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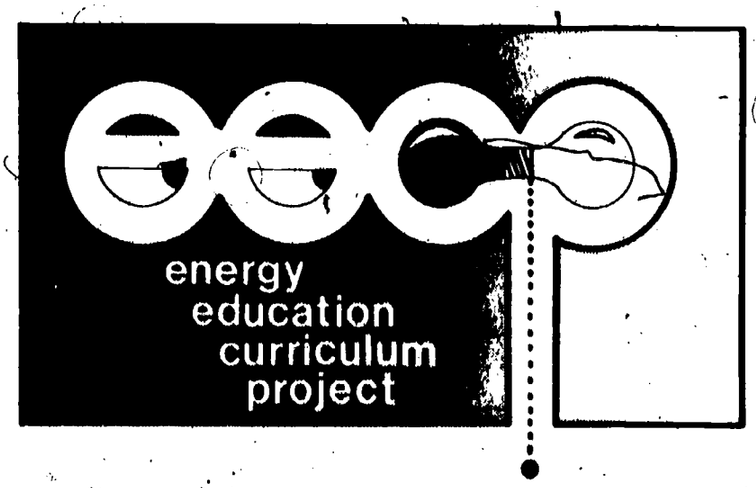
ABSTRACT

This guide is intended to help teachers integrate energy education into middle schools or junior high schools. A teacher's section includes an introduction, bibliography, and glossary. Thereafter, teacher materials sections and student materials sections are paired under topical headings addressing world-wide energy issues. Energy issues are addressed for Africa, Asia, Europe, and the Middle East. Instructions are provided for adapting lessons within the topical headings for integration into science, language arts, and practical arts curricula. (RE)

An Energy Curriculum for the Middle Grades

Unit I: Energy and World Cultures



April 1980

Lt. Gov. Robert D. Orr, Director
Indiana Department of Commerce

Harold H. Negley, Superintendent
Indiana Department of Public Instruction

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AN ENERGY CURRICULUM FOR THE MIDDLE GRADES

UNIT ONE: ENERGY AND WORLD CULTURES

with adaptations for

Science
Language Arts
Practical Arts

Indiana Energy Group
Indiana Department of Commerce
Lt. Governor Robert D. Orr, Director

Division of Curriculum
Indiana Department of Public Instruction
Harold H. Negley, Superintendent

April 1980

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These materials were created by the Development Team from the Program in Educational Policy and Change. This program is housed at the Workshop in Political Theory and Policy Analysis, Indiana University, Bloomington. Judith Gillespie directed the work of the team. Mary Soley developed the student cartoon book, Quantum Conserves, the teacher's guide to the cartoon book and the chapter, "Energy and North Africa-Middle East." MaryAnne Olsen developed the chapters, "Energy and Europe" and "Energy and Sub-Saharan Africa." Judith Gillespie developed the chapter, "Energy and Asia." Joel Pett developed all of the art work throughout the materials.

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These materials have been substantially revised on the basis of comments from teachers throughout the state who pilot tested the materials. These teachers and their students have made valued contributions and their help has been appreciated.

Pam Gunkel
Brown County High School
Nashville

Terry McIntosh
Doug Wilson
Dave Butcher
Carmel Clay Junior
High School
Carmel

Reed Bowser
Centerville Junior
High School
Centerville

Larry Taulman
Custer Baker
Middle School
Franklin

Bruce Durden
Culver Elementary and
Junior High School
Evansville

John Reed
Don Polston
Lebanon Middle School
Lebanon

Andrew Hendrickson
Lincoln Elementary and
Junior High School
Evansville

Dan Schafer
Linnwood Elementary
School
Lafayette

Marybeth Wiggins
Stockwell Elementary
School
Evansville

Robert Lombard
Stoneybrook Junior High
School
Indianapolis

Gary Miller
Storer Middle School
Muncie

Janet Heath
Wilson Middle School
Muncie

A panel of teachers from the Monroe County Community School Corporation also provided comments which aided the writers in the revision of these materials:

Jean Knowlton
Susie Webb
Don Bevis
Charles Rogers
Lois Smith
Bob Courtney
Carol Hanna

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ENERGY AND EARLY ADOLESCENCE

Most early adolescents are undergoing significant changes. The change pattern is not linear; it is serendipitous, making this age group extremely heterogeneous physiologically, psychologically and socially.[1] Schools must deal either directly or indirectly with these changes. One way schools can help early adolescents is through the curriculum.

The Energy Education Curriculum Project will focus on increasing the potential of young adolescents. Here a plan for an energy curriculum for the middle grades will be outlined which recognizes the heterogeneous changes and developmental patterns of early adolescents, while trying to push them beyond current levels of intellectual and participatory achievement. The Project will focus on students' potential as effective energy actors;[2] as citizens who have the knowledge and skills to conserve scarce energy resources and products in significant ways and to influence others in wise energy use. In this way, the Project hopes to provide one curriculum solution to the twin concerns of adolescent development and energy education.

RATIONALE

In a recent Psychology Today article a noted authority on adolescence, Joseph Adelson, made the following statement, "Adolescents as a whole are not in turmoil, not deeply disturbed, not at the mercy of their impulses, not resistant to parental values, not politically active or rebellious." In the article called "Adolescents and the Generalization Gap," Adelson points out that most of our generalizations about adolescents are based on a "tyranny of the visible." People tend to remember some of the more shocking, more spontaneous, more idiosyncratic events which adolescents experience and to generalize based on this behavior. Adelson pleads for a more well-rounded look at adolescents as a group that can be significantly generalized across the whole spectrum of types of young adults.[3]

The general approach outlined here is based on a "positive" approach to adolescents and their potential. The focus will be on what adolescents can do, what their potential is, or how people can help move them to achieve their potential. In the following paragraphs one approach to adolescents as individuals, to middle/junior high schools, and to the place of curriculum change will be described.

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[1]For our purposes here, young or early adolescents will refer to 10 to 15 year olds and are distinguished from their 16 to 19 year old adolescent counterparts by the fact that significant physiological changes are initiated in the earlier age group.

[2]By effective energy actors, the Project means those who can translate knowledge and skills into action which promotes energy conservation.

[3]Joseph Adelson, "Adolescents and the Generalization Gap," Psychology Today, February, 1979, pages 33-38.

Approach to Adolescents. Our view of early adolescents is shaped by a single word: "potential." Early adolescents have potential for moving from the concrete to the abstract in cognitive thinking. They can move from a rule-bound value position to a more principled value position. They have the capacity to shed their "subject" role and become citizens by taking responsibility for their actions on energy problems. The approach is not insensitive to where adolescents are, what problems they are having, and what kinds of growth patterns exist. But the "potential" concept keeps it headed beyond where adolescents are to where they can be.

The approach to adolescents is action-oriented. Anyone who has taught in junior high or middle schools, or has raised early adolescents, knows that they are spontaneous in their activities. They think, feel, and do things spontaneously within almost every setting in which they operate. The action base for the curriculum will focus on the need for self-expression in order for potential to be increased. The approach will mobilize the natural need that adolescents have to think creatively and more actively, and to express themselves in a variety of ways inside and outside of schools to promote student development and energy education.

Approach to Schools. Over the last decade, a distinction has been made between middle schools and junior high schools. Whatever the title, these schools generally include grades 6 through 9. Some have a four-year sequence, and most a three-year sequence that includes grades 6 through 8 or 7 through 9. When the middle grades are referred to here, both middle schools and junior highs are included.

As a recent report by the National Science Foundation indicates, there are relatively few differences between middle schools and junior high.[4] Presently, most schools in the middle grades prepare students for their high school years. They support a discipline-centered curriculum. Because of these school characteristics, the Project's approach to schools involves dealing realistically with the segmented structure of the school. Yet in order to serve adolescent development, everyday boundaries of schedule and structure need to be pushed beyond normal routines. Interdisciplinary cooperation will be emphasized in order to reinforce student experiences. Student activities will involve a variety of teachers and staff, transcending barriers of role and function. Therefore, the approach also supports the principle of dealing with the whole school and student participation in it.

Approach to the Curriculum. Every type of educational change needs a base. While the approach focuses on the whole school, it uses social studies as a base for curriculum development and change. Social studies is interdisciplinary by nature, and the focus of the social studies is on both knowledge and policy, or action. It seems a natural home for curriculum materials on energy education. Many materials have been developed in science; few in social studies. The scientific base is one important

[4]National Science Foundation, Early Adolescence: Perspectives and Recommendations. Washington, D.C.: U.S. Government Printing Office, 1978.

part of the curriculum, but it is only one part of what is needed to promote effective energy actors. Therefore, the materials will find their home in social studies in order to implement the curriculum and effect educational change in the schools. The middle grades material will focus on social studies lessons adapted to World Cultures and American History courses.

OBJECTIVES

The general goal of the curriculum is to promote effective energy actors. An effective energy actor is a person who is aware of his/her environment and its uses. This person is knowledgeable about energy resources, transformation processes and outcomes of those processes. An effective energy actor has the intellectual skills to deal with energy problems and to think through these problems in important ways. Finally, an effective energy actor can use his or her awareness, knowledge, and skills in acting in participatory ways in individual and group settings which promote energy conservation. It is the conversion process between awareness, knowledge, skills and participation that seems crucial to the promotion of effective energy actors.

Knowledge Objectives. Knowledge is an important domain of objectives for the middle grades. However, the content and kind of knowledge is unique. The National Assessment of Educational Progress study reflected that a good deal of common sense information is held by young adults about the energy problem.[5] They gain this knowledge through the media. However, knowledge was amazingly low concerning major concepts about energy problems, the processes of energy transformation and especially the policy processes through which people influence energy problems. For example, only 14% of the young adults knew that coal is the primary energy source used to produce the nation's electrical energy.

The assessment also showed that in the policy area, people doubted that they could influence government, manufacturers or oil companies with regard to energy problems. They also showed a lack of knowledge of alternatives in the policy process or alternative outcomes of their actions: they wanted to continue driving cars. Finally, they showed a lack of knowledge of the consequences of people's actions for the energy situation.

The knowledge objectives in the middle grades materials will focus on concepts which will allow students to abstract from their specific environment. The concepts will include concepts about energy, such as conservation or transformation, and concepts about human behavior, including effective energy habits. The knowledge objectives will also focus on policy processes, so that students can understand ways in which they can interact in decision-making. Finally, the objectives will stress the

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[5]National Assessment of Educational Progress, Energy Knowledge and Attitudes: A National Assessment of Energy Awareness Among Young Adults. Denver, Colorado: Education Commission of the States, December, 1978.

alternatives and consequences of actions so that students can see the trade-offs that they make in taking action on energy problems. (See chart on following page.)

Imagination Objectives. A new dimension becomes very important at the middle grades level. It can be labelled "imagination." Imagination is a motivational concept. It comes internally from the individual, not externally from the teacher or the school. It is necessary as a motivator to promote interest in a particular subject matter. It is through the vehicle of imagination that we will attempt to catch students' interest in energy and to motivate them to do something about it.

Bascially, imagination includes four different steps. First, it involves motivation. A student is asked to imagine something. This "something" comes internally from the student. A student can think about a problem or an event which may or may not be related to the specific subject matter at hand. The second level involves description. A student describes the image that is in his or her mind. Students can share that concrete image with other students. Third, the student utilizes abstract concepts to describe the image, moving from the concrete to the abstract. Finally, a student will apply those concepts to specific real-world situations. In this way, imagination capitalizes on the potential of students to move from concrete to abstract situations and provides internal motivation and concern for energy problem-solving.[6]

It is important to state here that the imagination objectives are not mere instructional strategies for motivating students. The reader should not think in standard curriculum categories. Imagination is, in itself, an objective which can be promoted by a variety of strategies. It is an ability to think new thoughts, feel new feelings and share them with others. It is one key for opening important conceptual and valuing capabilities. It is a skill of a different genre than either inquiry or moral reasoning. It is a skill in expanding potential dimensions of thinking, feeling and acting. It is a key to the unique potentials of early adolescents.[7]

Participation Objectives. The participation domain will focus on developing skills in the decision-making process. Decision-making refers to choices that people make and the consequences of those choices.

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[6]The idea of imagination is built from many sources. The chief source cited here is Robert Samples, The Metaphoric Mind. Menlo Park, California: Addison-Wesley, 1976; and The Whole School Book. Menlo Park, California: Addison-Wesley, 1977.

[7]See especially Jerome Bruner, On Knowing: Left Hand Learning. New York: Antheneum Press, 1962; and Abraham Maslow, The Farther Reaches of Human Nature. New York: Viking, 1971.

OBJECTIVES FOR THE MIDDLE GRADES ENERGY CURRICULUM

Knowledge Objectives

1. Students will acquire basic concepts of energy conservation, resources, and interdependence.

2. Students will acquire basic concepts of self and human behavior.

3. Students will acquire knowledge of basic processes of energy transformation and use.

4. Students will acquire basic knowledge of policy processes affecting energy decision-making and the impact of various alternatives.

Imagination Objectives

1. Students will develop images of energy situations from their own personal experiences.

2. Students will share concrete descriptions of their images of energy situations with other students.

3. Students will use concepts to describe their imaginary situations, and share those with other students.

4. Students will apply the concepts they develop to their own everyday lives.

Participation Objectives

1. Students will learn basic steps in individual decision-making including information, choices, alternatives, applying values to alternatives, and determining consequences.

2. Students will experience individual decision-making in group settings in their school, home, and community related to energy conservation.

3. Students will develop skills in group decision-making, including identifying rules and appropriate strategies, implementing group decisions, and identifying consequences.

4. Students will gain experience in acting in group situations in their school, home, and community related to energy conservation.

The objectives will facilitate individual decision-making. They will be especially focused on cultivating students' valuing skills in dealing with alternatives and recognizing the consequences of their actions.

The objectives will also focus on group decision-making. They will highlight the rules that made groups different from each other, strategies that can be used in influencing decision-making, and how to implement group decisions..

Students will also identify the impact that group decisions can have on schools, communities and nations as wholes. Group decision-making will also focus on peer relationships, trying to utilize the peer focus of most early adolescents in order to promote effective action.

According to these objectives, effective energy actors at the middle grades level will have skills in imagination which will cultivate their interest and clarify the applications of ideas about the energy problem. They will also have knowledge about energy and the policy process which they will put to use in effective decision-making, both in terms of making a choice and implementing that choice effectively. The activities will involve adolescents in multiple types of situations within and outside the school in practicing effective conservation strategies.

CURRICULUM PLAN

The curriculum plan for the Energy Project involves a basic structure. A core of lessons to be integrated into social studies instruction is the foundation. Major interdisciplinary building blocks take the form of mini-lessons in science, language arts, and practical arts. A teacher's guide and lesson plans are cross-beams linking the entire structure together. The goal of the curriculum is to articulate energy education with standard World Cultures and American History courses in the middle grades.

The plan includes an introductory cartoon book which explains the major ideas and skills in the program and the development of three units of material. The cartoon book constitutes a basic set of materials, roughly 15 to 20 pages long, that will introduce students to imagination skills, basic concepts in the course, including the concepts of conservation, energy resources and interdependence, and skills in individual and group decision-making. The first unit of materials will focus on the World Cultures course and include studies of Sub-Saharan Africa, Europe, Asia and Northern Africa and the Middle East. The second unit will offer materials to be used in American History courses.

The materials are designed to be used flexibly. Regardless of which unit is used by which teacher, everyone will have a common base for beginning the energy materials. Although the American History course is most often used in the eighth grade, the World

Cultures program is more diverse. A teacher might use a chapter on Sub-Saharan Africa and a chapter on Europe, each from different units in the material. This flexibility makes grade leveling of the materials difficult. There are major differences between sixth and eighth graders, as well as among students in any given grade. Therefore, lessons will be designed which include several levels of activity so that different grade levels can use any one or a group of lessons from the energy materials.

The introductory cartoon book and the two units of materials are outlined on the following page. The cartoon book will serve as an introduction. The first unit on Energy and Four Cultures will be divided into four chapters. In each of these chapters there will be lessons utilizing students' imagination which initiate the material, lessons on basic energy concepts and basic energy processes as well as policy processes, and finally, suggested participation activities. The lessons and activities will be related to the particular culture which is identified by the chapter heading. The second unit on Energy and American History is organized into three time periods. The lessons cover more advanced ideas and skills, but are not dependent on the use of the World Cultures materials.

For each of the major units there are also mini-lessons, which involve interdisciplinary activities and linkages to science, language arts, and practical arts classes. Students would be learning about energy conservation through their social studies class. The social studies teacher and the science teacher could then get together for a science lesson which would show basic energy conservation principles. In this way, a science lesson on the transformation of petroleum into gasoline might be linked to a social studies lesson on energy and Sub-Saharan Africa.

The materials also contain a teacher's guide and lesson plans. There are lesson plans for the cartoon book and for each of the two units. There are a total of twelve lesson plans for the World Cultures unit and nine lesson plans for the American History unit. Also included is a related bibliography and a set of reference materials, such as a glossary and background material necessary to understand some of the technical aspects of the energy problems which are confronted in the materials. Teachers need not have any special expertise in order to teach the materials. The teacher material serves as a resource library for teachers who can use the lesson plans in the teacher's guide, or create their own lessons based on the materials.

CONTENT OUTLINE FOR THE MIDDLE GRADES CURRICULUM

Cartoon Book Introduction

The cartoon book will introduce students to all of the basic ideas and skills in the curriculum. It will be done as a comic with a running story. Students' skills in imagination will be initiated, basic knowledge in terms of the concepts used in the curriculum will be introduced, and basic skills in individual and group decision-making will be outlined. The cartoon book will be used in conjunction with any or all of the chapters or entire units that are used by teachers in the middle grades.

Energy and Four Cultures

Chapter One: Energy and Sub-Saharan Africa

Students will develop imagination skills and basic knowledge about energy resources in Africa, basic conservation strategies and the interdependence of Africa with other cultures in energy use. They will develop skills in individual decision-making and act in roles making individual decisions about energy use in their skills.

Chapter Two: Energy and Europe

Students will learn basic imagination skills. They will apply their knowledge of energy conservation, resources and interdependence to the European setting. They will learn basic skills in individual decision-making and apply them outside of their school to their family setting.

Chapter Three: Energy and Asia

Students will apply basic imagination skills. They will learn specifically about India, China and Japan and make comparisons of energy resources, conservation and interdependence in the Asian context. They will learn basic skills in group decision-making and apply them to their family setting.

Chapter Four: Energy and the Middle East

Students will utilize basic imagination skills. They will apply the idea of energy resources, conservation and interdependence to the Middle East context. They will make comparisons based on their knowledge of other cultures. They will learn basic group decision-making skills and apply them to their community setting.

Energy and American History

Chapter One: Energy and Colonial America

Students will study a small town during the colonial period. They will develop basic imagination skills. They will apply their knowledge of energy resources, conservation and interdependence to the colonial setting. They will plan community conservation strategies which students can initiate in their community.

Chapter Two: Energy and the Industrial Revolution

Students will learn about the changes in energy use that were accomplished during the beginning of the industrial revolution. They will apply basic imagination skills. They will work with concepts of energy resources, conservation and interdependence during the industrial revolution. They will plan an energy fair reflecting energy uses during the industrial revolution for their entire school.

Chapter Three: Energy and the Post-War Era

Students will study energy use in the period of U.S. ascendancy after World War II. They will use basic imagination skills and apply concepts of energy resources, conservation and interdependence to the post World War II setting. They will initiate a plan for energy conservation which is based on the U.S.'s new position as an energy consumer in the post World War II era.

EVALUATION AND DISSEMINATION

The energy materials have undergone a thorough evaluation. At each stage of the Project the conceptualization, the materials and the policy plans have been reviewed by a steering committee at the Division of Curriculum in the Indiana Department of Public Instruction. Ideas and materials have also been reviewed by an eight-person teacher panel consisting of social studies, science, language arts and practical arts, teachers who are working in the middle grades in Indiana. This evaluation mechanism allowed for systematic evaluation by two panels of reviewers. Additional consultants and teacher reviewers were utilized as specific needs arose. A science consultant was used frequently. Materials were also evaluated through presentations at conventions and articles, such as this conceptualization plan.

There was also a systematic pilot testing of the materials in the Project. A pilot test was conducted in the spring utilizing schools across the state of Indiana. A sampler was developed that contains the cartoon book, the chapter from the World Cultures unit on Europe and the chapter from the American History unit on Energy and the Post-War Era. These sampler materials were systematically tested and evaluated and used as models for the development of the remainder of the curriculum materials. A final evaluation was conducted of the use of the curriculum materials when they were produced and used in schools across the state and the nation.

The materials are also being disseminated. Brochures were developed, articles were produced and meetings were attended in which many different individuals, both educators and practitioners, had the opportunity to learn about the materials and to use lessons from the units.

The chief dissemination mechanism involved workshops held across the state including middle grades teachers and administrators involved in social studies, science, language arts and practical arts instruction. These workshops were held in the Fall, 1979, and were attended by participants from a wide variety of groups.

In this way, curriculum development, evaluation and dissemination work hand-in-hand in the Project. Hopefully, this strategy allowed the Project to reach as many teachers and students as possible and to help students to become truly effective energy actors.

INTRODUCTION

ENERGY EDUCATION TEACHER'S GUIDE

The material that follows is designed to help you make the most use of these energy education materials. This introduction is divided into four parts. First, a brief description of the general plan of the materials and their use is given. Second, a part on active involvement illustrates how students can become truly involved with materials in their classroom, across the school as a whole and in community activities. The third part shows ways in which the materials can be integrated into standard social studies courses in World Cultures. Finally a part on interdisciplinary activities demonstrates ways that teachers from various subject areas can get together in order to reinforce students' activities in becoming effective energy actors. All of these parts are designed to highlight dimensions of the materials that will augment and improve instruction in your class.

GENERAL PLAN

The organization of these energy materials can be outlined as follows:

I. Rationale
II. Introduction
  A. Teacher's Guide
  B. Glossary
  C. Resource Bibliography
III. Teacher's Guide to the Cartoon Book
IV. Teacher's Guide for each Chapter/Adaptations
V. Student Materials for each Chapter

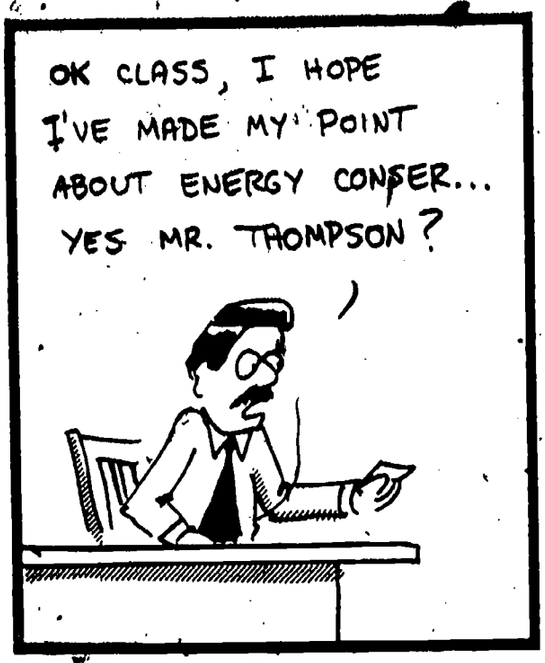
Each part of the materials has a specific purpose and function. Taken together, the materials constitute a base for you to effectively teach about energy and effective action on energy problems.

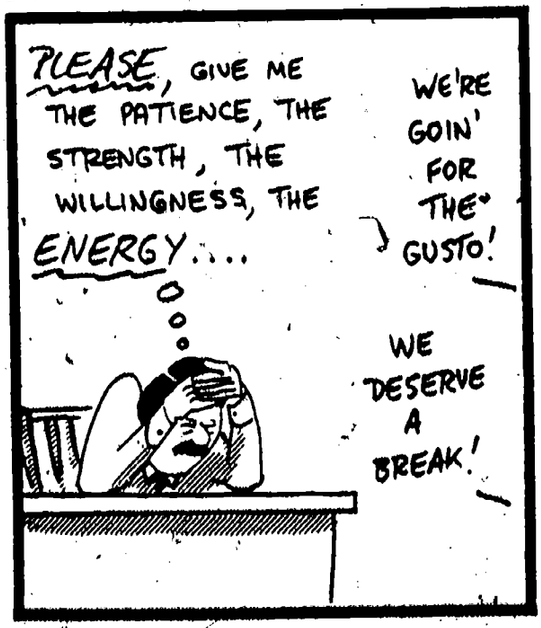
The rationale section explains the philosophy behind these materials. It shows the approach, the general content, the pilot evaluation, and dissemination of the materials. Basically, we are trying to enhance students' abilities to become effective energy actors.

This guide explains how to use and carry out the philosophy described in the rationale. It concludes with a glossary for reference as well as a resource bibliography. This bibliography can help you go farther with the materials or delve into particular topics.

The teacher's guide to the cartoon book offers suggestions for using the student cartoon book, Quantum Conserves, which is separate from this material. The cartoon book is designed as an introduction for any of the World Culture lessons. It can also be used on its own. It is a basic introduction to the ideas in the course.

There are four chapters in this World Cultures unit. There are chapters on Europe, Asia, Sub-Saharan Africa and North Africa-Middle East. There is a teacher's guide with lesson plans for each chapter. These pages follow the division pages. The lesson plans contain objectives and a step-by-step plan for carrying out the lesson. A student assessment instrument is also included for each lesson. If the lesson plans are





used in conjunction with the student materials, you have a complete plan for teaching about energy in your class.

There are also adaptation lessons contained in the teacher's guide for each chapter. The adaptations provide ways of working with teachers from other subject areas in enhancing the materials.

For each chapter, there is also a student materials section following the lesson plans. Student materials will need to be duplicated when more than one copy is needed. The materials are designed to help promote effective energy activity by students as they are studying various world cultures.

ACTIVE INVOLVEMENT

There is an equation here which is important. The equation runs as follows: Knowledge + Participation = Learning. In this program we are trying to teach students about energy and to have them participate in energy conservation. Together these elements make a powerful combination for learning and for establishing effective energy habits. Without knowledge, one cannot act reasonably. Without participation, one does not put one's knowledge to use. Both parts of the equation are equally important for the outcome we are striving to achieve. In this section we will talk about how students can get actively involved in this program in their classroom, at school, in their homes and in their community.

One of the major purposes of the materials is to provide students with activities. We want them to do things in class with objects and with other people. We want them to do games and puzzles and to work actively with the material. We want them to ask questions for which there are not well-defined answers. The purpose here is for each activity that is used in this material to be just that--an activity, or active learning. This will help students to learn more and to learn it better.

The active involvement in these materials can be contained within the classroom. The energy lessons contained in this material are designed to be used in the classroom. However, involvement can also extend beyond the classroom to the school where the class takes on activities or the entire school does. It can also include homes, neighborhoods and community organizations. These types of activities will be explained and suggestions for activities that you might try are included. Some energy lessons contained here will suggest that you move out of the classroom to reinforce learning and stimulate new activities in energy conservation.

Two types of activities are included here. The first type involves your class engaging in particular activities in the school. This means that your class can serve to initiate on energy activities outside the classroom. A second type of activity involves working with administrators, other teachers, other students and existing organizations in order to promote school-wide energy activities that are initiated by more people than those in your class. Both types of activities are described below.

Class-Based Activities

The activities that your class can undertake are numerous. The following twelve suggestions are some ideas on what you might do as a class for class-based activities. You might try some of these activities out as you are doing lessons in this material. Otherwise, you might generate your own ideas based on these suggestions.

1. An Energy Audit. Your class could conduct an energy audit of your classroom or the school by making a list of those things which use energy in the school and then seeing how much energy is used by the items on your list. They might conduct this audit daily or weekly for some time and then determine ways in which they might save on energy use in the school.

2. Energy Aides. Your class might volunteer to help with conservation by patrolling doors and specific rooms to make sure windows and doors are closed. They might prepare a form where they can write down what success or lack of success their efforts have. If the patrol is successful, students might work with students in other classes in setting up a permanent group that would help the school save energy.

3. Lights Out! Students in your class might initiate a campaign to use half the electricity they currently consume in their school. They might determine ways in which the classrooms, libraries, cafeterias and other areas of the school could use less lighting and still function effectively. They should be sure that the lighting changes they make are actually more energy efficient by studying the electrical use of

different types of bulbs and fixtures. They could suggest anything from actually taking out lightbulbs to rearranging classrooms or other areas so that more natural light is used.

4. Energy in the News. Your class might work with the school newspaper staff in order to provide a class poem about ideas for energy conservation. Students might come up with tips on how to save energy as well as information about energy alternatives. You might want to prepare a class newspaper about energy.

5. Dialing Up and Down. The students might initiate a school-wide attempt to use less heat in the winter and less air-conditioning in the summer in the schools. They could monitor thermostats and get a sweater campaign in the winter, or a dress cool campaign in the warmer months, in order to effectively use less energy in heating and cooling in the school.

6. A Paper Drive. Students might start a paper drive with the gathering of paper that has been used for re-use within the school. Paper that has been used on one side can be used on the other side for various uses including memos or scrap paper. Students can set up their own system for gathering the paper from classrooms and other places in the school and redistributing it to administrators, teachers and students for re-use.

7. An Energy Exhibit. Students might set up an exhibit in the cafeteria which shows knowledge about energy and ways in which students might conserve. They could set up, for example, various ways of cooking hot dogs in the cafeteria, or some other moving exhibits, so that students could actually try it out themselves.

8. Take It Home. The class could initiate an energy survey of tips on energy conservation. They could ask people in their school and community to share ideas with them about conservation. They could then make a booklet of these ideas. They could share the booklet with their parents and come up with class results in energy conservation that were chosen by families within the class.

9. Person Power! Students in the class could devise a series of posters to be used around the school on how students could use their own energy rather than mechanical forms of energy in trying to conserve electrical power and other sources. In this way, other students in the school would be exposed to knowledge about their own personal energy. Students who use their own personal power instead of other appliances or machines might be given an award by the students in the class.

10. Energy Survey. Students can conduct a survey of people in their class to see who walks, rides the bus, or comes in a car. They can then determine if there are ways that their transportation can be more energy wise (car pools). They can then extend their activities to other classes in the school.

11. Energy Facts and Figures. Students can use their math skills in drawing graphs and charts on posters which can be placed around the school. Students should collect their own information and then turn it into appropriate graphs in colorful displays.

12. Press Conference. Students can organize a press conference on the energy problem for people in their school. They can present various dimensions of the energy problem and debate alternative solutions. Questions can come from other members of the class and the school. Afterwards, students should discuss the role of the media in the energy problem and its solutions.

School-Based Activities

School-wide activities can be based on participation by the entire school rather than just students from the class. Students can cooperate with other students, with existing organizations, with teachers and with administrators and staff regarding possible school activities. School libraries can be the base for many activities. This will enhance the impact that the students have as well as give others opportunity to join in leading energy conservation efforts.

Some suggestions for school-based activities involving other groups follow. You may want to try out some of these activities or to initiate some of your own.

1. An Energy Fair. Students might want to work with other students in science classes, language arts and practical arts classes or others to establish a date for an energy fair. Students could provide exhibits, whether they are technical or social in nature, and prizes could be awarded for the best exhibits.

2. An Energy Audit. Students might join with other students, teachers, administrators and staff in the school to conduct an energy audit of their energy needs. Different groups could be assigned to different parts of the school and make an estimate on what energy is consumed. People then might come up with plans for energy conservation.

3. Energy in the News. Students might work with their local newspaper or radio or T.V. station to put on an energy show. They could make a column or page in

their local newspaper or take a 5 to 10 minute spot on the local radio. It would be up to the students in the school to write the script for the show and design it in the appropriate form for use by school participants and community members.

4. An Energy Drive. Students might organize a school-wide energy drive. They might register the energy they are saving on a big thermometer in a central location in the school. The homeroom representatives might be appointed in order to keep track of the number of things people in the school are doing to conserve energy. A rough point system might be devised and prizes given to those who came up with the most ways to conserve energy and actually carried them out.

5. Energy Tips. Teachers or students in the school could be organized to give students energy tips in homeroom classes. A student organization or combined organization might be used in order to provide the tips for teachers to announce. They might be part of regular homeroom announcements.

6. Using Both Sides. Students might conduct a drive in the school to use two sides of a sheet of paper in everything that is done from administrative work through students' essays and other work. They might organize checkposts where students, teachers and/or administrators could show that they have used both sides of the paper and could keep track of the number of times people did use both sides. Again, prizes could be awarded to those who used both sides of the paper the most times.

7. Signs. Students could run a contest on the best energy tips and put signs around the school which would show tips for energy conservation in the school and at home. The winners of the contest would be those with the best tips as well as with the best sign.

8. Neighborhood Conservation. Students in the school could pick a few close neighborhoods in the community and plan a campaign for educating community members in energy conservation. They could then go door to door to survey the people in these neighborhoods and to give them tips on energy conservation.

9. Energy Night. Students might plan one night at school where parents and community members would

attend an energy night. Students would demonstrate ways in which energy conservation could be conducted both inside and outside the school and work with parents and community members on plans.

10. Speakers. A speaker's program could be set up tied to regular events in the school. People could be brought in from the community to talk about energy use and energy conservation and the role of teachers, students, administrators and staff as well as parents and community members in that conservation process.

11. An Energy Club. Some students might want to organize an energy club in their school. The club could initiate school-wide activities. It could also be a major source for energy information for all school participants. Clubs from other schools could also help in organizing community-wide activities.

12. Energy Holidays. Students can list common holidays. They can then choose one and study what people usually do to use energy during the holiday period. They can think of ways that people can conserve energy. They can organize an "energy efficient holiday" and give their ideas to other members of their school.

All of these activities are ways to get direct involvement by students in energy conservation. The hope here is that they will transfer their knowledge from the classroom into their everyday lives and change their habits of energy consumption.

INTEGRATING MATERIALS INTO YOUR COURSES

One of the most important aids to instruction in these materials is their close integration with standard social studies courses. Unless the lesson can be seen as part of the general learning process, students will probably use the lessons and forget them. Lessons have been carefully designed so that they can be used with World Cultures courses. How they can most effectively be used is illustrated in the paragraphs that follow and in the chart on the following page.

A brief outline of the materials can be found on page 8 of the rationale. Basically, there is a cartoon book and four chapters of materials to be tied directly to what you are teaching. The cartoon book can be used anywhere in the World Cultures course. It can be used with or without the other energy materials. Basically, it is an introduction to energy and energy conservation.

If you are teaching a World Cultures course, you can have students study how Quantum conserves and compare it to the culture they are studying. How are energy resources different on Quantum than in the culture they are studying? How are conservation methods different? What similarities can

SUGGESTED USES OF ENERGY MATERIALS
IN WORLD CULTURES COURSES
(Grades 6 and 7: 1978 Indiana Adoption)

Text Publisher/Title	Cartoon Book	Energy and Europe	Energy and Asia	Energy and Sub-Saharan Africa	Energy and North Africa-Middle East
Grade 6					
1. Ginn and Company: Our World; 1979	Chapter 8	Chapters 9-12	Chapters 20-22	Chapters 16-17	Chapter 19
Grade 7					
1. Allyn & Bacon: Afro-Asian World; 1978	Chapter 1		Chapters 3-4	Chapters 20-22	Chapters 14, 17
2. American Book: World Geography; 1979	Chapter 3	Chapter 12	Chapter 14	Chapter 15	Chapter 16
3. Fiedeler: World Cultures; 1977-79	Any Volume	British Isles Volume, Chapters 14-17	Japan Volume, Chapters 12-16, China Volume, Chapters 13-17	Africa Volume, Chapters 9-12	
4. Follett: Exploring Our World; 1977	Part 4	Unit 10	Units 15-17	Unit 19	Unit 18
5. Holt, Rinehart and Winston: World Cultures; 1978	Chapter 2	Chapters 10-11	Chapters 15, 17, 19	Chapters 3-5	Chapter 7
6. MacMillan: World Neighbors; 1978	Unit 1	Unit 3	Unit 7	Unit 9	Unit 6

they find? All of these types of questions could be asked as a general introduction to energy as well as a tie to whatever particular culture you are using in World Cultures.

The World Cultures materials are called "Energy and Four Cultures." They focus on energy in Asia, Sub-Saharan Africa, North Africa-Middle East and Europe. These four areas are standard culture areas that are present in most World Cultures courses. Probably the best way to use the chapters that are contained here is to use them when you are studying the particular area in World Cultures. When you are studying Asia the materials "Energy and Asia" should be used. You can use them in the beginning, middle or the end of your study of a particular culture. It is not necessary to use the chapters in any particular sequence. If you teach Europe first, go ahead and use those materials. If you teach Asia first, use those. There are different materials in each of the chapters.

The chart on the preceding page shows the specific texts that have been adopted in the State of Indiana and the place where the authors think you could use energy materials if you would so choose. You, however, are the best judge. There is a close integration between the textbook topics covered on the pages indicated and the types of lessons that we have designed for the energy materials.

While all of the seventh grade texts offered clear linkages to the energy materials, the sixth grade books were quite varied and often offered no clear fit by area or topic to the energy chapters. The Ginn text was an exception and is included in the table. The cartoon book can certainly be used in all other texts on the adoption list. Other energy chapters can be used as teachers plan lessons and units during the year.

INTERDISCIPLINARY ACTIVITIES

Interdisciplinary activities are an important part of this program. The program has a social studies base, but you can see that adaptation lessons have been presented in each chapter of the lesson plans so that social studies teachers might work with science, language arts and practical arts teachers in doing the lessons. These areas were chosen as examples for cooperation. Interdisciplinary activities can and should include math, fine arts, health and other areas. The activities here provide a base for work in many areas. This is important because students' knowledge and participation habits can be reinforced in other classes that they are taking.

In this section, we will talk about some strategies for utilizing the adaptations and doing interdisciplinary activities. Basically, the adaptations are designed to fit the major concepts or ideas in each chapter of the material. The adaptations are rough outlines of activities that might be done in other classes to amplify and reinforce what is being done in social studies classes.

The adaptations can be used in a variety of ways. You can work with a science, language arts or practical arts teacher in doing independent lessons which are interrelated. You might do the main lesson in the

energy activities. The science teacher might be doing the science adaptation. This would reinforce students' knowledge. On the other hand, you might decide to team teach the material so that students could work together and each student was getting both social studies and science information.

All of these types of activities are not usually part of the normal routine in middle/junior high schools. They may be difficult to initiate because of lack of time, the problems of group work and the norms of the school. It may be useful to begin work with one other teacher and then expand your work gradually and naturally over a period of years. In this way, interdisciplinary activities could gradually become part of the everyday life of your school.

The ideas for interdisciplinary activities included here all involve one common element--group work. As we all know, group work (2 or more people) is not easy, most groups fail. Below are some tips that may be useful for starting a group and for carrying out activities.

Starting a Group

1. Begin with someone you know well.
2. Find someone who has personal or subject matter resources that will easily help you in your common task.
3. Find a common time before or after school or during prep period to meet.
4. Make the initial meetings short, 15 to 30 minutes.
5. Find a common goal that is concrete and workable as early as possible.

Carrying Out Group Activities

1. Specify your task(s) as clearly as possible.
2. Match tasks with people carefully.
3. Make a reasonable, flexible schedule for work.
4. Design a way to get feedback as you carry out activities.
5. Design a way of evaluating work so that you can determine your successes/failures.

Basically, we will talk about four ways of carrying out interdisciplinary activities here. The first way is to work with one other teacher in planning independent lessons that will reinforce each other. The second way is to use school-based activities that involve a group of teachers and students. The third way is to meet with a group of teachers to plan coordinated lessons on several subjects. The fourth way is to team teach the materials across a variety of subject areas. Each of these ways of carrying out the interdisciplinary

activities will be explained below and a case in which it has been successfully accomplished will be described.

Working With One Other Teacher

As a social studies teacher you have important knowledge to bring to students about energy education. However, other teachers also have knowledge from their own subject that is relevant. If you decide to work with another teacher, it is best to pick one who has resources, such as a person who has seen a solar energy system, which will help you. A science teacher, for example, might know a lot about energy resources that you do not know. You might be studying a culture in a particular country, and the two of you might together develop activities that would include the social studies aspects of energy resources in Asia and the science aspects of energy resources in that area of the world. You might also see if there are teachers who have actually visited some of the countries that you will be talking about.

Here are some examples of activities that you might do with one other teacher:

1. Matching Coursework. Topics can be identified that can be taught simultaneously in different subject areas. For example, a math teacher might use energy data for graphs while a social studies teacher was teaching about an area of the world using that data. Matching topics can be done with any lesson in this material through use of the adaptations or your own ideas.

2. Classroom Conservation. Joint efforts to conserve energy can be undertaken in two or more classrooms. Teachers can share ideas. Students can plan to conserve lighting, heat, paper use, plastics use, etc.

They can implement their plans and discuss how their activities vary depending on the particular classroom in which they are working.

3. Field Trip. You can jointly plan a field trip to a local solar or nuclear energy site, or to another organization working with energy, such as a local utility. For example, both the science and social studies aspects of energy could be seen by a field trip to a local power station arranged by a social studies and science teacher.

4. Media Review. Joint planning of the use of T.V. programs or radio programs for teaching about energy can be carried out. Teachers can assign media programs and jointly plan questions and activities based on both the substance of the programs and the role of the media in the energy question.

5. Inservice Activity. Teachers can jointly plan inservice activities that will reinforce their knowledge about energy. You can use the energy topic as a way of working with other teachers to plan possible interdisciplinary activities during the in-service meeting. You can jointly present the work you have done with one other teacher as a way of encouraging more cooperation with other teachers.

School-wide Activities

Another way you can promote interdisciplinary activities is to initiate one of the school-based activities listed in the previous section or to do one of your own. The basic idea here is to put together a plan for school-wide activities that includes a wide variety of subjects and interaction of students and teachers.

One school-wide activity that has been especially popular is the use of energy fairs to create interest in energy problems. In one school an energy fair was developed by the social studies teacher in conjunction with science, language arts, practical arts, foreign language, physical education and other teachers. The fair lasted an entire day and prizes were awarded for the best exhibits. After the fair was completed the social studies teacher and the practical arts teacher continued their work together in developing lessons on energy education. The practical arts teacher included many different energy lessons in his practical arts classes. The social studies teacher incorporated some of the ideas about appliances and other machines into his social studies lessons. The success of the school-wide event stimulated other teachers to work together in order to bring energy education into their classrooms.

Here are some other ways in which school-wide activities can form a base for interdisciplinary cooperation:

1. Speakers' Bureau. Teachers can work together to form a speakers' bureau for possible guest speakers on a wide variety of topics in many subject areas. The speakers can appear in assemblies, sets of classes or single classrooms. In this way, teachers could work together to promote energy awareness and information school-wide.

2. Homeroom Activities. A group of teachers from each subject area can plan announcements and short activities centered on energy information and action. These ideas can be circulated to all teachers so that anyone in the school can participate. A weekly energy bulletin could provide news and activities for an entire week.

3. Library Energy Resources. Teachers can work with their school librarian to set up a section of the library devoted to energy information. Many subject areas could be covered. Displays could be designed by students on various energy topics. In this way, teachers and students from many classes could find energy-related material in a single place in the library.

4. Classroom Conservation. Five classrooms could be chosen in the school for a study of energy conservation methods. Students using the classrooms could make suggestions for conservation from the subject they study while in the room. Teachers could then compile a list of suggestions for school-wide use.

5. Inservice Activities. A school-wide inservice day could be devoted to energy education. Teachers could discuss information and activities that could be carried out school-wide in order to get more information and conservation activities into the everyday life of their school.

Group Meetings

Another way to initiate interdisciplinary activity is to work with a group of teachers from different disciplines. One successful example of this type of work could have been initiated by a social studies teacher who was working on lessons in World Cultures. The social studies teacher had three lessons on energy in Asia. He worked together with a group of teachers including science and language arts teachers. They used the adaptation lessons for the chapter and created three lessons in each of the other subject areas tied to the ideas of energy resources, conservation and interdependence. The group met once a week after school for a half hour over a period of time and used the lessons and gave each other feedback on the successes and failures of the units. Throughout a two-month period the teachers enjoyed interacting together and constructing sucessful lessons that reinforced students' knowledge and participation in energy conservation. The success of the effort was marked by their continuation of their planning group for lessons in the following semester.

Here are some other ideas that an ongoing group of teachers might wish to undertake:

1. An Energy Club. A group of teachers might want to form a teacher energy club. The club could meet at school, or more informally outside of school. Its purpose could be to plan individual, classroom or school-wide activities related to increasing awareness, knowledge or participation in energy conservation.

2. Energy Seminars. A group of teachers might plan a series of seminars that could be offered after school or in the evening on energy topics. They could speak themselves or bring in outside speakers. The seminars could be for students or others in the school. They could also be opened to the community.

3. Energy News. A group of teachers from various subject areas could agree to write a section of the school newspaper, or their own bulletin, on energy issues. They could feed this information on regularly to homerooms, local media, and other sources.

4. Energy Lunches. A group of teachers could work with cafeteria staff to plan an energy efficient lunch. In good weather, it might be a picnic outside with solar hot dog cookers made by the students. Otherwise, signs could be posted in the cafeteria line showing the calorie value of foods and the energy used to produce them. People could be asked to be as energy efficient as possible, write their meals on cards with calories and kilowatts; and prizes could be awarded for the people with the most energy efficient lunches.

5. Inservice Activities. A group of teachers could arrange a section of an in-service day as a kind of energy fair which would inform and involve other teachers in energy conservation. Active involvement would be stressed, and some exhibits might then be transferred into classrooms or other parts of the school building.

Team Teaching

It is possible that you would want to work with other teachers in pairs and combine your students in order to team teach energy lessons. The lessons can be combined with more material from the adaptations in science, language arts or practical arts as well as other subjects. In this way, you would be assured that the same students would be getting the reinforcement material.

Several segments of the energy materials can be team taught by science and social studies teachers. A social studies teacher worked with a science teacher in teaching some lessons on Energy in Europe. The science teacher contributed several science experiments that showed increases in consumption due to mass use of appliances or automobiles. The social studies teacher planned to talk about lifestyle differences. The teachers met before the beginning of the unit during their prep time and planned specific segments of their instruction that were team taught across the classes. They then initiated specific days on which the team teaching effort would take place. Students enjoyed the team teaching. So did the teachers themselves.

Other activities that can set a base for team teaching include:

1. Energy Plays. Students from two classes might work on an energy play which could be performed before both groups together. Teachers could lead the discussion regarding the play. Spin-offs could be developed in several subject areas.

2. Energy Films. Classes can be combined to view several of the excellent films on energy issues. Some of these films are indexed in the resource bibliography contained in these materials. Teachers can jointly discuss the film and use it as a base for their team teaching effort.

3. Energy Panels. A panel of energy experts--students, teachers, community members--could be organized to speak to several classes of students. Teachers could combine classes to prepare questions for the panel. They could also debrief the students after the panel.

4. Energy Debates. Teachers could organize debates across two classes of students. One-side debates could be planned by each class. Representatives from each class would be chosen. Winners would be determined by an objective panel chosen from the combined classes.

5. Energy Simulations. A simulation could be run using combined classes of students. Students and teachers could work together to design their own simulation, or a simulation listed in the resource bibliography could be modified. Teachers could then jointly debrief the simulation to evaluate student experiences.

These are four ways that interdisciplinary cooperation can be promoted in these energy education materials. It is important for reinforcement. It is also important for teachers to get together and enjoy sharing ideas and planning cooperative activities. Their impact can go far beyond a single activity.

GLOSSARY OF WORDS

Anvil: An iron block on which metal is shaped.

Aramco: Arabian American Oil Company

Appropriate Technology: Machines and methods that best suit a goal, e.g., they are not inefficient.

Benefit: Anything contributing to an improvement in condition; advantage; help.

Body Power: Terminology used to define human energy.

Cartel: An association of business firms or nations establishing a fixed price for a commonly sold good or resource.

Charcoal: Wood partially burned in a kiln from which air is excluded.

Coal: A solid fuel, mostly carbon, formed from the fossils of plants living hundreds of millions of years ago.

Community: A part of a city where people live and act together in doing things.

Competitor: A person who competes, a human rival.

Compromise: An agreement in which everyone gets part of what he/she wants but usually not all.

Consensus Rule: Everyone must agree in order for a decision to be made.

Conservation: The wise use of resources.

Consumer Goods: Products that people buy.

Consumption: The use of any resource.

Cost: The amount of money, time, effort, etc. required to achieve an end.

Crude Oil: Liquid fuel formed from the remains of animals and plants.

Dependence: Something on which one relies and needs.

Development: Growth or advancement.

Demand: The desire for a good.

Desalination: The process of taking salt out of sea water.

Energy: The ability to heat, light and/or move things.

Energy Actor: A person taking action on an energy problem.

Energy Alternatives: Various substitutes for existing energy sources.

Energy Consumer: A person who uses energy or energy products.

Energy Disposer: A person who discards used energy or energy products.

Energy Interdependence: People and groups around the world needing to exchange energy sources and products.

Energy Product: Anything that is made from an energy source and which requires energy for its production.

Energy Resources: Those resources that are drawn upon for energy use.

Energy Shopper: A person who buys or sells energy or energy products.

Energy Sources: The supplies from which we receive energy.

Energy Transfer: A process in which one system supplies another system with energy.

Environment: Something that exists in the surroundings.

Exports: Shipping goods out of one's own country.

Food: The raw materials used by plants, animals and humans for nourishment.

Fossil Fuels: Fuels derived from the fossil remains of organic materials and includes resources such as oil, natural gas and coal.

Geothermal Energy: Energy produced by water flowing over hot rocks deep within earth's crust.

Grist Mills: A grain mill used for grinding wheat or corn into flour and meal.

Heat: A form of energy in motion that flows from one body to another because of a temperature difference between them.

Heritage: Tradition, something transmitted or passed down from people living previously.

Human Energy: The energy produced by a person's body.

Hydroelectrical Power. Energy produced by falling water. See Hydropower.

Hydropower: The energy in stored or moving water.

Immigration: The process of people coming into a country for the purpose of taking up permanent residence.

Import: Goods coming in from another country.

Industrial Revolution: The period of rapid growth and change brought about by new inventions, a cheap labor supply and the use of energy for producing goods.

Inflation: An increase in the amount of money in circulation resulting in a fall in its value and a rise in prices.

Inhibiting Factors: To discourage from being able to do something.

Interdependence: People sharing goods, needs, or affecting one another in some way.

Irrigation: To supply water to land by means of ditches, channels or sprinklers.

Islam: The Muslim religion in which the supreme figure is Allah and the Chief Prophet and founder is Mohammed.

Judaism: The Jewish religion based on the laws and teachings of the Holy Scripture and the Talmud.

Kilowatt: A kilowatt is a unit by which electricity is measured.

Labor Supply: Having people available that can work in the business or industry.

Land Reform: Making more land available for farming.

Lending Institutions: Banks and other establishments that are in the business of lending people the money to start a business and obtain the necessary equipment.

Lifestyles: The way people live.

Majority Rule: Fifty percent (50%) plus one person must agree in order for a decision to be made.

Miles Per Gallon: The number of miles that a car can drive on a gallon of gas.

Motivation: Something, such as a need or desire, that cause a person or people to act.

Muscle Power: The energy produced from humans or animals.

Muslim: Someone who believes in the religion of Islam.

Natural Gas: A gaseous fuel formed from the fossils of ancient plants and animals.

Nonrenewable Resource: A resource that can only be used once because more cannot be found or made.

Nuclear Energy: Energy contained within the nucleus of the atom that can be released by nuclear fission or nuclear fusion.

One-person Rule: One person can make a decision for a group.

OPEC: Organization of Petroleum Exporting Countries.

Paddle Wheel: A wheel placed in water when turned, causes movement.

Perspective: A specific point of view in understanding or judging things or events.

Petroleum: An oily, flammable liquid when refined yields fuel oil, kerosene, gasoline, etc.

Pig Iron: The product obtained from the melting of bog iron.

Plurality Rule: A majority need not agree, but support must be given that is greater than that obtained by the opposition.

Priorities: Things that receive immediate attention.

Promoting Factors: Those things that contribute to the growth of industry, to help bring an enterprise into being.

Prophet: A religious teacher.

Recycling: To reuse a product through reprocessing or determining a new use, i.e., rolled newspapers for fire logs.

Redistribution: To give out again or in a different way.

Renewable Resource: A resource that can be used again and again, such as solar, tidal or wind energy.

Self-reliance: Depending on oneself.

Sisal: A plant grown in Africa used for making rope.

Slag: The refuse (leftover) substance from the melting of metals.

Solar Energy: Produced by or coming from the sun.

Standard of Living: The way people live and whether their needs are met.

Subsistence Farming: Type of farming where only enough crops are raised to feed one's own family.

Sub-Saharan Africa: Those countries in Africa that are located south of the Sahara Desert.

Supplemental Heating System: A back-up system for heating, such as a wood stove.

Supply: The amount of a product available for purchase at a given price.

Tariffs: Taxes on goods coming into a country.

Technology: The system by which a society provides its members with those things needed or desired.

Tradition: A long-established custom or practice that has the effect of an unwritten law.

Transcontinental: Travel across an entire continent.

Transformation: The change in form or appearance from a source to a product.

Wind Power: Energy produced by the wind.

Wood Energy: Energy produced by burning wood.

ANNOTATED BIBLIOGRAPHY

BOOKS

Cottrell, Frederick W. Energy and Society: The Relation Between Energy, Social Change, and Economic Development. McGraw, 1955, 330 pages, $15.00.

Survey which examines the use of energy in low and high energy societies.

Halacy, D. S., Jr. Wind, Sun, and Water: Our Energy Alternatives. Harper, 1977, 192 pages, $9.95.

Easily read. The renewable resources of geothermal, water, tidal, sea thermal energy, wind, biofuels, and solar energy are presented for consideration.

Hammond, Allen L., William D. Metz, and Thomas H. Maugh II. Energy and the Future. American Association for the Advancement of Science: Washington, D.C., 1973, 184 pages, $3.95.

Gives an introduction to each of the present and possible future energy sources. It also covers energy conservation and energy policy.

Michigan United Conservation Clubs. Energy. P. O. Box 30235, Lansing, Michigan 48909.

Provides information on the nature of energy, sources and uses of energy and conservation. There are also some work sheets and ideas for helping others learn more about energy.

National Wildlife Federation. Energy. 1412 Sixteenth Street N.W., Washington, D.C. 20036.

A good eight-page overview of energy supplies, demands, types of sources and alternatives.

CURRICULUM MATERIALS

Bureau of Secondary and Elementary Education. Environmental Education; Energy - Society. (Grades 4-12) DHEW/OE, Washington, D.C. 20009. $3.50.

Numerous student learning activities for various grade levels based on behavioral objectives. Each provides the purpose, suitable level, related subjects and methods along with a resource list.

Coon, Herbert L. and Michele Y. Alexander. Energy Activities for the Classroom - 1976. ERIC Center for Science, Mathematics and Environmental Education, College of Education, The Ohio State University, 1200 Chambers Road, Third Floor, Columbus, Ohio 43212. 1976.

Resource booklet of energy teaching activities divided into grade levels: K-3; 4-6; 7-9; 10-12.

Crouch, William J. Energy Puzzles. Hayes School Publishing Company. Inc., Wilkinsburg, Pennsylvania. 1975, 18 pages, $2.50.

Eighteen spirit duplicating masters about energy sources. Good Basic information.

Curry, Wendell, et. al. Energy Crisis Teaching Resources. Oregon Board of Education, Salem, Oregon, 1973, 59 pages, (ED 085 316)

Many very useful activities to be used in stressing individual responsibility towards energy crisis problems.

Department of Energy, Technical Information Center. The Energy Challenge. (Grades 5-8) P. O. Box 62, Oak Ridge, Tennessee 37820. 1976, No charge.

Twenty-four duplicating masters of student activities about energy in the past, present and future. Teaching guide included with these six energy units.

Division of Science Education. Environmental Education: Strategies for Wise Use of Energy. North Carolina Department of Public Instruction, Raleigh, North Carolina 27611, c. 1974.

Designed for use at all grade levels, therefore activities are grouped K-3, 4-6, 7-12. An appendix contains charts, glossary, bibliography, checklists.

Energy and Conservation Education: Activities for the Classroom. (Grades 6-8). Energy and Man's Environment. 0224 S.W. Hamilton, Suite 301, Portland, Oregon 97201. 1977, $25.00.

This is a comprehensive multi-disciplinary publication in a looseleaf binder with 58 specific activities each organized around the headings of title, concept, objective, time, subject matter, area, grade, implementation and materials.

Environmental Education Project. Energy. ESEA Title III, Section 306 Topeka Public and Parochial Schools, 1601 Van Buren, Topeka, Kansas 66612. (ED 093 649)

Objectives are listed along with activities that meet the stated objectives. Teachers select only those appropriate to the objectives for their students.

Fowler, John W. Energy -- Environment Source Book. National Science Teachers Association, 1742 Connecticut Avenue N.W., Washington, D.C. 20009. 1975.

Designed for teachers who wish to incorporate a study of energy into their teaching. It is divided into two volumes each with many charts, tables and figures.

Materials Distribution, Center for Teaching International Relations. Teaching About Energy Awareness: 33 Activities. University of Denver, Colorado 80208. 1978, 179 pages, $7.95.

Most lessons include an introduction, objective, grade level, time and materials needed, procedures and student materials. Some good ideas for short lessons.

Minnesota Department of Education. Energy Activities for Junior High Social Studies. 640 Capitol Square Building, 550 Cedar Street, St. Paul, Minnesota 55101. 1977, No charge.

Seven well-done activities that can be easily simplified for use in upper elementary classes. Especially good for value clarification in relation to energy use.

Smith, Stephen M., Editor Energy - Environment Mini-Unit Guide. National Science Teachers Association, Washington, D.C. (ED 111 664)

Materials designed to stimulate decision making in young children and to make teaching more interdisciplinary. It is filled with many activities and guidelines.

Superintendent of Documents. Energy Conservation: Understanding and Activities for Young People. U.S. Government Printing Office, Washington, D.C. 20402. Stock #041-018-00091-7. 1975, 20 pages, $.85.

This is a booklet that provides brief background information followed by suggestions for activities and projects that can be adapted for teacher use. The topics are What Is Energy, Energy Conservation, and Uses of Energy.

U.S. Department of Energy - The following are interdisciplinary student/teacher materials in energy available through the U.S. Department of Energy, P. O. Box 62, Oak Ridge, Tennessee 37830, No charge.

Bringing Energy to the People: Washington, D.C. and Ghana. Grades 6-7. 1978, 63 pages.

Four lessons that are primarily oriented toward social studies. The climate, location, energy dependency and services of two countries are compared. Emphasis on map- and chart-reading skills.

Energy Conservation: Understanding and Activities for Young People. Grades 7-9. 1975, 20 pages.

This unit discusses the meaning of energy, its sources and limitations, and suggests conservation activities.

Energy, Engines and the Industrial Revolution. Grades 8-9. 1977, 82 pages.

This unit focuses on the period of 1700-1860 in the United States. The contribution of engines to the Industrial Revolution is described.

Energy History of the United States. Grades 7-8. 1978, 117 pages.

This unit charts the growth of American energy use and traces the history of the major sources of energy (coal, wood and oil) in the United States.

Mathematics in Energy. Grades 8-9. 1978, 64 pages.

This unit is designed to infuse energy concepts into math. It deals with conversions, various statistics and the manipulation of energy units, such as BTU's, watts and calories.

Organizing School Energy Contests.

Helpful brochure encouraging the formation of school energy contests. Guidlines are given as to the processes involved.

Tips for Energy Savers.

Helpful booklet filled with many useful and simple ways to save energy. Designed for individuals and families, but also contains a teaching guide for teachers to help students bring these tips to the concern of the family.

Transportation and the City. Grades 8-9. 1979, 46 pages.

This unit discusses the impact the automobile has had on small towns and how it influenced the growth of big cities, such as Los Angeles.

FILMS

Amron Nowak Association for Department of Energy. "Running on Empty - The Fuel Economy Challenge." 27 min., color, 1978.

This film deals with the automobile and ways to conserve energy.

Department of Energy, Office of Public Affairs. "Challenge of the Future." 29 min., color, 1978.

This film deals with the options that face the United States. A variety of different resources and the laboratories where they are being studied are examined.

Hugh Whittington for Department of Energy. "Energy - The American Experience." 28 1/2 min., color, 1978.

This film deals with energy from a historical perspective over the last 200 years. New resources are also discussed.

Owen Murphy Production. "Conservation - Investing In Tomorrow." 6:25 min., color, 1978.

This film deals with some of the ways we can conserve energy.

Owen Murphy Production. "Transportation - The Way Ahead." 7:45 min., color, 1977.

This film deals with America's dependence on the automobile and the future.

USDA Motion Picture Service for ERDA & U.S. Department of Agriculture - ARS. "Sun Power for Farms." 12:23 min., color, 1977.

This film deals with solar energy and its potential. It deals with various solar energy projects around the United States.

TEACHER'S GUIDE

THE CARTOON BOOK

Introduction

The purpose of the cartoon book is to introduce the objectives of the middle grades segment of the Energy Education Curriculum Project. It is through the use of the cartoon book that students will acquire the main ideas that are further developed in the other three units.

The use of a cartoon book format as an instructional tool is not new to education. Teachers have been using visual depictions, especially political cartoons, to teach concepts for many years. As developers interested in motivating students to learn more about energy, we feel that a cartoon book can help meet this objective. It is designed to be entertaining but at the same time encourage intellectual thought and discussion. We also feel that the cartoon book can facilitate student activitiy in the classroom, school and community.

Although the story takes place on another planet, the parallels to our own are obvious. We encourage you to help your students see the connections as well as make applications to their own lives.

The cartoon book introduces three basic objectives. They are: 1) knowledge, 2) participation and 3) imagination.

1) Knowledge

The knowledge objectives include three concepts related to energy. They are:

a) Interdependence
b) Energy Resources
c) Conservation

a) Interdependence is the idea that people and events affect our lives. How we live, what we think, and what we do is related to how other people live, how other people think and what other people do. Interdependence is also mutual need. We need other people and their resources. We need energy resources as well as the resources of our schools, homes, communities, our nation and our world.

b) "Energy resources" is defined as any sources from which we receive energy. There are man-made resources, human resources, and natural resources (all of which are related to energy resources.) Not everyone has access to the same resources and they are used and developed in different ways.

c) Conservation is the wise use of resources. Using less of an energy resource is one way to conserve. The efficient use of energy resources is another way.

2) Participation
The participation objectives focus on decision making skills. Throughout the cartoon book characters are seen participating in the process of individual as well as group decision-making.

3) Imagination
The imagination objectives encourage students to create and expand their thinking about energy, its use and alternative possibilities.

The Story

The story takes place on a fictitious planet called "Quantum". The basic theme of the story is what happens when the production and distribution of energy resources on the planet are halted. Because of this, people adapt their behavior to conserve energy. This situation proves to be a learning experience for all and one to which we can relate.

The story opens with a view of the planet. Quantum is much like Earth in that many people are overconsuming energy. This overconsumption is causing problems for there is concern about unequal distribution and the diminishing availability of energy.

To deal with this situation the people of Quantum have elected representatives to make energy decisions that will affect everyone. There exists a satellite called the "Interdependence" which orbits Quantum and serves to regulate the production, use and distribution of energy resources. The satellite is computerized and without it, large-scale energy use would be impossible.

The elected energy specialists who control the Interdependence are introduced. Their title is QuEST which stands for Quantum Energy Saving Team. Their job is to set energy use and distribution priorities for the coming decade. The members of the QuEST are:

1) "Mega Watts" -- This character is a scientist with great energy expertise.
2) "Dr. Drat" -- This character is alienated and angry because of the way energy is currently being used and distributed.
3) "Omni" -- This character is the imaginer. Through Omni we can explore different ways to view energy and alternative conservation strategies.
4) "Dyad" -- This character is our decision-maker and compromiser. Dyad helps us to see the process of gathering evidence, considering alternatives and facilitating bargaining and compromise.
5) "Zoic" -- This character represents environmental and conservation concerns.
6) "The Incredible Bulk" -- This character represents overconsumption.

We see them meeting aboard the Interdependence. They realize that they are wasting energy by traveling to the Interdependence every time they wish to meet. They decide to go to a system of meeting via multi-media panels. This way they can communicate with each other without leaving their homes.

QuEST continues to meet via multi-panels and their differing views on energy priorities become evident.

Zoic reflects about the conditions which existed on Quantum before the QuEST and the "Interdependence." Omni imagines about all the different meanings of the concept of energy.

Meanwhile Dr. Drat becomes so frustrated that he decides to construct a plot to take over the control of the "Interdependence." He tricks the other members of the QuEST so that they will not be available when he recomputerizes the "Interdependence" redirecting energy resources from the over-consumers to those in need.

As fate would have it, just as he starts to alter the flow of energy resources, a series of human and natural disasters renders the "Interdependence" inoperable. We now see Quantum without large scale energy resources.

At first there is chaos and panic. People are very dependent on energy and the crisis causes quite a shock. However, as time passes, people begin to cooperate and conserve. Their life-styles change and eventually they realize that alternate forms of energy can be used to meet their needs.

The QuEST meets again. At first they comment that their condition is only temporary for eventually the "Interdependence" will be repaired. Very quickly they realize that even when it is repaired, if they return to their old energy habits, they will be right back where they started.

The story ends with the QuEST recognizing that the people on Quantum have learned invaluable lessons about energy conservation from their crisis. They realize that the distribution and use of energy must be more equitable and efficient. Problems will always exist and solving them will not be easy. Everyone has learned a great deal, especially that conserving energy is a matter of changing people's energy habits.

Teaching Strategies

There are many learning opportunities in the cartoon book. The following suggestions are meant to serve as a guide for discussion and activity. We hope that you will build on these ideas and create learning activities which best meet your needs and particular classroom, school and community situation. These suggestions are also written so that students of varying abilities can successfully participate.

Pages 1-5 Main Ideas

1. Energy resources and use
2. Over-consumption
3. Interdependence
4. Differing opinions on energy priorities

Objectives

1. Students will be able to give examples of energy resources and use.

2. Students will be able to identify examples of over-consumption.
3. Students will be able to define the concept of interdependence.
4. Students will be able to identify the differing opinions on the use of energy as represented by the members of the QuEST.
5. Students will be able to apply these ideas to their own lives.

Instructional Strategies

1. Students could be asked to speculate about the nature of "Quantum" society as related to its dependence on energy. How is this society similar to our own? Ask students to write down examples of ways in which we depend on energy and discuss their ideas.

2. Have your students make two lists, one stating the benefits obtained from energy resources and the other disadvantages or negative results. Discuss the examples given in the cartoon book and those on their lists.

3. Help your students define the term "over-consumption." Alternative ideas could include the wasteful or over-dependency on energy intensive appliances. What are some examples of over-consumption shown in the cartoon book? Why is The Incredible Bulk an over-consumer? Relate this idea to things they are familiar with. What are examples of over-consumption in the classroom, school and community. Magazine advertisements often show examples of overconsumption. Students could make collages from these.

4. The satellite is called the "Interdependence." Have your students define the concept and explain why the satellite is so named. Next ask the students to pick out examples of interdependence from the cartoon book. How are the people mutually dependent on energy? How does the amount of energy available and the amount charged for its production affect the cost of energy to the consumer? Have your students ask their parents what it costs every month for electricy, gas and oil for their home. Has the cost changed in the last year? What about the price of gas for the car? How have price changes affected their life-styles?

5. The QuEST decides to meet via multi-media panels rather than travel to the "Interdependence." Do you think this actually saves energy? What are examples of using energy to save energy?

6. List on the board the names of the six main characters in the cartoon book. What are the problems involved in making group decisions that affect others? Have your students imagine that they are members of the QuEST. Have several students role play a QuEST meeting. After they have role played, ask the class to identify aspects of group decision-making such as stating positions, the use of evidence, negotiation and compromise. What have they learned about group decision-making and the problems involved in establishing energy policy? Relate this to the present situation in this country and the world. Why is it necessary to set energy priorites for the future now?

Pages 5-7 Main Ideas

1. Conflict
2. Imagination and the meaning of energy

Objectives

1. Students will relate the past conditions on "Quantum" to those potentially and currently on Earth.
2. Students will be able to imagine about the meaning and uses of energy.

Instructional Strategies

1. Zoic reflects on the history of Quantum before the "Interdependence" and the QuEST. Discuss with your students the feasibility of Earth experiencing wars over energy. Can they ever imagine a time when our world would go to an international energy policy board? What would be the advantages and disadvantages? What are their feelings about mandatory conservation laws? What laws would they want to see passed if any? How would they propose these laws be enforced?

2. Omni talks with others about the meanings of "energy." Using what he says as a base, have the students write down or share verbally "imagined" thoughts about energy. Students could do a survey of their schoolmates, other teachers and families, asking them what energy means to them. All ideas should be encouraged. The survey results could then be compiled. The point is that there are many different ways to think about energy.

Pages 7-12 Main Ideas

1. Decision-making
2. Conflict

Objectives

1. Students will be able to identify examples of decision-making.
2. Students will give examples of conflict over energy policy seen in the cartoon book.
3. Students will be able to relate these ideas to their own lives.

Instructional Strategies

1. Ask your students why Dr. Drat is so aggravated with the members of the QuEST. Why is it so difficult for the QuEST to make decisions? Relate this problem to an example occuring now such as the debate over gas rationing.

2. Dyad doesn't want to act without consulting the others. Dr. Drat has decided to take charge himself. What are the advantages and disadvantages of group decision-making and individual decision-making?

3. Dr. Drat decides to "take from the energy rich and give to the energy poor." Discuss with your students the unequal distribution of energy resources on Earth. Some students could be encouraged to do research

on a country where energy is not readily available. How are life-styles different from our own? Ask the students to offer suggestions for making more energy resources available to those in need. Discuss the problems of cost, transportation and adaptation from country to country.

4. Given our present situation on Earth, it is highly unlikely that one set of circumstances could occur to halt the production, use and distribution of energy resources. However, even though Quantum's situation is fictitious, it is one we can learn from. Discuss with your students how circumstances over which we do not have control can affect us and force us to deal with energy shortages. Factors such as wars and revolution, lack of supply, price, lack of knowledge, embargoes, strikes, etc., do affect us. How do they feel about these situations? Have your students write their own scenarios about what would happen on earth if energy was not available. How do they think people would react?

Pages 13-16 Main Ideas

1. Decision-making
2. Conservation
3. Cooperation

Objectives

1. Students will be able to pick out examples of individual and group decision-making about energy use.
2. Students will identify examples of cooperation and conservation.
3. Students will offer suggestions of ways they can conserve energy.
4. Students will summarize what the people of Quantum are learning from their experiences.

Instructional Strategies

1. Have your students identify the conservation measures being taken on Quantum. Have your students offer additional conservation strategies that they could use. What are the costs and benefits of conservation? How has life changed on Quantum and can they see these changes occurring in their own communities?

2. The people on Quantum believe that their situation is only temporary. Do you think our current energy situation is temporary? What happens to Quantum remains an open question. Have your students work individually or in groups to write a continuation of this story. What will happen if the "Interdependence" is not repaired? What will happen if it is?

3. The main point on the last page of the cartoon book is to help students realize that people make the difference. Decisions about energy use and resources are ours to make. What are the QuEST and Quantumites learning from their experiences? How is The Incredible Bulk acting as a model? Have your students outline their own energy conservation strategies. How can they

convince others in their school, family and community to conserve energy? Help them write strategies to do so. Check with your students every week on their progress. Discuss with your students the costs and benefits of conservation.

Additional Activities

Objective

1. Students will create their own learning opportunities from the cartoon book.

Instructional Strategies

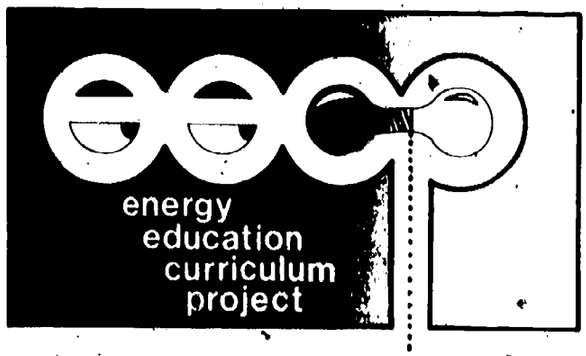
1. Have your students draw their own cartoon pictures or stories, either with their own characters or those from the cartoon book. How are their stories similar and different from the energy situation on Quantum? On Earth?

2. Ask your students to pick one of the characters in the cartoon book and write a story describing their energy habits and lifestyle. What attitudes about energy use, production and distribution does their chosen character represent?

3. Discuss with your students what would have been the future on Quantum had the "Interdependence" not broken down. What decisions would have been made by the QuEST and how would they have been implemented? Relate this to the implementation of the U.S. and other countries' energy policies.

There are several terms used in the cartoon book that your students may need help with. Discuss with your students these terms and the meanings they have as related to the story.

1. abundant - well supplied, more than sufficent
2. abuse - to misuse, to hurt by treating badly
3. consumption - the using up of resources, goods or services
4. disable - to make unfit for use
5. inhabitant - a permanent resident
6. institute - to set up, to construct. A place specializing in advanced study in technical subjects.
7. pyramid - any structure with a square base and four sloping triangular sides meeting at the top, as those built by the ancient Egyptians for royal tombs. Some people believe that the pyramid shape signifies power.
8. restore - to bring back to a former or normal condition
9. system of distribution - how goods, resources or services are divided among people and regions.



Energy and Sub-Saharan Africa

LESSON ONE: THE DEVELOPING CONTINENT

TEACHER'S GUIDE

Introduction:

Imagination is used to introduce this lesson. Students are to become aware of the changes that are occurring in Sub-Saharan Africa and how these changes influence and are influenced by energy resources. By using tables and maps, students become directly involved in identifying important resources of Sub-Saharan Africa. They also complete a word search which emphasizes some of the more important agricultural products, energy resources and a few of the Sub-Saharan countries. The remainder of the lesson presents material about energy resources of Sub-Saharan Africa both current and potential. The lesson concludes with an activity patterned after Bingo which provides an excellent review for students.

Objectives:

1. Students will use imagination to identify changes that would occur if they experience sudden and drastic changes in their physical make up.

2. Students will be able to identify rapid changes occurring in Sub-Saharan Africa.

3. Students will be able to identify major resources of Sub-Saharan Africa.

4. Students will identify the available and potential energy resources of Sub-Saharan Africa.

Time: Two to Three days.

Instructional Strategies:

1. Introduce this lesson with Activity 1. Let the students read the assignment and give them some time to develop their images. Ask them to make some notes in response to the six statements given in the Activity. Have some of the students share their images with the class.

2. Students should complete Activity 2.

Answers to Activity 2

1. Ethiopia, Kenya, Tanzania, Mozambique

2. Nigeria, Ghana

3. Zaire, Sudan, South Africa, Uganda

4. Zaire, Tanzania, South Africa, Sudan, Ethiopia

5. Nigeria - cocoa, cotton, coal, petroleum

   Ethiopia - coffee

   Zaire - diamonds, copper

   South Africa - tobacco, coal, uranium, gold, diamonds, copper

   Sudan -

   Tanzania - cashew, coffee, cotton, sisal, tobacco, diamonds

   Kenya - cashew, sisal

   Uganda - coffee

   Ghana - cocoa, gold

   Mozambique - cashew

6. Two countries - Nigeria - coal, petroleum; South Africa - coal, uranium

3. Have the students read the material after Activity 2 including: "A Continent of Contrasts" up to Activity 3.

4. Hand out the "Word Search Puzzle" and allow students time to complete this activity.

5. Ask the students to complete the reading of lesson materials and mention six energy resources available in Sub-Saharan Africa (wood, coal and oil, hydroelectric, nuclear, and solar.) As you discuss these energy resources and their use, point out the vast potential of hydroelectrical power because of the major river systems, amount of rainfall, and the changes in elevation in the region. Also, review the major problems related to this form of energy development. Finally, your discussion should focus upon the use of wood as a major source of energy in Sub-Saharan Africa and why hydroelectrical power, solar energy, or some other source of energy is needed. Some reasons for the need to develop additional energy resources are: the problem of over consumption of wood, the need for more energy to provide for the changes in agriculture and industry, the need for local sources of energy at a low cost, and energy to provide for an improved life style.

6. Activity 4 - This "Bingo" type game is an excellent review activity for the students. Distribute copies of the 16-square card to each student, 16 beans or grains of corn Ask the student to cut out the squares and rearrange them in any order that he/she wishes. This is essential if students are not all to attain "Bingo" at the same time. The squares can then be glued onto another sheet of paper. Have a student or the teacher be the "caller" and read the energy-related clue to the other students. Do not read the numbers of the clue. The clues may also be cut out and chosen randomly from a box.

   As the clue is read, the players will cover the correct answer. The first person to get four boxes in a row is the winner and should call out "Bingo." The caller should quickly check the answers to be sure they are correct. If the student was not correct then the person is eliminated and the game continues until a winner is declared.

   If desirable the students can make up their own clues and use those clues to play the review game.

Student Assessment: Correct answers for the assessment instrument for "The Developing Continent" on the following page are:

1. D, 2. D, 3. A, 4. B, 5. C

STUDENT ASSESSMENT

ENERGY AND SUB-SAHARAN AFRICA

Lesson One: The Developing Continent

1. Sub-Saharan Africa is known to have a large share of the world's potential for

   A. wind power.
   B. geothermal power.
   C. coal power.
   D. hydroelectric power.

2. If a world shortage occurred in the production of uranium, what source of energy would this affect?

   A. solar power
   B. geothermal power
   C. hydroelectric power
   D. nuclear power

3. Hydroelectric power is produced by

   A. turbines turned by falling water.
   B. boilers heated by coal.
   C. engines run by nuclear power.
   D. generators turned by animal power.

4. Twelve year-old Kip, living in Sub-Saharan Africa, turns off the television and turns on his desk lamp to do his homework. Where is he most likely to be living?

   A. rural area
   B. urban area
   C. farming area
   D. mountain area

5. Compared to the United States, Sub-Saharan Africa is much more dependent on

   A. oil.
   B. coal.
   C. wood.
   D. wind.

BINGO CLUES

1. What is the source of all energy?
2. What is the source of energy for humans?
3. What is a basic energy resource used in most of Africa?
4. What do coal, oil and natural gas have in common?
5. What type of energy is produced by harnessing the water from the many waterfalls and rapids in the rivers of Africa?
6. What type of energy resource is available to almost all American homes but to few homes in Africa except those located in the cities?
7. What is the term used to describe the "wise use of resources?"
8. What fossil fuel is produced in some north African countries, Nigeria, Gabon and South Africa?
9. What fossil fuel is obtained from mines?
10. When the source of energy or power is provided by animal or human effort, how is it identified or what type of power is it?
11. Wood is used as the main energy resource for what activity in Africa?
12. What term is used to describe the "sharing of resources so that all can benefit?"
13. What is another name for energy provided by the sun?
14. What term identifies those resources or goods a country trades or sells to another country?
15. What resource is used as a basic fuel to create nuclear power?
16. What term identifies those resources or goods a country buys from another country?

BINGO SCOREBOARD

(Duplicate a copy for each student, cut into)
(squares, and glue in differing order on)
another sheet of paper

1 Sun	2 Food	3 Wood	4 Fossil Fuels
5 Hydroelectricity	6 Electricity	7 Conservation	8 Petroleum
9 Coal	10 Muscle Power	11 Cooking	12 Interdependence
13 Solar	14 Exports	15 Uranium	16 Imports

ACTIVITY # 3

WORD SEARCH PUZZLE

N M U E L O R T E P A O C

O I E G U P A Z C C O I O

T O G O M N A S H A R A A

T O O E D I I A A T P S L

O R R Q R S D T C A I S N

C A G E A O P E O S S T I

O L O L Z B L C C D L O G

C O F F E E K A O N O B E

E S T T O J Y D A O E A R

E T U R A N I U M M O C I

P U D P E A R A H A S C A

O Y O K E N O O N I F O V

H O E A C I R F A D O O W

WORDS:

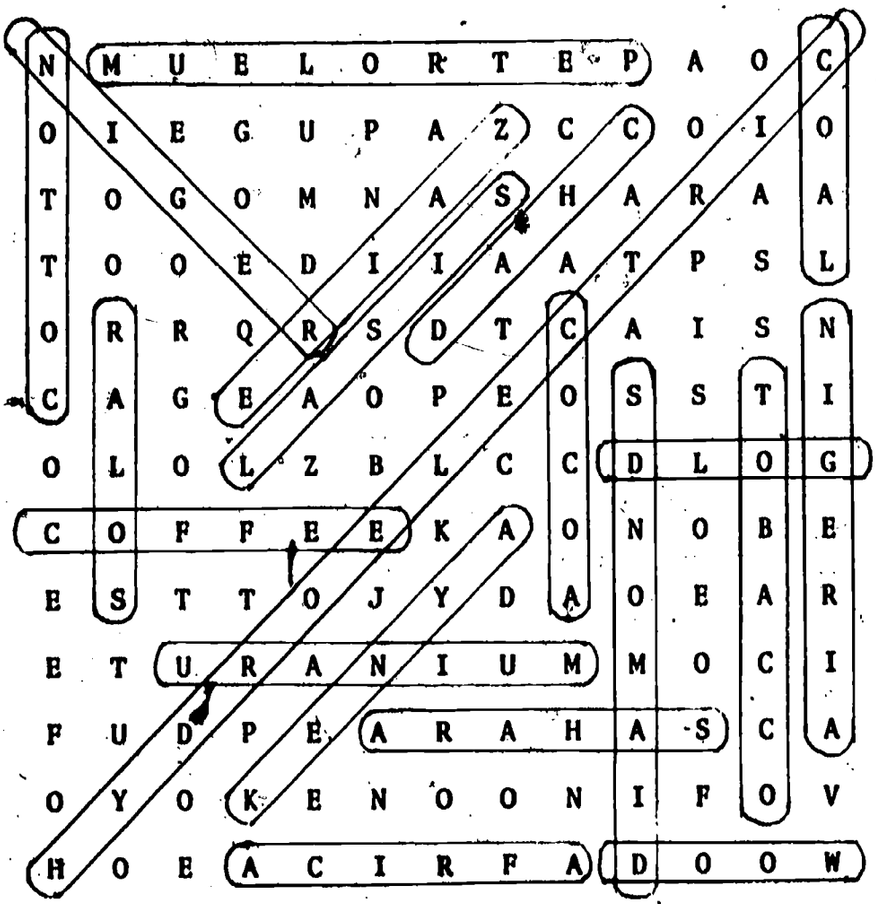
Cocoa
Coffee
Cotton
Diamonds
Gold
Sisal
Tobacco

Africa
Chad
Kenya
Niger
Nigeria
Sahara
Zaire

Coal
Hydroelectric
Petroleum
Solar
Uranium
Wood

ACTIVITY # 3

Key for Word Search Puzzle



LESSON TWO: NIGERIA: A SUB-SAHARAN OPEC NATION

TEACHER'S GUIDE

Introduction:

This lesson will focus on the Sub-Saharan country of Nigeria. The students will learn about energy resources available and used in Nigeria. It also discusses the country's major exports and imports. The major emphasis of this lesson is on interdependence.

Objectives:

1. Students will learn about interdependence and how it relates to Nigeria and the United States.
2. Students will be able to identify Nigeria's major energy resources.
3. Students will be able to identify Nigeria's major exports.
4. Students will use their imaginations to consider what the effects of a sudden loss of a major source of petroleum to the United States would have on them and their family.

Time: Three to four days.

Instructional Strategies:

1. Have the students read and complete Activity #1. Discuss with the students some of the ideas they had. How did most of them choose to travel? Why? What are some of their ideas about Nigeria. This may be a good chance to talk about stereotypes or other ideas students have about Africa in general. They refer to their article later to see how accurate they were.
2. The students should read the material up to Activity #2 and then complete the activity. By using partners the students will have an opportunity to interact with one another. They should be able to identify some resource that they possess that they would be willing to share or trade with another student. As the students become involved in this activity, encourage them to recognize some of their own needs. Help them to realize that some resources may be worth more than others. Therefore, they may need to trade with more than one person or an entirely different person. The difficulties that interdependence may cause should be discussed as a whole class. The idea that Nigeria might need goods that the United States can provide and vice versa should be discussed.

3. Have the students read the material about Nigeria's resources and exports and the material on interdependence. After the reading is completed have the students do Activity #3.

Answers for Activity #3

1. The energy resources shown on the map include oil and coal.

2. Other resources shown include cocoa, cattle, cotton, timber and tin.

3. Oil, tin and coal. The students might say coal, but most coal exported from Nigeria goes to Ghana.

4. Answers will vary. The United States could provide technical knowledge on farming and industralization as well as many food products, appliances and clothing.

5. Answers will vary. However, through international trade the United States does purchase oil from Nigeria and in exchange provides technical aid and other goods to Nigeria. The benefits would be that the United States can meet some of its oil needs and Nigeria can improve its way of life by receiving goods it needs. Some problems might be that Nigeria may lose some of its traditional culture.

6. Answers will vary but should reflect an awareness of the need to reduce the consumption of energy and/or the development of energy alternatives to replace the loss of oil supply. Help students examine their own values and how these values influence their decision on the best alternative.

4. Have students read the material on Rural Nigeria and complete Activity #4.

Answers for Activity #4

1. Answers will vary, but should include basic hand tools, cooperation between families and the possible use of fire to burn off trees and bushes.

2. Answers will vary, but should demonstrate the students' awareness of what they give up or gain if they do or do not cooperate.

3. Answers should reflect the students' knowledge of what the meaning of subsistence farming is. Most probably, the farmers would be subsistence farmers at least until the roads were developed so that they could move their surplus to markets.

4. Wood and muscle power would be the main source of energy.

5. Answers should reflect an awareness of the simulators as far as the dependence upon basic energy resource, and problems faced by both groups.

6. Answers will vary, but by taking advantage of knowledge and goods from other countries in exchange for those resources possessed by Nigeria, the people may be able to develop more productive lifestyles and improve their quality of life (life expectancy, literacy rate, etc.)

5. Have the students finish reading the lesson material. They are once again reminded of the importance of interdependence in providing benefits to both Nigeria and the United States. Have a class discussion summarizing the entire lesson. Answer any questions the students may have about the lesson. A discussion might develop on how too much dependence on other people and other nations might cause problems. Students should recognize that there may be costs as well as benefits and that both must be considered.

Student Assessment: Correct answers for the assessment instrument for "Nigeria: A Sub-Saharan OPEC Nation" on the following page are:

1. A, 2. B, 3. A, 4. C, 5. C

STUDENT ASSESSMENT

ENERGY AND SUB-SAHARAN AFRICA

Lesson Two: Nigeria: A Sub-Saharan OPEC Nation

1. How does Nigeria rank in population among African nations?

   A. first
   B. second
   C. third
   D. fifth

2. Where does Nigeria rank as a supplier of oil to the United States?

   A. It is the largest supplier.
   B. It is the second largest supplier.
   C. It is the third largest supplier.
   D. It is the fifth largest supplier.

3. What percent of Nigeria's exports are related to oil?

   A. 80%
   B. 70%
   C. 50%
   D. 40%

4. Cooperation in buying oil from nations that need to sell oil is an example of

   A. independence.
   B. self-reliance.
   C. interdependence.
   D. coexistence.

5. A Moslem family is living in a small village in northern Nigeria, what is their major source of energy?

   A. oil
   B. electricity
   C. wood
   D. coal

LESSON THREE: CONSERVATION: A NECESSITY

TEACHER'S GUIDE

Introduction:

This lesson on energy emphasizes conservation and compares the need for as well as means of consuming energy in the developing country of Tanzania and in the United States. Students learn the different ways Tanzania is trying to conserve and will be given an opportunity to identify ways they can conserve in their own lives.

Objectives:

1. Students will learn how people in Tanzania use energy compared to how people use energy in the United States.
2. Students will develop conservation strategies for themselves and their families.
3. Students will be able to identify energy resources in Tanzania.
4. Students will be able to identify energy problems in Tanzania.

Time: Two to three days.

Instructional Strategies:

1. Begin the lesson with the imagination Activity #1. This is a continuation of Activity #1 in Lesson Two and will be used in conducting or summarizing the information at the end of this lesson. Remind the students to keep their notes for later use.
2. Have the students read the material up to Activity #2. This material explains what some of the country's basic agricultural products are and also that Tanzania is almost totally dependent upon agriculture.
3. Have the students complete Activity #2. If your school is not likely to have a number of farmers readily available for students to interview, then perhaps you could arrange for a farmer to come to school and present a class discussion. You should conduct a large group discussion after students have either completed their individual interview or had an in-class presentation by a farmer. This discussion should center around the types of energy resources used in carrying out farming in the United States and what suggestions the students have for conserving energy. If neither alternative is possible, provide time for students to go to the library and do brief research on farming in their area.

4. After completing the discussion on Activity #2, ask the students to read the material in the lesson about why Tanzanian farmers must be concerned about conservation and why Americans are also interested in conservation. Assign Activity #3 to the students. This activity provides an opportunity for the student to learn about what problems they might have if they were dependent upon themselves to raise the food their family ate. The students should increase this awareness of the types of energy used in food production as well as the problem of deciding what to plant, when and how to plant it, etc. All of this should lead to a greater understanding of the importance of conservation of our resources as well as what and how energy resources are used in farming. The second part of Activity #3, that is the section where the student is asked to review some of the additional problems beyond planning and planting a garden but how to pay for the seed, types of tools available to do the work, etc., is intended to emphasize the amount of interdependence we in the United States have in meeting our basic energy needs for food.

5. After the students have completed Activity #3, conduct a large group discussion to consider what the students learned about their need to conserve and their dependence on others.

6. As you continue the study of this lesson, ask the students to read about the difference between energy used in homes in Tanzania and the energy used in most homes in the United States. Be sure to point out that 96% of the Tanzanians depend upon wood as their basic fuel for heating and cooking. Ask the students to read and complete Activity #4.

Activity #4 presents a chart on the typical amount of electrical energy used to run appliances found in American homes. The students are asked to use the chart in answering questions about energy consumption and to suggest possible ways of conserving energy. Emphasize how much energy the average person in the United States uses.

Answers:

1. Answers may vary but the items that are the larger uses of energy should provide the greater potential for savings. Some of these are electric heat, cooking appliances, washer and dryer, water heater, etc.

2. Answers may vary but some definite areas to consider are insuring good insulation in the home, closing off unused rooms, turning down the thermostat, etc. Use natural drying rather than automatic dryers whenever possible, cook using the most fuel efficient methods,

reducing water temperatures or getting a timer to turn electric water heat off and on at different times. Students may have a variety of creative suggestions here. Listen to them carefully.

3. Answers will vary.

4. Answers here should reflect the students' awareness of the data presented in the chart.

   Turning back the thermostat -- heat uses the most energy

   Cutting down on the use of hot water -- heating hot water uses more energy

   Turning down the heat but also using efficient cooking methods

   Reducing the use of both to a more efficient level

5. Answers will vary. Students might help by setting an example. Others might develop some type of community information service and/or plan, etc.

6. Have the students read the rest of the reading material on Tanzania and the way they use wood and the development of the Ujamma villages. Hold a discussion on the reading material. Help the students understand that resources must be used wisely and shared in Tanzania. In addition, have them read how the United States is trying to conserve energy. If time allows, discuss each suggestion and relate it to your students. Have them suggest ways to conserve. Interested students may want to make checklists for themselves or make posters to demonstrate energy saving ideas.

7. The lesson concludes with the students writing their imaginary news article about life and energy use in Tanzania. At this point, the students are to refer to their notes from the beginning of the lesson (Activity #1) plus use the information they have learned in the entire lesson.

Student Assessment: Correct answers for the assessment instrument for "Conservation: A Necessity" on the following page are:

1. B, 2. C, 3. B, 4. B, 5. C

STUDENT ASSESSMENT

ENERGY AND SUB-SAHARAN AFRICA

Lesson Three: Conservation: A Necessity

1. How does the use of energy for cooking in Tanzania compare with the use of energy for cooking in the United States?

   A. Tanzanians use more coal.
   B. Tanzanians use more firewood.
   C. Tanzanians use more steam.
   D. Tanzanians use more small electric ovens.

2. Tanzania's two major energy sources are

   A. coal and oil.
   B. uranium and solar.
   C. muscle power and wood.
   D. wind and hydropower.

3. Conservation is

   A. doing without resources.
   B. using resources wisely.
   C. getting the highest price for resources.
   D. starting parks to prevent the use of resources.

4. Conservation in the United States mostly involves the use of oil, gas and electricity, whereas conservation in Tanzania mostly involves

   A. coal.
   B. wood.
   C. water power.
   D. electricity.

5. All of the following are ways to conserve energy except

   A. taking showers instead of baths.
   B. reading instead of watching television.
   C. using paper napkins instead of cloth.
   D. recycling aluminum cans.

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ENERGY AND SUB-SAHARAN AFRICA
ADAPTATION LESSONS FOR SCIENCE, LANGUAGE ARTS AND PRACTICAL ARTS

The adaptation lessons on the following pages deal with energy resources, interdependence and conservation. All of these energy concepts have been related to Sub-Saharan Africa by the social studies teachers. It is our hope that the social studies teacher can then work with other teachers in Science, Language Arts and Practical Arts classes to reinforce energy concepts with the students. Students can become involved and relate it to their everyday lives.

ADAPTATION LESSON ONE: ENERGY RESOURCES

Idea. The idea of these lessons is to help students recognize various energy resources and their use in their own lives. They should be able to list a variety of resources and ways they can be used.

Objectives:

1. Students will be able to identify different energy resources.
2. Students will be able to list ways that resources can be used to produce energy.
3. Students will relate energy resources to their own lives.

Science Classes. Have the students build a solar reflector using aluminum foil to cook with. Directions for this are attached. An additional way of demonstrating the potential of solar energy is by using a crumpled up newspaper and magnifying glass. Take the newspaper and magnifying glass outside where the sun is bright. It is best to use a concrete or asphalt walk. Lay the newspaper on the cement and hold the magnifying glass just above the paper until the sunlight is concentrated in a small area. Hold it there until the paper begins to smoke. Do now allow a fire to start. When the experiment is finished, have the students discuss how it relates to energy and also the potential of solar use.

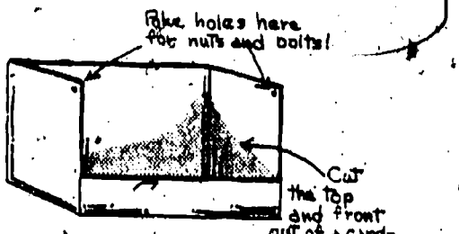
Language Arts. On one 3 x 5 card write an energy resource. Include coal, oil, sun, wood, gasoline, nuclear, tidal, geothermal, hydro, natural gas, garbage, wind, and food. Repeat this list until you have enough for each class member. Pin one card on the back of each student. They are then supposed to mill around the room asking as many questions as necessary to try and find out what resource they represent. Questions must be asked so they can only be answered Yes or No. When everyone has identified their resource take the cards off their backs. Next help the students group themselves into like resources. Discuss for a few minutes why they are alike. They may be different than how you might group them but as long as they can explain why let them explain. As a whole class, summarize and discuss any questions the students might have.

COOKING A [hot dog] WITH THE [sun]

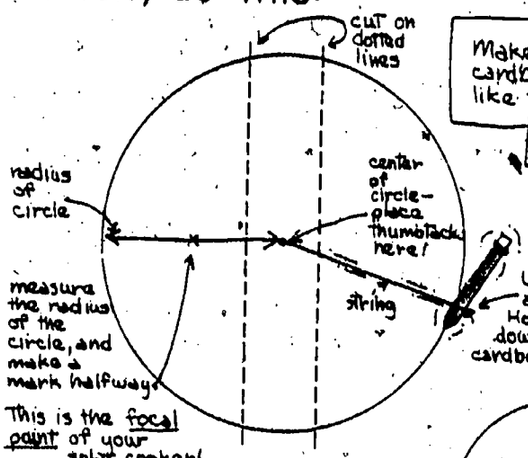
MATERIALS:

1 Hot dog
Cardboard boxes
Aluminum foil
Coathanger, thumbtack, string, pencil
2 Small nuts and bolts
Rubber cement

Do this first:

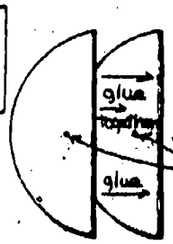


Then, do this:



Make 2 large cardboard circles like this:

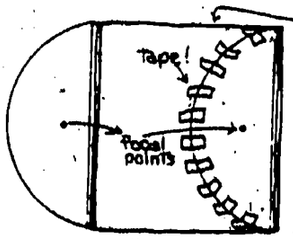
Use the string to hold the pencil, and attach the other end to the thumbtack. Hold the pencil tightly, straight up and down, and draw a circle on a piece of cardboard! Then, cut apart as shown.



Now, glue 2 pieces together to make 1 that's twice as heavy!

Do this with both circles you cut-

Now, put the 2 curved pieces together like this:



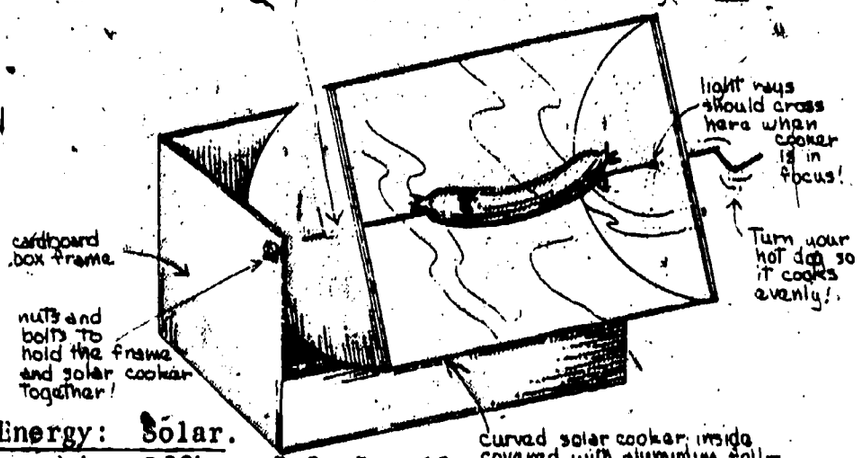
Tape another piece of cardboard to the curved edges of the 2 half circles you glued together -

the width of the piece of cardboard should be slightly less than the width of the box you cut to make a frame!

Then, cover the inside of this piece with aluminum foil - use rubber cement!

Cover all of inside with aluminum foil!

Put an unpainted coathanger through the focal points, then cook your hot dog on it. But be careful - it gets hot!



Adjust the cooker so that you can see the sun's rays cross on the focal points. How long does it take to cook a hot dog?

Adapted from Science Activities in Energy: Solar. Department of Energy, Technical Information Office, P.O. Box 62, Oak Ridge, Tennessee 37830.

Practical Arts. In industrial arts class, the students could work in groups and make examples of crude hand tools that many Africans use today for farming. In addition, have students bring in any tools from Early America if they have them. Have the students discuss these tools and the use of energy when the projects are completed. A display could be made in the school library with an explanation of each tool and its use.

ADAPTATION LESSON TWO: ENERGY AND INTERDEPENDENCE

Idea. The main idea in these lessons is for the students to learn the importance of interdependence. Interdependence exists in a variety of ways and in different situations.

Objectives:

1. Students will be able to recognize examples of interdependence.
2. Students will learn how other people depend on energy.
3. Students will participate with other students to create a meal.

Science Classes. Students can make mobiles showing the relationship of the body and food energy. More specific mobiles could show a food chain or photosynthesis. As a class, they should discuss how the body is dependent on food for energy. The food chain should be discussed and the interrelatedness of the process should be pointed out. Students may point out that they can interrupt the cycle by growing their own food or by just not eating so much.

Language Arts. Have the students make a survey of students, teachers, staff, and administrators to find out how they depend on energy. Include the areas of home, school, recreation, and transportation. Which areas do they depend on energy the most? The least? Are they willing to do anything about trying to be less dependent? Students should share and discuss results. Discuss ways to help people see how dependent they are and the problems this creates.

Practical Arts. Have the students plan a meal they can cook for the class using only wood as a source of fuel. Discuss the difficulties involved, the type of utensils necessary, and the limitation of the menu itself. Where will the wood come from? How much wood is needed for a whole meal? Students can then talk about how they normally cook and the type of energy involved. Compare the two methods. Time can be discussed and how dependent we are on the stove or other cooking devices.

ADAPTATION LESSON THREE: ENERGY CONSERVATION

Idea. The central idea is for students to recognize the importance of conservation. Students will be asked to generate their own ways to conserve and to participate by using conservation strategies.

Objectives:

1. Students will develop a plan to conserve energy use.
2. Students will be able to recognize the importance of recycling.

Science Classes. Have the students either take a field trip or look at a map or picture of a nearby shopping center. In groups or individually, they should identify different ways energy is being used. Students should make a list of the ways energy is being wasted. When students return to class or are finished, they should write a plan on how the shopping center could conserve energy.

Language Arts. Have one student volunteer to convince the class that an aluminum can is useless. The class should respond and give reasons why they disagree. The class should discuss the importance of recycling. Students could be encouraged to participate in a recycling activity. For example, many students like to collect aluminum cans to trade. They could be encouraged to collect others to recycle. A bulletin board of items brought in is often effective. They should become aware of the variety of things that are recyclable. Newspapers can be made into logs for fire fuel.

Practical Arts. Have students do a survey of paper products they use in their home. Napkins, paper toweling, paper plates, waxpaper, Kleenex, etc. Students should keep track of the number of times during one week they could have used a cloth towel or handkerchief instead. As a project, they could make terry cloth towels for the kitchen or hankies for their noses. Students should discuss other items they might use in place of their paper products. In shop class, students could make a project from only scrap material. They should be encouraged to be as creative as possible. Display all projects in a central location to show others what can be done with "scraps."

ENERGY AND SUB-SAHARAN AFRICA

LESSON ONE: THE DEVELOPING CONTINENT

Lesson Objectives

- To imagine changes that would occur if you experienced a sudden and drastic change in your physical make up
- To develop an awareness of the rapid changes occurring in Sub-Saharan Africa
- To identify major resources of Sub-Saharan Africa
- To identify the available and potential energy resources of Sub-Saharan Africa

ACTIVITY # 1

Imagine that you have been asleep. When you first went to sleep only yesterday, you were a young child of 2 or 3. Somehow when you awake today you are now a young adolescent of 11 or 12.

1. What changes have taken place?
2. What kind of things can you do today that you could not do yesterday at the age of 2 or 3?
3. Be aware of your physical self. Notice you are a whole person but there are also many different parts of you.
4. Continue to be aware of how your hand needs the help of your arm and your arm needs the rest of your body. Your brain is dependent on the blood supply from your heart. Think of other ways different parts of your body depend on one another.
5. Next, think of the type and amount of food you needed as a young child and the type and amount you need at 11 or 12. Is there a difference?
6. What other things are different because of the changes that occurred?

As a young adolescent you are growing, changing and developing in many ways each and every day. In this chapter, you are going to study a continent that is much like a growing adolescent -- Africa. As you read about Africa, you will also learn about energy and will be able to recognize the many ways Africa is growing, developing and changing.

Africa is one of the largest continents and has many countries. In fact, it is the second largest continent in the world and has 52 different countries. The continent as a whole covers 30 million square kilometers (12 million square miles) and is more than three times the size of the United States. The countries of Africa are dependent on one another for many reasons. They share resources as well as boundaries. And as an adolescent, just like yourself, there is much to know and understand about Africa.

In this chapter, we will focus mainly on Sub-Saharan Africa. This is the portion of Africa that is south of the Sahara Desert. The Sahara is the largest desert in the world. See Map #1 for the location. When the word Africa is used it will refer to the continent as a whole. North Africa, the area north of the Sahara Desert, is discussed in another chapter.

SUB-SAHARAN AFRICAN COUNTRIES

Table 1A
Ten Largest Countries by Population 1978 (in millions)

1.	Nigeria	100.0
2.	Ethiopia	29.7
3.	Zaire	27.1
4.	South African Rep.	26.7
5.	Sudan	16.5
6.	Tanzania	16.4
7.	Kenya	14.8
8.	Uganda	12.7
9.	Ghana	10.6
10.	Mozambique	9.5

Table 1B
Ten Largest Countries by Land Area (in 1,000 square miles)

1.	Sudan	967
2.	Zaire	906
3.	Chad	496
4.	Niger	489
5.	Angola	481
6.	Mali	479
7.	Ethiopia	472
8.	South African Rep.	471
9.	Mauritania	398
10.	Tanzania	363

Map #1

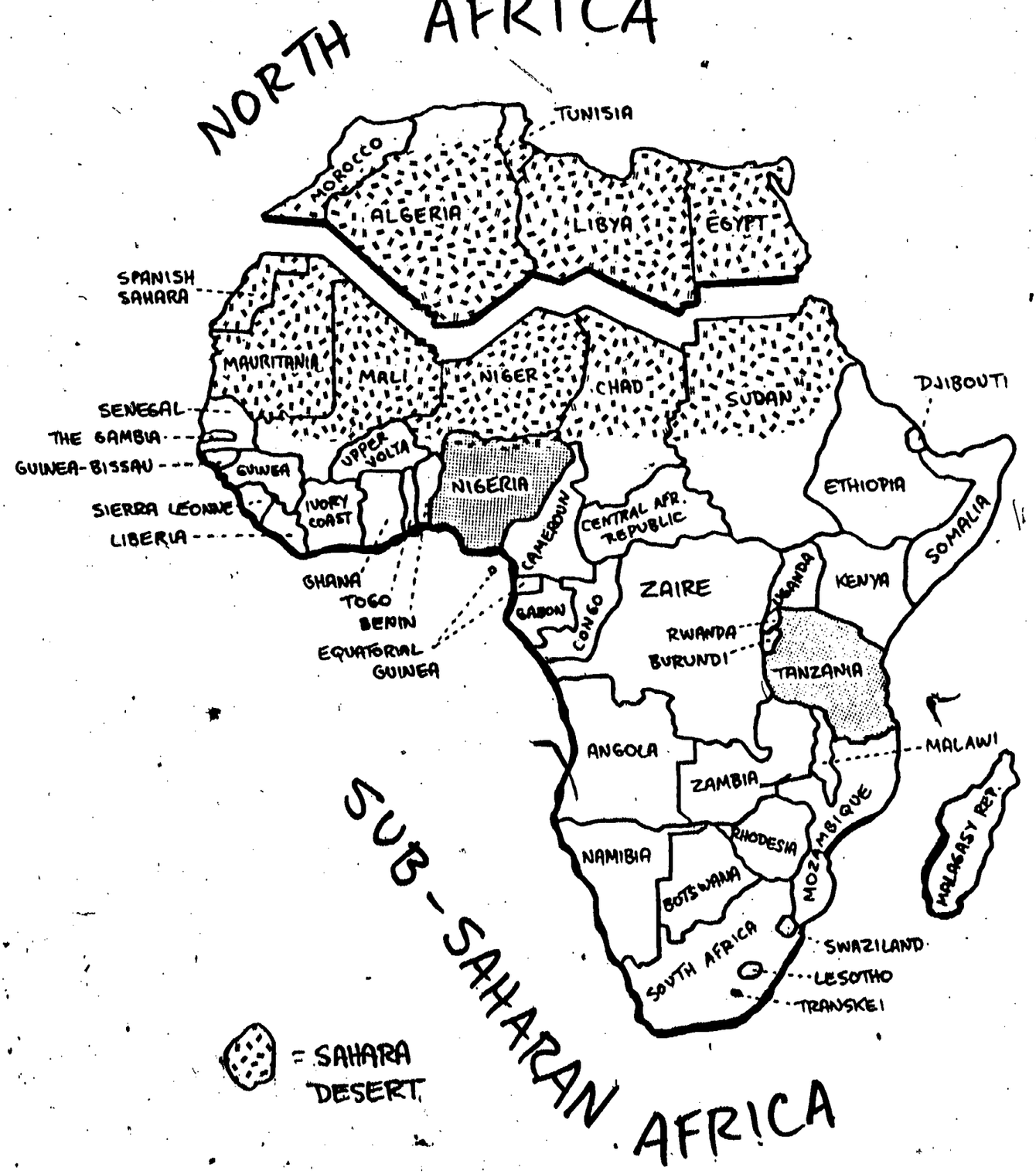

NORTH AFRICA
TUNISIA
MOROCCO
ALGERIA
LIBYA
EGYPT
SPANISH SAHARA
MAURITANIA
MALI
NIGER
CHAD
SUDAN
DJIBOUTI
SENEGAL
THE GAMBIA
GUINEA-BISSAU
GUINEA
UPPER VOLTA
NIGERIA
ETHIOPIA
SIERRA LEONE
LIBERIA
IVORY COAST
CAMEROUN
CENTRAL AFR. REPUBLIC
SOMALIA
GHANA
TOGO
BENIN
EQUATORIAL GUINEA
ZAIRE
UGANDA
KENYA
GABON
CONGO
RWANDA
BURUNDI
TANZANIA
ANGOLA
MALAWI
ZAMBIA
RHODESIA
MOZAMBIQUE
NAMIBIA
MALAGASY REP.
BOTSWANA
SWAZILAND
SOUTH AFRICA
LESOTHO
TRANSKEI
= SAHARA DESERT
SUB-SAHARAN AFRICA

Table 2 (1975)

Major Products of Africa as Percent of Total World Production and Percent of African Production for Selected Countries

Cashew		Cotton		Coal		Copper	
Africa	57%	Africa	9%	Africa	3%	Africa	21%
Mozambique	40%	Chad	6%	South Africa	92%	Zambia	52%
Tanzania	44%	Nigeria	4%	Rhodesia	5%	Zaire	31%
Kenya	5%	Tanzania	4%	Nigeria	.4%	South Africa	11%
Cocoa		**Sisal**		**Petroleum**		**Diamonds**	
Africa	66%	Africa	43%	Africa	9.5%	Africa	75%
Ghana	40%	Tanzania	42%	Nigeria	42%	Zaire	39%
Ivory Coast	23%	Angola	20%	Gabon	4%	South Africa	22%
Nigeria	22%	Kenya	16%	Angola	3%	Tanzania	1.5%
Coffee		**Tobacco**		**Uranium**		**Gold**	
Africa	26%	Africa	5%	Africa	24%	Africa	78%
Ethiopia	23%	Rhodesia	56%	South Africa	62%	South Africa	95%
Uganda	15%	South Africa	13%	Nigeria	28%	Ghana	2%
Ivory Coast	15%	Tanzania	7%	Gabon	10%	Rhodesia	1.9%
Tanzania	5%						

1977-78 Africa South of the Sahara
Europa Publications Limited 1977

ACTIVITY # 2

Using Tables 1A, 1B, 2 and the map, answer the following questions on your own paper.

1. Which countries are located along the east coast of Africa?
2. Which countries are located along the west coast?
3. Which countries would not be considered to be located in either of these two areas?
4. Do any of the countries in Table 1A appear in Table 1B? Name them.

Now look at Table 2.

5. List those products identified with each of the ten largest countries on Table 1A, e.g., Nigeria - cocoa, etc., Ethiopia - coffee, etc.
6. How many of the countries on Table 1A have an energy resource as a major product? Name the countries and the resource or resources.

Throughout the nineteenth and early twentieth century, most of Africa was ruled by European colonial powers, including France, England, Portugal and Germany. Only Ethiopia and Liberia were free nations. In March, 1957, Ghana became an independent country. This was the first in a series of independence days among the other 52 Sub-Saharan African countries. As a result, many changes occurred in Africa, and like a young adolescent, the continent began to develop rapidly.

A CONTINENT OF CONTRASTS

Sub-Saharan Africa is also a region of many contrasts. In the cities, there are many modern office buildings, hotels and tall apartments much like you find in the cities in the United States. In the villages, however, you see thatched huts, simple clothing and people living in more traditional ways.

One of the reasons Sub-Saharan Africa is developing rapidly is because of the discovery of the many resources that are desirable to the other countries of the world. This region mines over 75% of the world's diamonds, about three-fourths of its gold and exports two-thirds of the world's cocoa. In exchange for these resources, goods and technology are provided to the countries. The Sub-Saharan African people, in turn, use the goods and technology to develop their own countries.

ACTIVITY # 3

WORD SEARCH PUZZLE

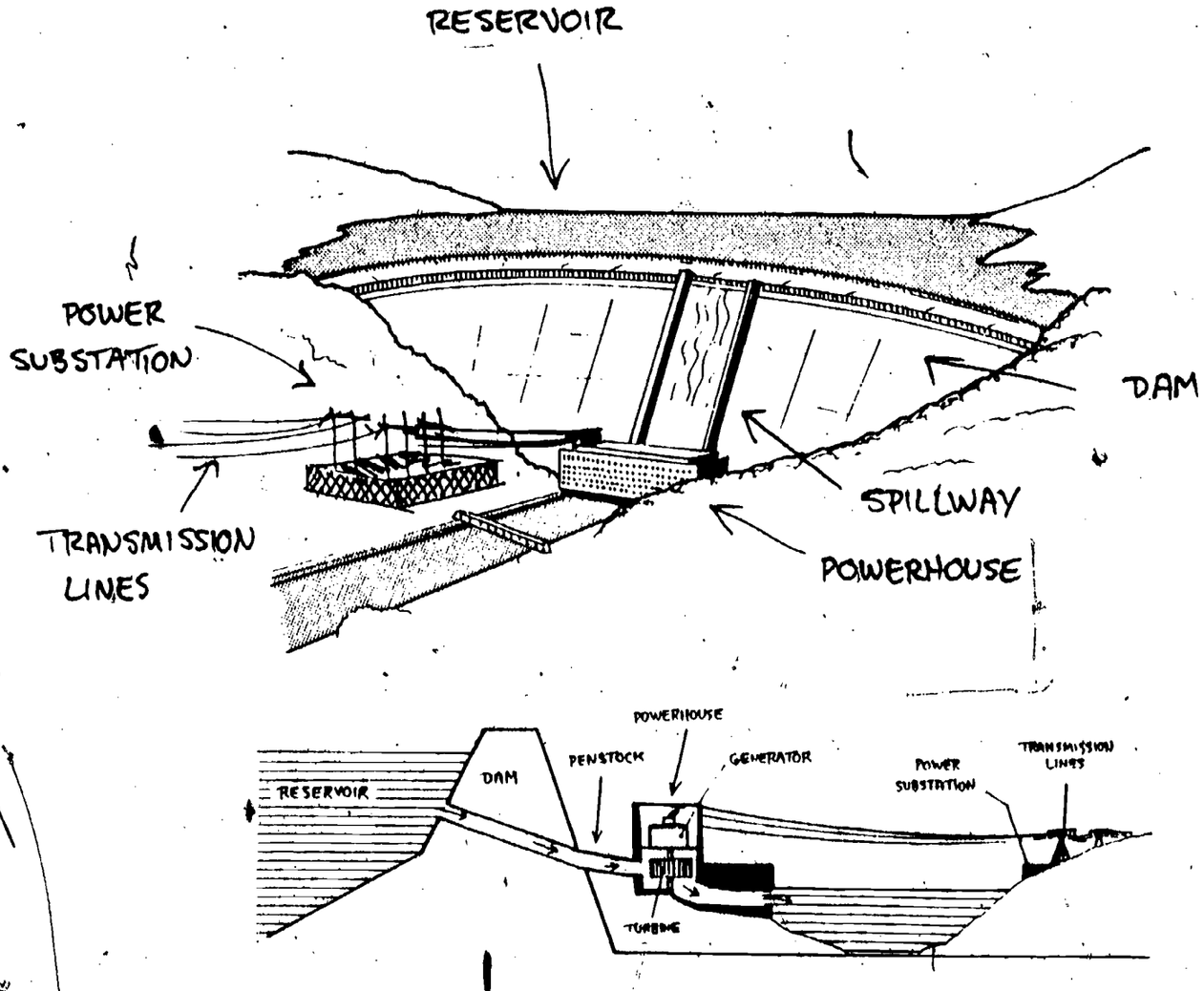
Find and circle the following agricultural products a few of the Sub-Saharan countries and the energy resources hidden in the puzzle your teacher passes out to you. Words may be found vertically, horizontally or diagonally. Africa and the Sahara can also be found hidden in the puzzle.

Cocoa	Africa	Coal
Coffee	Chad	Hydroelectric
Cotton	Kenya	Petroleum
Diamonds	Niger	Solar
Gold	Nigeria	Uranium
Sisal	Sahara	Wood
Tobacco	Zaire	

ENERGY RESOURCES OF SUB-SAHARAN AFRICA

All of Africa exports 80% of the energy resources it produces. At the same time it imports 13% of the resources it uses! Even though Sub-Saharan's mineral resources are plentiful and the region is considered wealthy, it still has energy problems. Many areas have no electricity and are totally dependent on wood as a fuel for cooking, heating and lighting. In only a few areas, namely larger cities, is electricity produced by the use of coal, oil or hydropower. However, Sub-Saharan Africa does have the potential for energy resources.

One such energy resource is hydroelectrical power. Hydroelectrical power is energy produced by falling water. The main reason Sub-Saharan Africa has this potential resource for energy is because of the topography of the continent. Topography is the surface features of a region. The rivers have many waterfalls and rapids that are a great source for hydroelectrical power. The area south of the Sahara is said to have more than 40% of the world's hydroelectrical power potential. (See drawing below for an illustration of how this type of power is generated.)



HOW HYDROELECTRIC POWER IS GENERATED

Although Africa has this potential for hydroelectricity, it has only developed 5% of this resource; and the main use of electricity is limited to urban areas. There are several reasons for this. A few of these are: the lack of money to build the actual hydroelectrical plant or facility; the lack of money to buy the electricity if it was available; and finally, the distance that the electricity often has to be transported from the hydroelectrical facility to the cities or rural areas where it is needed.

Solar energy is another energy resource that has potential in Sub-Saharan Africa. The location of the entire Sub-Saharan region is within 30^{o} North and 35^{o} South of the equator. Therefore, the area is rich in solar energy potential. Many countries, such as Upper Volta, Nigeria, Gabon and Tanzania, are presently researching solar energy.

Sub-Saharan Africa Has Other Energy Resources. Those found in the region are uranium, coal, petroleum, natural gas and wood, which is the basic energy resource throughout all of Sub-Saharan Africa.

In some areas, such as the Sahel, the 20 million inhabitants are entirely dependent on wood. The Sahel is a desert-type land that stretches across the entire width of Africa just south of the Sahara Desert. Even in the handful of cities in this area, wood is used for cooking. Wood must be used cautiously and be conserved in Sub-Saharan Africa. Drought and over use has made wood scarce as well as expensive.

Uranium is found abundantly in South Africa and, therefore, nuclear power has the potential to be a common resource of energy for many parts of Sub-Saharan Africa in the near future.

If Sub-Saharan Africa can develop its available as well as its potential energy resources, its energy future will most likely become more secure.

ACTIVITY # 4

You are now going to play Bingo using information you have learned in this Lesson. You will receive a Bingo card from your teacher. Cut out each of the sixteen squares and glue them on a new sheet of paper. This will allow you and each of your classmates to have different cards and you will not all Bingo at the same time.

ENERGY AND SUB-SAHARAN AFRICA

LESSON TWO: NIGERIA: A SUB-SAHARAN OPEC NATION

Lesson Objectives

- To learn how interdependence relates to Nigeria
- To identify Nigeria's major energy resources
- To identify Nigeria's major exports
- To imagine what effect the loss of a major source of petroleum to the United States would have on you and your family

ACTIVITY # 1

Imagine that you are a newspaper reporter going on a trip to Sub-Saharan Africa. First, decide on how you will get there. Will you go by boat or plane? Why did you choose the form of transportation you did?

The first country you will visit is Nigeria in western Africa. When you first arrive you will land in Lagos, the capital, which is located in southwestern Nigeria. You will notice many contrasts in the city itself and the rural areas around Lagos. When you first step off the plane or boat, look around to see what types of things use energy.

Imagine you are still in Nigeria and you are asked to write a newspaper article on the way the people use energy. Included should be the energy resources you think Nigerians might depend on. You may use the Map on page 12 to give you some clues, but do not worry if your article is not 100% accurate. Write what you imagine to be the case or what you have learned from other sources. Save this paragraph as you will refer to it later.

_____

_____

At first glance you may not notice a great deal of difference between Lagos and many other modern cities around the world. You would see cars, motorcycles, mopeds, bicycles, transit buses and a railroad. And, of course, you probably arrived at the international airport. If not, you probably sailed into its harbor on an ocean liner. In any case, you are in the midst of one of the fastest growing cities in Nigeria.

The traffic congestion, however, would not be as great as the traffic congestion in Indianapolis or Chicago, because the actual number of vehicles per person is less in Nigeria than in the United States. Nigeria, with almost 100 million people, has the largest population of any African nation. Today, the population is still growing at one of the highest rates in Africa. It is projected that by 1990 there will be 1/4 more people in Nigeria than it can feed with its present rate of agricultural production. For this reason Nigeria must depend on other countries; it must meet some of its basic needs by importing goods. Import means to bring in goods from other countries.

At the same time Nigeria depends on other countries for such goods as machinery, cereals, grains, etc., it is among the leading producers of a number of products for exports. Exports are goods shipped out of the country. Examples of such goods are peanuts, cocoa, tin, palm oil and palm oil products. Nigeria is a member of OPEC, and the seventh largest producer of oil in the world. OPEC stands for the Organization of Petroleum Exporting Countries. Nigeria is the United States' second largest oil supplier and accounts for 17% of America's foreign oil purchases. Nigeria's oil accounts for 80% of the total value of goods exported by the country. This exchange of goods or products can be used to pay for needed imports and technological knowledge.

ACTIVITY # 2

In pairs, find a place in the classroom to talk to your partner. Spend the first few minutes finding out about each other if you are not good friends. Next, do the following:

1. Each of you should separately think of something you have that your partner needs or would like. It might be a book, a piece of food you brought for lunch, an article of clothing, etc.

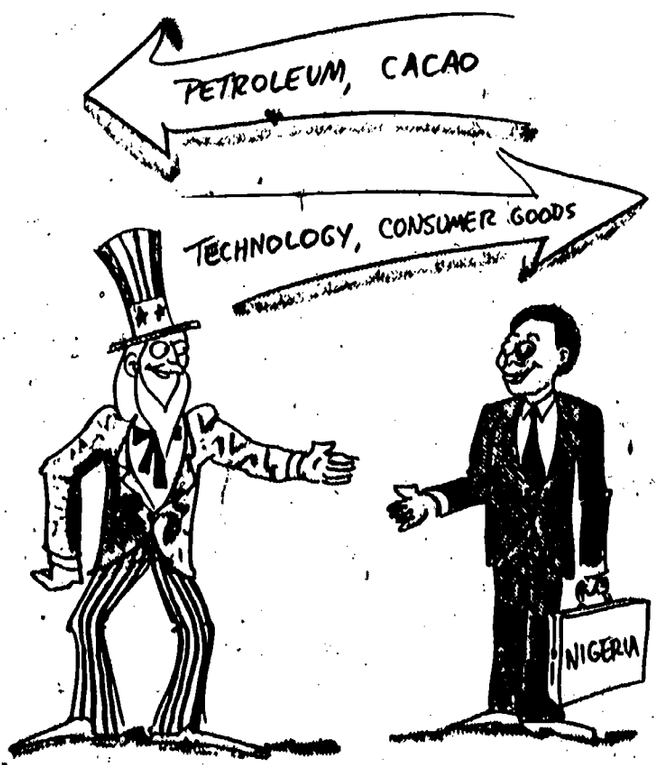
2. Tell each other what you have thought about and determine if the other person would like to have what you have to offer. Decide on something each would like.

3. Next, determine what a fair exchange would be for the use of whatever each of you have. What type of things do you have to consider when you decide whether to trade or not. (Hint: One of you may have something more valuable than the other and then what do you do?)

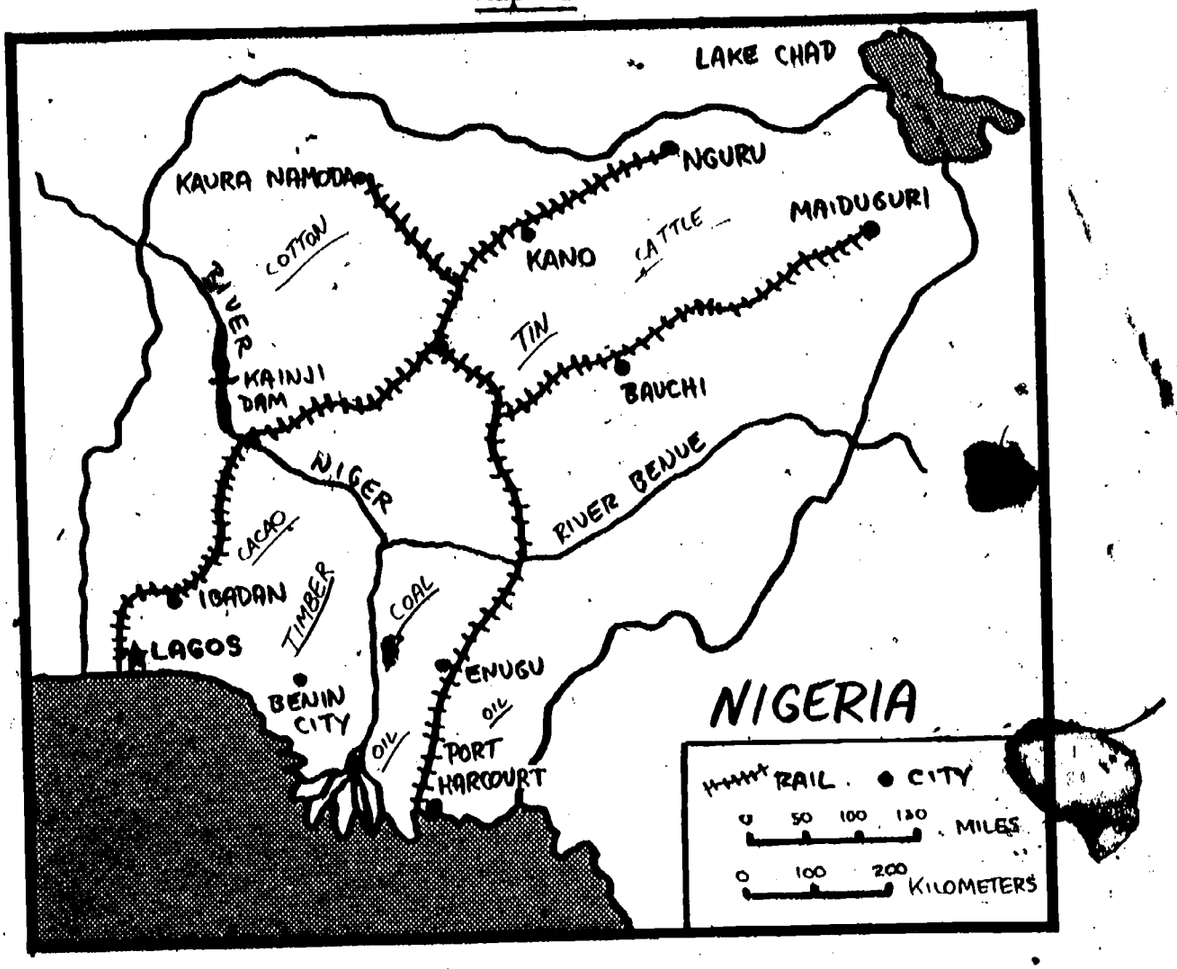
4. If you decide not to trade, what alternatives might be considered. (Hint: Are there other people in the classroom with whom you can discuss the exchange of your product?)

5. As a whole class, discuss how this activity relates to Nigeria.

Since Nigeria has resources that other countries want and other countries have goods and knowledge that Nigeria needs, it is involved in international relationships. These relationships are known as interdependence. Interdependence is countries sharing and affecting one another.



Map #1



ACTIVITY # 3

Study the map of Nigeria and answer the following questions on a separate sheet of paper.

1. Identify and list the energy resources.
2. What other resources are shown?
3. What resources does Nigeria have that we could use?
4. What resources does the United States have that Nigeria can use?
5. Describe the way the United States and Nigeria cooperate with one another. Include the benefits and problems that might result from such a relationship?
6. Imagine that the supply of oil to the United States from Nigeria, which amounts to 17% of all oil imported into this country, has

suddenly been shut off. What effect would this have on you and your family? Next, list at least five alternatives, things you could do about the situation that results from having less oil available. Finally, of the alternatives you listed, choose the one you feel would be the best and state why.

_____

_____

RURAL NIGERIA

While many people are moving from the country or rural areas into the growing cities of Nigeria, over 60% of the people still work and live off the land. Many Nigerians make their living from subsistence farming.

Subsistence farming is a type of farming where only enough crops are raised to feed a family. This type of farming is often difficult. The work is usually done with hand tools and human energy. In these rural areas, traditional methods are used and little change has occurred over the years. The main energy resource for these areas is wood. Charcoal and kerosene are used in some places. Wood is used most often to cook with and to heat with when necessary. Because the people are poor and wood has been available without any cost, it is rapidly being used up throughout Africa. And as the wood has become a more scarce resource in some rural areas, people have had less time to do farm work because more time is spent gathering this essential energy resource.

ACTIVITY # 5

Imagine that you are a farmer in the United States 200 years ago. A small group of other farmers and their families are with you. As you move into the area that is now Indiana, you find an all wooded area. Imagine that you have only the crude hand tools that were available.

1. On a separate sheet, describe how you and the other families would work to clear the land and build a home.
2. Would you cooperate with the other families? Why or why not?
3. Would you be a subsistence farmer? Explain.
4. What would be your main source of energy for doing work? For cooking and heating?
5. How does the life you describe compare to rural Nigeria today? Can you understand some of the problems they face? Explain.
6. How can interdependence help rural Nigerians?

In this lesson you have studied how interdependence, the sharing among individuals, groups, areas within a country and between countries provides opportunities for everyone to benefit. The United States benefits from the foreign trade it conducts with other countries and it also provides goods and services that are helpful to these countries.

You have finished your stay in Nigeria. While there are many things you have not had time to investigate in this rapidly developing country, we need to continue our journey to Tanzania. Because of time, you will fly to Tanzania instead of taking the one transcontinental highway that stretches from Nigeria to Kenya. Transcontinental means across the continent.

ENERGY AND SUB-SAHARAN AFRICA

LESSON THREE: CONSERVATION: A NECESSITY

Lesson Objectives

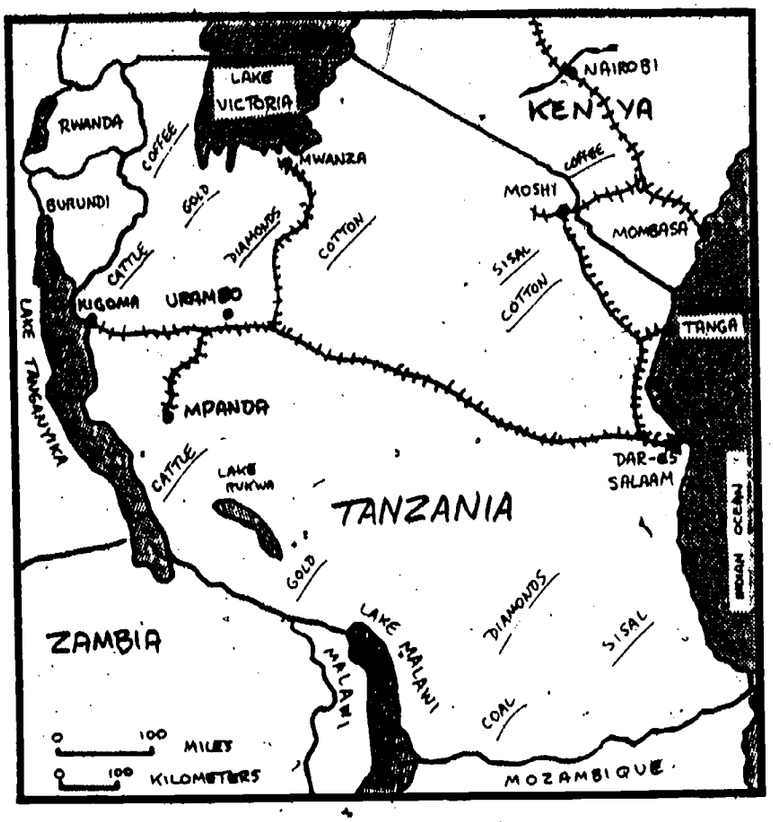
- To compare energy use in Tanzania and the United States
- To develop conservation strategies that relate to you and your family
- To identify energy resources in Tanzania
- To identify energy problems in Tanzania

ACTIVITY # 1

Imagine that you are continuing your Sub-Saharan Africa trip. You head southeast to the country now called Tanzania.

We fly into Dar es Salaam, the capital located on the east coast. As a newspaper reporter you are again asked to write an article on the way the people of Tanzania live, how they use energy and the energy resources they might have available. Not having any experience with Tanzania, you decide to write the article later after your journey. In the meantime, you jot down a few thoughts you have about the country. List these in your notebook and put it in a safe place until you need to refer to it later.

Most people of Tanzania live and work in rural areas. Over 60% of the total farm production is food for personal use of the Tanzanian people. Eighty-five percent of all of the country's exports are agricultural products, such as sisal, coffee, cotton, tobacco and cloves. Sisal is a plant used in making rope. This means that Tanzania is almost entirely an agricultural country. As a result, the main source of energy for this country is muscle power and wood. (See Map 1 for the location of agricultural products.) Tanzania has few large trucks or lorries as they are called, and even less modern farming equipment. They use hand hoes and other tools to do their farming.



ACTIVITY #- 2

Interview either a student, teacher or someone else who is familiar with farming. If there is no resource person available, find the information in the library.

1. Find out what kinds of things are grown.
2. Ask if they grow more crops than their family can use. What do they do with the extra crops if the answer is yes.
3. Ask what type of farm machinery they use.
4. Have them estimate how much oil and gasoline they use in one year to run their farm.
5. Write a summary of the interview or information.
6. Compare the results of your interview of information with the way Tanzanians farm.
7. Are there any ways you can recommend for the American farmer to conserve on energy? What are they?

Conservation or the wise use of resources is as important in Tanzania as it is in our country. However, because of the degree of development of the country, conservation efforts are in different forms.

Tanzanians must be concerned with their land as it is the basis of the people's survival. A problem for the Tanzania farmer is that some of the land in the country is not very fertile. They do not always have enough rainfall and for many years in the past they have overused the soil. Years of overgrazing and poor farming techniques have left the land nonproductive and incapable of supporting the people who depend on it. Therefore, one of Tanzania's major conservation concerns is the wise use of the land itself so it can be used to provide a more generous supply of the energy resource everyone needs -- food.

Many Americans are planting more and more vegetable gardens to supplement their food needs. Gardens can provide recreation as well as cut food costs. As food costs rise due to increases in the cost of energy used in farming and transporting goods, even more Americans may choose to grow home gardens for their families just as the Tanzanians do.

ACTIVITY # 3

By yourself or with two or three other students pretend that you want to grow a garden to raise food for your family. You are going to plan and if possible, actually grow a garden.

1. The garden is to feed you and your family. If you plan to grow a garden, you need to check with your parents. Decide how much land you will need and how much you can actually take care of.
2. Where will you locate your garden?
3. What crops will you grow?
4. What tools will you need?

5. Where will you get the seeds or plants?

6. When do they need to be planted? Obviously, if it is the middle of the winter, you will not be able to actually start your garden. However, you can plan it and if possible, in the spring actually grow a garden.

7. How do you plan to store or preserve your food?

After you have finished planning your garden, answer the following questions:

1. Was it difficult to plan a garden big enough to feed a whole family? What types of things did you have to consider?

2. Was there a variety of crops you wanted to grow? Would this cause problems?

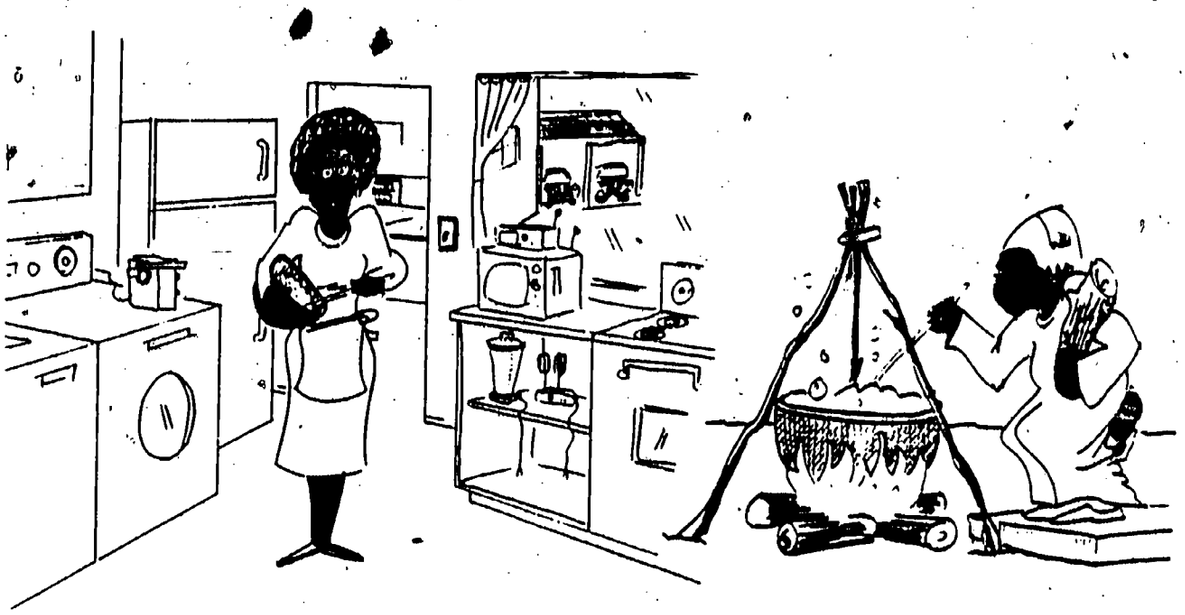
3. Would your garden be difficult to take care of with only hand tools?

4. How will you pay for the seeds or plants you want to grow?

5. Were you able to find a place that had good fertile soil? If not, what problems might you have?

6. What types of energy would you use if you actually decide to grow a garden?

Most Tanzanians do not have the convenience that most Americans do when it comes to preparing a meal or heating their homes. Most of the people in the United States can flick a switch to turn on the heat to keep warm or to cook a meal. The average American kitchen is full of electrical appliances and energy-using devices. Tanzanians, on the other hand, often have to walk miles just to gather the firewood they use to cook each evening meal.



ACTIVITY # 4

Following is a chart of annual KWH use for each of several home electricy consumers. KWH stands for kilowatt hour and is a standard measurement of electric energy.

	Average KWH per year
Room air conditioner	935.0
Corn popper	12.0
Cooking appliances	1,500.0
Dishwasher	430.0
Curling iron	3.6
Freezer	1,500.0
Lighting	1,000.0
Blow dryer	24.0
Refrigerator	1,400.0
Color TV	525.0
Microwave oven	300.0
Black and white TV	360.0
Water heater	4,000.0
Electric heat	13,400.0
Stereo/Hi-Fi	109.0
Washer and dryer	1,360.0
Radio	86.0
Miscellaneous	1,205.0

1. Judging from the figures on the preceding page, in which areas are the greatest savings possible?

2. What are ways of saving in these areas?

3. List all the items in your home that use electricity.

4. Which of these would be the easiest to give up?

5. Which would be the most difficult?

6. Which do you think is most important in energy conservation and why?

   Turning off lights or turning back the thermostat in a house with electric heat

   Turning off the TV or cutting down on the use of hot water

   Using cooking appliances less or turning back the heat

   Using the dishwasher or air conditioner less

7. What can you do to help other people to understand which are the top priority areas for conserving energy?

Wood accounts for 96% of Tanzania's energy use. Even many of the people who live in cities use wood for cooking and heating because they cannot afford the electricity. Tanzanians are now trying to conserve wood, because supplies are being rapidly used. And although wood is a renewable resource, it takes years to replace a mature crop. Therefore, Tanzanians while implementing different types of conservation methods are also looking for alternate sources of energy just as we are in the United States.

In rural areas of Tanzania, the Government is establishing small farming villages called Ujamaas to help the people. The word "Ujamaa" is a Swahili word meaning familyhood. The idea behind the villages is that

the people will share resources and cooperate with one another. Therefore, they will stay in the rural areas and not move to the urban areas that cannot provide for them. It is the hope of the Government that energy can be conserved as a result of creating the Ujamaas.

The American Government, too, is encouraging its citizens to establish new energy conservation habits. As students you can practice and encourage members of your own families to use many good energy habits. A few of these might include the following:

Buy all-aluminum cans and recycle when finished

Use and reuse each piece of aluminum foil before recycling it

Buy only returnable bottles and return them

Reuse glass jars

Do not accept plastic bags at the grocery store or at the dry cleaners, or if absolutely necessary, reuse them for other items

Turn down water heater

Do not buy frozen foods in plastic cooking pouches

Take your own shopping bags to the store

Write on both sides of paper

Use cloth napkins, towels

Do not throw away leftovers. Use for lunches or add to pet food

Use cloth handkerchiefs

Reuse wax paper liners in cereal boxes for wrapping other items

Save and bundle newspapers

Take a shower instead of a bath

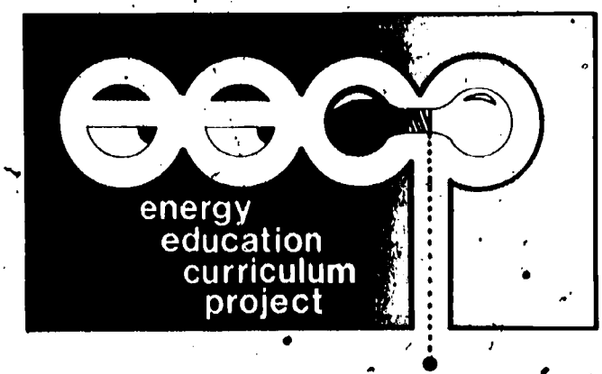
Walk or car pool to school if you do not ride a bus

Read a book or play with friends instead of watching television

The above list is just a beginning. There are hundreds of ways to save energy, but it will take an effort on everyone's part to make it work. Can you think of ways to save energy? How will you help?

ACTIVITY # 5

As a concluding activity, refer back to the notes that you made as a newspaper reporter at the beginning of this lesson. Now write the article on Tanzania. Include how they live and the problems they face in the area of energy. Suggest some ways Tanzania may be able to solve their problems and ways you feel you can conserve energy.



Energy and Europe

TEACHER'S GUIDE FOR ENERGY AND EUROPE

LESSON ONE: EUROPE'S ENERGY RESOURCES

Introduction:

The lessons on "Energy and Europe" can fit into the regular curriculum when Europe is the content area. Hopefully, these lessons will add a new focus to studying Europe as well as aid the students in becoming effective energy users.

The chapter on "Energy and Europe" has three lessons. The first lesson focuses on the types of energy resources. Through various activities students will learn the major energy resources in Europe. The students will become aware of Europe's major dependence upon coal prior to World War II, as well as the shift to oil as the major energy resource since World War II. Imagination will be employed to enable students to create an understanding of what it would be like to live without certain resources. Prerequisites include the ability to read a chart and understand a map key.

Objectives:

1. Students will be able to identify energy resources available and used in Europe.
2. Students will learn that different countries of Europe depend upon one another for various energy resources.
3. Students will be able to read and interpret data from maps and charts.
4. Students will be able to imagine what it might be like to live without a certain energy resource.
5. Students will be able to identify values they hold regarding certain energy resources.

Time: Two to three days.

Instructional Strategies:

1. Help the students identify Europe's energy resources by going over their list of unscrambled words. They are:

1. SOLAR	5. WIND
2. GEOTHERMAL	6. NUCLEAR
3. WOOD	7. PETROLEUM
4. HYDROELECTRIC	8. COAL

Ask the students to explain each energy resource.

2. Chart I shows the increase in petroleum dependence from 1950-1975. Ask the students to think about this change and discuss possible reasons and repercussions. If necessary, help the students to understand why and how oil dependence on foreign sources costs more and can cause problems. Who controls the price and supply of the oil? How does money leaving the country to purchase oil lead to economic and political problems? (e.g. balance of payments problems and inflation.)

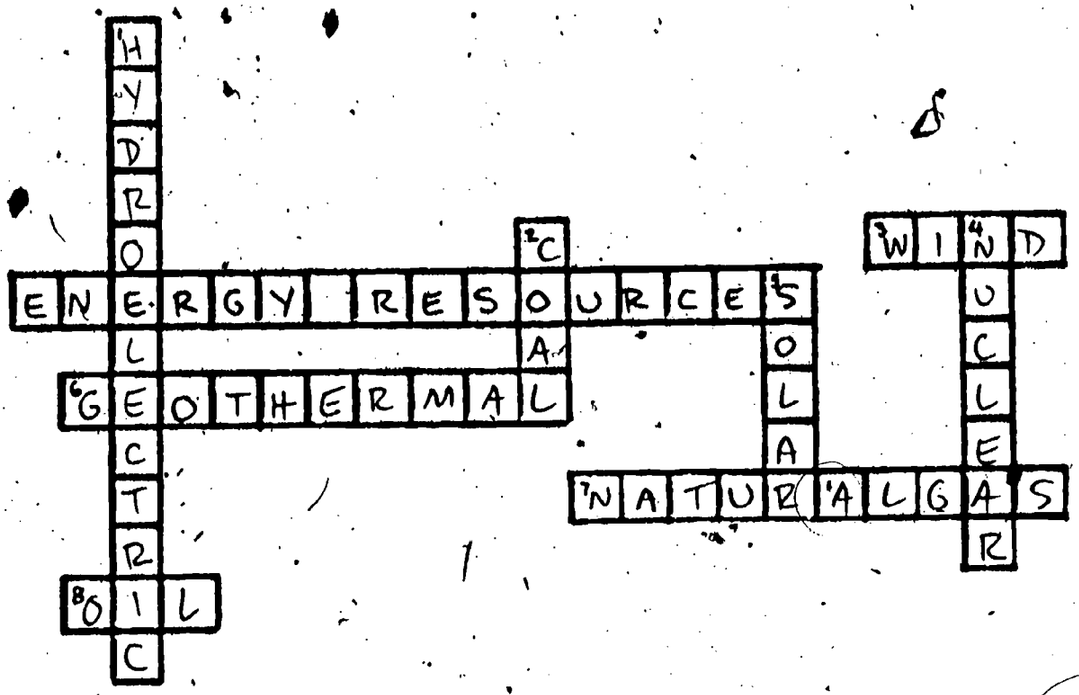
3. Ask the students to study Chart II and the Map of Energy Resources in Europe. They should be able to identify the energy resources represented on the map and chart and their general location by country. Conduct a brief discussion of energy resources and their location. Be sure to point out that no one country has all the resources. In addition, help the students see that they are not distributed evenly.

4. The questions related to the map and chart will help the students learn the different types of energy resources available to countries in Europe and how they are distributed. The countries having five or more resources are: France, Italy, Norway, Sweden, U.S.S.R. and West Germany. The countries having two or less resources are: Denmark, Greece, Luxembourg, Portugal, Switzerland and Turkey.

5. Question three in Activity # 3 provides the students with an opportunity to identify some of their values related to energy resources. After the students write the paragraph explaining the choices they made, help them to identify what factors were important to them in deciding on a particular country. Point out that the decision they make reflects their values. Mention to the students that there are no right or wrong answers but they should be aware of the reasons for their choices.

6. For the next activity you may wish to divide your class into small groups of four or five students each. Depending on the nature of your class you may want to let the students organize their own small groups. The students are to select a different energy resource from everyone else in their group. The students will then imagine what their lives would be like without this resource. Some students will want to write this image down. It may be in story form. Again, depending on your students, allow 15 to 30 minutes. Have them share this image with the rest of the group. The students should become aware that how they see the world reflects the values they hold. They should also become aware of other people's values through listening to the images others have created. Have the more advanced students draw pictures of their images.

7. Hand out the crossword puzzle (Hand Out #1) and use it to reinforce the major types of energy resources of Europe. The answers are provided below.



DOWN

1. Widely used in Sweden and Austria.
2. Main source before WW II in Europe.
4. Great Britain leader in use of this modern-day source.
5. Energy made possible by the rays of the sun.

ACROSS

3. One of the oldest forms of energy used on farms.
6. Produced by water over hot rocks deep in the earth's crust.
7. Found in the North Sea (two words).
8. Replaced coal after World War II, also known as "black gold."

8. Activity #5 deals with the cost of gas in Europe and the United States. The ten questions can be answered by students individually or you may wish to conduct a class discussion. Factors that influence the cost of gas in Europe and the United States can include government regulation and taxes, supply, demand and price. Discuss with your class how the price of gas affects how people live. As the price of gas continues to rise in the United States, how will their life-styles change?

Student Assessment: Correct answers for the assessment instrument for "Europe's Energy Resources" on the following page are:

1. B, 2. A, 3. B, 4. D, 5. A, 6. D

STUDENT ASSESSMENT

ENERGY AND EUROPE

Lesson One: Europe's Energy Resources

1. Before World War II, European energy supplies came largely from

   A. oil.
   B. coal.
   C. wood.
   D. water.

2. Since 1950, what energy source has seen the greatest increase in use in Europe?

   A. petroleum
   B. nuclear
   C. hydroelectric
   D. geothermal

3. How are Europe and the United States similar regarding oil?

   A. Both export oil to Africa.
   B. Both import over half of their oil.
   C. Both import less than 25% of their oil.
   D. Both produce their own oil.

4. As in the United States, gasoline prices are going up. How does this make people change?

   A. People take longer vacations.
   B. Prices do not change people's habits.
   C. People drive faster.
   D. People buy smaller cars.

5. How do gasoline prices in most European nations compare to prices in the United States?

   A. Gasoline costs about twice as much in many European nations.
   B. Gasoline is slightly higher in most European nations.
   C. Gasoline prices are about the same in Europe.
   D. Gasoline costs slightly more in the United States.

6. What can you conclude from the following chart?

Energy Resources in Europe

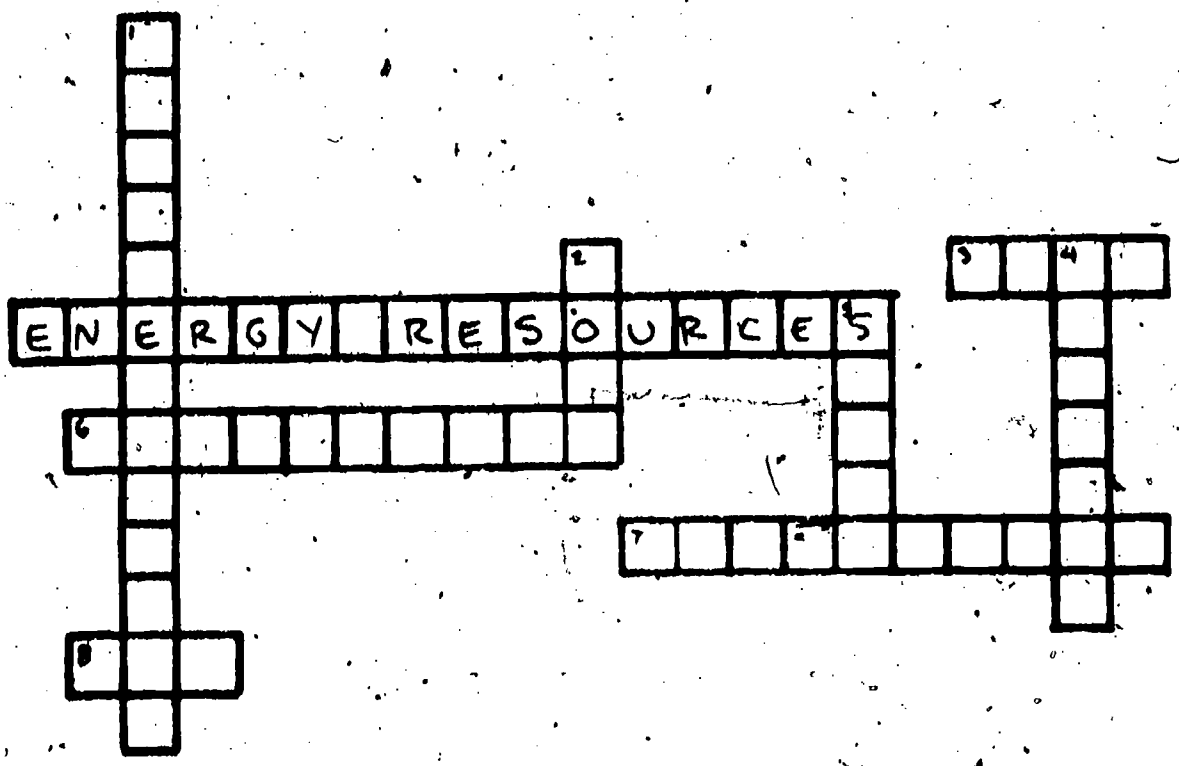
	Coal	Oil	Natural Gas
Poland	-	-	-
Portugal	-	0	0
Rumania	(x)	(x)	(x)
Sweden	-	0	(x)
Switzerland	0	0	0
United Kingdom	(x)	(x)	(x)
U.S.S.R.	+	+	(x)

Key:

0 no supply
- minimal supply
(x) moderate supply
+ adequate supply

A. Sweden and Switzerland probably export coal.
B. Rumania and the U.S.S.R. probably import oil.
C. United Kingdom and Sweden probably import natural gas.
D. The U.S.S.R. and Poland probably export coal.

HAND OUT # 1



DOWN

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ACROSS

3. One of the oldest forms of energy and often used on farms.
6. Produced by water over hot rocks deep in the earth's crust.
7. Found in the North Sea (two words).
8. Replaced coal after World War II; also known as "black gold."

10

LESSON TWO: THE COMMON MARKET AND ENERGY

Introduction:

This lesson uses the often discussed Common Market to illustrate the concept of interdependence. The students will become aware of the idea of dependent and interdependent relationships. It also provides the students with the opportunity to create and implement a shared project. There are no prerequisite skills.

Objectives:

1. The students will acquire knowledge of how different cultures depend on one another for various energy resources.
2. Students will acquire knowledge about interdependence and energy in different countries of Europe.
3. Students will imagine situations and share examples of dependence and interdependence.
4. Students will be able to recognize problems that result from too much dependency.
5. Students will be able to recognize the benefits of interdependent relationships.
6. Students will participate in a student generated activity in order to experience interdependence.

Time: One to two class periods.

Instructional Strategies:

1. Students should read the material on the basketball game and answer the questions regarding dependent relationships in Activity #1. The students should then use their imaginations to create new ways of depending on others. Have them share these with the class. The exercise asking students to identify types of dependence and ways in which they depend upon others is intended to provide an opportunity for them to learn how others are involved in their lives. During the discussion on the problems of too much dependency, the example of the U.S. and Europe and their dependency on the Middle East can certainly be mentioned. Through class discussion develop the ideas on dependence which the students have presented and introduce the idea of cooperation.
2. Work with students in doing Activity #2. Then have them share their diaries in class. This exercise should reinforce their thinking about dependence and interdependence.

3. Students should read the material on Interdependence, Energy and Europe. As they conclude this reading, have them identify ways in which the members of the Common Market cooperate and depend upon one another. This would include the sharing of energy resources, other goods and resources without the imposition of import tariffs.

4. The purpose of Activity #3 is for the students to cooperate in a joint effort as well as save energy by sharing resources. The students should be encouraged to come up with as many different ideas as possible. An additional activity may include organizing a student committee which will work with the school principal and/or others to find ways in which the school could save energy by sharing resources.

5. For those students who need a review or reinforcement activity, "The Common Market Review Sheet" can be used. Students should put the names of the Common Market countries on the dotted lines of the review sheet. They should then make a list of the ways these countries are interdependent on a separate sheet of paper. The answers are: Ireland, Denmark, Britain, Belgium, Italy, Greece, France, West Germany, Luxembourg, Netherlands.

   For those students who can handle an additional assignment, here's one that would allow them to use their research skills as well as obtain an even greater understanding of energy resources and interdependence. Have the students pick an energy resource or an energy product and trace it back to its origin. Include in the report all the countries and various people handling the resource or product before it gets to them.

Student Assessment: Correct answers for the assessment instrument for "The Common Market and Energy" on the following page are:

1. D, 2. B, 3. A, 4. C, 5. B

STUDENT ASSESSMENT

ENERGY AND EUROPE

Lesson Two: The Common Market and Energy

1. Depending on mutual cooperation with other nations in trading goods and ideas is called

   A. alliance.
   B. independence.
   C. self-protection.
   D. interdependence.

2. Taxes on imported goods are called

   A. windfalls.
   B. tariffs.
   C. penalties.
   D. bonds.

3. The European Common Market has

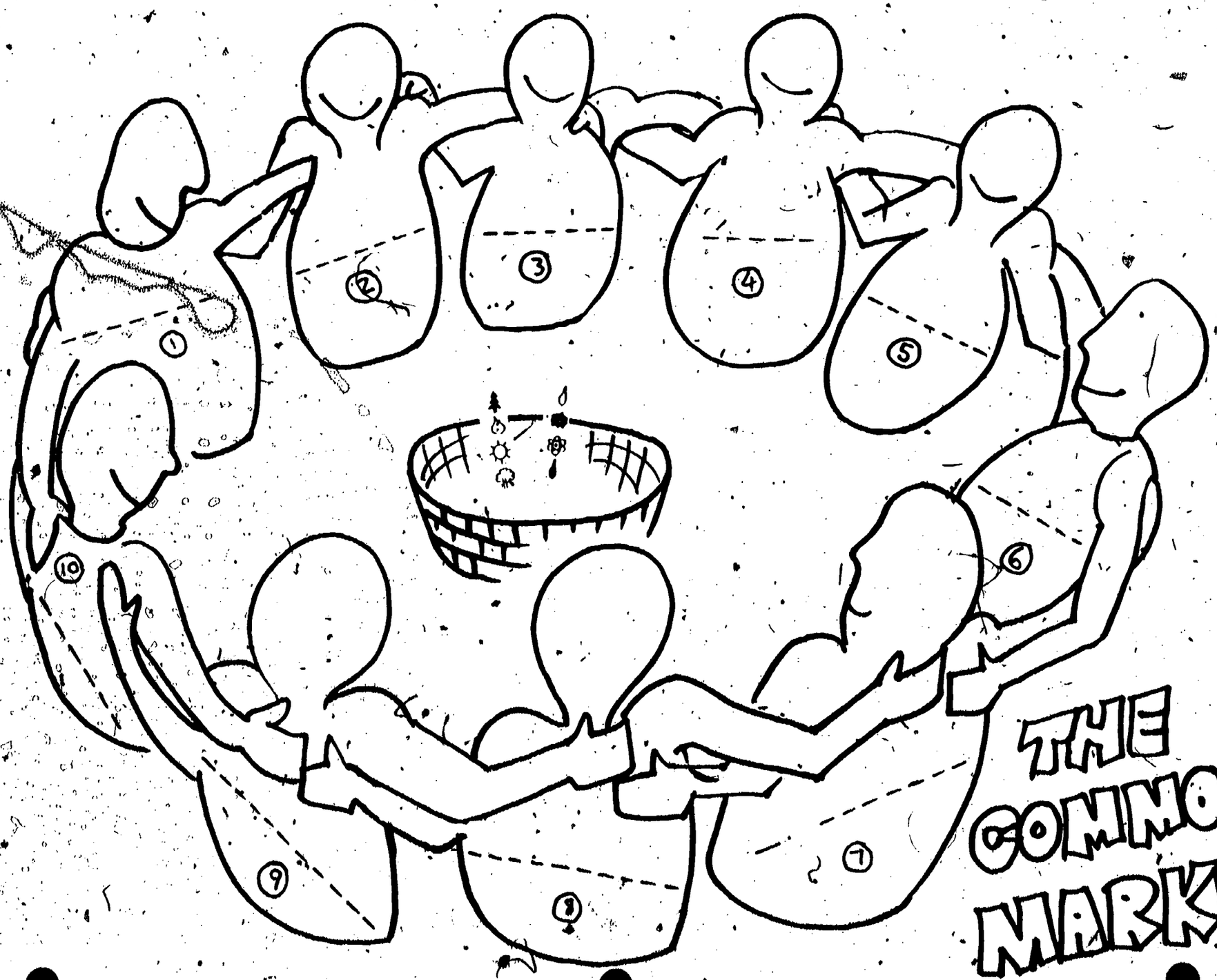
   A. reduced trade barriers.
   B. kept workers in their own nations.
   C. limited the use of nuclear energy.
   D. maintained controls on travel.

4. What would tend to increase the trade of coal among Common Market nations?

   A. raising taxes on coal profits
   B. raising the price of coal
   C. reducing tariffs on coal
   D. reducing the number of coal miners

5. How have Common Market nations tried to meet their increasing need for energy?

   A. By sharing in the development of nuclear power.
   B. By sharing the North Sea oil among all members.
   C. By buying oil from the United States.
   D. By building huge solar power generators.



THE COMMON MARKET

LESSON THREE: ENERGY USE IN TWO AREAS

Introduction:

In this lesson the students will learn about two different lifestyles from two different cultures and the uses of energy. In addition, they will compare their own lifestyle with the two models. Students will determine ways in which the conservation of energy can be utilized in each case. The students will be asked to imagine new ways to conserve energy and to share these images with the class. Students will also be asked to experience a week without an electrical appliance. Prerequisite skills include understanding the term conservation.

Objectives:

1. Students will be able to identify different values concerning energy use in Poland.
2. Students will become aware of their own energy using habits.
3. Students will acquire knowledge of energy conservation techniques in Poland.
4. Students will use their imagination to learn how their lives would be different without a particular energy resource.
5. Students will be able to compare differences of energy use in Poland and the United States.

Time: One to two days.

Instructional Strategies:

1. Before the students read the materials on Paul and Alice, have them write a paragraph on how they as individuals would spend a typical day. Included should be all the ways in which they use energy.
2. Have the students read the materials on Paul and Alice. You may have to deal with ethnic jokes at some point. Hopefully, this will not distract from the lesson. When they finish reading the materials, have them write a comparison on the different lifestyles of Paul, Alice, and themselves. They should include in their comparisons the different ways the three consume as well as save energy.
3. Have the students identify the various energy consuming items in Alice's home. They should be able to identify 19. After they check off the ones they have in common as well as list any additional items, the students should become more aware of their own energy using habits.

4. Paul's activities should be used to identify different ways another culture saves energy. The students should come to the conclusion that there is usually more than one alternative for saving energy. Have the more capable students conduct interviews with different people around the school to find out how others in the school conserve energy. They can draw pictures or make a chart showing these methods.

5. Encourage the students to imagine in as many ways as possible what it would be like not to have one or more of these items. Have them discuss these ideas with the class. Give the students time to imagine ways to conserve energy. Have them tell their ideas to the class. List on the board all the ways that are mentioned to conserve energy. Have the students write these down at the end of the discussion.

6. Help the students identify one item they are willing to do without for a week. You may want to discuss consequences of not being able to use the given item. Making a contract with each student is one way of implementing this activity. At the end of the week, discuss the results. Also, a discussion should be made on what would be a more realistic time period to use or not to use the item. Remember conservation is the wise use of energy.

Student Assessment: Correct answers for the assessment instrument for "Energy Use in Two Areas" on the following page are:

1. B, 2. A, 3. D, 4. D, 5. C

STUDENT ASSESSMENT

ENERGY AND EUROPE

Lesson Three: Energy Use in Two Areas

1. Conservation is

   A. doing without resources.
   B. using resources wisely.
   C. getting the highest price for resources.
   D. starting parks to prevent the use of resources.

2. Among Polish families, it is most common to see

   A. small cars.
   B. dishwashers.
   C. clothes dryers.
   D. color televisions.

3. How does energy use compare between teenagers in Poland and teenagers in the United States?

   A. Polish teenagers use more energy for transportation, but not as much for entertainment.
   B. Polish teenagers use about the same amount of energy as teenagers in the United States.
   C. Polish teenagers use more energy for entertainment but not as much for transportation.
   D. Polish teenagers use less energy for transportation and entertainment.

4. Electricity is measured in

   A. gallons.
   B. cubic feet.
   C. decibels.
   D. kilowatts.

5. Which of the following steps by teenagers in the United States would save the most energy?

   A. Using a portable radio.
   B. Getting a television for their own room.
   C. Watching television two hours less each day.
   D. Playing the stereo two hours less each day.

ENERGY AND EUROPE
ADAPTATION LESSONS FOR SCIENCE, LANGUAGE ARTS AND PRACTICAL ARTS

Adaptations are written in order to show students how energy and the use of energy overlaps into many areas of study. Hopefully, teachers can help students to become knowledgeable and effective energy users. These adaptations serve as a springboard for fitting the ideas of energy resources, conservation, decision-making, and interdependence into the teacher's own particular style of teaching.

Generally, the adaptations are organized around concepts. Here, three concepts are presented. The first is energy resources, the second is interdependence, and the third is conservation. With each of these adaptations, suggestions are included for science, language arts, and practical arts. Ideally, a social studies teacher, in conjunction with a science, language arts, and/or practical arts teacher, would use these adaptations with their students.

ADAPTATION LESSON: ENERGY RESOURCES

Idea. This lesson is concerned with energy resources. Students will see that when decisions are made to use various resources in certain ways that a variety of consequences may result. The costs and benefits of using an energy resource vary also.

Objectives:

1. Students will learn the different consequences that result from the use of different energy resources.
2. Students will learn that the costs and benefits of different energy resources vary.

Science Classes. Students should choose an energy resource such as coal and then gather information on the problems the resource can create. With coal, for example, students would learn about temperature inversions and sulfur dioxide as environmental problems. They would then make a class collage of environmental problems and use it as base for discussion.

Language Arts Classes. Students can organize a debate on a topic such as the mandatory rationing of gas which includes a discussion of the costs and benefits of such a plan. One half of the class will be for gas rationing and one half will be against it. When they finish, the students can write a summary of the debate and a rationale for the side they would declare the winner.

Practical Arts Classes. Students will trace the energy resources that are used in making and operating certain tools or machines they use in shop. They also do this in home economics with food items, cooking utensils, and clothing. They students should try to find the different resources that go into making certain items as well as the amount of each resource. The amount of time in terms of human energy could also be determined. Finally, students should determine the costs and benefits of using various energy products and which are most efficient in energy use.

ADAPTATION LESSON: CONSERVATION

Idea. The idea here is for the students to identify conservation strategies and apply them to their own lives. Students will see how they can conserve on energy and energy products of various kinds in activities they commonly undertake. They will make specific personal conservation plans in order to form important habits of energy conservation.

Objectives:

1. Students will identify ways to conserve energy.
2. Students will apply these strategies to their own lives.

Science Classes. The students should pretend they are going on a backpacking trip in the woods. They need to buy groceries, medical supplies, and other supplies that they will need for the two-week period they will be gone. They must plan out each meal and how much of each item they will use. After they finish planning the trip, have them write what they learned about conservation.

Language Arts Classes. Students should create a play to depict the world in the year 2020 if we continue to consume energy at our present rate. They should choose a setting such as their home, classroom or community. The dialogue should reflect energy resources that exist at the time and their availability, how and what energy products are made and how they are used. Students should act out the play when they are finished and analyze the ways energy can be saved now to improve the future.

Practical Arts Classes. In shop classes have the students save all kinds of scrap materials for a given length of time. With these materials they are to create a collage or a new product. Have them discuss how saving and re-using materials is conservation. In home economics classes, have the students keep track of how much food their families throw out for a week. After the week is over, have them devise a plan to cut back on waste. Carry out the plan and then discuss the results.

ADAPTATION LESSON: INTERDEPENDENCE

Idea. The idea of these lessons is to help the student better understand the concept of energy interdependence in their everyday lives. Energy interdependence stresses our need for energy resources and how resource production, distribution and use mutually affects people.

Objectives:

1. Students will be able to give examples of energy resource interdependence.
2. Students will be able to apply the idea of interdependence to their everyday lives.

Science Classes. For this lesson have your students list examples of energy resources that they depend on. How do other people depend on them also? Next, have your students rank these energy resources according to degree of dependence. Which one or ones are most important to them? Why?

Language Arts. Ask students to write a dialogue which features two people from the same country or different countries. The dialogue should show how these people depend on each other for energy resources and products. Have them show how one person's consumption of energy affects others. Then ask them to act out the dialogues in class. Discuss how interdependence is illustrated in the dialogues and its consequences for different people.

Practical Arts. Give your students a simple recipe such as a cake to prepare. Tell them that they may not use some basic energy source such as electricity in a stove or electric mixer. Without actually preparing the meal, have them outline the steps they would take to complete their task. From this, discuss their dependence on energy in food preparation. They may decide to prepare the meal.

ENERGY AND EUROPE

LESSON ONE: EUROPE'S ENERGY RESOURCES

Lesson Objectives

- To identify energy resources in Europe
- To use your imagination to determine what it would be like without a certain resource
- To identify your values regarding the use of energy resources

ACTIVITY #1

Energy resources are any resources that can be used to produce energy.

The following eight scrambled words are the most commonly used energy resources in Europe.

1.	AOSLR	5.	NWID
2.	RELAEGTOMH	6.	LRUANEC
3.	ODOW	7.	MUELORTEP
4.	THECIRYRDOCEL	8.	AOLC

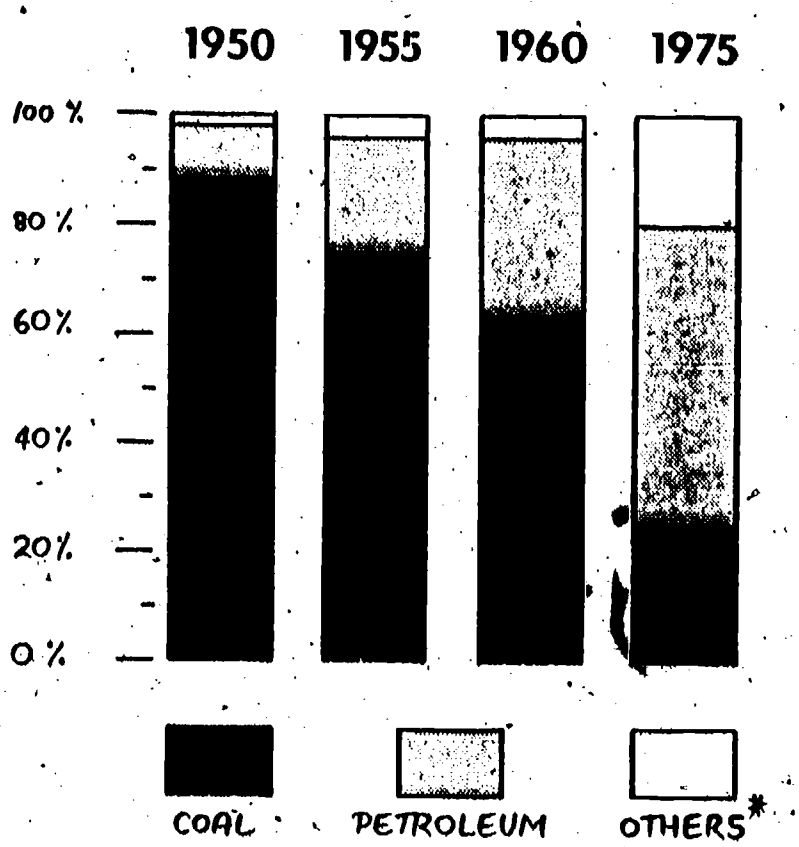
Using your own paper unscramble the words and write them correctly.

EUROPE CHANGES FROM COAL TO OIL

In studying Europe we learn that it is not a very large land mass, but it is made up of many nations. The Europeans have many different backgrounds and speak many languages. In this lesson you will learn that European countries also have many different energy resources they depend upon. This was not always true. Before World War II almost all of Europe was dependent on coal for its energy. Later it became more dependent on oil. See Chart I on the next page.

CHANGING ENERGY SOURCES FOR WESTERN EUROPEAN COUNTRIES

CHART I



1950 — 1975

* INCLUDES HYDROELECTRIC, GEOTHERMAL, NUCLEAR, ETC.

EUROPE HAS MANY ENERGY NEEDS

After World War II, Europe became more industrialized and many changes occurred. The Europeans also became concerned with air pollution and the causes of lung disease. With these changes and concerns Europe became very dependent on other resources for energy; mainly oil, which quickly became known as "black gold." Not having a large supply of oil of their own caused Europe to become very dependent on other nations. They must import (bring in from other countries) large quantities of oil which increases the cost. This is still true today. However, most of the countries are now trying to do something about their particular situation. Even so, it appears that international support and cooperation is necessary for Europe to adjust.

THE AMOUNT OF RESOURCES VARIES

Look at Chart II and the Map I on the following pages. Europe has many energy resources including oil, solar, natural gas and wood. The resources are not evenly spread over the continent. Some countries have as many as six resources available while others have only three or four and still others only one or two. The amount available of each of these resources varies as well. When you refer to the chart, keep in mind the following differences. The (-) on the chart means that while the country has a particular resource it is only a minimal supply and a major amount of the resource must still be imported. The (x) indicates a moderate supply which means that even though a country has this resource it still must import some to meet its total needs. The (+) means an adequate supply and that the major portion of the energy for the country is produced from this resource and it may export it as well.

ACTIVITY #2

Refer to the Chart II again and answer the following questions on a separate sheet of paper: 1) In which countries are the major deposits of coal found? 2) Which countries have developed nuclear energy? To what degree? 3) Which countries have an adequate supply of hydroelectric energy (electrical power generated by falling water)? 4) Name four countries that must import a major portion of their petroleum.

EUROPE MUST IMPORT RESOURCES

The European countries not only depend on one another for their energy needs, but they also depend heavily on the Middle East and other nations such as Algeria in North Africa and Venezuela in South America

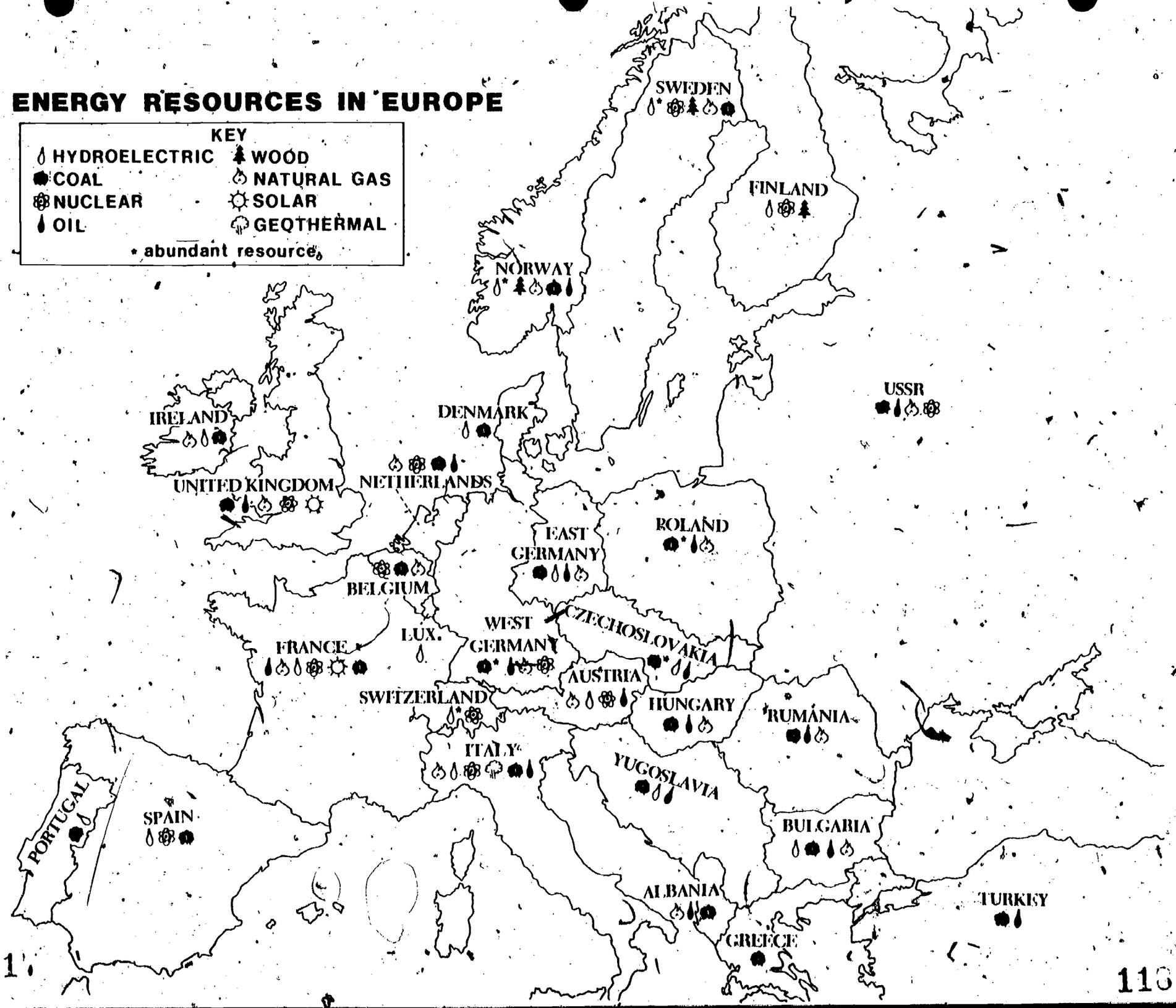
CHART II

EUROPE AND ITS ENERGY RESOURCES

Key: – minimal supply
⊗ moderate supply
+ adequate supply

European Country	Coal	Petroleum	Natural Gas	Hydro-Electric	Nuclear	Geo-Thermal	Solar	Wood
Albania	–	–	⊗					
Austria		–	⊗	⊗	⊗			
Belgium	–		–		⊗			
Bulgaria	–	–	–	⊗				
Czechoslovakia	⊗	–		⊗	–			
Denmark	–				⊗			
East Germany	⊗	–	–	⊗				
Finland				⊗	⊗			⊗
France	–	⊗	⊗	⊗	⊗		⊗	
Greece	–			⊗				
Hungary	–	–	–					
Ireland	–		⊗	⊗				
Italy	–	–	⊗	⊗	⊗	⊗		
Luxembourg				⊗				
The Netherlands	–	–	+		⊗			
Norway	–	–	⊗	+				⊗
Poland	+	–	–					
Portugal	–			⊗				
Rumania	⊗	⊗	⊗					
Sweden	–		⊗	+	⊗			⊗
Switzerland				+	⊗			
United Kingdom	⊗	⊗	⊗		⊗			
U.S.S.R.	+	+	⊗	⊗	⊗			
West Germany	⊗	⊗	⊗	⊗	⊗			
Yugoslavia	⊗	–		⊗				
Spain				⊗	⊗			
Turkey	–	⊗						

ENERGY RESOURCES IN EUROPE



for their petroleum needs. In this way, they are similar to the United States because we also depend on other countries for our petroleum needs. In fact, almost 50% of our "black gold" had to be imported in 1978.

ACTIVITY #3

Once again think about energy resources. On a separate piece of paper list the ones discussed in the lesson. Are there any others? Did you include solar, wind and geothermal energy? Solar energy is energy produced by the sun. Geothermal energy is available where the hot core materials of the earth are close enough to the surface to tap. A sail boat uses wind energy. There are a few others but these are the major energy resources known today.

By studying Chart II and the map on Europe and its Energy Resources, answer the following questions on a sheet of paper.

1. Which country or countries have at least five different energy resources? List their names and the resources found in each country.
2. Which have only two or less? List the names and resources they have available.
3. Using the chart as a guide, choose a country you would like to live in based on the energy resources you would have available. On your separate paper write a paragraph explaining why you chose the country you did. Were there any other reasons for your decision? What were they?

CHANGING OUR WAYS

Changing one's habits and the way one lives is difficult. Often times people take things for granted. However, shortages of oil have caused many problems for the European people as well as the American

people. In recent times gas prices have doubled in America. In fact during the summer of 1979 gas prices in the United States increased somewhere from one cent to five cents per week. The price increases have forced people into thinking of new ways to meet some of their needs. For example, many families are buying smaller cars and not taking long vacations. More bicycles and mopeds are being used for transportation in cities. You can probably think of ways in which your own life has been affected.

ACTIVITY #4

Choose an energy resource. After a short time you will be asked to describe what you think your life would be like without the energy resource you have chosen or been assigned. Write your description on a piece of paper. In describing your life without a certain resource, try to be creative and let your imagination go. For example, without wood maybe you would mention that you would have to write your lesson with your fingers in the dust outside your classroom. There are no right or wrong answers; so you can be as creative as you like.

EUROPE'S GAS PRICES HIGHER THAN UNITED STATES

The price of gas in Europe is even higher than the United States. Look at Figure I on the next page.

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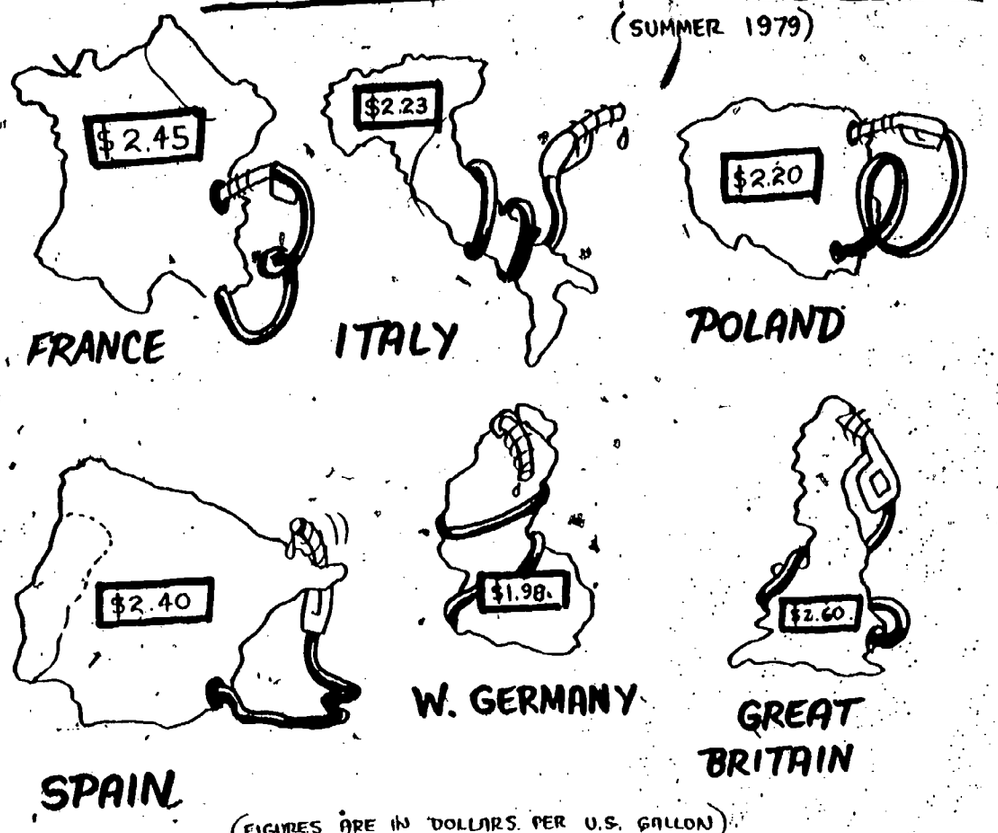
Figure 1



Prices in Europe

ACTIVITY #5

The prices of American gas has increased rapidly in recent months. 1) What do you predict might happen in the next six months to the prices? 2) Does the price of gas in Europe influence your answer? 3) Why or why not? 4) Find the cost of gas in your area. What is it? 5) Do you think gas will soon cost as much as it does in Europe? 6) By what date? 7) List 3 factors that influence the cost of gas in Europe. 8) List 3 factors that influence the cost of gas in the United States. 9) Are they the same in both countries? 10) Explain how they differ or are similar.

ENERGY AND EUROPE

LESSON TWO: THE COMMON MARKET AND ENERGY

Lesson Objectives

- To acquire knowledge about interdependence
- To imagine situations of dependence and interdependence
- To become aware of some of Europe's energy problems and how they are similar to the United States

Imagine the day of a big basketball game. Your school's team is taking the court to play their biggest rival from the neighboring town. As the game begins you notice that something is wrong. The team's players are not playing together. Each person seems to want to do everything alone rather than cooperate with each other. The game continues and still no one is willing to pass or do anything for anyone else. The players seem to have only their individual goal in mind. You watch as your team loses the big game. After the game, you hear the coach trying to explain to all the players about the nature of team cooperation and interdependence in order to achieve common goals.

ACTIVITY # 1

In the picture on the following page pick out the players that aren't working together. Think about your own life and in what ways you cooperate with or depend on others and ways they cooperate with or depend on you. On a separate sheet of paper do the following: 1) List five benefits that you receive by depending upon others and from others depending upon you. 2) What type of problems might arise from depending on someone or something too much? For example, you might depend on one certain person for friendship and that person moves away with her family. What problems would this cause? You can think of others. 3) Write down five problems that may arise from too much dependency. 4) Share at least one of these ideas with the class.

COOPERATION AND INTERDEPENDENCE

The basketball game you have just read about is an example of each team member working alone or independently. As you can see, being on a winning team or achieving a goal means cooperating and working together. This is also called interdependence because people are sharing and affecting each other.

There are many different ways that people or things depend on one another. Flowers depend upon bees or other insects to carry pollen to other flowers in order to produce seeds. Insects depend on flowers and plants for food. A dog depends on its owner to feed it each day. The owner of the dog depends on it for companionship. Many of your teachers depend on a car for a ride to work. You depend upon many people and things as well.

ACTIVITY # 2

Think about the year 2000. Try to imagine how you will depend upon something or someone in that year. Be creative, using new ways in which you might be dependent. For example, maybe there will be very few cars or, more likely, gas will be so high you can't afford a car. Therefore, you are totally dependent on a bike or the neighbor for transportation. Further, imagine you are writing in your diary in the year 2000. Include a description of what your life is like as a result of the dependent relationship you have created. Describe your feelings about your life as well.

INTERDEPENDENCE, ENERGY AND EUROPE

Interdependence is a concept which can help you understand some of Europe's energy problems. Being a continent of many countries has always caused problems for Europe. In fact, before World War II, western Europe resembled your basketball team. That is, the eighteen different countries of this region acted as if each nation was completely capable of taking care of itself. Because they were each concerned about individual power and wealth, trade restrictions or tariffs (taxes on goods coming into a country) were used. The restrictions were intended to protect the individual country's products. Goods produced within the country would be cheaper than imported goods. The tariffs did not solve all of the problems for the European countries. In fact, the rise of tariffs caused some bad feelings among countries.

Formation of the Common Market. Eventually in 1948 three countries, Belgium, Netherlands and Luxembourg, also known as the Benelux Countries,

joined together and decided to lift the tariffs among their countries. Goods and resources could now be traded among all three countries without the tariffs being enforced. As other European countries saw the need for sharing resources such as iron ore from France, coal from West Germany, and workers from Italy, a cooperative European community began to appear. This community, also called the European Common Market, agreed to get rid of all tariffs, remove travel restrictions, and allow movement of workers between member countries.

Today, the Common Market cooperates in many areas, including the development of a European Atomic Energy Community. In 1973, Great Britain, Denmark and Ireland also joined the Common Market. Most recently, in the spring of 1979, Greece joined the Common Market, making the total population 260 million people.

European countries share goods and resources among themselves. This sharing has helped to improve the opportunities for Western Europe, but at the same time has created some problems. The increased development of Western Europe's industry has brought about an increased demand for energy. Even with coal, some oil and natural deposits as well as hydroelectric power, Europe needs more energy than it now has available to provide for the current rate of production of its goods and services. As was mentioned in Lesson One, it still must import large amounts of oil and natural gas from countries outside the Common Market.

ACTIVITY # 3

Imagine that you are called upon to help the Common Market countries solve some of their energy problems. From the information you have just read suggest some solutions for them. Include in your answer the countries that would be affected and what resources they might have to offer. (You may need to refer back to Chart II in Lesson I for help.) Write your solutions on your own paper.

EUROPE'S STRUGGLE

European countries continue to struggle to find various solutions to their energy problems. The shortage of energy and increased prices has occurred as a result of changing from coal to oil and natural gas and because of the uncertainty of resources available outside of Europe. Many countries are now trying to find ways to meet their energy needs through the sharing and exchange of energy resources among the Common Market countries. The discovery of oil and natural gas in the North Sea area has given hope to the situation. For many areas of Europe it may also mean a return to coal as a major energy source or a greater use of nuclear generated electricity. Hopefully, continued cooperation and sharing, as well as the conservation of their resources, will provide satisfactory solutions to energy problems that European countries may face in the future.

ENERGY AND EUROPE

LESSON THREE: ENERGY USE IN TWO AREAS

Lesson Objectives

- To identify different values concerning energy use in another culture
- To become aware of your own energy using habits
- To imagine what your lives would be like without a certain energy resource
- To compare your lifestyle with the lifestyle of a boy from Poland

ACTIVITY # 1

Conserving energy means the wise use of energy as opposed to not consuming any energy. Before reading the letters from Paul and Alice write your own energy ideas about how you would spend a typical day. Be sure to include all the ways in which you use energy from the time you get up in the morning until the time you go to bed at night.

LETTER FROM PAUL

Dear Friends,

Hi, my name is Paul and I am in the 7th grade. I live with my mom and dad in Warsaw which is the capital city of Poland. We have a four-room apartment on the edge of the city. My father, whose name is Frederick, is a professor at the university and my mom, Marcia, works at home and does some volunteer work at a clinic in the center of our city.

I am usually the last one out of bed in the morning. Dad calls me to get up about 7:15 because I have to be in school by 8:00 a.m.

My school is about two miles from my house and I walk each day. That may seem pretty far but it's fun because my friends join me and we laugh and joke a lot. I also walk home.

After school I usually do my homework right away and then I have the evening free to do whatever I want. My family and I are very lucky because we have a telephone, a stereo, one black-and-white TV and a radio. We also have a small car. You might want to know that we don't have a dishwasher or a clothes dryer because they use too much energy and cost too much.

Some of the things I enjoy doing are riding my bike, walking and playing soccer. I also love to use my skateboard! Here are some pictures of me.

PAUL'S ACTIVITIES

Would you send me some pictures of you and let me know some of your hobbies?

By the way, my family and I have been talking about the energy problems here in Europe and we're wondering if you have any in the United States. We have been trying to conserve by using "save lights." These are lights that use fewer kilowatts. (A kilowatt is a unit by which electricity is measured.) Gasoline costs over $2.00 per gallon in Poland so we only use the car for vacations, grocery shopping, and in bad weather. We also turn our electric water heater off until just before we are going to use it. Since I like soccer so well I usually play that with my friends after dinner instead of watching TV. After soccer I like to listen to the radio with my parents to find out what is happening in your country. It would be very nice if you would write to me and tell me the things you like and how you live. Since I am studying about energy and the United States I would also appreciate it if you would tell me about your problems and how the kids are helping. Please write soon.

Your friend,

Paul

LETTER FROM ALICE

Dear Friends,

Hello. I live in Indiana and I am writing to you so that I can tell you about myself and I can learn more about you. Before I forget, I was hoping maybe you could help me with a problem we are having in our family. My dad told me the other day that we had to be more careful because gasoline costs so much and our electricity bills are so high. If you can think of

ways for me to help save energy, that would be great. My dad would appreciate it too!

Anyway, about me. I am in middle school and I live with my brother Ted and my mom and dad. We live in the country about three miles from the main business district. School is about two miles from our house. Ted goes to college which is on the other side of town. I hate to get up in the morning so I have an electric alarm clock that rings real loud. I have to be at school by 8:30 a.m. Before school, I usually watch TV on one of our three TV sets. If there is time I also have to help with some of the housework because both of my parents work. Mom usually does a load of washing or puts the clothes in the dryer while Dad makes breakfast. After I eat I usually put the dishes in the dishwasher.

I always ride to school with my mom who works at a newspaper five blocks from my school, or with my dad, who is a teacher in an elementary school near the center of town. School lasts until 3:00 p.m. but I have to wait until 4:00 or 4:30 when Ted picks me up.

I like to do my homework right away while I listen to my stereo. After studying, it's usually time to eat. When dinner is over I often watch TV in my own room while my parents watch their own TV. It's neat to have your own TV, telephone and stereo.

I like lots of things. I like to swim, cook, garden, ride horses and sail. What kinds of things do you like? I am sending you a picture of our house. I hope you write back to me soon.

Oh, don't forget to tell me about how to save energy! I just can't think of anything.

Your friend,

Alice

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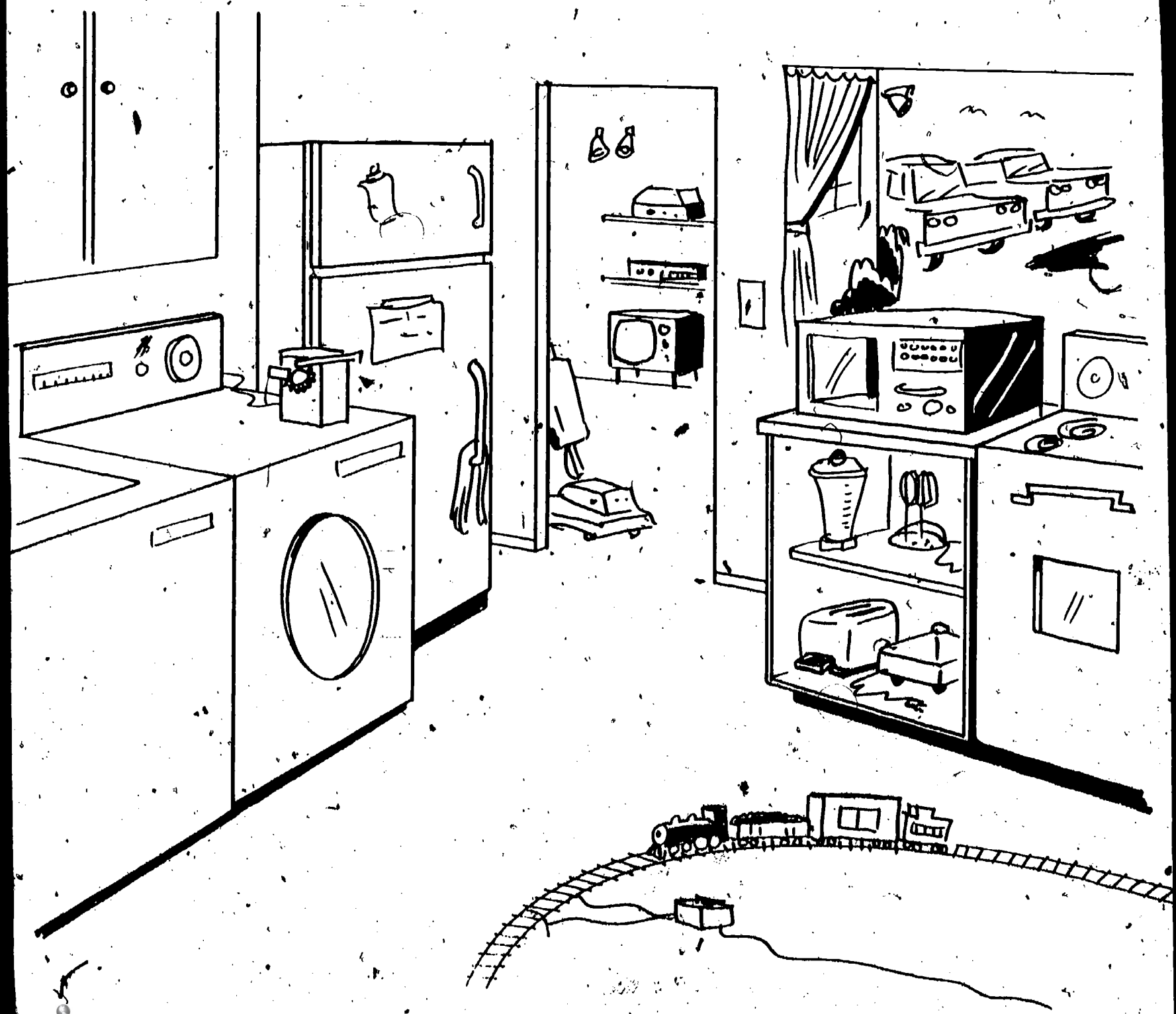
ALICE'S HOME



ACTIVITY # 2

1. Refer back to your typical day.

2. Compare the ways in which you use energy with both Alice and Paul.

3. Are you more like Alice or more like Paul?

4. Why do you think so?

Even though Paul lives in Europe and Alice lives in the United States they both were asking for information or for help about energy concerns.

ACTIVITY # 3

1. Write a letter to Paul and one to Alice. You may include the pictures that Paul and Alice asked you to send them in your letters.

2. Explain the difference between the two letters you write. Was the advice and information the same? Was it related?

ACTIVITY #/4

Many people, whether they live in Europe, the United States or Africa, have similar energy-consuming items (items that use energy). Yet people conserve or use these items to different degrees.

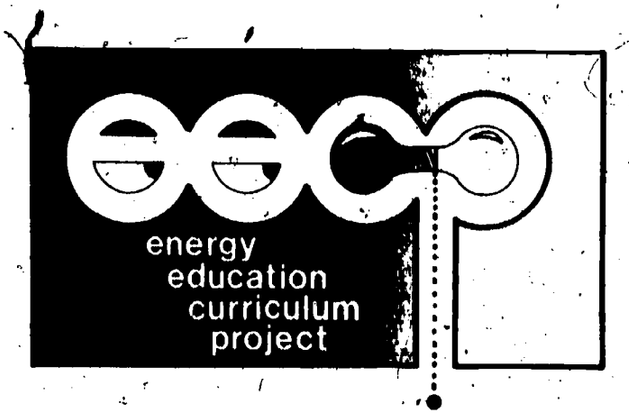
1. On a separate sheet list all the energy-consuming items that you can think of that you have in your home. How many?

2. Count the number of energy-using items you can find in the picture of Alice's home. How many?

3. Are there any items you just listed that you personally could use less? Name them.

4. Next, imagine what it might be like without any one of these items. Then write this on your separate sheet of paper.

5. Many times we think to ourselves that we don't know what something would be like until we have tried it. So here's your chance! Are you willing? Making something real is often making it exciting! Choose an energy-consuming item you use at least once a day or more. You will not be able to use it for the next full week! Record your feelings about not using it, as well as what you did instead of using the item. Report back to the class when your week is up. Remember -- you can't use whatever you choose for one week -- no exceptions! Keep Paul in mind when you think of using the item.



Energy and Asia

TEACHER'S GUIDE
ENERGY AND ASIA
LESSON ONE: ENERGY RESOURCES IN ASIA

Introduction:

This is the first of three lessons on Energy and Asia. It focuses on energy resources. Here we are concerned about energy resources in developing nations. The concept of development creates a puzzle for energy. To develop we need to use resources, yet it is important to conserve world energy resources. This dilemma will be studied in light of three countries in Asia: Japan, India and China. The students will learn about the variety of energy resources in use in Asia and apply their knowledge to their everyday lives. There are no prerequisite skills for this lesson.

Objectives:

1. Students will imagine ways in which energy use in Asia is different from their own use of energy.

2. Students will identify basic energy resources in Asia.

3. Students will analyze differences in energy resources in Japan, China and India.

4. Students will analyze how resources are used for development in China.

Time: Four to five days.

Instructional Strategies:

1. Use Activity #1 to get students to imagine what energy resources are like in Asia. They should be able to see that it is different to have few energy resources and little petroleum. The United States has many energy resources and much more petroleum than Asia. There is also a difference in wealth and students should see that it is easier for wealthy countries to obtain energy than for countries that are less wealthy. This activity should give students an idea of what Asia is like and what it means to be different from the United States.

2. Ask students to review material about Asia and the section on Asia's energy resources. They should see that there is a type of country called "developing" countries and their energy problems are different from our own. Use Activity #2 in this lesson in order to reinforce the development concept.

You might find a story to use with students who need to reinforce the idea of development and have them use the story to talk about what energy resources might be needed by a nation. You might want more advanced students to write a story about a nation which needed particular energy resources.

3. Have students study the material on Japan, China and India. You might want to use maps in your classroom in order for them to place these countries in Asia. They should know the resources of each of these countries and use Activity #3 to stress the similarities and differences across countries in Asia. Asia is a vast continent with many different countries. All three of these are dramatically different. Students should be able to see these differences, as well as differences from the United States.

   You might want to have some students draw maps of these countries and find their natural resources. For more advanced students you might want them to explore the use of particular resources in these countries and to bring in material related to energy use in one of these countries. They should then discuss this material in class.

4. Use Activity #4 to summarize the ideas of resources, development and conservation. Students should see the controversy in developing nations over conservation and the problems and prospects for developing nations in energy use. They should also use their collages for a basic discussion of how they might conserve on the use of energy products.

5. Some students might want to try out a conservation plan for one of the products in their collage. Encourage them to keep a daily log of their use of the product. They might go one week with normal use and the next with conservation. The log sheet could be set up as follows:

WEEK ONE Regular Use		WEEK TWO Conservation	
Day	Use of Product	Day	Use of Product
Monday		Monday	
Tuesday		Tuesday	
Wednesday		Wednesday	
Thursday		Thursday	
Friday		Friday	
Saturday		Saturday	
Sunday		Sunday	

Student Assessment: Correct answers for the assessment instrument for "Energy Resources in Asia" on the following page are:

1. B, 2. C, 3. B, 4. A, 5. D

STUDENT ASSESSMENT

ENERGY AND ASIA

Lesson One: Energy Resources in Asia

1. All of the following are examples of national development except

   A. improving hospitals.
   B. growing traditional foods.
   C. making more tractors.
   D. building factories.

2. Which Asian nation is most dependent on petroleum imports?

   A. India
   B. China
   C. Japan
   D. Burma

3. Bill is traveling in rural India. What two major energy sources should he expect to see in use?

   A. coal and gasoline
   B. wood and animal power
   C. wood and nuclear power
   D. electricity and animal power

4. Since the 1950's, China has vastly increased the development of

   A. oil reserves.
   B. coal reserves.
   C. nuclear power.
   D. solar power.

5. The largest portion of China's energy resources come from

   A. wood.
   B. animal power.
   C. oil.
   D. coal.

TEACHER'S GUIDE
ENERGY AND ASIA

LESSON TWO: ENERGY INTERDEPENDENCE: A FOCUS ON JAPAN

Introduction:

This lesson focuses on energy interdependence. It uses Japan as an example to illustrate how nations can depend on each other for energy. A special highlight of this lesson is an exchange either within the school, community, United States or with Japanese students abroad, in order to find out more about their energy situation. There are no prerequisite skills for this lesson, but it would be helpful if students have studied some material on Japanese culture and/or students in Japan and what they are like.

Objectives:

1. Students will identify ways in which Japan is dependent in its energy needs.
2. Students will develop basic skills in group decision-making.
3. Students will make a plan for studying interdependence with students from Japan.

Time: Four to five days.

Instructional Strategies:

1. Use Activity #1 in order for students to be aware of the wide variety of Japanese products which are part of their everyday lives. Begin with something like radios or cars and progress to more complicated products. Students should see that high quality products they use are produced in Japan. Students should see from this activity how nations need each other and how they exchange products in order to meet needs. The activity can be a brainstorming activity. It is merely to introduce students to the idea of interdependence.
2. Have students read the material on interdependence and do Activity #2. They should see how they are dependent on some things. They should then hypothesize about what it is like for a nation like Japan to be dependent on energy resources and products. Finally, they should see how we are all interdependent in the energy situation.

   Some students may need to have the idea of interdependence reinforced. They can find pictures in their local papers and magazines which will reinforce the idea of interdependence.

You might want them to bring these pictures to class and talk about what examples of interdependence are shown. For more advanced students you might want them to develop a diary of a week in their lives and their own interdependence with people in other nations.

3. Work through the four decision rules with students. Give them plenty of examples of the use of each of the four rules in operation. Be sure that they understand the difference between majority and plurality rule. Then use Activity #3 to have the class make a decision about energy conservation.

4. Then talk with students about the impact of rules. Have them take decisions they have made in their everyday lives and show how the decisions might have been different if the rules had been different. Have students discuss the consequences of having one decision made rather than another. They should see what would happen if decisions about their everyday lives and about energy had been made using a different decision rule.

5. Then do Activity #4 with students. If there are Japanese exchange students in the school or people in the community or foreign students at a local university, they might be a useful resource. Otherwise you might try to set up an exchange between students in a junior high school or middle level school in Japan and your own students regarding the differences in energy situations. The Indiana Social Studies Guide (Section G) lists several resources for getting information and carrying this out, including the Consulate General in Chicago.

Student Assessment: Correct answers for the assessment instrument for "Energy Interdependence: A Focus on Japan" on the following page are:

1. D, 2. C, 3. B, 4. A, 5. B

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STUDENT ASSESSMENT

ENERGY AND ASIA

Lesson Two: Energy Interdependence: A Focus on Japan

1. How does the use of energy per person in Japan compare with the energy use per person in the United States?

   A. Use is the same in both nations.
   B. Use in Japan is twice that in the United States.
   C. Use in Japan is three-fourths that of the United States.
   D. Use in Japan is one-third that of the United States.

2. In order for its economy to survive, Japan must

   A. export coal
   B. export electricity.
   C. import oil.
   D. import steel.

3. The Congress votes on a bill to fund solar energy projects. What decision rule is used here?

   A. consensus
   B. majority
   C. plurality
   D. one-person

4. The third grade class talked over the use of lights in the room until everyone agreed on three ways to save electricity. What decision rule is used here?

   A. consensus
   B. majority
   C. plurality
   D. one-person

5. Three or more groups are involved in a

   A. monopoly.
   B. plurality.
   C. oligopoly.
   D. majority.

TEACHER'S GUIDE
ENERGY AND ASIA
LESSON THREE: ENERGY CONSERVATION: A FOCUS ON INDIA

Introduction:

This lesson focuses on energy conservation. India is an excellent example of alternative ways that energy can be conserved. It stretches peoples' conventional ideas about energy conservation to include humans in animal energy. There are no prerequisite skills for this lesson.

Objectives:

1. Students will identify a variety of ways that they can conserve energy.

2. Students will analyze conservation strategies involving the needs of animals and human beings as in India.

3. Students will apply conservation strategies used in India to their own everyday lives.

Time: Three days.

Instructional Strategies:

1. Use Activity #1 to get students thinking about conservation. There are many strategies illustrated in the picture. It is not important to find them all. It is important for students to study the picture and to come up with their own ideas about the ways that energy can be conserved.

2. Then work with students in understanding the variety of ways that energy can be conserved. Be sure that they understand the difference between renewable and nonrenewable resources. Have them work through the word scramble in Activity #2 in order to reinforce these ideas. Pass out the worksheet on the following page for students to use for the word scramble. The answers to the word scramble are: General answer in top box = THINK. Clues = 1. HEAT; 2. OIL; 3. LIGHTS; 4. WALK; 5. NOW.

3. Then ask students to look at the material on India and energy conservation. You may want to bring in pictures of different animals that are used for work in India. You may want to also bring in pictures showing different people using their own human labor in energy conservation. Be sure that students understand the idea of appropriate technology. When you are sure students have a lot of ideas about this have them do the next activity and develop their own plan for energy conservation using their own energy and the energy of the animals around them.

Student Assessment: Correct answers for the assessment instrument for "Energy Conservation: A Focus on India" on the following page are:

1. B, 2. C, 3. C, 4. D, 5. B

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STUDENT ASSESSMENT

ENERGY AND ASIA

Lesson Three: Energy Conservation: Focus on India

1. Which of the following is a non-renewable resources?

   A. solar energy
   B. petroleum
   C. wood
   D. hydropower

2. Conservation is

   A. doing without resources.
   B. getting the highest price for resources.
   C. using resources wisely.
   D. starting parks to prevent the use of resources.

3. A farming family in northern India is ready to plow their field. How are they most likely to pull the plow?

   A. by hand
   B. by tractor
   C. by bullock
   D. by horse

4. You are traveling in Asia and you see a traffic jam. What nation are you most likely to be in?

   A. India
   B. Afghanistan
   C. China
   D. Japan

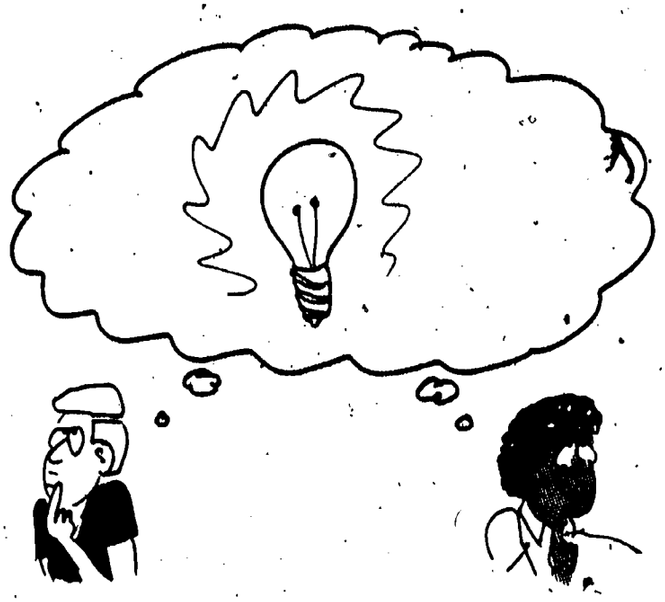
5. An example of appropriate technology would be using a wind-powered generator to produce electricity for a

   A. factory.
   B. home.
   C. stadium.
   D. supermarket.

WHAT'S THE BEST THING YOU CAN DO TO HELP SAVE ENERGY?

TO FIND OUT THE ANSWER, JUST UNSCRAMBLE THE WORDS IN THE CLUES BELOW.

THEN TAKE THE CIRCLED LETTERS AND REARRANGE THEM TO GET THE ANSWER SUGGESTED IN THE CARTOON!



PRINT ANSWER HERE → ⬭⬭⬭⬭⬭ !!

CLUES

1. MUCH OF OUR ENERGY IS USED TO A E H T AND COOL OUR HOMES.
2. MOST OF THE ENERGY WE USE COMES FROM BURNING L I O.
3. TURN OUT THE S H G I L T !
4. IF YOU'RE NOT GOING FAR, WHY NOT K W A L ?
5. THE TIME TO START CONSERVING IS O W N !

ENERGY AND ASIA
ADAPTATION LESSONS FOR
SCIENCE, LANGUAGE ARTS AND PRACTICAL ARTS

On the following pages are three adaptation lessons. They concern energy resources, conservation and interdependence. Hopefully, social studies teachers who are using the lessons on Energy and Asia will work with other teachers in Science, Language Arts and Practical Arts classes in carrying out these lessons. They will provide an important reinforcement for students who are studying about the energy situation.

ADAPTATION LESSON 1: ENERGY RESOURCES

Idea. The idea in this lesson is for students to see how energy resources are needed for the development of nations. Here we will look at a variety of ways in which things grow or develop because of the use of resources. Students should see that development applies not only to nations, but to people, forms of animal life and a wide variety of other types of developmental processes.

Objectives:

1. Students will know basic resources which are involved in development.

2. Students will demonstrate ways in which resources are used in developmental processes.

3. Students will apply ideas of the use of resources for development to their everyday lives.

Science Classes. In life science classes the growth and development of animals can be studied using energy resources. Animal intake of food and other vegetable matter can be studied. Also their use as work animals can be brought out. The students should study a specific animal and its growth pattern. They should be able to recognize the basic energy resources that are needed for the animal to grow and develop. This same concept can be applied to people if the human body is being studied. Students should see that in a specific case there is a growth or developmental pattern that is aided by energy resources.

Language Arts Classes. Students should study the term "development" and its forms and usage. They should see both the dictionary definitions and common language uses of the term. They should then write an essay on development of energy in some country in Asia and the many ways in which development occurs socially, economically, politically and in terms of individual human beings.

Practical Arts Classes. Students should set a calorie intake and see how it contributes to the development of human beings in home economics

classes. They should be able to see how food is an energy resource, as used to help human beings develop and grow. You may want to use the following comparative chart as a base (1973 figures from the World Bank):

Daily Calories Per Person

U.S.	3,330
India	2,070
China	2,170
Japan	2,510

In industrial arts classes the use of energy for building or developing any machine, tool or other piece of material can be studied in the same way. Energy is needed in order to build something or to develop it. Students should reinforce the idea of development by actually building something which requires human and non-human energy resources.

ADAPTATION LESSON 2: ENERGY INTERDEPENDENCE

Idea. The idea here is for students to study the many ways in which we are interdependent with other people and nations. They should see how energy is an especially good example of needs and wants being satisfied by multiple people and/or nations together. They should understand that we both need each other and contribute to each others' development.

Objectives:

1. Students will analyze the idea of interdependence.

2. Students will apply this idea to their everyday lives.

Science Classes. Arrange for students to engage now in a situation where they are packing for a survival trip. Have them make a list of the things they would take in order to survive in the wilderness. When students have made their lists have them compare them and compile composite lists for the class. Then talk with students about where the items they are taking for their survival come from. You should be able to show that these items come from a variety of countries. Students should understand that even though we might be alone in the survival trip we depend on other people for materials and supplies.

Language Arts. Have students write an essay on energy interdependence. You may want them to interpret an essay which is already written or to develop their own. Then have them illustrate the ways in which we are interdependent in their essay without words in front of the class. Other students in the class would then guess what basic kinds of interdependence are being illustrated by the behavior illustrated in the pantomime in front of the class.

Practical Arts. Students should make an inventory of their home economics or industrial arts classroom. They should see where material

in that classroom comes from. They should especially highlight that material which comes from China, India or Japan. When students have compiled their inventory, talk with them about how we depend on other countries for energy and energy products.

ADAPTATION LESSON 3: ENERGY CONSERVATION

Idea. Here the main purpose is to explore human and animal energy and strategies for energy conservation which use these forms of energy. Students will also be asked to carry out the conservation plan using more human and animal energy sources.

Objectives:

1. Students will be able to identify the six strategies for energy conservation.

2. Students will be able to apply their knowledge to their own energy conservation plan.

Science Classes. Teach students the difference between renewable and nonrenewable resources. Have them make a list of these different resources. Then work with them in devising conservation strategies using renewable resources as replacements for nonrenewable resources. Talk with them about how using more renewable resources can help in energy conservation.

Language Arts Classes. Have your class find ways to conserve the use of paper in your language arts class. Indicate that they must do the same work, such as writing themes, but they should think of ways to conserve. Writing on both sides of the paper is one idea. They should present these ways orally and practice oral speaking skills. Students should vote their plans and the best plans should be used by the class for the remainder of the time that they are together.

Practical Arts Classes. Students in home economics or industrial arts classes should make a list of the appliances that are used in their class. They should think of ways that they might save on using these appliances or tools substituting human labor for electrical or other energy. They should just tell which of the appliances or tools they could decide not to use in order to conserve energy. They should then institute that plan during the remainder of the class.

ENERGY AND ASIA

LESSON ONE: ENERGY RESOURCES IN ASIA

Lesson Objectives

- To imagine ways in which energy use in Asia is different from your own
- To identify some basic energy resources in Asia
- To analyze differences in energy resources in Japan, China and India
- To see how resources are used for development in China

ACTIVITY # 1

Look at the following facts about energy in Asia:

1. Most areas of Asia have few energy resources compared to other parts of the globe.
2. Most Asian countries have very little petroleum.
3. Most countries in Asia are not wealthy.
4. Wealthy countries in Asia, such as Japan, get most of their energy resources from other countries.

How do these facts differ from the situation in the United States? How would we use energy differently without rich resources and petroleum?

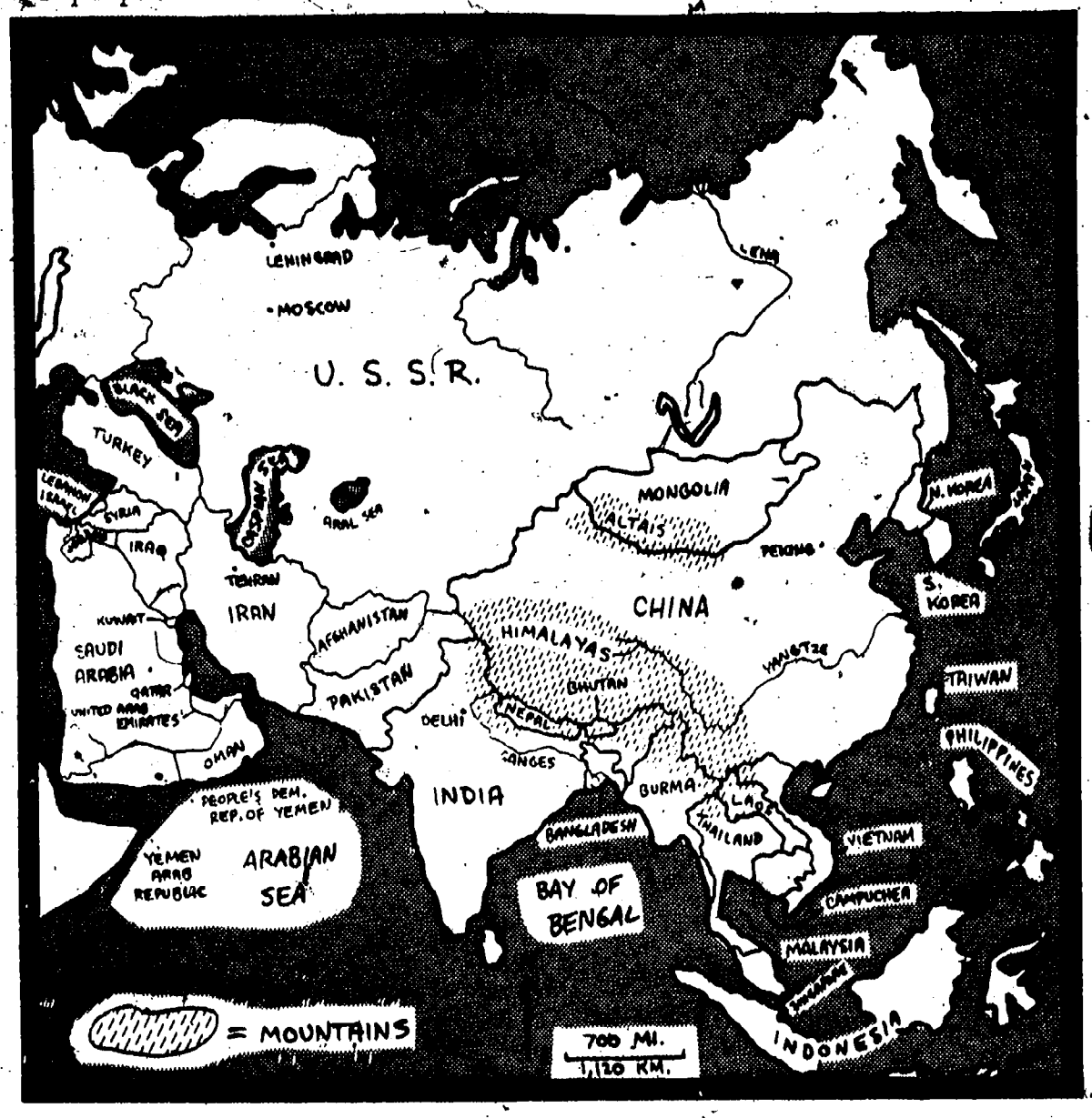
_____

_____

ASIA'S ENERGY RESOURCES

Asia is a vast land mass. Look at the map on the following page. You can see that Asia covers over a third of the land on the entire globe. There are many different areas of Asia. Some areas, like the Middle East are rich in energy resources like petroleum. Other areas, like South Asia,

where India is located, have few energy resources. Most areas of Asia are like South Asia and do not have many energy resources. The countries in these areas must depend on other nations in order to have the energy their people need.



Development in Asian Countries. Energy resources are very important to nations in Asia. The products that can be made from energy resources help development. Development means growth. There are examples of development in your life everyday. If you are young, you are developing, or growing, physically. If you add an extra room to your house, it grows bigger and it has developed. Think of some everyday examples of development

and write them on a piece of paper. Ask people in your home if they know of examples of development in your life.

In the same way you can think of everyday examples of development, we can think of ways that nations develop. People in the United States have more food and better health than they had in early American history. This is because we have developed our food supplies. Americans also spend less time doing basic cooking, getting to work and making clothes than they did a long time ago. This is because we have developed appliances, automobiles and sewing machines (and factories!). All of these are examples of development.

Most countries in Asia are less developed than the United States. In order to increase their development, they need energy resources. Energy resources are needed to feed people, to run factories, and to make energy products like appliances and automobiles. This is why energy resources are needed by so many Asian countries. They want to develop, or grow.

Think about the list you made of examples of development in your everyday life. What energy resources were needed for these examples of development? Add the energy resources needed for development to your list.

An Energy Puzzle. This need for development creates an important energy puzzle. In order to have development, a nation must use energy. At the same time, with the world energy crisis, people are being asked to conserve energy. Conserving energy can mean a slower rate of development and having less of what developing nations want for their citizens.

In addition, to develop most nations nations must trade goods with other nations. Because they have fewer energy resources, most Asian

nations must trade with other nations to get needed energy resources and products. This creates a dependency situation. At the same time, they are trying to build nations and to become more self-reliant, or to do more things for themselves. If Asian nations trade with other nations in order to get scarce energy resources, they cannot become more self-reliant.

The industrial nations like the United States are in a different position than the developing nations. For industrial nations, the question is how to conserve. For developing nations, the questions is how to use resources for growth. So far, most developing nations in Asia have tried to help their growth rate using energy resources and to maintain their self-reliance, or independence.

ACTIVITY # 2

Read the two statements below. Each is made by a student. One student is from an industrial country. One is from a developing country. Work in pairs with one of your classmates to write a conversation these two students might have about energy resources and puzzles in their countries, how the energy question affects them. Present your conversation to the class.

Student A

I am 12 years old. I live in a large city. I help clean our apartment. I help with dinner using our microwave oven. I do the dishes with our dishwasher. I clean the family room using our vacuum cleaner. It is not hard to help. After I do the cleaning, I do my homework and watch TV. Recently I've heard about an energy problem. Our whole family is trying to save energy. We turn off lights and do not drive our car as much.

Student B

I am 11 years old. I live on a farm. I help with many chores around our house. I like to help feed the animals. We use them for milk and other food. I also pick vegetables from the garden. When my chores are finished, I do my schoolwork and talk with my family. I wish we had a TV, but that is a long time away. Our country needs to produce other products that are necessary for us to live well.

ENERGY RESOURCES IN JAPAN, CHINA AND INDIA

There are many different types of nations in Asia. They all use different energy resources. Japan, India and China are three nations in Asia that we will study here.

Let us look first at Japan. Japan is not a developing nation. It is an industrial nation. It has developed high standards of living. A standard of living is the way people live and whether their needs are met. Even though it is a developed nation, it is energy poor. Over three-quarters of the fuel that it uses is petroleum, and most of that petroleum is imported. Japan is a very energy-dependent nation. It also uses some coal and hydropower.

A nation with a very different energy picture is India. India still uses a great deal of traditional energy resources. India uses both wood and animal power for energy. One startling fact about India is that its animal power is the equivalent of one-third of its energy use. Animals are used for a wide range of tasks in India. India also uses a great deal of wood from its forests for energy. Basic industrial energy resources include coal and hydropower. India's reliance on traditional energy

sources makes it a developing nation. It also makes its developmental growth slower than some other nations.

The People's Republic of China is also a developing nation. It relies on traditional energy resources. However, it is developing very fast. It has very high coal production and uses basic oil and petroleum energy resources for industrial development. During the past few decades, China's development has been speeded by the use of these important energy resources.

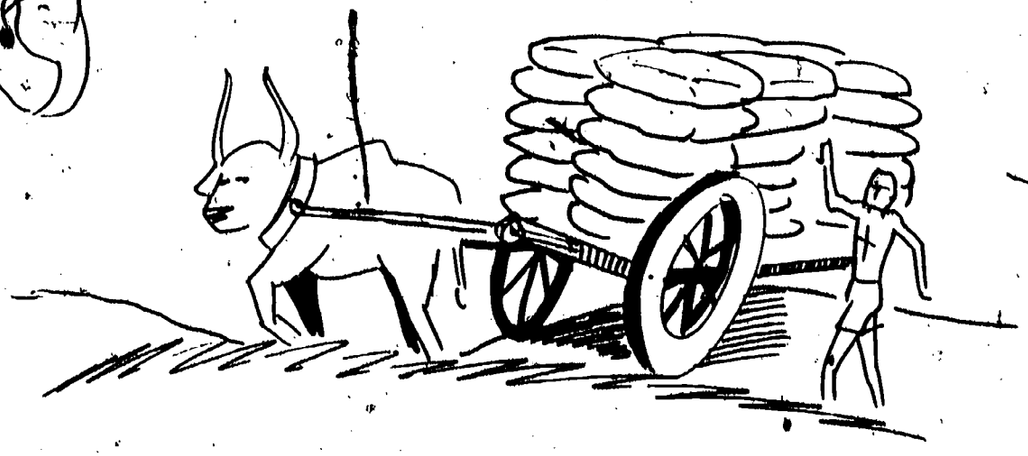
All three of these nations have very different energy resources and development needs. It is easy to see how energy resources are needed for development. It is also easy to see how puzzles can arise over energy conservation among developing nations, or energy dependence among industrial nations.

ACTIVITY # 3

Look at the pictures on the following page. Identify the energy resource that is being used in each picture. Identify which of the three countries -- India, China or Japan -- are most likely to be using this resource. Then answer the following questions:

1. Which of these energy resources might we in the United States do without? What energy resources can we not do without?

2. What part do each of these resources play in your own everyday life?



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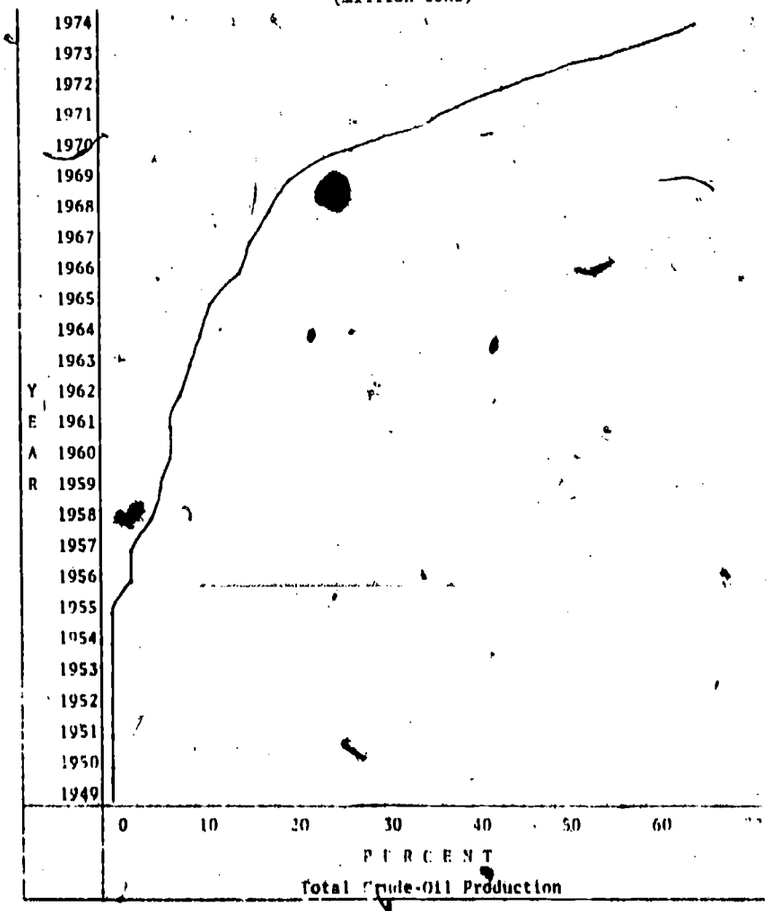
CHINA'S ENERGY DEVELOPMENT

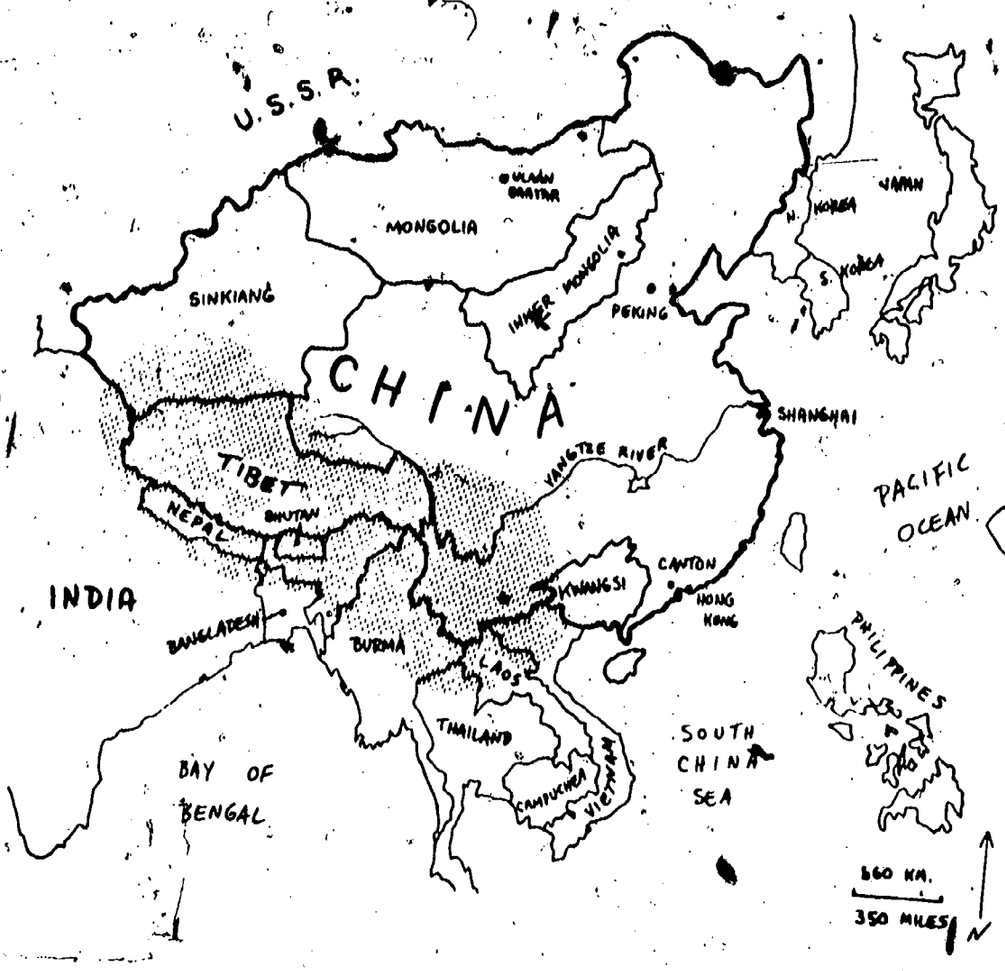
One of the Asian nations which has developed its energy resources in a most effective way has been China. It is easy to look at almost any resource in China and trace its developmental pattern. China has always relied on coal as a basic energy resource. Looking at oil, for example, you can see that China was the first country to use oil. It was used there in the first century before Christ. It is also the first nation to have an oil well. This was built in 1521, over 300 years before an oil well was used in the United States.

China has always had an interest in oil, but until the 1960's it imported oil, largely from the Soviet Union and some Far Eastern countries. It did not develop its own oil reserves because China had not industrialized to the point that it needed oil for many machines and factories. From the 1960's to the 1970's it has moved from a position of importing oil to one of energy self-reliance. China in the 1970's is now selling oil to other countries which need it.

TABLE 1: CRUDE-OIL PRODUCTION IN CHINA, 1949-74
(million tons)



CHINA'S ENERGY: P. 34



The Chinese also have a planned economy. They have long-term plans that are given by the government and can be controlled. Once it decides to develop a resource such as oil and become self-reliant, it is fairly easy to carry out this policy compared to countries with economies run by many different organizations. Eighty percent of the energy resources China uses is coal and ten percent is oil. This ten percent is now being supplied totally by production of oil in China.

As you can see from the table on the preceding page, the curve of oil production rose dramatically over the years 1945 to 1974. The Chinese set out through a series of five-year plans to build their reserve. They did this through the principle of self-reliance. They now have energy production which provides all the petroleum energy that they need, plus more.

This change in energy dependence through development has occurred for several reasons. The first is that the Chinese economy is immense. There are a great many individuals and sectors to the economy. Self-reliance is a basic part of China's economy. Individuals and groups within the Chinese economy are striving for self-reliance on an individual, local, regional and national basis. This philosophy has promoted the development of oil for self-reliance as part of a general economic structure.

ACTIVITY # 4

Use your world cultures text or books in your library to make a list of energy resources and 10 energy products that are made from them in China. Do the same for the United States. Now join with other students in making two collages for the classroom bulletin board. One collage should show products from China. The other should show products from the United States. You can use pictures from magazines or draw your own pictures of the products.

When you have finished your collages, answer the following questions.

1. What are the advantages of the development of energy resources?

2. What are the disadvantages?

3. Can we <u>both</u> develop resources and conserve energy?

4. How can you conserve on your use of some of the energy products in your collage?

ENERGY AND ASIA

LESSON TWO: ENERGY INTERDEPENDENCE: A FOCUS ON JAPAN

Lesson Objectives:

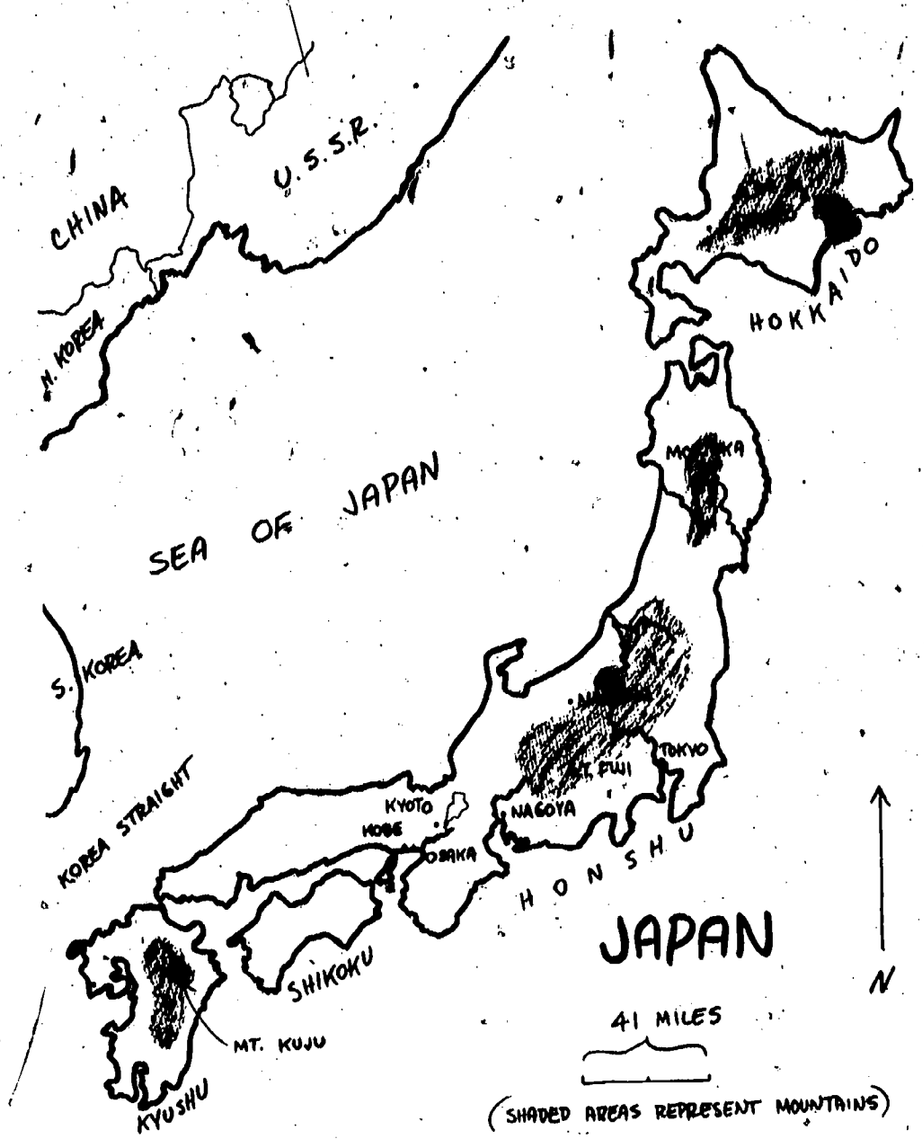
- To identify ways in which Japan is dependent in its energy needs
- To develop basic skills in group decision-making
- To make a plan for studying interdependence with students from Japan .

ACTIVITY # 1

Make a list of all the things that were made or produced in Japan in your classroom or in your home or community. Think of as many possible things as you can. Then make a list of all the things that we export to Japan. What do we sell to them? What the Japanese sell to us and what we sell to them constitutes interdependence. Make a list of all the ways in which students in Japan and students in the United States depend on each other. Discuss your ideas in class.

ENERGY INTERDEPENDENCE AND DEPENDENCE

Interdependence means that people have needs and these needs can be satisfied by others either within the same nation or within another nation. Others have wants which can be satisfied by these people. People are dependent upon each other to meet basic needs and wants. This is clearly true in the energy area. Asia is an excellent example. Of the countries that we have looked at, Japan is one of the most dependent. Look at the map on the next page. Think about who Japan might be dependent on for energy resources and what natural resources they have that are pictured in the map.



Japan has natural ties to China, the Soviet Union and other countries for energy resources. Of its energy use, it consumes over 73% in petroleum. Most of this petroleum must be imported. Over 16% is used in coal and over 5% is used in hydropower. Japan has a natural water source for hydropower. It is mountainous and has many fast flowing rivers. It also has ocean currents for tidal power.

Japan has seen its dependency on other nations as a problem. It is too imbalanced towards imports. To <u>import</u> is to buy energy from others. This puts Japan in a very dependent position. Therefore, Japan has worked to increase its own supplies of energy. These supplies have doubled over the last decade. At the same time it has tried to cut consumption. Consumption of energy in Japan is only 33% of the amount that is used in the United States per person. Japan is working to solve its problem

by increasing supplies and cutting consumption. One way it is trying to conserve is to make use of mass transit rather than the automobile.

However, Japan will never be as self-reliant as China. It must depend upon some nations for standard resources. Here, conservation is a key strategy so that there is less dependency. So is the development of alternative sources of energy. The Japanese are fully involved in developing such alternative sources as solar energy, wind energy and nuclear energy. In all of these ways, Japan may overcome its problems of extreme dependency by increasing supplies, cutting consumption and developing alternative sources. It will never, however, be independent of other nations.

ACTIVITY # 2

Think of one thing on which you depend every day. Create a pantomime to describe this thing to the class. When you have finished presenting your idea, respond to the following questions:

1. What does it mean to be dependent on something?
2. What does it mean to be interdependent with someone else?
3. How is the interdependence of the Japanese different from our own?

DECISION-MAKING ABOUT ENERGY INTERDEPENDENCE

Energy decision-making is very important. Every time we make a decision about what we use, we make a decision that affects energy resources. Every time we decide how to use a product we make a decision about the availability

of energy supplies. Every time we decide how we are going to use energy we make a decision that affects our own living and our ability to conserve energy.

Most decisions about energy are made by individuals. We make a decision to turn lights out. We make a decision to drive on a family vacation. We make a decision to wear sweaters in our house and to keep the heat down. All of these decisions about energy are individual ones. We can make these decisions as individuals. Think of some decisions you have made about energy use. Make a list of them on a separate sheet of paper.

Groups also make decisions. When more than one individual enters into an energy decision, then a different kind of decision-making process occurs. In order for two or more people to agree, they must come to some acceptable decision that is pleasing to everyone. Now you are not only involved in a decision, but your friends or your family and others that you know are also involved. They may have different opinions. This requires finding a compromise. A compromise is an agreement in which all parties find something they want, but usually not all that they want.

One of the most important things about making decisions in a group is the rules that are established for decision-making. There are a great many rules. Sometimes one person can decide for the group. The President, the principal, the leader of an informal group can make decisions. At other times everyone must agree. Everyone's opinion is weighted the same regardless of their position or age. Because there are so many rules it is important to know about them and to know what affect they have.

Basically we will study four rules here. They are: the consensus rule, majority rule, plurality rule and one-person rule. We can imagine

that we are part of Sashimoto Corporation, which produces tires for trucks. Sashimoto is a medium sized corporation, and one group of its employees works to inspect the tires that are produced. Let us suppose that there are five inspectors, and they are making some decisions.

In a consensus rule everyone must agree in order for the decision to be made. If one person disagrees, then the group will not do it. If, for example, you make a decision with your family to turn out some of the lights in the home, it is a consensus decision if everyone must agree. If your mother, or father, or sister, or aunt, or other person living in your house can disagree and stop the decision, then it is a consensus rule. Under this rule, one person has more power than he or she ever will have under another type of rule. This is good because it treats everyone equally. It is also bad because it is hard to make a decision if one person is opposed.

Let us suppose that our five inspectors are making a decision by consensus rule. They are deciding whether the standards for tread on tires are high enough. More tread makes tires last longer, and gives better mileage, saving energy. If they can all agree to make the standard higher, they will do it. If one person disagrees, they will keep the same standards. This is consensus rule.

Under majority rule 50% plus one person must agree. In other words, half plus one of the people must decide that a decision is correct. The minority must abide by the majority's decision. This is how decisions are often made in local governing groups, in states or in the U.S. Congress. In majority rule, some people win and some people lose. It is important to try to influence other people about your position so that you can be in the majority on a given issue. If you were deciding with your family using a

majority rule, if you had four people in your family and three people agreed and one person did not, then the decision would be made. The person who disagreed would be bound by that decision.

The pros and cons of majority rule can be seen in a decision by the Sashimoto inspectors. Let us suppose that the five inspectors are making a decision about improving the aging of tires. Two inspectors want to improve the quality of the rubber. Two others think the quality is good enough, because the tires are safe and they want the company to make a profit. Both try to influence the fifth inspector. Finally, the fifth inspector decides to keep the tires the same. Under majority rule, very few people, or one person, can sometimes make the decision. The majority is not really a large majority, and the minority must live with the decision. However, it is easier to make a decision than with consensus rule.

In a plurality rule, you do not need a majority in order to make a decision. Your side must have more support than any other side in order to win. In a nine-person group, as long as four people think that something is right, it will be decided. This is a plurality. It is more people than any other group could get if there were three alternate positions. There must be three positions for this rule to work. In your family, a plurality rule would work in a seven person family if there were three positions and three people agreed to one of the positions. This is not a majority, but it is more than any other position could get.

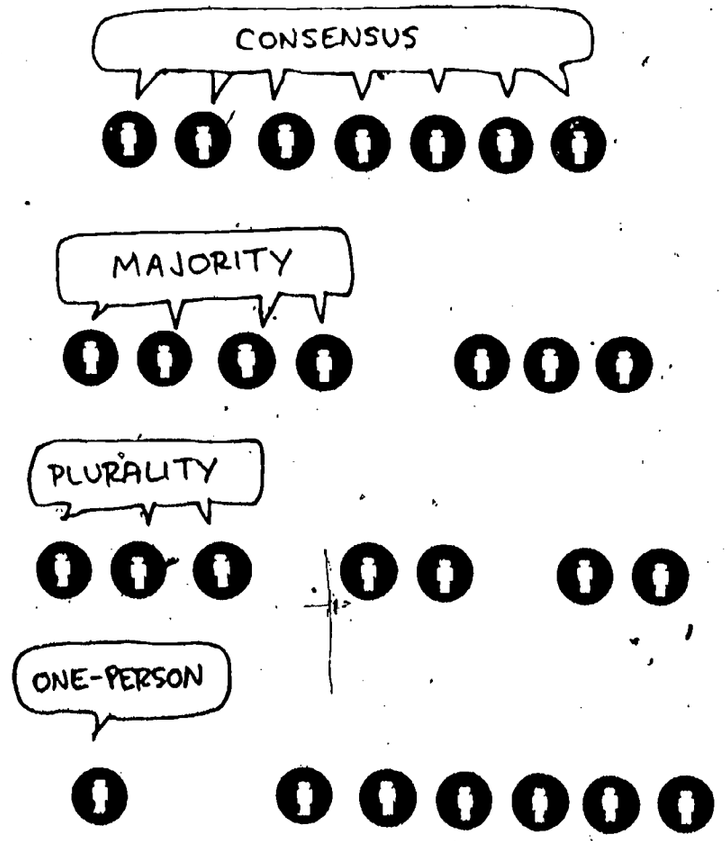
In our five person group at Sashimoto Corporation, a plurality rule would mean that as few as two inspectors could make a decision. If there were three alternatives and one person did not vote, then the vote could be 2-1-1, with one not voting. Decisions would be easy to make, but they would not reflect a majority opinion.

Finally, sometimes one person can decide. This is an efficient means of making the decision. You can decide for the entire group or someone else can decide for you. In this case, no one needs to agree, for one person can make the decision. On the other hand, most people are not represented by the decision. One person can make a decision which will hurt other individuals. Very few alternatives are considered. At Sashimoto, this would happen if the inspectors chose one person to make their decisions for them.

ACTIVITY # 3

Look at the pictures below.

DECISION-MAKING RULES



In each of the following situations, tell why each decision-making rule would be useful or not useful. Give your reasons for what you think the best rule is.

a. Your family needs to cut down on its use of electricity.

b. The nation needs to save in its use of gasoline.

c. Your school needs to save on heating Bills.

In a group, select an energy problem you think you have in your school. Use one of the rules for decision-making to decide what you as a group can do about that problem. Write your decision down on a sheet of paper then answer the following questions.

1. How does your decision require that you be interdependent with other people?

2. What is the decision rule that you used?

3. If the rule had been different, would your decision have been different?

THE IMPACT OF ENERGY DECISION-MAKING

The impact of different rules can be very great. Because we are interdependent and all have different needs and wants and abilities to help each other, the rules can make an impact on groups both within and between nations. So far we have seen how groups within nations, like the Sashimoto Corporation, make decisions. Here we will look at Japan as a nation and how it interacts with other nations.

We have seen how Japan is dependent among interdependent nations. If it could make a decision, it would lower the price of petroleum. Others, however, would not agree. Countries which are producing oil want the price to be high. If they could make the decision, they would make it even higher. It is clear that if we are using one-person rule, it depends on who is making the decision. World energy policy has been affected by the fact that the oil-producing nations have made decisions about the price of petroleum. The impact is higher prices.

We can also see that we might have a situation in which nations were relatively equal in their energy situation. They might choose a consensus rule in order to get things done. However, if the developing nations and the industrialized nations wanted to agree on a decision, it would probably take them a long time. Developing nations need to grow and need to use their energy resources. Industrial nations need to conserve and need to save on energy resources. These two differences of opinion would limit a general agreement on the issue. The impact would be that it would take a long time to make any decision, and a decision would probably not get made.

Nations could use a majority rule, like they often do in the United Nations. In this case, Japan would need to join with many other nations in order to get its way on energy issues. A majority would be hard to form because of differences on energy issues, but also because other political issues, such as disarmament, divide nations. It would be hard to keep these other issues out of the energy decision.

Most often energy decisions are made under a plurality rule. A small group decides to do something which applies to its group. It does not necessarily apply to the rest. This is how energy policy has been made so far. It has been made by a single nation or group of nations without necessary agreement from others.

Rules affect energy policy by raising prices, by postponing policy-making and by affecting some people in good ways and other people in bad ways. Japan is in a different position from the United States. The petroleum situation has had a major effect on the Japanese. It has had an impact on the United States. Japan will be in a dependent position

until it can find alternative forms of energy or cut consumption. The United States must also conserve, yet its dependency is not as great.

ACTIVITY # 4

Get together with the students in your class and think of ways that you might better understand the Japanese situation. Make a list of the ways that you might correspond with or find out from people who have lived in Japan what their energy situation is like. Draw a plan as a class and try to carry it out.

ENERGY AND ASIA

LESSON THREE: ENERGY CONSERVATION: FOCUS ON INDIA

Lesson Objectives

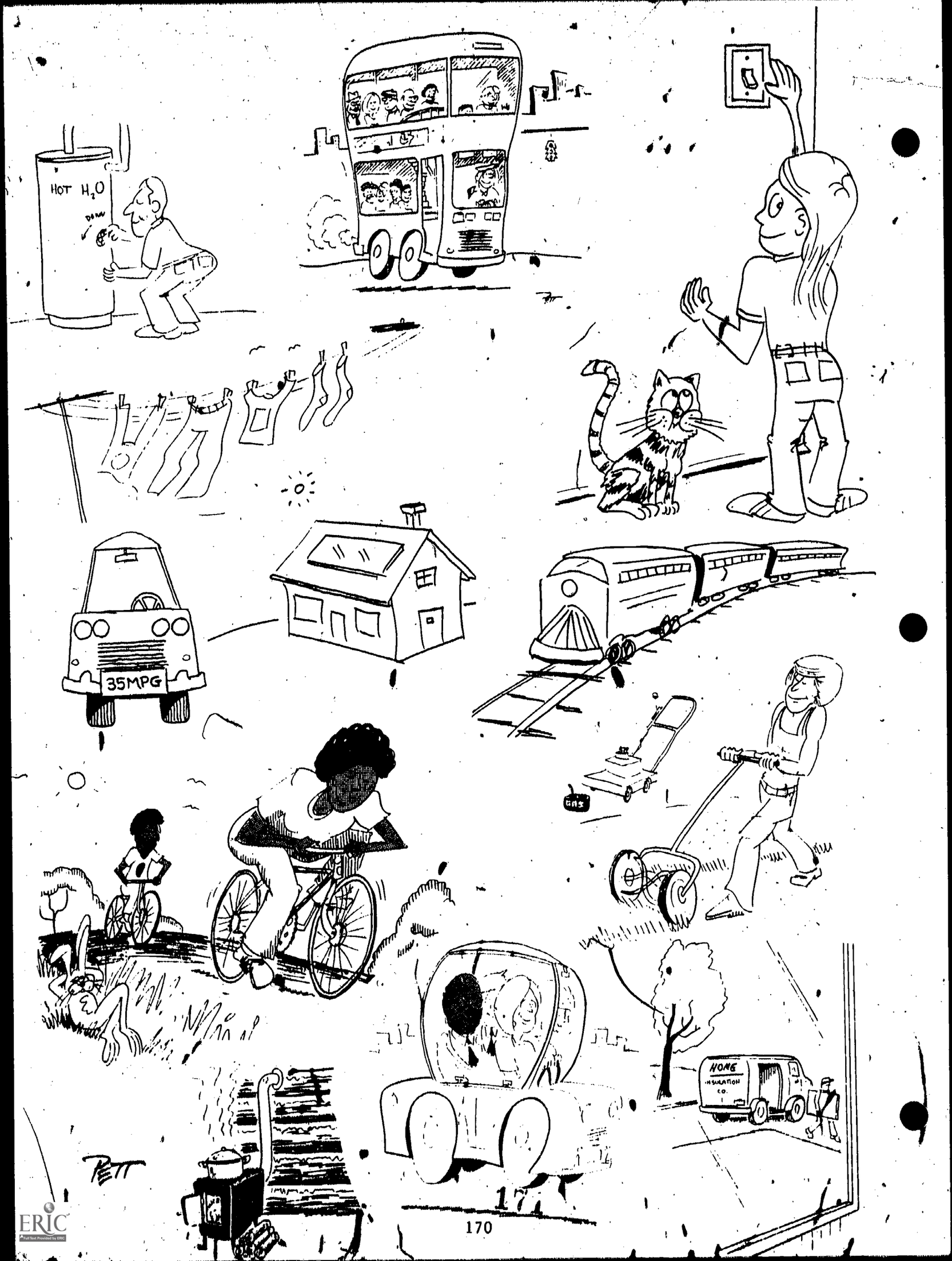
- Identify a variety of ways that you can conserve energy.
- Analyze conservation strategies involving needs of animals and human beings, as in India
- Apply conservation strategies used in India to your own everyday lives.

ACTIVITY # 1

Use the picture on the following page to name all of the ways that people are carrying out conservation. The picture contains at least six ways. See if you can name them. Write them on a separate sheet of paper. Save your paper and they will be discussed in class.

WAYS TO CONSERVE ENERGY

Energy conservation involves the wise use of energy. Here we are talking about things that people do in order to use less energy, or to use alternate forms of energy which are in larger supply. A basic distinction is made between renewable and **nonrenewable energy resources** A renewable resource is something which can be used again and again. Examples are solar, tidal or wind energy. Wood is a different kind of renewable resource. More trees can be planted, but wood is not always automatically there to be used. A **nonrenewable resource** is something like coal or oil which can only be used one time and cannot be made again. By using the renewable rather than the **nonrenewable resources** people can conserve energy.


HOT H_2O
35MPG
GAS
HOME
INSULATION
CO.

There are a wide variety of other ways in which people can act to conserve energy. They can save energy by using less. They can use fewer lights; they can turn down thermostats; they can drive cars less. In all of these ways, people are using less energy as a strategy for conservation.

Using your own human energy is also a basic way of conserving other forms of energy. Instead of letting a machine do it for you, you can do a task. You can renew your own energy by eating food.

You can also use animals for energy. Animals can do tasks for you as they did in previous years in the United States and as they still do around the world, in India, for example. You can also use animal wastes as fertilizers.

In India, they use a great deal of what is called non-commercial energy. Almost two-thirds of the energy that is used in India is wood energy. India has great forests and this is a renewable resource.

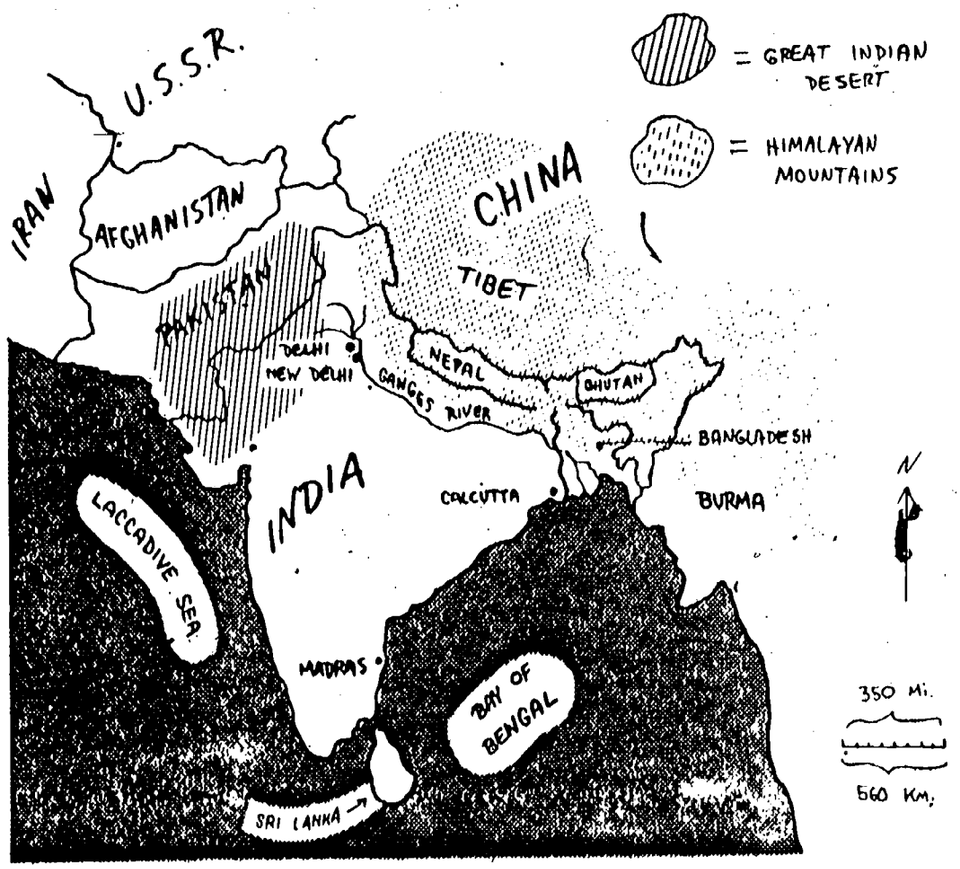
Indians also use animal and vegetable wastes as fertilizer. They use animals for transportation. In all these ways, energy conservation can help to preserve precious energy resources. In India, there is special use made of animal and vegetable resources as well as human energy.

ACTIVITY # 2

Use the worksheet your teacher gives to you to unscramble the words so you can determine ways of conserving energy. When you have completed unscrambling the words, share your answers with the class.

USING HUMAN AND ANIMAL ENERGY

People in the United States commonly think of conservation as saving on heat and light. In India, the need is not so much for electrical conservation. People think of human and animal energy and ways that it can be used effectively. We can learn some important conservation strategies by looking at what happens to human and animal energy in India.



Animal energy is vital to the Indian economy. There are over 80 million work animals in India as of 1979. There are over 70 million bullocks, 8 million buffalos, 1 million camels and 1 million horses. This amounts to about 40 million horsepower, enough to satisfy all of India's energy needs.

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Animals are used chiefly in agriculture for plowing and drawing carts. Over half of the farms in India are too small for tractors and plowing is done by animals. The roads in farmlands are not good. Over two-thirds of the rural transportation of goods is done in carts which are animal drawn.

India also uses a great deal of human energy. Most people work the farms using their own human power. There are very few cars in India. Most people ride bicyles in the cities or ride animals or in animal-drawn carts.

In these ways Indians use their own human and animal energy in order to get things done. They use alternatives that we do not think of much here. However, some people in the United States do think about them. The Amish, for example, live using a great deal of both human and animal energy. They believe in a simple lifestyle. Most are farmers. They use animals for plowing and transportation. They use human energy for household chores like doing dishes and washing clothes.

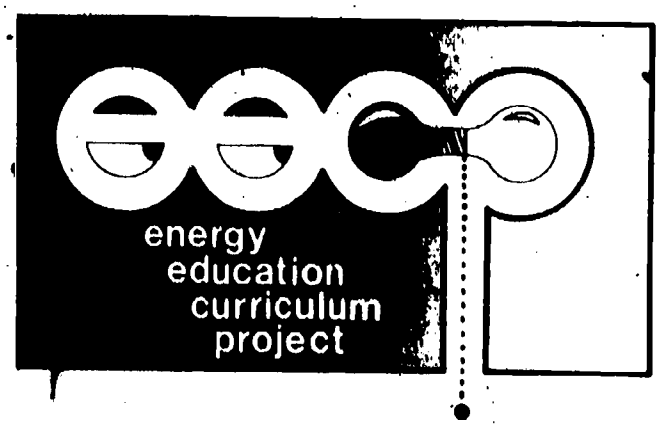
It is possible, even in the United States, to use more human and animal energy. One important idea to think about is appropriate technology. Appropriate technology is what is needed to get something done. It means that you do not use a tractor to plow a very small garden. Nor do you till by hand a 1,000 acre farm. You might walk a mile to school, but you could ride in a car with other students, or take a bus, if the distance is too long.

Many people say that we use too many high energy items like appliances in our lives. We do not need them to get things done. Producing them has a high energy cost. Using them is also expensive. On the other hand, time is valuable. Appliances often save time. Buying them also helps the economy. There is a question here that each person, whether Indian or

American, must decide for himself or herself. Yet, because of the energy problem, we should all think of what is appropriate, or what we really need, instead of just convenience.

ACTIVITY # 3

Develop your own conservation plan using one of the ideas about human or animal energy you have studied here. Try to think of things that you could do every day involving your own human or animal energy which would help in energy conservation. Write out your plan on a piece of paper. It will be discussed in class.



Energy and North Africa — Middle East

LESSON ONE: EGYPT AND THE ASWAN HIGH DAM

TEACHER'S GUIDE

Introduction:

This lesson introduces the topic of Energy: North Africa-Middle East and then focuses on Egypt and the Aswan High Dam as an example. Students are asked to state and recognize their unique impressions of this area of the world. They will learn about setting priorities as part of the decision-making process. They will also learn that actions taken, based on priorities set, affect people and the environment. The results of actions taken can be measured in terms of costs and benefits. Through this lesson students will be able to apply this decision-making process to something in their own lives.

Objectives:

1. Students will be able to state the cultural, political, and economic links among countries of the Middle East and those of North Africa.
2. Students will recognize that setting priorities is part of the decision-making process.
3. Students will be able to state the costs and benefits of the Aswan High Dam in Egypt.
4. Students will be able to set priorities, recognize the effects of changes on the environment, and weigh the costs and benefits of changes.

Time: Two to three days.

Instructional Strategies:

1. Activity #1 asks students to brainstorm. Some of their impressions of North Africa and the Middle East may be accurate. Other impressions may be stereotypes that do not apply to the area. Whichever, the point of the activity is to encourage students to think about this area of the world. Another point is to help students recognize that their impressions are unique because people have different perspectives. You could ask your students to pretend they are teenagers from one of the countries in this area and guess what their impressions of the United States include. How do others see us? If there are members of your school or community who are from a North African or Middle Eastern country, ask your students to ask them what they thought the United States was like before they came to this country. This can help students gain a sense of cross-cultural awareness; that people view others from their own frames of reference.

2. The idea of links and differences is presented to help students understand that although there may be many differences among people, there are also many things that link people together. Both ideas co-exist whether it be in the classroom, state, nation or the world. The differences may or may not cause conflict. The similarities may be great enough to give people common ways of thinking about things. Ask students to think of ways they are similar to teenagers in North Africa and the Middle East. What concerns do they have in common with other teenagers? What they think about school, their future or their families may be links. Discuss this idea with your students.

3. Activity #3 is designed to give students experience in setting priorities. We set priorities all the time, although we may not be aware that we are participating in decision-making. Discuss with your students their priorities. Why are priorities different for different individuals? Deciding wants, shoulds and possibilities is also part of the process. Leaders of groups and/or countries set priorities the same way we do.

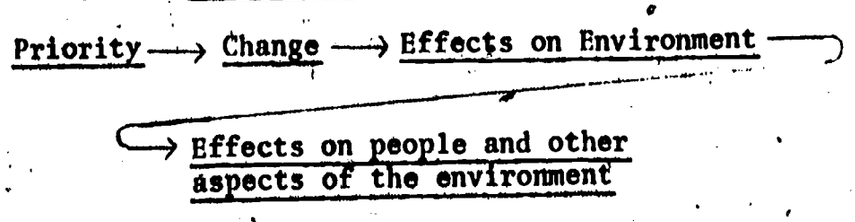
4. Books on Egypt will include pictures of the Nile River and the Aswan High Dam. Show your students pictures of Egyptian people living and working. Include pictures of farming and the use of electrical power.

5. Activity #4 asks students to hypothesize the effects of electrical power and irrigation available because of the construction of the Dam. Again, you may wish to use pictures here. They will probably think only of the benefits, because they have been mentioned. Encourage them to also think about the costs of building a dam.

6. Activity #5 is key to this lesson. Setting priorities, implementing changes, consequent effects on the environment and recognizing the effects on people and other aspects of the environment are important concepts today. In addition, recognizing and being able to weigh costs and benefits is crucial as we participate in energy decisions.

Student materials give one example of this process.

Example #1



Here is another example and one you might want to use. Present the priority and have them work through the rest.

Priority	→ Change	→ Effects on Environment
An area needs more electrical power for homes, schools and places of business.	An electric power plant is constructed to be run by coal.	Air quality changes in the area. Surface mining occurs.

→ Effects on people and other aspects of the environment

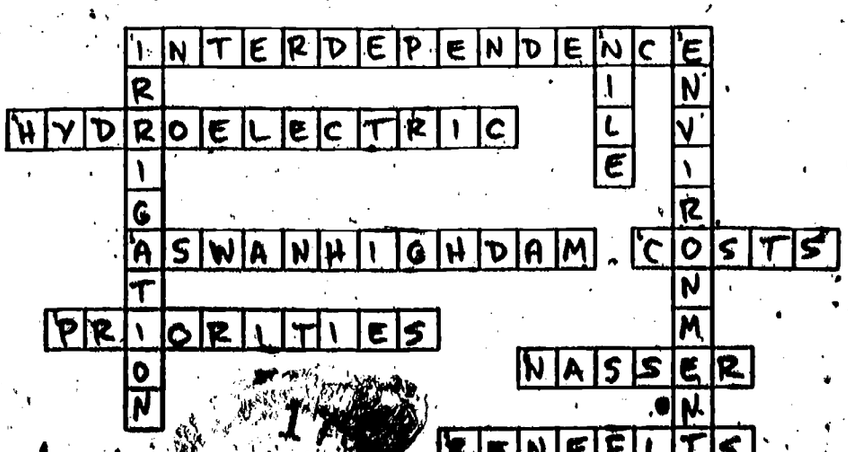
Electricity is provided.
People get jobs.
Animal life is affected.

Benefits	Costs
1. electric power	1. pollution of air
2. people have jobs	2. animal life is endang
3. area develops	

This process is not an easy one. Obtaining the necessary and accurate information is difficult. In addition, priorities, changes and effects, as well as costs and beneffits, are oftentimes subjective assessments. Again, how people view these things depends on their experiences, needs and goals.

You might want to bring in speakers representing different points of view. Newspaper stories and magazine articles on energy resources and alternatives can also be used to help students gather information and recognize differing perspectives. Making decisions about energy production, use and distribution is a complex process. This fact is about the only one upon which experts can agree. Decision makers strive to cut down on the costs and increase the benefits.

7. The key to the crossword puzzle for Activity #6 is as follows:



Student Assessment: Correct answers for the assessment instrument for "Egypt and the Aswan High Dam" on the following page are:

1. D, 2. D, 3. B, 4. B, 5. D, 6. A, 7. B

STUDENT ASSESSMENT

ENERGY AND NORTH AFRICA-MIDDLE EAST

Lesson One: Egypt and the Aswan High Dam

1. The Middle East is important as

   A. a center of the Buddhist religion.
   B. a major source of coal.
   C. an example of peace and stability.
   D. a crossroads of world commerce.

2. The birthplace of Islam is in

   A. Jordan.
   B. Iran.
   C. Egypt.
   D. Saudi Arabia.

3. The Middle East produces much of the world's supply of

   A. coal.
   B. oil.
   C. electricity.
   D. uranium.

4. Since 1948, four wars have been fought in the Middle East over the conflict

   A. for the rights of oil in Saudi Arabia.
   B. between Israelis and other nations for territory.
   C. to control shipping in the Suez Canal.
   D. to hold the holy city of Mecca.

5. The Aswan Dam was built to help Egypt with all of the following except

   A. land reform.
   B. electricity production.
   C. growing food.
   D. oil production.

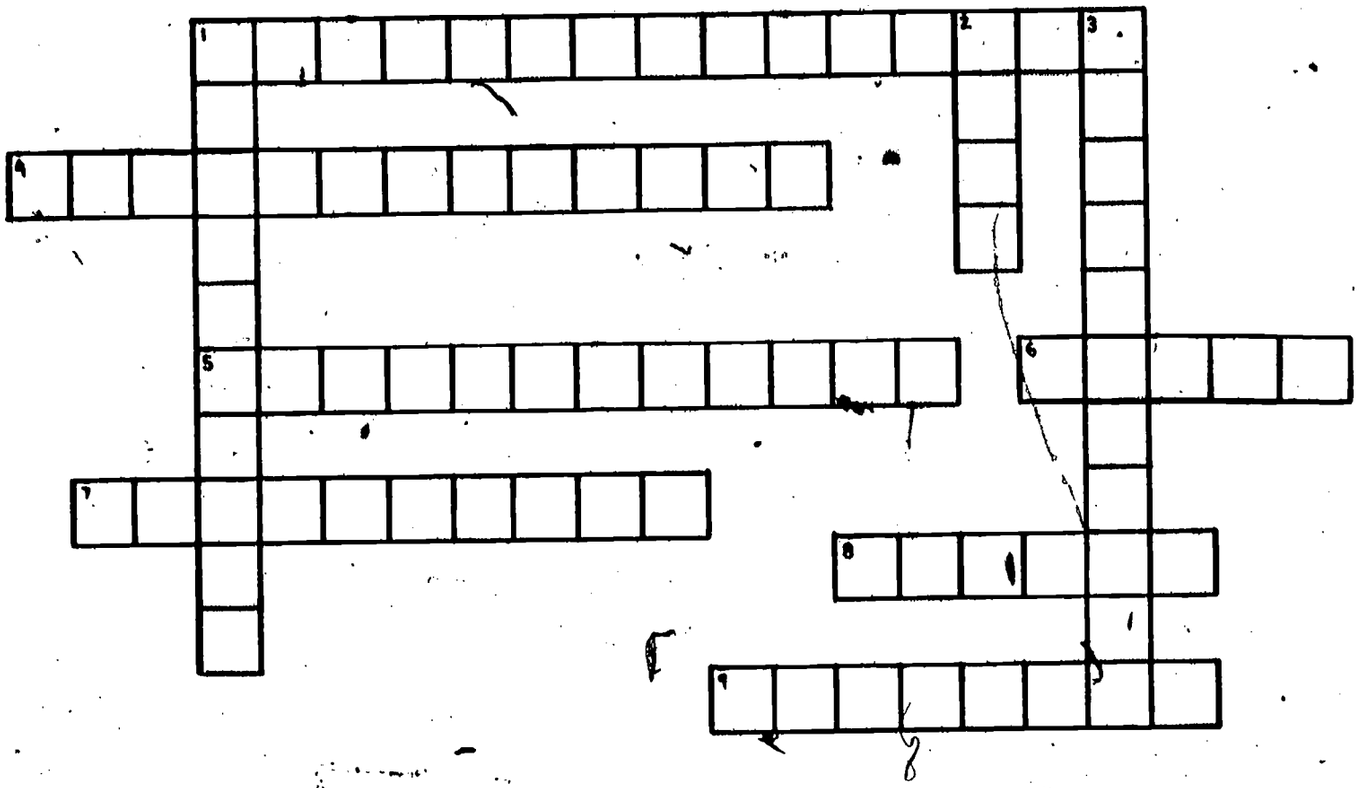
6. Dams can produce

   A. hydroelectric power.
   B. geothermal power.
   C. nuclear power.
   D. solar power.

7. Every environmental change brings

   A. improvements.
   B. costs and benefits.
   C. problems worse than before.
   D. lower food production.

Blank crossword puzzle for Lesson 1, Activity #6.



LESSON TWO: SAUDI ARABIA, OIL AND CHANGE

TEACHER'S GUIDE

Introduction:

Although this lesson focuses on how oil wealth is changing Saudi Arabia, there exist many opportunities for students to discover changes that have occurred or might occur in their own lives. In addition, students will learn how to recognize and weigh the costs and benefits of change. The major concepts in this lesson are change, interdependence and conservation.

Objectives:

1. Students will be able to list several ways in which increased oil production and oil wealth have changed the way of life in Saudi Arabia.

2. Students will be able to recognize and weigh the costs and benefits of these changes.

3. Students will be able to state ways in which Saudi Arabia is interdependent with the rest of the world and the rest of the world is interdependent with Saudi Arabia.

4. Students will recognize ways in which their own lives are changing because of increasing oil prices.

5. Students will identify ways oil can be conserved.

Time: Two to three days.

Instructional Strategies:

1. Activity #1 can help students begin to realize that things occur to change the ways they think, feel and act. Help students to see that habits they have can be considered types of traditions. What energy consuming habits do they have? How are these habits like traditions?

2. Map #2 shows Saudi Arabia and other countries in the areas' oil production. The pie graph shows Middle East as well as other areas' proportion of total oil production. Ask your students to state what the graph describes.

3. Students could make collages from magazine pictures showing ways they and the United States use oil. They could also take a survey around the school asking other students where they think much of the oil we import comes from. The survey could also ask other students ways they think oil is used in this country. Have your students compare their answers with other students. Is there a difference?

4. Ask students to give examples of other nonrenewable resources. There are differences of opinion as to when we and Saudi Arabia will run out of these resources; but most people agree that for a while, energy resources will continue to increase in expense. How does this prospect affect their lives?

5. Activity #5 asks students to pretend they are a Saudi Arabian leader. As a leader they must think of the future. You may wish to first have them read or reread that section of the text being used on Saudi Arabia. They may need to learn more about the country before they can decide on things they would do. They could also do the same for the United States given the increased consumption of energy. What things do they think should be done first? Have a class discussion combining the ideas in their plans and weighing costs and benefits. Talk about the difficulties presented in trying to think about the future. Think about how much the energy situation has changed even since 1970. Have students compare the changes they think will occur in Saudi Arabia to the ones included in the section of these materials on "Saudi Arabia Changes."

6. In Activity #6 community members could be invited to come in and talk about the ways their lives and businesses have been affected by increased oil prices and other energy costs. How are people adjusting and adapting to the increased cost? Take advertising and the manufacturing of American cars. How is that industry changing its products? For example, ten years ago no American car company would have thought to advertise gas mileage. What other industries are being affected?

7. Students could also look into the cost of energy, especially oil, for the school district. How much money could be saved by cutting back on heat? What would be some of the costs involved?

Student Assessment: Correct answers for the assessment instrument for "Saudi Arabia: Oil and Change" on the following page are:

1. A, 2. D, 3. C, 4. C, 5. B, 6. C, 7. D

Lesson Two: Saudi Arabia: Oil and Change

1. Traditions in Saudi Arabia are based on

   A. Islamic religious law.
   B. leadership in heavy industry.
   C. Communist ideals.
   D. the new wealth brought by oil.

2. How much of the worlds oil reserves are found in the Middle East?

   A. less than 15%
   B. 25%
   C. 40%
   D. more than 55%

3. What part of the world's total oil supply is found in Saudi Arabia?

   A. one-tenth
   B. one-fifth
   C. one-fourth
   D. one-third

4. Cooperation in buying oil from nations that need to sell oil is an example of

   A. independence.
   B. self-reliance.
   C. interdependence.
   D. coexistence.

5. Which of the following is a non-renewable resource?

   A. solar energy
   B. petroleum
   C. wood
   D. hydropower

6. How has Saudi Arabia changed as a result of investing oil money?

   A. More people are nomads.
   B. Western technology is disappearing.
   C. More people are going to school.
   D. Old religious views are stronger.

7. Between 1970 and 1980, the price for a barrel of oil jumped from about $2.00 to

   A. $5.00
   B. $9.00
   C. $18.00
   D. $30.00

LESSON THREE: OIL, OPEC AND YOU

TEACHER'S GUIDE

Introduction:

This lesson contains several concepts and skills. It focuses on oil, North Africa and the Middle East but also includes the economic as well as political aspects of the world oil situation.

The formation of OPEC as a cartel is explained. Supply, demand and price are covered and world oil consumption and production is taught. In addition, the conflict in the Middle East and its effects on the United States is included to help students understand the complexities of oil politics.

Students will learn decision-making skills. They are asked to role play, interpret maps and create conservation strategies. Throughout this lesson students will have opportunities to apply their knowledge to new situations.

Objectives:

1. Students will be able to imagine what their lives would be like without oil.
2. Students will be able to define the term cartel.
3. Students will be able to explain how supply and demand affect price.
4. Students will be able to identify areas of the world that produce more oil than they consume and areas of the world that consume more oil than they produce.
5. Students will be able to apply the conditions to be considered in decision-making to a new situation.
6. Students will recognize possible futures involving oil availability.
7. Students will give suggestions for oil conservation, the development of alternative energy resources and ways the United States can help negotiate a Middle East peace.

Time: Two to three days.

Instructional Strategies:

1. Activity #1 is an imagination exercise. Many students are not aware that plastics, fibers for clothing, the ink in their pens as well as gasoline are oil products.

Although we will be able to get oil, we may not be able to afford this resource. Help students to think about how their lives would change if they did not have access to oil products. What alternatives are there?

2. Map #1 of the student materials has lines drawn to the OPEC member nations. A blank they can write on is provided in this Teacher's Guide. A key is also provided. Often we think that OPEC is made up of all Arab nations. This is not so. Iran, for example, is a Muslim nation, but the people are not Arabs. Sub-Saharan nations as well as a South American and a South Pacific nation are part of OPEC. It is true that OPEC is dominated by Arab influence. Saudi Arabia especially has a great deal of power because it produces the greatest quantity of oil. OPEC as a cartel has been effective because these nations have remained united. Although they have major differences of opinion, no nation has broken out of OPEC to undersell the others. In their unity, they can charge top prices for their oil. Disadvantages for buying nations include the fact that we must politically and economically adjust to OPEC prices, supplies and even desires. Help students to see that our economic and political freedom is curtailed. Although United States businesses have "charged what the market will bear," there exists a great deal of resentment toward OPEC for doing the same. How do they feel about this dependence.

3. Supply, demand and price as described in this lesson is over simplified. Talk about the factors that influence supply and demand. Advertising, for example, strives to create a demand. A cartel fixes prices. The OPEC cartel can do this because they are in a unique situation. Students should role play using something for which a demand exists. To role play they have to "get into" the idea of a limited supply, a high or low demand and see what happens to the price. The introduction of a cartel and price fixing, of course, changes this. Competition may be the American Way, but obviously OPEC nations want to get the high prices for as long as their oil will last.

4. Activity #4 should help students understand the need we and other industrialized nations have for oil. You could ask students to research the areas of the world that do not consume nearly as much oil as we do. Why is this so? How are the lifestyles different for most people living in developing nations? Explore possible criticism of the United States for our consumption. Be sure to point out the things we produce and sell to the rest of the world through the use of oil.

5. The section of this lesson on decision-making is designed to help students see that decisions are difficult to make. You could turn Activity #5 or #6 into a type of simulation. Some members of the class could represent within a country or school desires and goals, some members could represent outside country or school desires and goals and some members could represent inter-organizational desires and goals. Students could also do more research on any of the OPEC nations and make decisions based on their findings.

6. The section on "Conflict in the Middle East" gives a basic outline of the situation. You may wish to go into more detail. People in your community may have a special knowledge or interest in the issue. They could be invited to speak to your class. You could have opposing views expressed on the same day or separate days. Whether or not you decide to expand on the information given here or in the text you are using, stress the connections this conflict has with the United States and oil.

7. In addition to Activity #7, students could draw their own political cartoons. They could deal with the Middle East, opposing views of energy use and alternatives or even an issue closer to home. The point is that people see things differently because different people have different perspectives or frames of reference. This could also be demonstrated by using newspaper editorials or articles. Students could also be asked to write something reflecting their own perspective. It could be a national, local or school issue. Help students pick out slanted terms and phrases. Help students to understand that how reality is perceived depends on the situation and "location" of the perceiver.

8. The last Activity in this Lesson is designed to help students understand the fragile nature of our oil supply. The "Futures Wheel" on page 45 is divided into three (3) parts. Circle "C" asks "What if?" Circle "B" are possible future situations. Circle "A" are possible outcomes that are matched with Circle "B." Make copies of the wheel and have your students put it together. Brass paper fasteners can be used so that the circles of the wheel can be turned. Discuss the questions that go with this first wheel. Next give students copies of the blank "Futures Wheel" (page 46). The inner most circle is again "What if?" The middle circle are future strategies. In the outer most circle students should develop ways to fulfill those three goals. The futures presented here are just suggestions. You may wish to have students make up their own.

Student Assessment: Correct answers for the assessment instrument for "Oil, OPEC and You" on the following page are:

1. A, 2. B, 3. C, 4. B, 5. C, 6. B, 7. A

STUDENT ASSESSMENT

ENERGY AND NORTH AFRICA-MIDDLE EAST

Lesson Three: Oil, OPEC and You

1. What is OPEC?

   A. a group of nations that sell oil
   B. a group of nations that buy oil
   C. a branch of the world export council
   D. a defense alliance in the Middle East

2. If demand grows faster than supply, the price

   A. will go down.
   B. will go up.
   C. will stay the same.
   D. cannot be predicted.

3. How are production and consumption of oil in the United States related?

   A. It cannot be determined how they are related.
   B. The United States produces more than it consumes.
   C. The United States consumes more than it produces.
   D. The United States produces about as much as it consumes.

4. Qatar decides to raise its oil prices in order to build more schools. This is an example of making a decision based on conditions that exist

   A. outside of the country.
   B. within the country.
   C. within the government organization of the country.
   D. within international organizations.

5. During the 1973 Middle East war, Arab nations

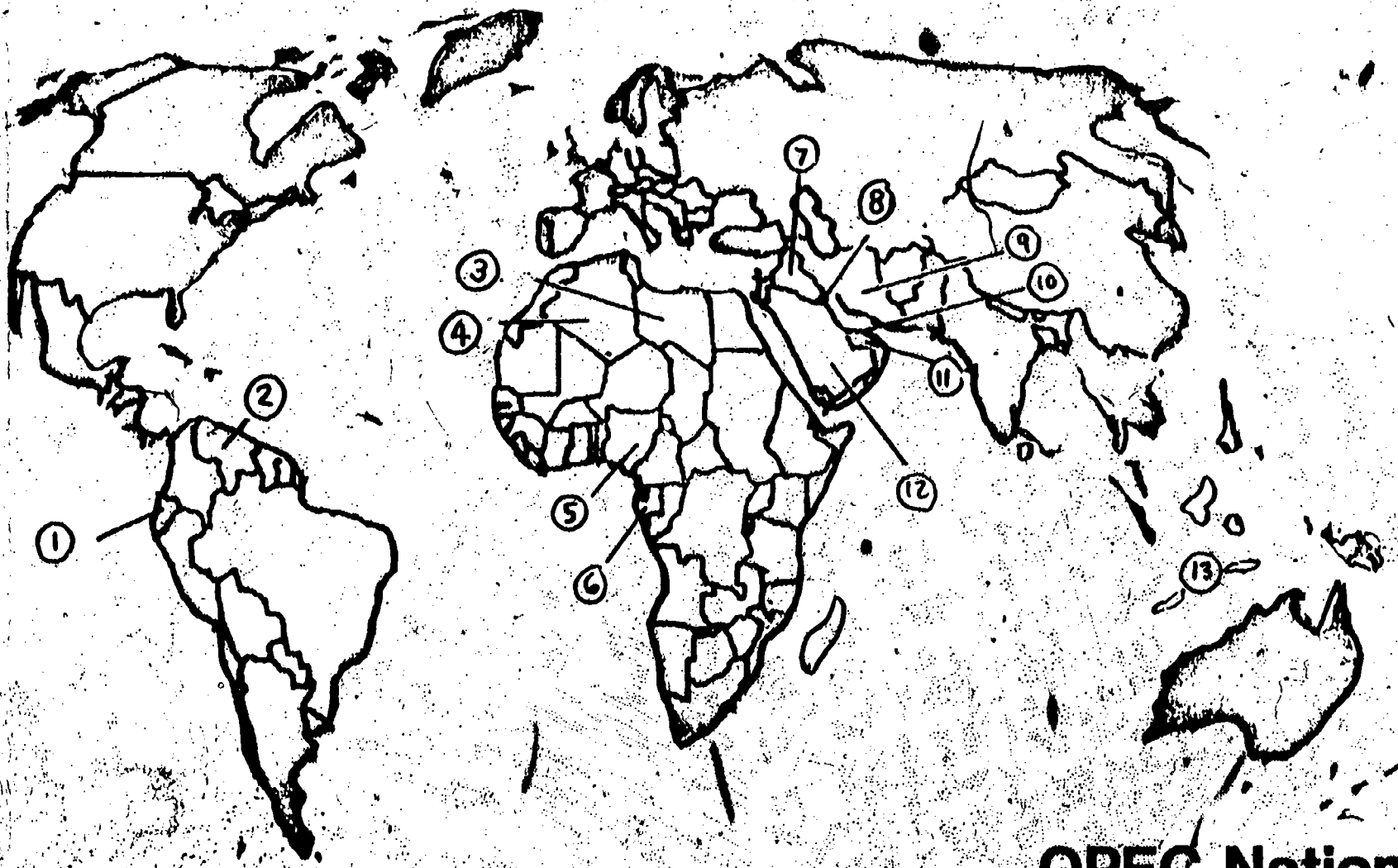
   A. fought off a Soviet invasion.
   B. destroyed the oil fields in Iran.
   C. cut off oil to the United States.
   D. seized the Golan Heights and the Gaza.

6. The United States sometimes faces conflict between friendship with oil suppliers and

   A. friendship with Moslems.
   B. support for Israel.
   C. friendship with coal producers.
   D. support for nuclear energy.

7. Transportation in the United States depends heavily on

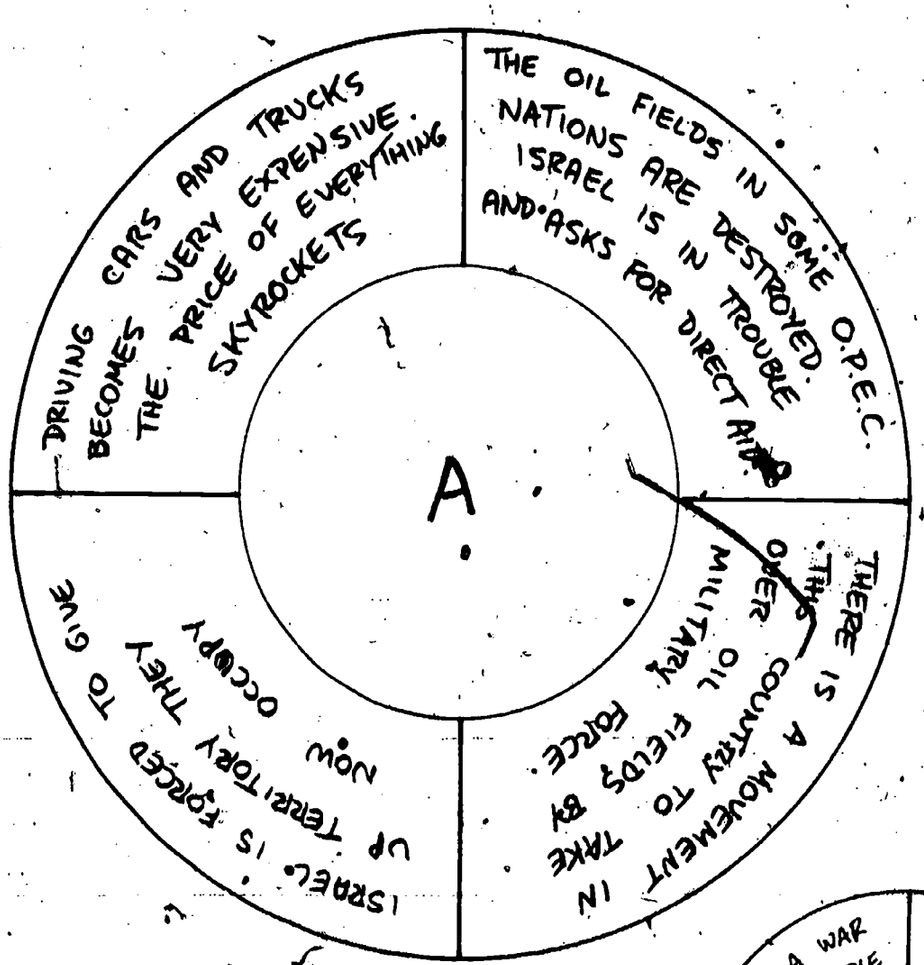
   A. access to foreign oil.
   B. construction of new power plants.
   C. production of hydroelectric dams.
   D. activity on the gold market.

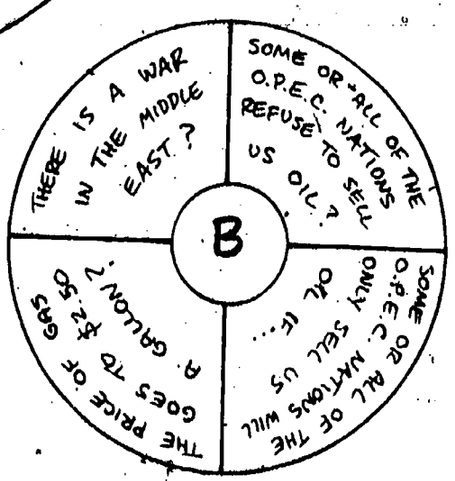


OPEC Nations

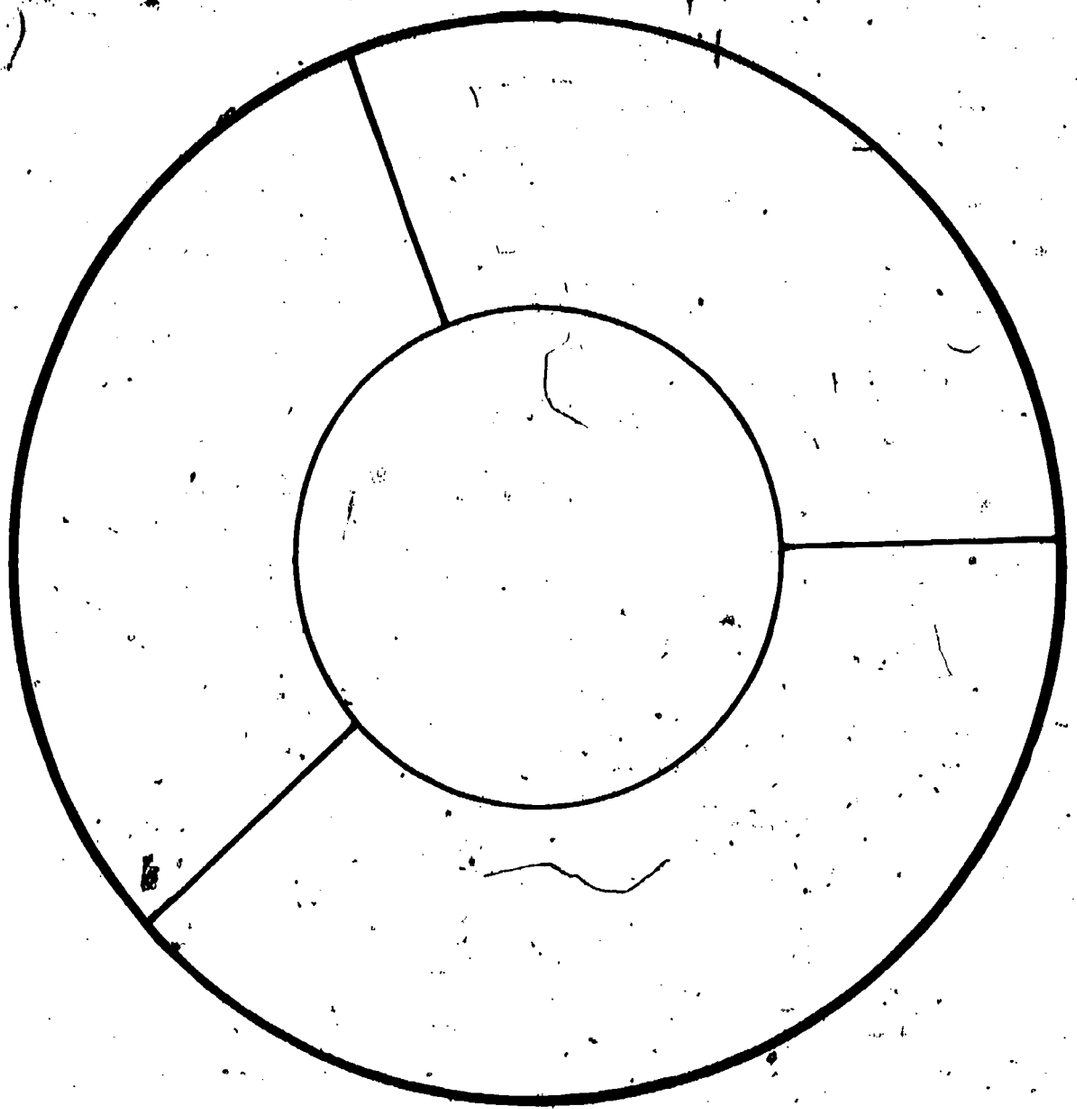
FUTURES WHEEL

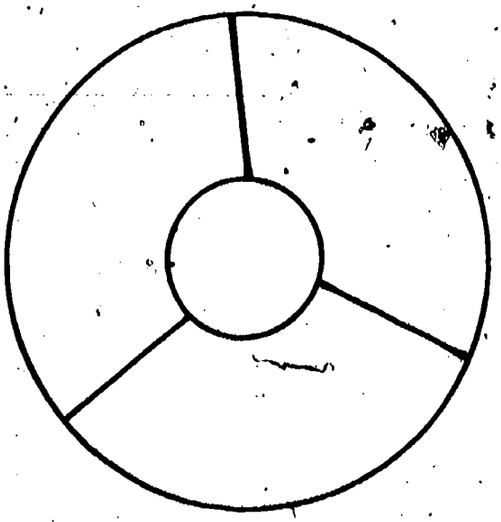
FOR ACTIVITY #8

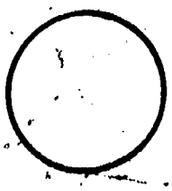




C.







BLANK FUTURES WHEEL

FOR ACTIVITY #8

ENERGY AND NORTH AFRICA-MIDDLE EAST
ADAPTATION LESSONS FOR SCIENCE, LANGUAGE ARTS AND PRACTICAL ARTS

The concepts and skills taught in this chapter of lessons can be adapted and used in science, language arts and practical arts classes. The main ideas include setting priorities, recognizing the effects of changes in energy use on the environment, weighing the costs and benefits of energy decisions and being able to identify differing perspectives on the issues of energy production, use and distribution.

ADAPTATION LESSON: ENERGY PRIORITIES AND EFFECTS

Idea. The idea in these lessons is to help students recognize the process of setting energy priorities and how changes can effect the environment.

Objectives:

1. Students will be able to recognize the process involved in setting energy priorities.
2. Students will be able to state effects of energy use on the physical environment, home and business..
3. Students will be able to use the library to research energy questions.

Science Classes. Chemical reactions as well as effects on the physical enviroment are common components of science courses. Students could do experiments that produce chemical reactions producing a new substance. Applying this idea to an energy resource, such as coal used to generate electric power, students can begin to think about the effects on the environment. How does the use of coal change the land and air quality in an area? What chemical by-products are emitted and what effects can different degrees of emission have on the quality of the air? What scientific advances are being used to improve air quality? Why is coal production a priority for the state?

An earth science or geology course could offer opportunities to talk about the formation of oil. How is it formed and why is it that some areas of the world have an abundance of one resource while others have none?

Language Arts Classes. Have your students search through the Readers Guide for articles on energy use and the effects of certain energy resources on the environment. They could also compile a bibliography or articles and books on energy resources and energy effects. Articles could be outlined with the identification of priorities stated in the articles as a point of focus. The card catalog and reference materials could be used to help students practice research procedures.

Practical Arts Classes. Have your students compute miles per gallon for their family car and compare these. How much gas do buses use?

Students could study the pollution factor and the costs and benefits of emission control devices. What priorities would your students set on the use of cars and trucks using gas as well as electrical appliances in the home, school and community?

ADAPTATION LESSON: ENERGY USE, CHANGE AND WEIGHING COSTS AND BENEFITS

Idea. These lessons focus on the concept of change and how energy use and availability has changed the way people live. Students will practice the process of weighing the costs and benefits of change.

Objectives:

1. Students will be able to state ways in which energy consumption has changed the way people live.
2. Students will be able to recognize the costs and benefits of such changes.
3. Students will state their opinions as to the relative costs and benefits of these changes and the effects on their own lives.

Science Classes. Ask students to pick an energy resource. How is the raw resource, such as crude petroleum, changed into products that we commercially use? Compare the price of the crude resource to the finished product. What proportion of that difference is due to chemical and other scientific processes performed? What chemical by-products are a result of the conversion process? How is the process a benefit to the energy industry and the people who use it? What are the financial as well as environmental costs? In their opinions which energy resources are more beneficial than others, why?

Language Arts Classes. Ask students to write a story about what their lives would be like without the energy resources we have available today. Ask them to make a list of the changes that have occurred because of the availability and use of energy resources. From their own stories ask them to think about the costs and benefits of energy use. Do they think the benefits outweigh the costs or vice versa? Why? Have students present their opinions in oral form to the rest of the class.

Practical Arts Classes. Ask students to select several well used appliances in a home. What changes does their use have on the way they live? Have students prepare a meal or construct a project without the use of appliances or machines. Discuss the changes that have occurred in peoples' lives and business production as a result of the use of these energy consuming appliances or tools. What are the costs and benefits of these? Have students weigh the costs and benefits of these changes.

ADAPTATION LESSON: THE ENERGY ISSUE SEEN FROM DIFFERENT PERSPECTIVES

Idea. These lessons focus on the concept of perspectives. How people view energy issues depends on their own experiences, situation, needs, goals and the decisions they are responsible for making.

Objectives:

1. Students will be able to recognize different perspectives on energy issues and energy use.
2. Students will be able to state their own perspectives. They also will be able to state the factors that influence the energy decisions they agree or disagree with as well as the energy they consume.

Science Classes. There is a great deal of discussion in the scientific community on the relative effects of certain energy resources. Divide your class into groups assigning each a different energy resource to investigate. Solar, nuclear, hydroelectric and petroleum are possible topics. What do the specialists advocating each resource and how it is used have to say? What do the opposing scientists have to say? What scientific knowledge and resources do each depend on?

Language Arts Classes. Divide your class into two groups for a debate. The issue could be: U.S. Foreign Policy in the Middle East should be changed. Another debate topic could be: The Federal Government should (or should not) prohibit the further construction of nuclear power plants or the Federal Government should invest large sums of money in solar energy innovations. All three of these topics are highly controversial. Students should practice their research skills and the techniques of debate. Discuss the different perspectives and how decisions are made because of their importance.

Another lesson could include having students read magazines or books printed in English from different countries. How do they reflect the countries' point of view? Have your students write an article defending U.S. energy consumption habits and one critical of U.S. energy consumption habits. How does an author's point of view cause the written piece to be biased. Use newspaper articles as examples.

Practical Arts Classes. Have your students conduct a survey on the existance and uses of appliances and equipment used in the home. They could survey other students, teachers and members of the community. Also include in the survey questions asking why certain appliances are used and what is their relative importance for the family. Compile the results and compare the findings. Why do people have differing opinions on what appliances they think are necessary? How do people's opinions depend on their own perceived needs and wants? Have students set up a hypothetical home of their own. What appliances would they want to have in it and why? How is their "home" different from others? Examining advertisements could also be a way of helping students recognize the impact of expectations on their own desired lifestyles.

ENERGY AND NORTH AFRICA-MIDDLE EAST

LESSON ONE: EGYPT AND THE ASWAN HIGH DAM

Lesson Objectives

- To state several cultural, political and economic links among the countries of the Middle East and those of North Africa
- To state the costs and benefits of the Aswan High Dam in Egypt
- To be able to set priorities, recognize the effects of changes on the environment and weigh the cost and benefits of change.

ACTIVITY # 1

Look at Map #1 on this page. On a piece of paper write down your impressions of this area of the world. For example, what are your impressions of the way people live, the climate and the resources available? Do not be concerned if your impressions are accurate or not. This activity is to help you recognize your own perceptions of North Africa and the Middle East.

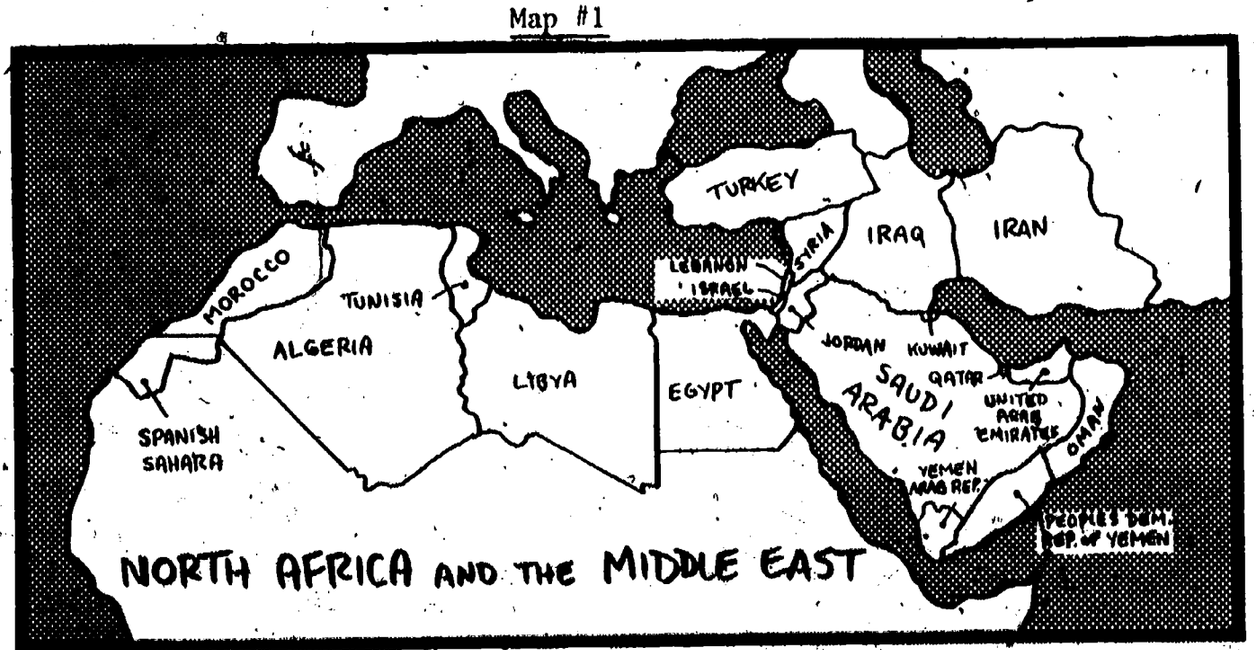
1. Compare your impressions with others in your classroom.

2. How are your perceptions different from others? How are they similar?

3. Why do you think your perceptions of North Africa and the Middle East are similar to or different from others' perceptions?

4. Keep this idea of perceptions in mind as you study about North Africa and the Middle East.

Map #1



NORTH AFRICA AND THE MIDDLE EAST

North Africa and the Middle East are located where three continents meet. The countries in this area are in Europe, Asia and Africa. Throughout history, this area has been a crossroads for the world. Goods and people have traveled through this area linking them together as well as providing links to the rest of the world. The Suez Canal is a short-cut between the Mediterranean Sea and the Red Sea making it an important route for products, especially oil, bound for Europe as well as the United States. Without the Suez Canal ships would have to go around Africa increasing the time and money needed to transport goods.

Another factor linking this area is religion. A majority of the people in this area of the world are Arabs. Their religion is Islam, and the people are known as Muslims. Mecca, in Saudi Arabia, is the birth-place of Islam because the prophet Mohammed was born there. A prophet is a religious teacher who is said to speak for God. In 622 A.D. Mohammed started teaching his new religious beliefs. Mohammed's teachings spread and served to unite this area of the world. Language and customs that came along with the religion has also served to link this area.

North Africa and the Middle East is also linked together because it is an area of conflict. There is a great deal of debate among the people in this area who are Muslims and those who support the existence of the Jewish state of Israel. The land of Israel has great religious significance for three of the world's major religions: Judaism, Islam and Christianity. Conflicts over this land have existed for thousands of years. Conflict still exists today.

The Muslim nations in this area are linked together in their concern for the Palestinian people who became refugees when Israel was

created as a nation in 1948. There have been four wars in this area since then. Other nations of the world recognize the constant danger of open conflict in this area. Conflict in North Africa and the Middle East affects nations all over the world.

Another important link among the countries of North Africa and the Middle East is the recent discovery of the abundance of energy resources. This area of the world is tied together because of its ability to produce much of the world's oil supply. The political and economic aspects of this fact have further united the people. Although there are many differences among the people of North Africa and the Middle East, there are also many things that link them together.

ACTIVITY # 2

We have been talking about things that link North Africa and the Middle East. This point may be more easily understood when you try the following activity.

Look around at the people in your class. Notice the differences. Some of you are boys and some of you are girls. But all of you are people, all of you are students, and all of you are studying about energy.

Look at the following list of characteristics and descriptions. Copy this list down on a piece of paper.

1. Mark the things with a #1 that link you with <u>all</u> the other people in your class.

2. Mark the things with a #2 that make you different from all the others.

3. Mark the things with a #3 that link you with <u>some</u> of the others but not <u>all</u> of the others.

Hair color
Favorite hobby
Young people
Members of your school

Same social studies teacher
Same language spoken
Height
Citizen of the United States
Born in the 1960's
Birthdate
Favorite musical group
Street where you live
Participation in extra-school activity

Think about the following two questions when you have completed marking the list.

1. How do the things you have in common with some or all of the other members of your class help you to talk to each other?

2. How do the things you have in common with others affect the way you "see" things; your likes and dislikes?

EGYPT AND THE ASWAN HIGH DAM

We have been talking about North Africa and the Middle East as an area with many things in common. We are now going to change our focus to look at one country in North Africa--Egypt. We will study Egypt because it is an example of how one nation is striving to deal with the issue of energy. Energy, as a part of Egypt's development effort, is very important. Energy development is a priority for Egypt's people.

ACTIVITY # 3

Think for a moment about the idea of priority. A priority is something that is more important than something else. Think about your own priorities. Pretend that today is Saturday. It is your day to do what you want.

1. Make a list of things you want to do. Next to each item on your list put down how much time each thing will take.

Now put your list in order of things you want to do first to the things you will do last. After all, Saturday does not last forever. Your new list is in order of priorities that you have. Compare your list with those of others. Why are your lists different?

2. Now make another list but this time think about the things you feel you are supposed to do on your Saturday. Things on this list may include doing homework, doing chores or even just taking the time to relax. Now order this list in terms again of priorities. This list can be the same as your want to do list but then again it might be different. Compare this second list with others in your class. How is this list different? Why do you think this list is different from others?

3. Now make a third list but this time list the things you can do. How does this list influence what you will actually do on your Saturday? How does what is possible affect your other two lists? How is your can do list different from others? Why?

Keep this idea of priorities, what you want to do, should do and can do, in mind as you read about Egypt and energy.

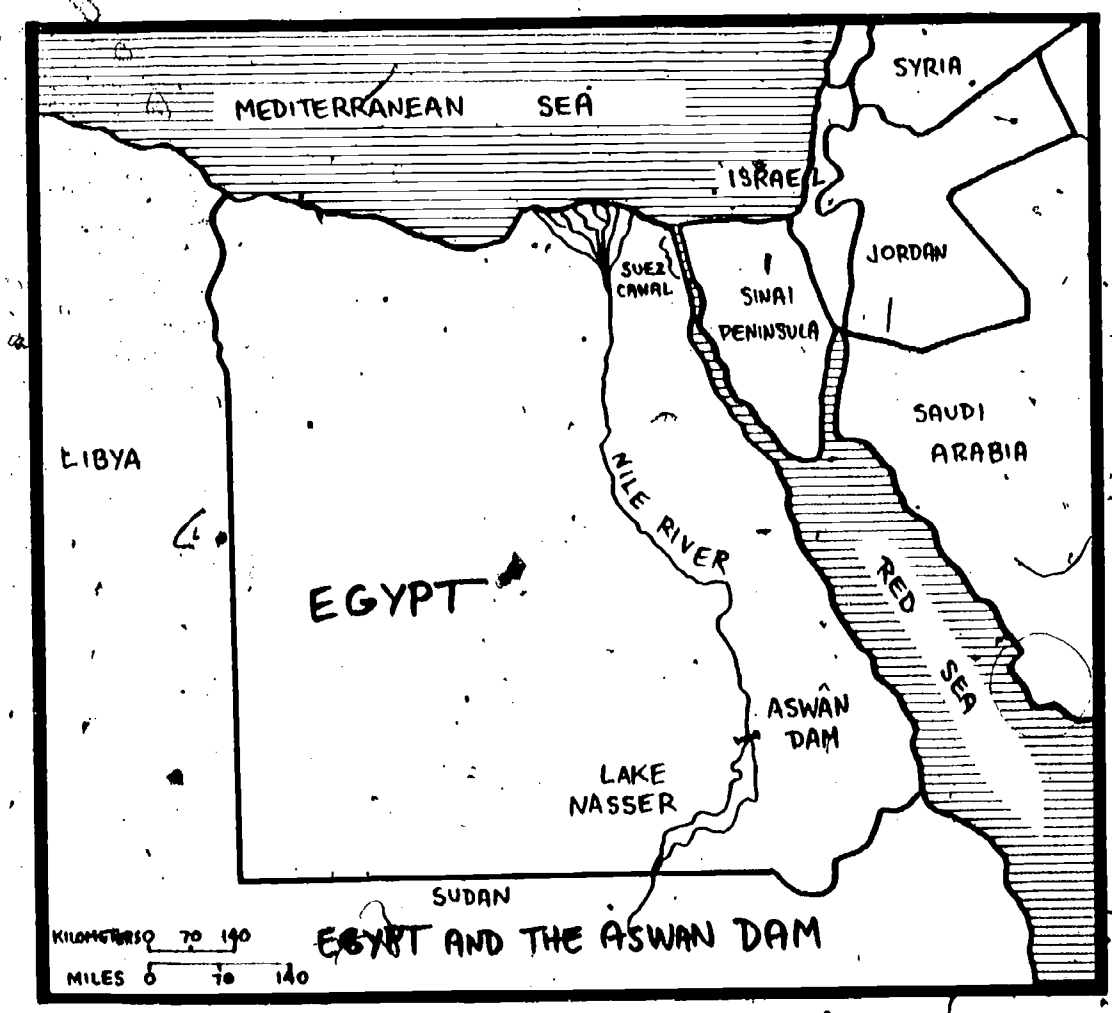
NASSER SETS PRIORITIES

When Gamal Abdel Nasser came to power in Egypt in 1954, he had major decisions to make about the fate of his country. He looked at the goals and needs of the people of Egypt and realized he had to set priorities. Egypt, like other countries, had and still has many problems. One of Egypt's problems was, and still is, feeding its 40 million people. So one of the priorities set was land reform.

Land reform, in Egypt's case, was an attempt by the Government to redistribute land so that more people could farm. Land reform also meant helping farmers to raise more crops. Besides land reform, another priority was to have more electric power to aid in the growth of industry.

One way Nasser could meet these priorities was to build a huge dam on the Nile River. Look at Map #2. Locate the Nile River and the site of the Aswan High Dam. This Dam would provide for more irrigated farmland as well as generate the hydroelectricity needed for industry and light. Hydroelectricity is generated by turbine plants. The turbines are run by water and drive electric generators. These generators produce electric power measured in kilowatt hours.

Map #2



Construction on the Aswan High Dam began in 1960 and cost one billion dollars by the time it was completed in 1970. It is 2 miles long and 361 feet high. During the rainy season in late August, the Aswan High Dam holds back the rising waters of the Nile River. The water collects in Lake Nasser. This water is used to irrigate farmland during the dry periods and to generate electricity.

The Aswan High Dam has the capacity to produce 2100 megawatts of electrical power. This is 2100 million watts, enough electricity to supply all the households in Indiana for one hour, twenty minutes. Riverfront Stadium in Cincinnati uses 1 million watts of power to light a night football or baseball game. Water supplied by the Dam irrigates 2 million acres of farmland, which is approximately half the size of Indiana. Therefore, Egypt has been able to double its agricultural production.

ACTIVITY # 4

The building of the Aswan High Dam had many effects on the people of Egypt. Here is a list of main categories that could have been affected by the construction of the Aswan High Dam.

1. Agricultural production
2. Industrial production
3. The lifestyle changes of the people
4. Environmental effects
5. Growth of the economy

On a piece of paper write down under each category the possible effects. For example; under the category of agriculture one of the effects could be that more land is now available for farming. Compare your list of possible effects with those of others in your class. Discuss the following questions.

1. Which effects do you consider to be <u>benefits</u> for the people of Egypt? Why?
2. Which effects do you consider to be <u>costs</u> for the people of Egypt? Why?
3. Why do some people consider a certain effect to be a benefit while others may consider the same effect to be a cost?

CHANGES HAVE EFFECTS

We know that the construction of the Aswan High Dam had many effects. Agricultural production doubled, electric power has brought light and power for industrial development. These things are important for Egypt, and most people would consider these benefits. However, nothing is ever that simple. Many people, while recognizing the benefits of the Aswan High Dam, also recognize the costs.

The construction of the Aswan High Dam has seriously damaged the environment. Environment is one's surroundings. The natural environment for people living near the Nile River has been changed. The environment and people's interactions with it is a relationship of interdependence. People affect the land, air and water around them while the condition of the land, air and water affects the way people live.

The balance between people and their natural environment is difficult to maintain. One change in the environment, such as the building of a dam, can also affect other parts of the environment. This in turn can affect the way people live.

ACTIVITY # 5

As a class construct a chart of a possible chain of effects for a change in your community. Your chart will have the following categories.

(1) Priority → (2) Change → (3) Effects on Environment → (4) Effects on people and other aspects of the environment

1. Start with a goal or priority that will potentially benefit the people of your community. In setting your priority consider the thing or things you want to do, should do and can be possible.

2. Put the changes related to your chosen priority under category #2.

3. List possible effects the change would have on the environment.

4. List further effects the change would have on people and other aspects of the environment.

For example,

Priority	Change	Effects on Environment
1. Providing more jobs 2. Economic growth of the community 3. A company is willing and able to locate in your community	1. Building a factory on available land	1. Site for factory will cause wildlife there to migrate elsewhere 2. Possible changes in air quality in the area from factory emission

→ Effects on people and other aspects of the environment

1. Wildlife is endangered
2. More people have jobs
3. Possible pollution
4. Economy of the area grows

5. Once you have gone through this process for something in your community, list all the benefits and costs for the change.

For example,

Benefits	Costs
1. More people have jobs 2. People move into the area increasing community revenue 3. Other businesses grow and develop	1. Natural wildlife is possibly endangered 2. Community must provide more services for increased population 3. Natural environment is altered 4. More traffic

6. Now looking at benefits and costs, weigh each and decide which things are more important than others. You could do this by assigning numbers (1-5) to each benefit and cost, 5 being a major cost or benefit,

3 being a moderate benefit or cost and 1 being a slight benefit or cost. How does one benefit outweigh a cost? How does a cost outweigh a benefit? Why do some of you think costs outweigh benefits and others think benefits outweigh costs? Where can you go to get the information you need to make these decisions? How can you possibly decrease costs and increase benefits?

7. Do you still want to make the change? Why or why not?

The process you have just gone through is similar to the one Egypt is going through over the effects of **constructing the Aswan High Dam.** For thousands of years, while the Nile River flooded, the silt carried over the land acted as a type of natural fertilizer. Now, because of the Dam's ability to stop the flooding, the farmers must use expensive fertilizer. The absence of the silt has also increased erosion. Snails carrying worms that caused disease used to be killed every year in the floods. **Now there is an increase of disease.**

The Aswan High Dam has brought many benefits to the people of Egypt. Electric power is essential; people must have a source of energy. However, the Dam's construction has also had some costs. Egypt strives to cut down on the costs while making best use of the benefits. Nothing is ever totally free; and this process takes time, money and human energy.

ACTIVITY # 6

Obtain from your teacher a crossword puzzle blank sheet and fill-in the terms that match the numbered blanks. This puzzle is a review of the ideas in this lesson.

ACROSS

1. Mutual needs and effects
4. Energy produced by water pressure
5. The Dam built in Egypt
6. Negative results of a change
7. Ordering the things you will and want to do first
8. Name of the president of Egypt from 1954 to 1970
9. Positive results of a change

DOWN

1. Process by which more land is given water to grow crops
2. Name of river the Dam is built on
3. Things in your surroundings

ENERGY AND NORTH AFRICA-MIDDLE EAST

LESSON TWO: SAUDI ARABIA: OIL AND CHANGE

Lesson Objectives

- To list several ways in which increased oil production and oil wealth has changed the way of life in Saudi Arabia
- To recognize the costs and benefits of these changes
- To identify how Saudi Arabia is interdependent with the rest of the world
- To recognize ways your life and the lives of others have changed because of rising oil prices
- To identify ways oil can be conserved

ACTIVITY # 1

Think about tradition. Tradition is a long established custom or belief that has been handed down from generation to generation. What traditions are there in your school? What events are there every year that have become traditions? What traditions are there in your family? Share your ideas with others in your class.

SAUDI ARABIA: A LAND OF TRADITION

Saudi Arabia is a country in the Middle East rich in oil. Its population is 9 million, and its society is built on traditions. Until recently most of the people of Saudi Arabia were nomads or small farmers. Nomads are people who move from place to place. They keep sheep and goats and move every few weeks as the grass gives out. Nomad men are skilled at riding and shooting. Through centuries they have lived peacefully depending on their natural environment. They also depend on the camel. When temperatures rise in the desert to 120 degrees and there is no rain, the camel enables the Nomad to live and travel.

Saudi Arabian tradition is also based on religion. The Muslim religion is very important to the people. Throughout the centuries religious law has become a code for their way of life.

Even though Saudi Arabian society is built on tradition, it is now experiencing the effects of change. Oil has a great deal to do with the changes that are taking place.

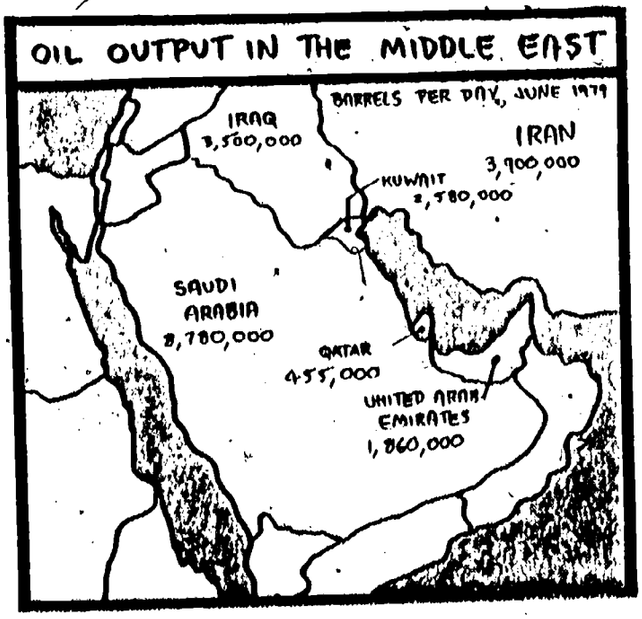
ACTIVITY # 2

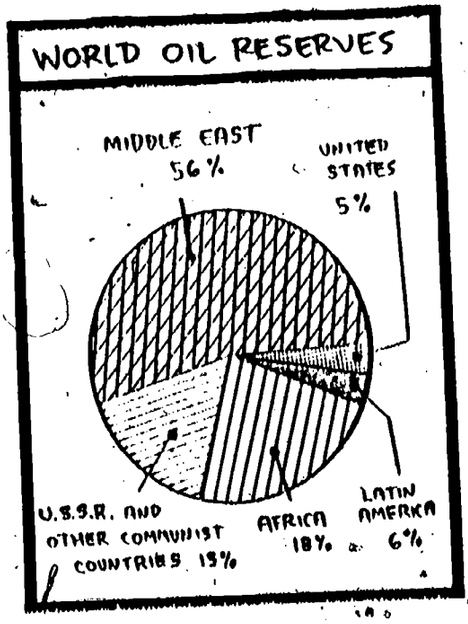
Look at the map and graph on this page. Answer the three questions from the information given.

1. In 1978 how many barrels of oil per day did Saudi Arabia, Iran, Iraq, Kuwait, Qatar and the United Arab Emirates produce individually and collectively?

2. What percent of world oil production is this?

3. What percent of world oil reserves does this represent?





ACTIVITY # 3

Read the following list of facts about Saudi Arabia and oil.*

1. In 1970 Saudi Arabia produced 3.8 million barrels of oil a day. For this oil in 1973 they received a total of 1.2 billion dollars.

2. In 1974 daily production of oil in Saudi Arabia rose to 8.5 million barrels. For this oil in 1974 they received a total of 22.5 billion dollars.

3. In 1977 Saudi Arabia produced 9.2 million barrels a day. For this oil in 1977 they received a total of 42.2 billion dollars.

What has happened to Saudi Arabian oil production since 1970? What has happened to the amount of money received for the oil?

1. Given these facts, write down on a piece of paper what changes you would guess have occurred in Saudi Arabia.

2. Pretend you are a teenager living in Saudi Arabia today. You live in a city. Write a letter to a friend who lives on a small farm in the country. Tell your friend the changes that have occurred in your life because of increased oil production and increased money coming into your country. Include such things in your letter as facilities being built, educational opportunities, health care, lifestyle changes and even foods that are now available.

3. Share your letter with others in your class.

*Source - Annual Statistical Bulletin. 1977, Organization of Petroleum Exporting Countries Statistics Unit, September, 1978.

SAUDI ARABIA AND OIL

In 1933 Americans came to Saudi Arabia searching for oil. Within a few years, they discovered a vast wealth. Saudi Arabia alone has about one-quarter of the world's known oil supply. After World War II the Saudi Arabians and Americans established a company called Aramco, Arabian American Oil Company. American business and technology built the oil industry. Saudi Arabian people, trained by Americans, learned the necessary skills. Between 1973 and 1976 Saudi Arabia acquired full ownership of Aramco. Saudi Arabian oil production is now owned by their Government.

As you are aware, there is a great demand in the world for oil. North America alone consumes 27 million barrels of oil a day, while producing 16 million barrels a day. The difference comes from many sources, one being the Middle East. Because the Middle East, in particular Saudi Arabia, has the supply needed, countries like the United States buy or import oil. We depend on Saudi Arabia to sell us oil. Saudi Arabia depends on us to buy their oil. With the money they receive from us for their oil, they buy the things they need to develop their country.

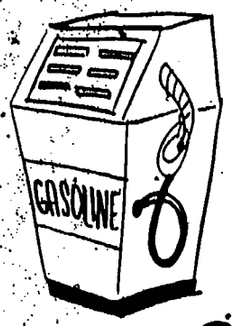
This relationship is an example of <u>global interdependence</u>. We have a mutual dependence on each other. However, this dependence is not equal. While we depend to a great extent on Saudi Arabian oil, they can buy what they need from other countries besides the United States. What we in the United States and other oil consuming countries do, affects those countries who produce oil. What those oil producing countries do affects us.

ACTIVITY # 4

Look at the pictures on this page.

1. Which pictures represent the things we need and get from oil?

2. Which pictures represent the things Saudi Arabia needs from us?



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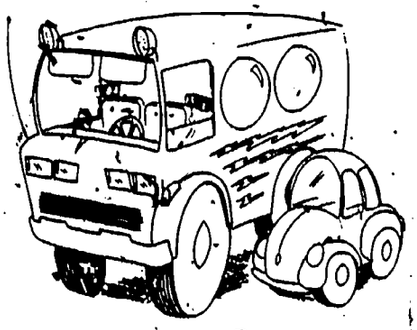

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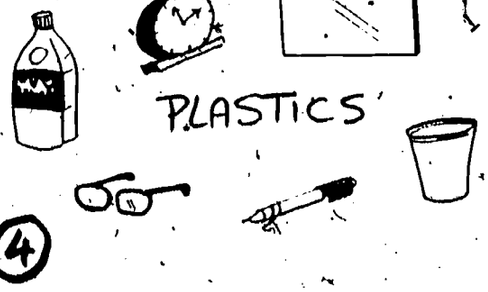

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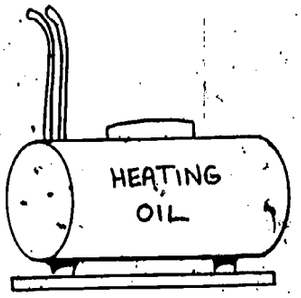

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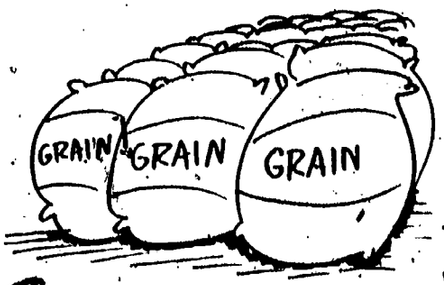

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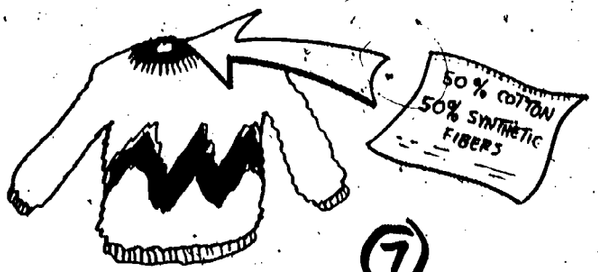

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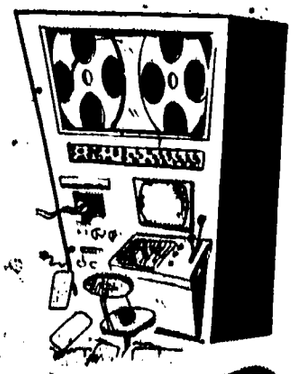

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Now write one paragraph describing how the pictures represent an example of interdependence.

1. How do you use products made from oil?

2. How do you think the Saudi Arabians use the products they buy with the money they receive from oil?

SAUDI ARABIA LOOKS TO THE FUTURE

Oil is a nonrenewable resource. Nonrenewable means that the resource cannot be replaced. Oil takes millions of years to be formed naturally. Therefore, the oil in Saudi Arabia will not last forever. It is very important to the Saudi Arabian people that when the oil is gone, their people will have other ways to earn a living. Saudi Arabia is setting priorities for ways they will spend the oil money wisely. The changes that are occurring in Saudi Arabia are affecting the way people live. The leaders of the Saudi Arabian Government are doing what they think is best for their people and their future.

ACTIVITY # 5

Pretend for a moment that you are a leader in Saudi Arabia. Your country has great wealth from selling oil to other countries. You realize that the oil will not last forever. You must plan now for the future. Write down your ideas using the following questions as a guide.

1. What are your priorities for your country and its people?

2. What changes will you make to meet these priorities?

3. What effects will these changes have on the people and the environment?

4. What are the benefits of your proposed changes?

5. What are the costs?

6. Who will you have to depend on to bring about these changes?

7. How do other countries in the world depend on you and the decisions you make?

8. Compare your ideas with others in your class and with the information that follows in the next section of these materials.

SAUDI ARABIA CHANGES

Saudi Arabia is investing its oil money. In agriculture, for example, they are building several large irrigation projects. A desalination plant has been built on the Arabian Gulf to take the salt out of sea water. It will soon produce enough salt-free water to irrigate 68,000 acres of land. The irrigation of the desert is enabling them to grow crops, such as fruit. They are opening canning factories and hope to export fruit. The irrigation of land is also making it possible to raise more sheep.

The Government is also encouraging new industry. Plastics, steel, cement and clothing are the biggest. They are also building plants that can produce fertilizer and other chemicals.

The lives of the people are also changing. Money from oil is building free schools, free hospitals and housing. Whole new cities are rapidly being built. Western technology and consumer goods are being brought to Saudi Arabia. Many Saudi Arabian people are receiving degrees from American universities in medicine, business, education, engineering and agriculture.

Today less than 15 percent of the people are nomads. People are giving up their horses for pick-up trucks. Many are now working for the Government in the oil industry. Western products and ideas are coming into the country affecting the way people live and think.

There is a fear for many Saudi Arabians that much of their rich tradition is being lost. They want to prosper, but they also want to keep their religion and old family ways. Where women were traditionally considered inferior to men, now large numbers of women have given up the veil and are obtaining an education. The old view of their religion, Islam, is also changing. People are not giving up their religion but viewing it more in terms of modernization. Within Saudi Arabian society there exists conflict between the old and new ways.

As Saudi Arabia makes use of their new found wealth, they must deal with the costs and benefits of living in a modern era. With the benefits of oil money ~~also~~ comes challenges, additional needs and wants, and world-wide responsibilities and involvement.

ACTIVITY # 6

Now think about changes that have occurred or are occurring because your family, school, community and nation is spending more money to obtain the oil it needs. In 1970 the United States was able to buy a barrel of oil from Saudi Arabia and other members of the Organization of Petroleum Exporting Countries (OPEC) for $1.80. By the beginning of 1980 the price of a barrel of oil is expected to rise to $30. Our lives are changing because we must spend more to obtain the oil we need. The price of gas for our cars and trucks has risen considerably. The prices of plastics, fertilizers, clothing made from synthetic fibers, and home heating oil, to name just a few, have risen to the point that our economy is greatly affected. How do you fit into all of this? Think about the following questions. Share your thoughts with others in your class.

1. What changes have occurred in <u>your</u> life and the lives of others because of this?

2. What are you presently doing to conserve oil?

3. What could you do to conserve even more?

4. How can these and other efforts benefit you and your family? How can conservation benefit our nation?

ENERGY AND NORTH AFRICA-MIDDLE EAST

LESSON THREE: OIL, OPEC AND YOU

Lesson Objectives

- To define the term cartel
- To explain how supply and demand affect price
- To identify areas of the world that produce more oil than they consume and areas of the world that consume more oil than they produce
- To state the three conditions that need to be considered in decision making
- To apply these to a new situation
- To recognize possible futures involving oil availability

ACTIVITY # 1

Pretend for a few minutes that you have to go without oil, gasoline and oil products for one day. What do you use every day that comes from oil? Make a list of things you could not do without. How would your life change? Compare your list with others in your class.

THE ORGANIZATION OF PETROLEUM EXPORTING COUNTRIES - OPEC

Petroleum, or oil, is a very valuable energy resource in North Africa and the Middle East. This is so because this area of the world is able to export, or sell, huge amounts of this needed resource to the rest of the world. Other countries of the world, especially the industrialized nations, need oil to heat their homes, factories and places of business. They need oil also to manufacture petroleum based products and provide gasoline and oil for their cars and trucks.

Consumption, or the amount of oil used, has been increasing. For example, in 1970 the United States imported 15 million barrels of oil. In 1977 the United States imported 500 million barrels of oil. A barrel of oil equals 42 gallons. Because the demand for oil is so high, countries that export oil are able to charge and receive top prices.

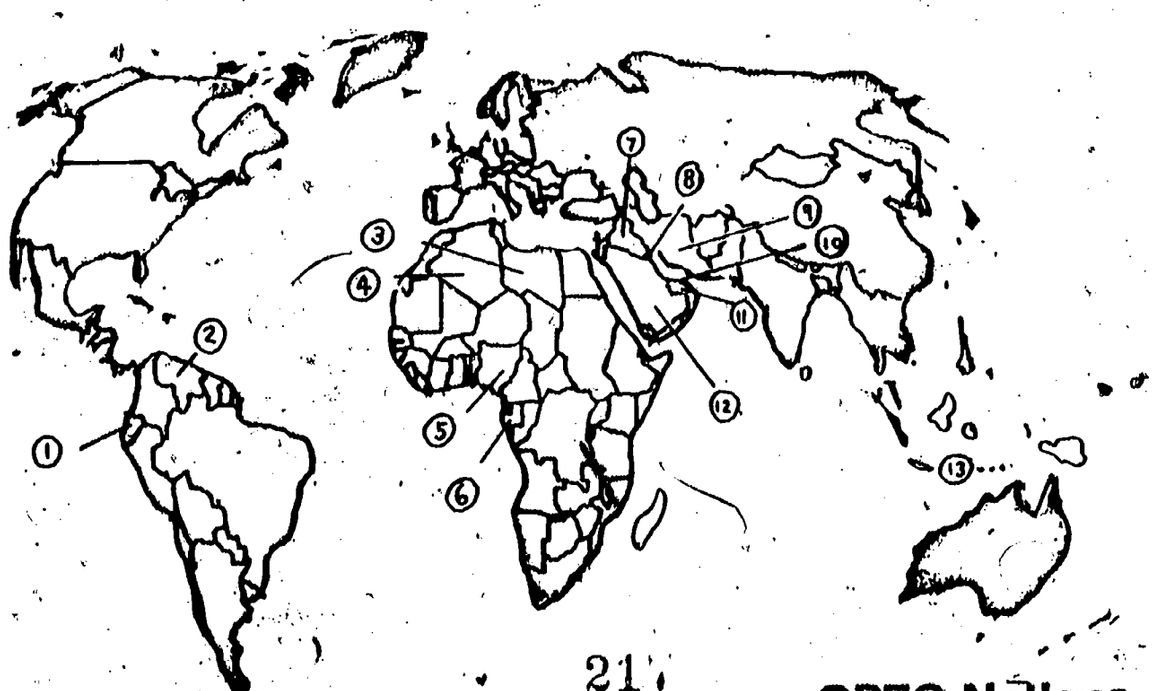
In 1960 many nations joined together to form the Organization of Petroleum Exporting Countries, known as OPEC. These nations meet to decide what price to charge for their precious resource. They have formed a cartel. A cartel is the banding together of nations or businesses who possess a needed resource. They all agree on the approximate price they will charge to nations who want the resource. By remaining united they have the ability to charge what they want. Since nations need oil and cannot produce enough of their own, they must buy from the OPEC nations. OPEC, as a cartel, has been able to enjoy new found wealth through petroleum sales.

ACTIVITY # 2

Map #1 is a blank copy with lines drawn to OPEC member nations. Obtain a copy of this map from your teacher and using a world map or atlas, fill in the following OPEC nations:

Algeria	Iran	Libya	Saudi Arabia
Ecuador	Iraq	Nigeria	United Arab Emirates
Gabon	Kuwait	Qatar	Venezuela
Indonesia			

Map #1



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OPEC Nations

Answer the following questions on a piece of paper.

1. Which nations are in the following areas of the world: The Middle East, North Africa, Sub-Saharan Africa, South America, South Pacific.

2. What is OPEC?

3. What is a cartel?

4. Why do nations join cartels?

5. What are the advantages for cartel member nations?

6. What are the disadvantages for the nations who buy oil from OPEC nations?

SUPPLY, DEMAND AND PRICE

When people want to buy a resource or product, there is a demand. The amount available for sale is the supply. There are many things that contribute to a demand and many things that influence supply.

Let us take an example and see how it basically works. On one particular day you have come to class and forgotten your pen or pencil. You need a pen or pencil to complete an assignment before the end of the period. You do not have one in your locker, and the school bookstore is not open. You have a demand. What will you do? You might borrow from someone else, but no one has an extra. In fact, ten other members of your class are also without pens or pencils; and their assignments are due.

In walks a pen salesperson. This person has a supply. However, the salesperson's supply is limited and has only five pens for sale. These pens usually sell for 50¢. The salesperson decides to sell the pens at $1.50 per pen. You dig in your pocket to see how much money

you have.. Others do the same. Since a total of eleven people want the limited supply of pens, what can happen to the price of the pens available? The price can go up. It has been inflated. You are paying more for a pen because the demand is high, and the supply is limited.

If a competing salesperson came into your room with more pens to sell, what then would happen to the price? It will go down, because the supply is higher than the demand.

If that potential competitor decided to work out an arrangement with the first pen salesperson, what would they agree to? How can they form a pen cartel and what then would happen to the price?

ACTIVITY # 3

Role play a situation in your class similar to the one with pens. Use lunch tickets, snacks or a ride to Friday night's game. Pick something for which there is a demand.

1. Give an over supply to someone of the product or service. Have an auction and see what happens to the price.
2. Now give an under supply of the product or service but keep the demand the same. What then happens to the price?
3. Bring in someone else with another supply of the wanted product or service. What happens to the price?
4. Next have competing sales people form a cartel. What now happens to the price of the product or service?

WORLD OIL CONSUMPTION AND PRODUCTION

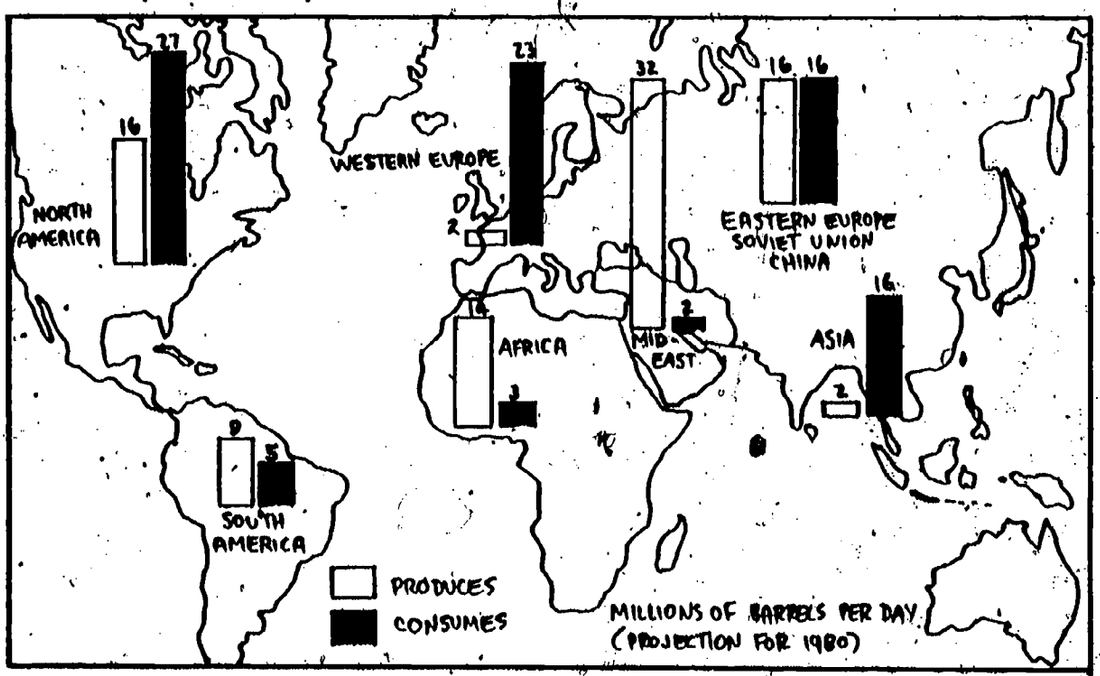
The role play you have just conducted is a simplified version of what happens with oil. Actually, the factors involved in world oil

demand, supply, consumption and production are far more complicated. One of the reasons the world situation is so complex is because not everyone has the same demand. Some nations of the world are able to produce the oil they consume. So, the price of OPEC oil does not affect everyone.

ACTIVITY # 4

Look at Map #2 and the information* given below.

Map #2



WORLD OIL PRODUCTION AND CONSUMPTION

Petroleum Imported into the United States

1977 -- 8,714,000 barrels per day of petroleum
1977 -- 7,252,000 barrels per day from OPEC nations
1977 -- 3,636,000 barrels per day from Arab OPEC nations
1977 -- 1,523,000 barrels per day from Saudi Arabia
1977 -- 46% of our oil consumption from Saudi Arabia, Nigeria, Libya and Venezuela

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1973 -- 486,000 barrels per day from Saudi Arabia
1979 -- 1,329,000 barrels per day from Saudi Arabia.

*Source -- Department of Energy

Answer the following questions:

1. What is meant by the term oil production? Oil consumption?

2. What areas of the world produce more than they consume? Consume more than they produce? Consume about as much as they produce?

3. What does this map tell you about the relationship between the areas of the world that have a demand, and areas of the world that have a supply?

4. How is the United States dependent on OPEC nations, Arab OPEC nations and Saudi Arabia for imported oil?

5. What has happened to the U.S. dependency on Saudi Arabian oil from 1973 through 1979?

DECISION-MAKING AND OIL

There are many decisions that the people who control oil production have to make. There are many decisions that the people who have to buy oil have to make. Each group of people within a nation who make decisions have to consider three basic things. They are as follows:

1. The conditions that exist within their country, excluding the government organization.

2. The conditions that exist outside their country.

3. The conditions that exist within their government organizations.

This will be easier to understand if you apply this idea to a decision you have to make in your school.

ACTIVITY # 5

Pretend you are the president of your school's student council. You have to make a recommendation about a dress code for the student body to the principal.

On a piece of paper write the three conditions that you must take into account in making your decision.

1. Conditions within your school will include what the students and teachers want. All students do not want the same thing in the way of a dress code.

2. Conditions outside of your school will include what the parents and other community members want.

3. Conditions within the student government organization will include what other members of the student government want.

When you have listed conditions for all three categories, write down all the choices you have. Who will approve of which decision you make? Who will disapprove? Why is it so difficult to make a decision? Make a decision. Share it with others. What are their reactions? How do you feel about having to make this decision?

AN OPEC NATION AND DECISION-MAKING

The problems you have had in making a decision about a dress code can be applied to making oil decisions. OPEC nations meet to set oil prices. They also must decide how to spend the money they receive for their oil. The decisions they make depend on their perspective. A perspective is the way a person or group of people see a situation. People have different perspectives, because they live in different circumstances. What a person wants, feels and thinks is different from what another person wants, feels and thinks. Past experiences, the role one plays in a government or company and personality traits affect the perspective.

ACTIVITY # 6

Here is a list of conditions that would apply for a leader of an OPEC nation selling oil. Group the numbers for each statement into each of the three things that must be taken into account when making a decision.

Category #1 -- Conditions that exist within the country

Category #2 -- Conditions that exist outside of the country

Category #3 -- Conditions that exist within the government organization

1. The people of the country want better educational facilities.

2. The minister of defense wants more money to buy weapons.

3. The people want to limit production of oil to keep prices high and make the supply last longer.

4. The countries in the area want oil to be cut off to those nations who are not friendly to them.

5. The religious leaders want traditional religious law to be followed strictly, which means decreasing the amount of "Western" customs and goods coming into the country.

6. The nations who buy the oil want the price of oil to be lowered.

7. The people of the country want the oil money to be invested in foreign businesses.

8. Other officials in the government want more oil supplied so the government will have more money to buy foreign goods.

9. People in the nation want to have more money to build hospitals.

10. Other governments want you to use oil money and oil supply to help their own cause.

1. Given all these things, why is it so difficult for an OPEC nation to make decisions about their nation's supply, price and use of oil and the money gained from it?

2. How is each perspective different? Write your thoughts down under the list of things you have grouped.

CONFLICT IN THE MIDDLE EAST

Any discussion of oil in North Africa and the Middle East must include a section on the conflict in this area of the world. This conflict affects areas all over the world as well. The United States is particularly affected, because we are dependent on oil coming from the Middle East and because we are a powerful country.

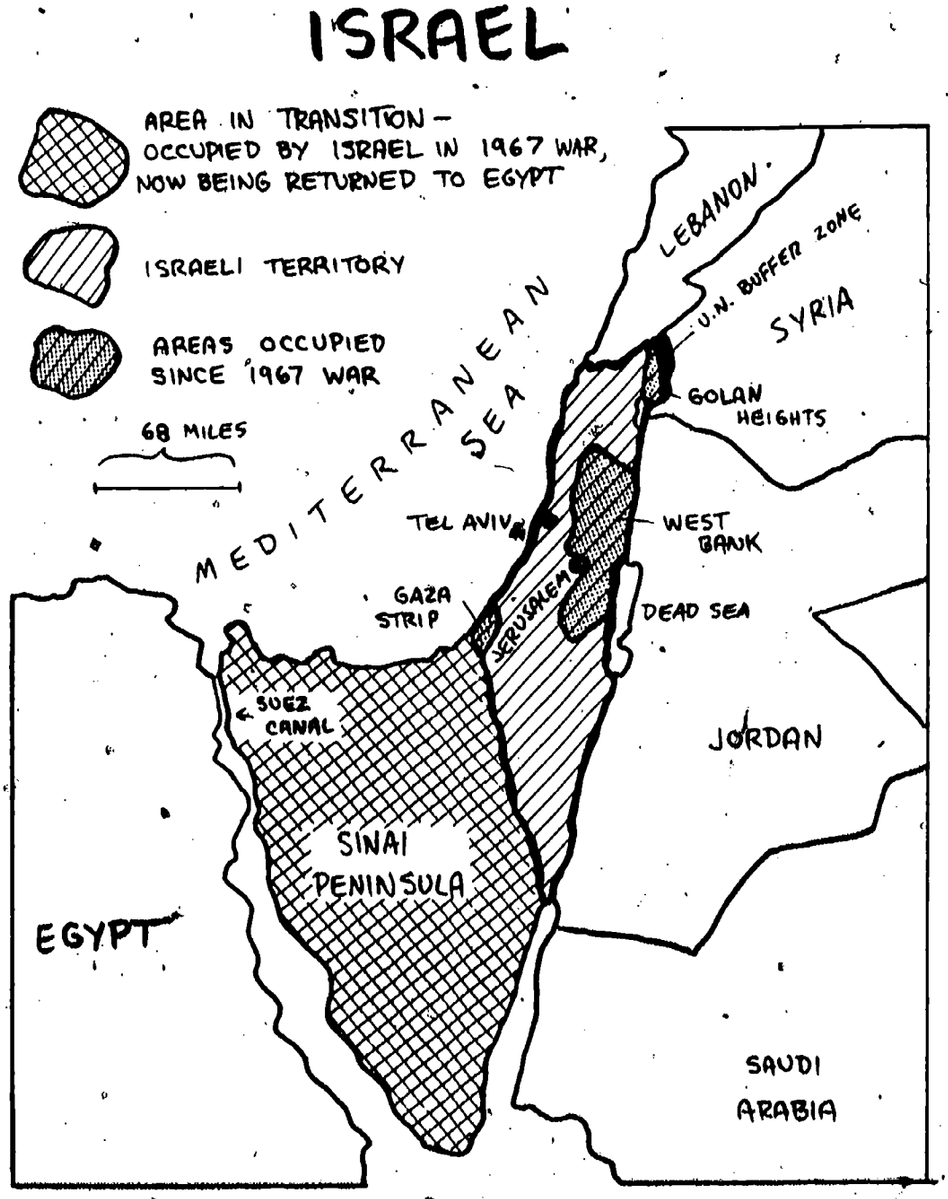
The conflict in the Middle East is extremely complicated, but briefly the situation is this. In 1948 the Nation of Israel was created by the United Nations. The United Nations is a world organization where member nations come together to discuss and try to solve international problems and concerns. Prior to the creation of the State of Israel, this area was called Palestine. Palestine was partitioned or divided up creating Israel, a homeland for Jewish people, and Arab territory, land for mostly Muslim people.

In 1948 war between the State of Israel and surrounding Arab Nations ended with Israel having more territory.

Israel is a holy land for Jews. It is also a holy land for Muslims as well as Christians. Many still live there. When the State was created as a homeland for Jews, many Arabs left this area. They left because they feared that a war would result, and because they did not want to live in a Jewish State.

The people who left are Palestinian refugees. They do not have a permanent home, because the land on which they were to live now belongs to Israel, Jordan and Egypt. Many of the Palestinian refugees do not recognize Israel's right to exist as a State. They are living in the surrounding Arab nations but want a homeland of their own. The people of Israel do not want to give up the territory that was created for them by the United Nations or the territory they acquired in the 1967 war. So, we have at least two groups of people who feel they have a right to the same land. See Map #3.

Map #3



There have been four wars in this area since Israel was originally created in 1948. They were in 1948, 1956, 1967 and 1973. Each time there has been a war the rest of the world was affected. Arab Nations of North Africa and the Middle East support the Palestinian position. The United States, on the other hand, has been a supporter of Israel. Where does oil fit into all this?

Since the mid 1960's, the United States, along with other industrial nations, has become more and more dependent on OPEC oil. In 1973 OPEC Nations imposed an oil embargo on the United States. An embargo is when one nation or group of nations refuses to sell a product or resource to another country. The 1973 oil embargo lasted several months and the shortages experienced affected us in many ways. The OPEC Nations felt that the United States was supporting Israel's position too much and ignoring the rights of the Palestinian people. Powerful North African and Middle East OPEC Nations have used and are using their oil resource in political and economic ways.

What is basically a conflict in the Middle East affects us greatly. We need to import oil from these nations. We need to have friendly relations with the nations who sell us oil. We also want to support Israel's right to exist. We want to be fair to all parties. But it is very difficult, because people want different things. Any settlement of the Palestinian question involves careful negotiation. We cannot control all the behaviors nor can we force our views on other people.

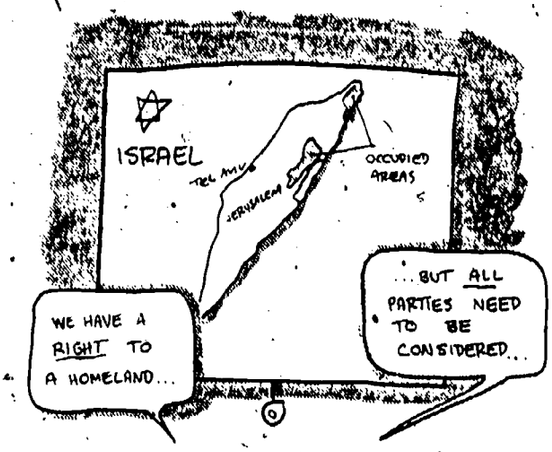
President Carter in 1978 was able to help establish communication that has led to the beginnings of a peaceful relationship between Israel and Egypt. Still, the Camp David accords are only a step in what needs to be a total Middle Eastern peace settlement. The United States is playing an important role in the Middle East. As a consumer of oil, a

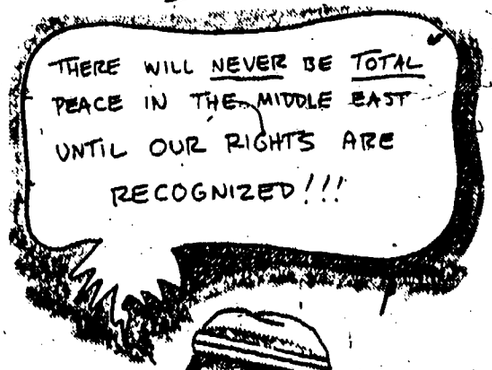
producer of needed goods and a partner with others in a concern for the future, we are constantly trying to help settle the conflict.

ACTIVITY # 7

Look at the cartoons on this page. They are political cartoons. A political cartoon is someone's point of view on an issue. These cartoons each see the Middle Eastern conflict from a different point of view or perspective. Can you tell which perspective is being favored in each cartoon? Match the number of the cartoon with the following perspectives:

1. The Palestinian Refugees
2. The Israelis
3. The United States
4. Other Arab Nations





THE UNITED STATES, OIL AND THE FUTURE

As long as there is conflict in the Middle East, our needed oil supply is in danger. We are very vulnerable. We are in a fragile position, because we cannot control all aspects of the situation. Think about all the possibilities for the future. What if there is another war in the Middle East, and we cannot get the oil we need? What if a revolution in the country exporting oil to us causes them to shut down their oil wells? What if OPEC nations refuse to sell oil to us? How long could we hold out? What would happen in this country? These are all scary thoughts, but they are possibilities.

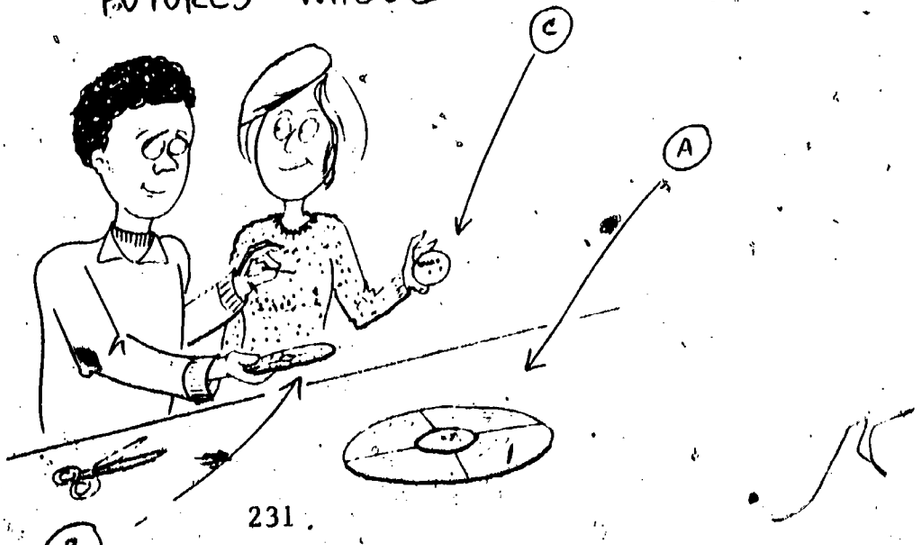
ACTIVITY # 8

Obtain a copy of the "Futures Wheel" for Activity #8 from your teacher. Cut out the three circles. Circle "C" is placed on "B" and both are placed on "A." You should be able to turn all three circles. Match up the situations described in the middle circle with the possible outcomes in the outer circle. For example: There is a war in the Middle East ⟶ ? (Which one of the four outcomes is related to this?)

Discuss the possible futures shown on the wheel. Answer the following questions:

1. Do you think these futures are possible?
2. How would the United States and other nations of the world be affected?
3. How would your life be affected?

THE MID-EAST ENERGY FUTURES WHEEL



Now obtain a blank "Futures Wheel." The inner most circle is "What if." In the middle circle copy the following strategies:

1. We conserve the oil we use.

2. We develop alternative sources of energy.

3. We help countries negotiate a peaceful settlement in the Middle East.

In the outer circle put things we can do to implement these goals. These will answer the following questions:

1. How can we use less oil and/or use the oil we do have more wisely?

2. What possible spurces can we develop? What are the potential costs and benefits of these sources?

3. How can the United States promote peace and compromise in the Middle East

Discuss your strategies with your classmates.