by the U.S. Department of Energy as "a conscious effort on the part of the individual to think in terms of wise and efficient use of resources when developing, buying, or consuming them. It reminds one of the 'stewardship' responsibility to maintain an ecological balance for survival, that the natural environment is not limitless in its capacity to assimilate waste and abuses."

All of us can contribute in many ways to the wise use of energy in our country. Some of these conservation measures may mean some sacrifices on our part, but generally, conservation can be very painless and very profitable to us as individuals and to our nation as a whole.

"Conservation is not just a matter of saving; it is a method for maintaining a way of life."

STUDENT PAGE III

A Project to Do: Energy Monitor (Taken from Reference #3 p. 10)

Here's a project which conserves fuel and saves your family money.

1. Find your gas or electric meter (or both). Make sure you know how to read them.

2. Take a reading on Sunday evening, and compare it with the reading the following Sunday evening. How much energy did you use?

3. Make a list of everything in the house which uses that energy.

4. Now work out a plan with your family on who you can cut down on the use of that energy for 1 week. Write down your plan and try to get everyone to agree to follow it.

5. Again measure the amount of gas or electricity used over a week when your family was following your conservation plan. How much did you save? Could other factors such as cold or hot weather make a difference?

6. Compare your home's energy use with your friends. Why are there differences?

STUDENT PAGE IV

How Is Energy Used Town and City? (Taken from Reference #3 pp. 13-14)

Energy is used in city living in many ways. Electricity, which is used to light streets and buildings, and sometimes cool or heat stores, is generated by burning oil or coal or natural gas, or in some places by using the energy stored in the atoms of uranium (nuclear) or the forces of running water (hydroelectric).

Most office buildings are heated with oil or natural gas. Gasoline and diesel oil move cars, trucks, buses, and many trains. Our factories get the power they need to manufacture their goods from coal, natural gas, or oil. Food, aluminum cans, and many products sold in shops require a great deal of energy to produce and transport. Others, especially plastics, are made from petroleum itself. The consumption of energy does not end when something is sold - we must also count the resources which are used up in disposing of our trash and refuse.

We Americans use a tremendous amount of energy - more per person than any country in the world. We have only 6 percent of the world's population, but we account for 35 percent of the world's energy consumption. Even countries with a standard of living about as high as ours (Germany, Denmark, and Sweden, for example) use about half as much energy per person as we do.

A Project to Do: Energy Survey

Much energy is wasted by our towns and cities. Shops may leave doors open when they are using energy to cool their buildings; office lights may be left on overnight; monuments may be flood-lighted; resturants may be kept too

cold with air-conditioning.

You can help your town or city by keeping a notebook of energy being wasted and the address of the place wasting it.

With your classmates list all the places you have found wasting energy. After three or more class members have confirmed each energy waster on the list, have a class debate to decide if that use of energy is really wasteful.

After the debate and the class vote, write letters to the three addresses considered to be wasting the most energy. Explain in your letter the national need to conserve energy, the class project you have undertaken, and the way you think energy is being wasted. Try to be helpful and suggest ways that the same job can be done with less energy.

Other Things To Do:

1. Set up a display in the town hall or city library showing ways to save energy.

2. Ask the local stores to give special price discounts on items that save energy. For example, sell 25-watt light bulbs for less than 100-watt light bulbs.

3. Write an article for the local paper on the energy conservation project your class is doing.

4. Interview everyone in your neighborhood to find the ways they are saving energy.

STUDENT PAGE V

Energy Use Situation and Decision-Making (Taken from Reference #2, pp. 135-142).

Objective: To provide students an opportunity to better appreciate the decision-making process about energy use.

Multidisciplinary

Have students select one or more of the 29 *Energy Use Situations* prepared for this activity. Situations should be considered as though they are occurring in the students' own community. Students should be able to defend their decisions or answers. This might require some library research or contacts with agency officials. If maps are needed, they may be obtained from the Chamber of Commerce, Soil Conservation Service, or Local Planning Commission Office.

NOTE: It is advisable to omit any references to local personalities by name or inference in this activity.

ENERGY USE SITUATIONS

1. Assume you are in a position to considerably influence energy consumption patterns in your community:

   a. Would you limit energy use? In what ways? Why? What factors would you consider?

   b. What provisions would you make for the elderly on fixed incomes? The unemployed? The sick?

   c. What special considerations, if any, would be given to hospitals? To schools? To public office buildings? To jail?

2. Assume you hold a political office and have the power to influence decisions on energy use:

   a. How would you reach decisions? How might they be put into effect?

   b. Would one group of citizens receive more attention than others? Why?

   c. What factors would influence your decision? Wealth? Power? Knowledge?

   d. Would you make unpopular decisions? Why? State an example.

3. Assume you are in a position to assist in recreational planning for your community:

   a. Would you give consideration to having athletic events only during daylight hours? What problems would you encounter?

   b. What areas near major concentrations of people could be utilized for parks?

   c. Would bicycle trails throughout the city be popular? Could you suggest a location for a bicycle trail?

4. Assume you are in a position to determine the location of street lights in your community:

   a. Are there locations in which you would add lights for safety or security reasons? Where are they?

   b. Are there locations in which you would eliminate lighting? Where are they? Why?

   c. Are there types of lighting that require less electricity than others? What kinds of lights last the longest period of time? Justify the reasons for using different types of lights at different places.

5. Assume <u>you</u> are in a position to promote mass transit in your community:

   a. Where would you encourage special bus, van or carpool lanes? What criteria would you use in deciding their location?

   b. Are there adequate areas to park cars so individuals could then take part in mass transit? Where are these areas?

   c. Where would you obtain the funds to start your programs?

6. Assume <u>you</u> are owner/manager of a grocery store in your community:

   a. Are there items you, as an energy conservationist, would not sell, knowing your personal income might be reduced? Explain.

   b. Are there items you would not sell because of the energy used in packaging? What are the alternatives to packaging?

   c. What other ways could you promote the conservation of energy at your grocery store?

7. Assume <u>you</u> are going to purchase a family automobile:

   a. What type of automobile would you buy? Why?

   b. Would you buy a new or used automobile? Why?

   c. On what basis would you choose options (radio, air conditioning, power steering, power windows, etc.)?

   d. What effect do you think the new anti-pollution systems have on gas mileage or engine efficiency? What is the effect of running an air conditioner on mileage?

8. Assume <u>you</u> are in a position to give a homeowner in your community an award of $100 for energy conservation:

   a. What energy conservation features would you look for on the exterior of the home?

   b. What energy conservation features would you look for on the interior of the home?

   c. How does the homeowner's lifestyle contribute to energy conservation?

9. Assume <u>you</u> have been asked to develop an advertising campaign on energy conservation for your community:

   a. Would there be different approaches for different segments of the community? What would they be?

   b. What types of programs would you develop for television, radio and newspapers?

   c. Where would you go for assistance (information, manpower, money, etc.)?

10. Assume you are in charge of transporting coal from the mine to a power plant:

    a. What type of transportation would you use (roads, a river, and railroads are all available)? Why?

    b. What social factors would be considered in your decision?

    c. What economic factors would be considered in your decision?

    d. What environmental factors would be considered in your decision?

11. Assume you are in charge of operating a strip mine operation:

    a. What would you do to reclaim stripped land? Why?

    b. How would you deal with citizen objections to your operation?

    c. What type of reclamation laws are now in effect? To what extent are they enforced? Who (what agency) is responsible for enforcement?

12. Assume you are an automobile salesperson?

    a. How would you describe the air pollution controls on the new models? (See driver's manual of a new car.)

    b. What energy conservation tips would you offer?

    c. Would you feel any obligation to lead your customers to an energy conserving model?

13. Assume you are interested in promoting solar energy technologies (or hydroelectric facilities, conventional nuclear power plants, coal-fired steam plants, or liquid metal fast-breeder reactor):

    a. Where would you go for assistance?

    b. What type of opposition might you encounter? Why?

    c. Are there any solar demonstrations in the state?

    d. How would you inform citizens about your energy choice?

14. Assume you are mayor of your city and, in attempting to involve more citizens in decision-making situations, are going to establish a citizens' advisory committee on energy conservation:

    a. What type of individuals (educational background, occupations, political philosophy, age, experience, and wealth) would you choose? How many individuals would you choose? Why?

    b. What problem areas would you assign this committee?

c. What responsibilities would the committee have? How much decision-making power?

15. Assume you want to live a simple, uncomplicated, and less consumptive lifestyle:

a. Where would you establish your home? Why? Where would you not live and why?

b. How would you support yourself?

c. In what ways would you use less energy?

d. What kind of home would you buy or build?

16. Assume you are on the Board of Directors of the Tennessee Valley Authority and must approve the site of a nuclear or coal-fired power plant:

a. What economic factors would you consider?

b. What social factors would you consider?

c. What environmental factors would you consider?

d. What other kinds of data or information would you want in order to make your decision?

17. Assume you, a consumer, are about to buy some clothing:

a. Would you want synthetic (e.g., polyester) material? Why? Why not? How much energy is required to produce it? To maintain it?

b. Would you want natural (e.g., cotton) material? Why? Why not? How much energy is required to produce it? To maintain it?

18. Assume you, a consumer, are purchasing a television set:

a. What size set would you buy? Why?

b. Would you buy a black-and-white or color set? Would you buy a tube set or a solid-state set? Which ones utilize the most energy? Why?

c. If you had unlimited funds, how many television sets would you have in your house? Why?

19. Assume you are the fleet manager for a large governmental agency or private firm:

a. What type of vehicles would you purchase? Why?

b. What options would you consider for vehicles in the fleet?

c. In what ways would you encourage drivers to conserve energy? How could you enforce energy conservation?

20. Assume you are the manager of an apartment complex:

    a. How would you encourage tenants to conserve energy?

    b. In what ways could energy be conserved in maintenance of the apartments?

    c. What energy conserving actions would you take in the public areas of the complex?

21. Assume you are designing an apartment complex in your community:

    a. Is there a site that could result in saving transportation costs for the prospective residents? Where?

    b. What type of recreational facilities could be developed on this site to encourage residents to stay home during leisure hours?

    c. How could the apartments be designed and situated (oriented on the site) to conserve energy?

22. Assume you are looking for a way to store additional amounts of frozen food:

    a. Would you buy an upright or chest-type freezer? Which conserves the most energy? What would be advantages and disadvantages of having your own freezer at home?

    b. Is freezer locker space available in your community? Where? Would you conserve energy by storing food this way? What would be the advantages and disadvantages of using this system?

23. Assume you are buying a water heater for your home:

    a. Where would you place the heater? Is the location important? Why?

    b. What is the quick recovery system on a water heater? Is it possible to disconnect this system? Why would this be done?

    c. How often should you drain the water heater? Why?

24. Assume you are a state legislator preparing a bill introducing a state energy policy:

    a. What energy conserving measures would you include and why?

    b. What would be the major steps you would have to follow in order to get the bill passed by the legislature?

25. Assume you are buying tires for your automobile:

    a. What are the advantages/disadvantages of bias ply tires? Radials?

    b. Does the speed at which you drive affect the lifetime of tires?

26. Assume you are going to insulate your home:

    a. What are the most important areas of the house to insulate?

    b. What insulation materials would you use and why?

    c. How is the effectiveness of insulation specified on the material?

    d. Within what time period could the insulation pay for itself in lowered utility bills?

27. Assume you are remodeling your present home:

    a. Where would you place new lights and why?

    b. Where would you use fluorescent light fixtures? Why?

    c. Where could you reduce wattage and size of lights?

28. Assume you are planning a vegetable garden:

    a. What would you plant and why?

    b. How could you conserve energy in gardening? In canning or freezing your own foods? In cooking?

29. Assume you are a planner for the State Department of Transportation:

    a. Would you encourage mass transit? Why? How?

    b. How should highways be designed to conserve energy? For safety?

    c. Would you recommend a right turn on red after stop? Why?

    d. What would you want the speed limit to be on interstate highways?

ENERGY-ENVIRONMENT OPINIONAIRE

STUDENT PAGE VI

Directions: Circle the letter on the answer sheet which corresponds to your opinion on the scale. Please do not write on the opinionaire.

1. Nuclear breeder reactors should be developed because they would be cost-effective and safe.

2. Nuclear power plants should be placed underground.

3. The government should develop floating nuclear power plants at sea.

4. Automobiles should be banned from certain streets in the largest cities during certain times of day.

5. Global environmental standards must be established and followed if man is to survive.

6. Basic changes in lifestyles will be necessary in order to offset the energy crisis and environmental problems.

7. Electricity will probably never be cheaper than it is today.

8. Regional urban waste management systems should become a major responsibility of the federal government.

9. It will eventually be necessary to have gasoline rationing to conserve fuel.

10. There should be an additional charge on bottles, newspapers, and automobiles which would be refunded if and when the items were recycled.

11. Vehicles and household appliances should be designed to allow for nearly total reclamation.

12. The United States needs a cohesive land-use policy.

13. The United States needs a cohesive energy policy.

14. Additional taxes should be imposed on industries which do not clean up their air and water pollution.

15. Effective energy conservation programs will result in increased unit costs and slow down economic growth.

16. Zero population growth would result in an improved quality of life.

17. Population size must be limited.

18. The population must be redistributed.

19. A real problem in establishing environmental standards lies in determining "how much" of any pollutant is "too much".

20. Citizens will eventually have to place more value on government controls if they are to live in a healthy environment.

21. Citizens have the responsibility of analyzing and lessening the magnitude and number of environmental problems.

22. A major concern of pollution control technologies in the United States is the degree to which the air, water, and land can assimilate poisons and wastes.

23. Most environmentalists are radicals and oppose economic growth and development.

24. Most environmentalists are staunch preservationists.

25. Ecological principles and systems apply to man in the same ways they apply to other animals.

26. Stability and diversity are important elements in an ecosystem.

27. Pollution control devices are essential for maintaining balanced ecosystems.

28. Any change man can bring to a natural system will be beneficial.

29. The average citizen doesn't realize the extent to which he/she is dependent upon the proper functioning of natural ecological systems for survival.

30. The National Environmental Policy Act (NEPA) is very valuable legislation.

31. Greater consumption of energy is currently rewarded by lower prices per unit.

32. Society really doesn't want to pay the cost of maintaining a quality environment.

33. It is currently more profitable to pollute in the United States than to apply pollution abatement technologies.

34. TVA is a leader in strip-mine reclamation.

35. The cost of controlling pollution must, in most instances, be passed on to the consumer.

36. Technology assessment refers to determining the full impact of a new technology, including secondary effects, before the technology is applied.

37. The world population doubles about every 35 years.

38. Short-range and self-centered thinking linked with a lack of commitment and responsibility are primary factors of human behavior contributing to environmental degradation.

39. The only time there is an energy crisis is when demand exceeds supply.

40. There was no energy crisis; the whole problem was contrived by the oil companies.

41. Building codes should be modified to encourage energy conservation in homes and other buildings.

42. The public has the right to get all the electric power it wants whenever they want it.

43. It is neither reasonable nor economically desirable to limit the growth and use of energy in the United States.

44. Utilities must develop better methodologies for communicating effectively with the people they serve.

45. There should be no governmental limitations placed upon energy production.

46. It is extremely unlikely that there would be a disaster in the United States from a nuclear accident.

47. The quality of the environment is primarily a social issue, not an economic one.

48. Most people would buy a less expensive polluting detergent over a more expensive nonpolluting one, even if they knew the difference.

49. Environmentalism is just a fad and most people couldn't care less about it.

50. American society is destroying the quality of life by producing more and more goods.

51. Although used widely, the gross national product (GNP) is a misleading index for measuring the quality of life because it deals only with economic activity.

52. If the less developed nations of the world accepted our capitalistic economic system, there would be added negative impacts on the world's environment.

53. As cities increase in industrialization, pollution increases to the point where it is not assimilated effectively by the environment, thus endangering the health of the residents.

54. Stockholders of industry, the consumer, and the taxpayer have all benefited economically from the lack of environmental control by not being charged the full costs of products and their impact on the environment.

55. It is not known to what extent environmental degradation has affected the health and life span of people.

56. To date, government and industry have done very little to measure the value which society places on a quality environment.

57. It is extremely difficult to place a dollar value on recreation areas or the aesthetics of viewing a clean river.

58. Some government agencies and industries have tended to ignore the real environmental issues and blamed the "radical environmentalists".

59. Engineers and chemists make the best resource or environmental managers.

60. The government has made an excellent attempt to conserve energy.

61. Effective strip mine reclamation laws would increase the cost of coal and electricity.

62. An adequate energy supply is as important to society as food, clothing, and shelter.

63. Most citizens get involved in the energy-environment decision-making process very effectively through voting, participating in hearings, and writing letters to members of Congress, the Senate, and newspapers.

64. Effective energy conservation programs will help alleviate shortages, extend supplies of resources, and result in improvements to the environment.

65. It is possible to attain zero energy growth by the year 2000 and still have an adequate supply of energy.

66. TVA should not play a role in the development of energy-efficient appliances or machinery.

67. The government should not encourage the implementation of any new energy technologies until it is sure there would be no unacceptable consequences to society.

68. Locating power plants in rural or undeveloped areas would facilitate economic growth.

69. Some significant environmental problems will have to go unsolved in the short run to provide an adequate supply of energy to meet current demand.

70. The public wants to have a voice in the energy development decision-making process, but this should be left to the experts.

71. TVA is unresponsive to changing social needs and must be forced by public pressure to implement programs which improve the overall quality of life and environment.

72. Solar heating is not technologically feasible at this time and offers little potential for the future.

73. There is a great need for providing citizens with sound economic and environmental information so they can make personal decisions which save them money and preserve natural resources.

74. All electrical appliances should contain a label revealing the resources used in making them, their energy requirements, and expected operating costs.

75. If industries use more electricity, they should pay more and not be rewarded by cheaper rates for higher consumption.

ENERGY-ENVIRONMENT OPINIONAIRE

ANSWER SHEET

Name (optional)_____ Date_____

A = Strongly agree
B = Mildly agree
C = Not sure or don't know
D = Mildly disagree
E = Strongly disagree

Directions: Please circle the letter which best describes your opinion on each corresponding statement.

1.	A	B	C	D	E	26.	A	B	C	D	E	51.	A	B	C	D	E
2.	A	B	C	D	E	27.	A	B	C	D	E	52.	A	B	C	D	E
3.	A	B	C	D	E	28.	A	B	C	D	E	53.	A	B	C	D	E
4.	A	B	C	D	E	29.	A	B	C	D	E	54.	A	B	C	D	E
5.	A	B	C	D	E	30.	A	B	C	D	E	55.	A	B	C	D	E
6.	A	B	C	D	E	31.	A	B	C	D	E	56.	A	B	C	D	E
7.	A	B	C	D	E	32.	A	B	C	D	E	57.	A	B	C	D	E
8.	A	B	C	D	E	33.	A	B	C	D	E	58.	A	B	C	D	E
9.	A	B	C	D	E	34.	A	B	C	D	E	59.	A	B	C	D	E
10.	A	B	C	D	E	35.	A	B	C	D	E	60.	A	B	C	D	E
11.	A	B	C	D	E	36.	A	B	C	D	E	61.	A	B	C	D	E
12.	A	B	C	D	E	37.	A	B	C	D	E	62.	A	B	C	D	E
13.	A	B	C	D	E	38.	A	B	C	D	E	63.	A	B	C	D	E
14.	A	B	C	D	E	39.	A	B	C	D	E	64.	A	B	C	D	E
15.	A	B	C	D	E	40.	A	B	C	D	E	65.	A	B	C	D	E
16.	A	B	C	D	E	41.	A	B	C	D	E	66.	A	B	C	D	E
17.	A	B	C	D	E	42.	A	B	C	D	E	67.	A	B	C	D	E
18.	A	B	C	D	E	43.	A	B	C	D	E	68.	A	B	C	D	E
19.	A	B	C	D	E	44.	A	B	C	D	E	69.	A	B	C	D	E
20.	A	B	C	D	E	45.	A	B	C	D	E	70.	A	B	C	D	E
21.	A	B	C	D	E	46.	A	B	C	D	E	71.	A	B	C	D	E
22.	A	B	C	D	E	47.	A	B	C	D	E	72.	A	B	C	D	E
23.	A	B	C	D	E	48.	A	B	C	D	E	73.	A	B	C	D	E
24.	A	B	C	D	E	49.	A	B	C	D	E	74.	A	B	C	D	E
25.	A	B	C	D	E	50.	A	B	C	D	E	75.	A	B	C	D	E

STUDENT ACTIVITY VII

From your previous activities you may begin to realize that the value of conserving energy has some bearing upon your lifestyle. Some of you may be starting to think about the consequences of your actions in relation to the energy these actions use. You may find that you can make many choices about how you spend your leisure time in relation to energy use. In one previous activity, you may have made some choices between cross-country skiing and down-hill skiing, water skiing vs. sailing, and various others. Most of the choices presented were designed to allow you to make choices between what are generally referred to as non-consumptive activities vs. more highly energy consumptive activities.

But what is considered in the way these activities are categorized as energy consuming or non-energy consuming? Generally, if an activity needs a fossil fuel or electricity as its primary fuel source, we tend to think of it as energy consuming (at least in relation to those activities that rely on human energy, solar or wind energy). But are the activities such as cross-country skiing, sailing, and backpacking actually non-consumptive in relation to energy?

To answer this question, we must do some thinking about <u>all</u> the energy requirements of a particular acitivity. Let's take backpacking for an example. We usually think of backpacking as using mainly physical energy and little more. But, where do we go backpacking and how do we get there? What special equipment do we buy and how is it produced? What foods do we take with us for ease in packing and carrying?

An "energy analysis" of backpacking would then look something like this:

Product or Activity	Energy Used
Backpacking (the actual activity).....	physical energy
Transportation to and from the area.....	gasoline (fossil fuels) (You could go so far as to include the car itself.)
Equipment including its production, distribution and sale.....	raw materials, fossil fuels and electricity (again fossil fuels usually)
Foods.....	fossil fuels and electricity used in processing canned and dehydrated foods (dehydrated foods use about 3 times the energy of canned foods and about 4 times the energy of fresh food in their production)

In considering activities in this way, you are analyzing factors of the "net energy" involved--all the energy put into a system must be added in before a value for that system's total consumption can be derived.

Try this type of analysis with other of your favorite leisure time activities and see which ones are really low in energy consumption. Some possibilities include:

watching TV

reading a book

cross-country skiing

sailing

going to a movie

swimming

jogging

hiking

bike riding

Module Evaluation

A method of teaching values has been presented in this module. The module is designed to see the types of values students hold about energy and energy use. We are trying to get students to see the value of understanding and thinking about energy use in their every day lives. As their teacher you should be able to observe value shifts in students. There should be no "Right" or "Wrong" answers but students should be able to explain their values about energy use.

You can assess value shifts by a pre-post questionaire on energy use statements. You may also be able to observe how they are arriving at a particular position. (See the student self evaluation.) Are your students following the steps outlined for them for developing a position on an issue? Do they show any behavior which would indicate a value shift, e.g. conserving energy, talking more about the topic of energy, planning for the future with energy in mind?

Student Self Evaluation

You may never have thought about the development of your present values, but there are some checks you can make to analyze the way you form values in the future.

The first thing you should do is analyze how the issue or question is approached. (Use the items in the "Energy Environment Opinionaire" as examples). Check yourself and see if you use the following steps to develop a position or a value about an issue.

1. Do I understand the question?
2. Have I gathered the facts to answer the question?
3. Have I assessed the facutal assertions?
4. Are the facts relevant?
5. Can I arrive at a tentative decision?
6. Is the solution acceptable?

When you go through the above steps you may get involved in sub-issues. These may be:

1. moral issues.
2. dealing with definitions.
3. issues involving facts.

If you think about all these steps, you will understand more about how values are formed.